How Role Models Affect Role Aspirants’ Motivation and Goals

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Abstract

Role models are often suggested as a means of motivating people to set and reach ambitious goals, especially for members of stigmatised groups in achievement settings. Yet, findings in relation to the effectiveness of role model are mixed and the literature on role models suffers from a number of limitations: (1) it lacks a clear definitional consensus of role models, (2) there is a lack of an integrated theoretical framework around role modelling, (3) very little of our current understanding of role models draws on the motivational literature to explain how role models can influence motivation and goals, and (4) the focus of the extant role model literature has been mainly on the attributes that make role models effective at the expense of understanding how this occurs. In this thesis, we first review the literature on role models (Chapter 1) and present two studies highlighting the limitations of the extant understanding of role modelling (Chapter 2). We then address these limitations by developing a theoretical framework of role modelling where we integrate different definitions of role models into a new conceptualisation in which we propose that role models influence goals and motivation in three distinct ways: by acting as behavioural models, by representing the possible, and by being inspirational. We then draw on expectancy-value theories of motivation to build a theoretical framework for understanding not only when but also how role models can effectively influence motivation and goals in these three functions (Chapter 3). This new theoretical framework, the Motivational Theory of Role Modelling, highlights how the power of role models can be harnessed to increase role aspirants’ motivation, reinforce their existing goals, and facilitate their adoption of new goals. We present four empirical studies supporting the ideas put forward in this theoretical framework, namely that role models in their three functions increase expectancy and value and, in turn, motivation and goals (Chapters 4, 5, and 6). Finally, we integrate and summarise our findings and discuss theoretical and practical implications (Chapter 7).
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"I think [girls are] not seeing role models — they’re seeing boys who are astronauts, boys who are engineers, they’re seeing boys who start Facebook or Google, they’re not seeing girls, it’s really hard to imagine yourself as something that you don’t see, particularly when you’re a kid,"

Chelsea Clinton (CNN, 2013).

The above quote from Chelsea Clinton illustrates the common claim that a lack of role models is a key reason for the under-representation of stigmatised and negatively stereotyped groups in positions of prestige and power. This discourse is most prevalent in discussions about the under-representation of girls and women in science, technology, engineering, and mathematics (STEM; e.g., Bowman-Boyles, 2012; Edwards, 2014) and in leadership roles (e.g., Fraser, 2014; Pereira, 2012); the under-representation of ethnic and racial minorities in educational and high achievement settings (Blackett, 2014; Nguyen, 2012); and the under-representation of individuals from low-income families (e.g., Carter, 2013), members of the LGBTQ+ community (e.g., Browne, 2014; Nguyen, 2012), and those living with a disability (e.g., Lepkowska, 2012) in positions of power.

However, interventions designed to provide minority group members with role models to inspire and motivate them are often not particularly successful (e.g., Armour, & Duncombe, 2012). This may, at least in part, be because we lack a clear understanding of role models and the role modelling process, as evidenced by four main limitations of the role model literature. First, the role mode literature lacks a clear consensual definition on what role models are and what they can achieve. Second, while the extant literature provides evidence for a variety of separate factors that influence role model effectiveness, which we will review below, there is a lack of an integrated theoretical framework into which we can
incorporate these findings and from which we can derive expectations of what type of role model interventions might work. Third, and related to that, although role models are often seen as those who motivate role aspirants to set more ambitious goals and work towards achieving them, the current understanding of role models tends not to draw on the motivational literature to understand how role models can be most effective in influencing motivation and goals. This is despite the fact that research into motivational processes often acknowledges that social processes similar to role modelling can influence goal setting and motivation (e.g., Bandura, 1997; Fishbach & Ferguson, 2007). Fourth, the focus of the extant role model literature has been mainly on the role model as an individual and the attributes that make a role model effective. This focus has two implications. It provides little understanding of how the process of role modelling occurs, and it largely ignores those who are thought to benefit from the role model, who we will refer to as role aspirants in this thesis. This is problematic as it is important to gain a better understanding of the processes involved in role modelling in order to address the under-representation of negatively stereotyped groups.

In this thesis we aim to address each of these four issues in order to provide a better understanding of the role modelling process. We do this both to further the theoretical advancement of the role model literature and to provide an integrated framework from which those who might function as role models in everyday life and those who wish to design effective role model interventions may draw practical advice. We will dedicate the rest of this introductory chapter to a review of the current role model literature, with a focus on the various factors that have been identified as contributing to the effectiveness of those the literature refers to as role models.

In Chapter 2, we will follow the review with our first empirical chapter (Studies 1 and 2) that illustrates two important points and thus sets the scene for the rest of this thesis. First,
it will demonstrate that role models do indeed influence role aspirants’ motivation and goals and thus highlights the importance of drawing on the motivational literature when developing a theoretical framework to understand role models and their effects on role aspirants. Second, Chapter 2 will demonstrate the limitations of our extant understanding of role models by illustrating that the role model process is not as straightforward as exposing under-represented groups to ingroup role models. These findings will illustrate that clearer definitions of role models and their functions are needed, as is a better understanding of the processes by which they may influence role aspirants.

On the basis of these findings, in Chapter 3 we will develop a theoretical framework where we bring together insights from both the motivational literature and from the role model literature. In this core chapter of this thesis we will integrate multiple definitions of role models into a new conceptualisation in which we suggest that role models serve three distinct functions: They act as behavioural models, they act as representations of the possible, and they act as inspirations. We draw on expectancy-value theories of motivation to build a theoretical framework for understanding not only when, but also how, role models can effectively influence role aspirants’ motivation and goals. We introduce the idea that, in order to be effective, role models need to be perceived by role aspirants as embodying their own goals, and to be both attainable and desirable. Moreover, we argue that role models do so by changing the expectancy and value associated with these goal in question. In this new theoretical framework, the Motivational Theory of Role Modelling (MTRM), we highlight multiple ways in which the power of role models can be harnessed to increase role aspirants’ motivation, reinforce their existing goals, and facilitate their adoption of new goals.

In Chapters 4 to 6 we will provide empirical tests of the ideas put forward in the MTRM, using both experimental and correlational designs. In Chapter 4 (Study 3), using a sample of undergraduate university students we demonstrate that the relationships suggested
by the theory hold true in “real world” settings. Here, we provide evidence that the presence of role models, in each of their three functions, has an impact on role aspirants’ expectancy and value and in turn on role aspirants’ motivation and goals. In Chapter 5 we report an experimental study (Study 4) in an academic context that demonstrates that a role aspirant’s perceptions of both a role model’s attainability and their desirability contribute to role aspirant career intentions. The study further suggests that perceived attainability does indeed influence role aspirant expectancies and, in turn, influence their goals. In Chapter 6 we focus on role models in their function as representations of the possible. Here we describe two studies (Studies 5 and 6) in which we investigate the way in which the extent to which a role models embodies a role aspirant’s goal and the perceived attainability of this role model influence role aspirants’ career intentions. Both studies provide further support for the relationships proposed by the MTRM. Finally, in Chapter 7 we will integrate our findings across the thesis and highlight ways in which they are important in theoretical and practical terms.

Throughout this thesis, we will predominantly focus on motivational outcomes of the role modelling process rather than those outcomes associated with performance or achievement. We do so because the under-representation of certain, often stigmatised, groups in achievement settings such as the workplace or education, have been demonstrated to be associated with motivation rather than performance. Indeed, despite the fact that there are a number of barriers to the performance of under-represented groups, such as stereotype threat (e.g., Steele & Aronson, 1995), poor performance is generally not the biggest obstacle to overcome. For example, in relation to gender it has been shown that, in general, women and girls do not perform worse than men and boys in male-dominated areas such as STEM (e.g., Else-Quest, Hyde, & Linn, 2010; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002; Wang, 2012). Rather, they seem to show less interest in, and decide against, those fields (Else-Quest
et al., 2010; Wang, 2012) – and thus we can see their under-representation as primarily a motivational issue rather than a performance issue.

In line with this example, in the studies presented in this thesis we primarily focus on women and their under-representation in STEM (Studies 1-3) as well as in academia (Studies 4-6). However, these should be seen as just two of many domains in which role models can influence role aspirants and their motivation, although replication of our findings in other domains will be necessary.

Chapters 2 to 6 have been written as independent, stand-alone papers suitable for publication. However, to increase readability and reduce repetition, some changes have been made for this thesis. This includes abridging certain pieces of information but also the addition of a paragraph at the end of each chapter to facilitate the transitions from one chapter to the next. First, however, we will now give an overview over the current role model literature and the factors which have been identified as contributing to role model effectiveness.

**Definitions of Role Models**

Despite the fact that the term ‘role model’ is widely used today, it was not until the 1950s that Merton (1957) coined the term to refer to individuals in specific roles (e.g., surgeons) who serve as examples of the behaviour associated with this role. Since then, the term ‘role models’ has become widely used both by the general public, in organisations, and in academia, with over 400,000 scholarly articles using the term at the time of writing this chapter. However, more often than not, contemporary meanings of the term diverge quite drastically, both from Merton’s original definition and from one another.

For example, Lockwood (2006) describes role models as “individuals who provide an example of the kind of success that one may achieve, and often also provide a template of the
behaviours that are needed to achieve such success.” (p. 36) while Gauntlett (2002), defines a role model as “someone to look up to and base your character, values and aspirations on” (p. 211). While these definitions both fit with what we intuitively might describe as a role model, they don’t seem to have much in common. While Lockwood’s (2006) definition focusses on success and achievement and the fact that role models can make this success seem more attainable, Gauntlett’s definition has admiration at its core. This matter of diverging definitions is complicated further by the fact that there are a number of other terms which pertain to similar constructs and processes, for example “exemplar” and “proxy” from the social comparison literature (e.g., Wheeler, Martin, & Suls, 1997). We will come back to this matter when developing our theoretical framework. However, for the purpose of this chapter rather than settling on one definition of role models and thus limiting the evidence to review to those studies which fit our definition, we will take a broad approach and summarise the literature on role models as defined by the authors in question. Often this refers to upward comparison targets in a specific context or more generally members of certain domains. At other times, it refers to whomever role aspirants themselves define as role models.

Do Role Models Matter?

If there is one thing that the current role model literature clearly shows it is that under the right circumstances the right role models - defined in various ways - can have a plethora of positive effects for role aspirants, including changing their competence related outcomes such as success beliefs (Armour & Duncombe, 2012; BarNir, Watson, & Hutchins, 2011; Dasgupta, 2011; McIntyre, Paulson, & Lord, 2003), reducing stereotype threat (Blanton, Crocker, & Miller, 2000; Dasgupta, 2011; Marx & Roman, 2002; McIntyre, Paulson, Taylor, Morin, & Lord, 2010; Stout, Dasgupta, Hunsinger, & McManus, 2011; Taylor, Lord, McIntyre, & Paulson, 2011), affecting attitudes and self-stereotyping (Dasgupta, 2011; Stout...
et al., 2011), altering mood (Hoyt, Burnette, & Innella, 2012), changing goals (BarNir et al., 2011; Dasgupta, 2011), increasing motivation (Lockwood, Jordan, & Kunda, 2002), prompting prosocial and moral behaviours (Brown & Treviño, 2013; Hurd, Zimmerman, & Reischl, 2010), increasing health (Bird, Kuhns, & Garofalo, 2012; Chen, Lee, Cavey, & Ho, 2013), and changing values (Barker & Loewenstein, 1997).

So what makes an individual an effective role model? The literature has identified a variety of factors that contribute to role model effectiveness, most notably shared group membership between role model and role aspirant, similarity between role model and role aspirant, role model sociability and warmth, role model success and competence, and attributions associated with this success. While each of these factors may be important predictors of role model effectiveness, it is the perception of these factors by the role aspirant that really matters. Effectiveness is not, for example, dependent on objective similarity, but rather on whether a role aspirant sees her- or himself as similar to the role model, regardless of actual similarity, however that may be defined. These factors are thus a subjective assessment rather than an objective reality which highlights the importance of extending the focus from the role model to include the role aspirant. Nonetheless, we structure this review around different role model attributes that have been previously identified in the literature as important, starting with the one that has received the most attention in relation to the under-representation of negatively stereotyped groups – shared group membership.

**Shared Group Membership**

As exemplified in the quote used at the beginning of this chapter, it is a common assumption in the role model literature, as well as in public discourse, that ingroup members make the best role models, especially for role aspirants from minority groups. For example, it is thought that while Barack Obama is a good role model for African Americans, women
need female role models such as Hillary Clinton. Following this logic, many studies examine the effect of group membership in relation to the role model process, and such studies do demonstrate that ingroup role models can have positive effects on a range of outcomes which we will discuss below.

**Shared group membership and stereotype threat.** There are a number of studies that demonstrate that ingroup members can alleviate the detrimental effects of stereotype threat. For example, Marx and Roman (2002) presented students who identified highly with maths with either a female or a male experimenter who was competent at math and was thought to act as a role model. After exposure to the experimenter, participants took a maths test. The authors found that, in line with stereotypes, men performed better than women when the experimenter was male, but this difference was attenuated, that is, stereotype threat was reduced, when the experimenter was female. In two subsequent experiments, the researchers demonstrated that female experimenters only had this beneficial effect if they were perceived as competent. Importantly, while competence seems to be an important condition for role model effectiveness, this competence does not need to be in the stereotype threat domain itself. McIntyre and colleagues (2003) demonstrated that being exposed to information about women who managed to overcome gender specific barriers in different fields, for example in law, alleviated stereotype threat on maths test performance (see also Beaman, Duflo, Pande, & Topalova, 2012; Latu, Mast, Lammers, & Bombari, 2013; and Marx, Ko, & Friedman, 2009, for results on racial stereotype threat).

There is also evidence that the benefits of role models are not simply about being exposed to a successful person – exposure to successful outgroup members does not tend to attenuate stereotype threat. Indeed, von Hippel, Issa, Ma, and Stokes (2011, Studies 1 and 2) found that upward comparison with outgroup members can instead be deleterious. They asked women working in a consumer goods company and a law firm to indicate the extent to
which they compared themselves with men or with women when thinking about their career progression and the extent to which they experienced stereotype threat. They found that the more women compared themselves to men (outgroup members), the greater the stereotype threat they experienced. Unfortunately the authors do not report whether the men and women role aspirants in their studies compared themselves to were of equal or greater seniority.

**Shared group membership and success beliefs.** The positive influence of successful ingroup members, and the deleterious influence of being exposed to successful outgroup members, goes beyond reducing stereotype threat and improving performance – such social comparisons can also impact on role aspirants’ beliefs about performance, namely self-efficacy, beliefs about success, and perception of one’s competence (e.g., von Hippel et al., 2011). For example, Blanton and colleagues (2000) examined how female African American students' self-esteem was affected by upward and downward social comparison with ingroup or outgroup members. After making racial identity salient, participants took a test that was described as measuring mathematical IQ alongside a White or Black confederate with whom they could compare. During the test, participants were made aware that the confederate had either performed extremely well (upward comparison) or extremely poorly (downward comparison). They then completed a state self-esteem questionnaire. Results demonstrated that when individuals compared themselves with an ingroup member (i.e. a Black confederate), self-esteem was higher when the confederate had performed well compared to when the confederate had performed poorly, indicating assimilation to the ingroup role model. When the confederate was an outgroup member (i.e. White), the opposite was the case, such that self-esteem was lower when the outgroup member performed well compared to when they performed poorly.

Lockwood (2006) found a similar influence of comparison in the context of gender. She presented male and female students with articles describing high achieving men or
women before asking them to rate their own competence. She found that women exposed to successful women (who can be thought of as a potential ingroup role model) rated themselves higher in competence than those women exposed to successful men (who can be thought of as a potential outgroup role model) or those women in a control condition who had rated their competence without reading about potential role models. Men’s ratings of their own competence, on the other hand, did not differ as a function of condition. Whether they were exposed to a male role model, a female role model or to no role model at all did not influence their competence ratings, arguably because, as men are more likely to enjoy success, role models were less relevant. These results were also mirrored in the extent to which participants identified with the person they read about, such that female participants identified more strongly with successful women whereas for men the successful individual’s gender did not matter (see also Gilbert, Gallessich, & Evans, 1983; Marx and Roman, 2002).

Unfortunately, the author does not report whether role aspirant identification with male and female role models helped explain role aspirants' self-competence ratings.

**Shared group membership and self-stereotyping.** Exposure to successful ingroup members can also reduce role aspirant’s negative self-stereotyping as demonstrated by a longitudinal field study by Asgari, Dasgupta, and Cote (2010). They measured the effect of quality and quantity of contact with male and female professors (potential role models) on female students’ class participation and career goals, as well as their implicit and explicit self-stereotyping in the form of the degree to which the students associated themselves with stereotypical masculine, agentic traits (e.g., assertive and dominant) and stereotypically feminine, communal traits (e.g., nurturing and compassionate). The measures were taken at two time points – on entering university and towards the end of their second year. The researchers found that, overall, high quality contact with professors led female students to implicitly associate themselves more strongly with agentic traits, irrespective of the
professors’ gender. Moreover, for participants who had frequent contact with female professors and were thus exposed to potential ingroup role models more often, over time, the quality of this contact reduced their implicit association with communal traits whereas for those with only infrequent contact (i.e. those whose professors were predominantly male) contact actually enhanced the association with communal traits. The researchers did not find any significant effect on women’s explicit self-stereotyping measures. The relationship between quality of contact and women’s career goals was also dependent on professor gender, such that quality contact with female professors increased students’ ambitions over time, but this was not the case for those students who primarily had contact with male professors (see also Evans, Whigham, & Wang, 2006; and Zirkel, 2002, for similar results regarding race and gender).

The patterns of findings described above can be partly explained by the Stereotype Inoculation Model (SIM, Dasgupta, 2011). This model was designed to explain how, in high achievement contexts, ingroup experts and peers – who can be thought of as potential role models - can help to inoculate minority group members against negative stereotypes. According to the SIM, contact with ingroup experts and peers changes how role aspirants perceive the demographic composition of a domain. For example, contact with women in a given context, such as STEM, results in role aspirants perceiving a greater number of women in that domain. This change in role aspirant perceptions of women’s representation in turn enhances role aspirant’s self-efficacy, reduces or – using the terms of the model itself – inoculates role aspirants against self-doubt and threat, and enhances social belonging. These changes in role aspirant self-perceptions are also accompanied by stronger identification with, and a more positive attitude towards, the domain. These processes in turn lead to a variety of positive outcomes for role aspirants such as increased effort and performance, better career goal setting and decision making, and more active participation.
The SIM specifies that these processes are especially relevant for members of minority and stigmatised social groups as it only for them that seeing successful ingroup members defies the negative stereotype associated with their group. Importantly, the effectiveness of role models depends on role aspirant identification with those ingroup experts and peers, as stronger identification “makes the path from one’s present self to a future ‘possible self’ seem more attainable” (Dasgupta, 2011, p. 233). Dasgupta also notes that it is likely that most of these processes are quite subtle and thus more likely to occur on an implicit rather than an explicit level.

Stout and colleagues (2011) used the context of women in STEM to test these assumptions. In their first experiment they presented female students majoring in a STEM field with a male or female ingroup STEM expert (a potential role model) in form of the experimenter. In Study 1 they found that women who had interacted with the female experimenter (an ingroup member) attempted more problems in a maths test, showed a more positive implicit attitudes towards maths, and implicitly associated themselves more strongly with maths than those who had interacted with the male experimenter (an outgroup member). However, as proposed by Dasgupta (2011), no differences were found on more explicit measures. In a second experiment in which female engineering students were presented with biographies of successful female or male engineers they also found that identification with ingroup members predicted career intentions. Identification with male engineers (i.e. outgroup members), on the other hand, did not. The more participants identified with the successful engineers, the more motivated they were to pursue a career in engineering. Moreover, the relationship between role aspirant identification with the role model and role aspirant future career intentions was in part explained by the implicit association between role aspirant self-concept and maths and implicit self-efficacy, but only when role aspirants
were exposed to female engineers, that is, role models with whom they shared group membership.

More support still comes from Stout and colleagues’ (2011, Study 3) longitudinal study in which they examined male and female students majoring in STEM subjects in calculus classes that were either taught by male or female professors and teaching assistants. The authors measured students’ attitudes at the beginning and the end of a semester and found yet more evidence for the fact that shared ingroup membership mattered for minority group students: by the end of the semester, women who were taught by other women exhibited neutral implicit attitudes towards maths (compared with attitudes towards English, which is generally more strongly associated with being female), whereas women taught by men showed a negative attitude towards maths. For men, no such difference was observed. The same pattern emerged for implicit associations between role aspirant self-concept and maths. Further, for female students, identification with the (female) professors and teaching assistants at the beginning of the semester was associated with higher expected grades at the end of semester. Interestingly, for male students this pattern was reversed, with weaker identification with the female professors and teaching assistants at the beginning of the semester predicting higher expected grades at the end of the semester, indicating that male students may have sought their role models elsewhere. However, these attitudinal differences did not translate into differences in performance, with the gender of the professors and teaching assistants having no effect on the actual grades of students.

Taken together, these results clearly provide evidence for the SIM and the assertion that the group membership of potential role models does matter. This is especially true when the role aspirants’ ingroup is negatively stereotyped or a minority in the relevant domain. The model is also particularly useful as it helps explain the processes by which ingroup role models come to be effective – role aspirant identification with role models.
**Beyond shared group membership.** However, there are also a number of studies that fail to demonstrate the importance of ingroup membership on role aspirant outcomes (e.g., Aronson, Jannone, McGlone, & Johnson-Campbell, 2009; Lunneborg, 1982). A study by Cheryan and colleagues (2011) did not find that the gender of potential role models had any differential effects on female role aspirants’ success beliefs and interests, arguably because other factors played a more important role in the specific context. We will discuss this in more detail in the next section on similarity. On a comparable note, Carrington, Tymms, and Merrell (2008) found that the gender of teachers had no impact on the maths performance of girls and boys or their attitude towards maths. This is may not be surprising as in a school context the categories of “teacher” and “student” are likely to be more relevant group memberships than is gender. The teachers are thus likely to be categorized by students as outgroup members regardless of their gender. Moreover, there is evidence suggesting that students generally don’t see their teachers as role models (Ashley, 2003; Assibey-Mensah, 1997; Bricheno & Thornton, 2007), although it can be argued that, as role models are defined in so many different ways, whether or not they are seen as role models is not necessarily relevant or informative.

In relation to demographic variables other than gender, Ainsworth (2010) used longitudinal performance data and census information to investigate the influence of race on role model effects. More precisely, he tested whether race influenced the effects of neighbourhood characteristics such as the percentage of high-status residents (college graduates) who, he argues, might function as role models and influence high school students’ grades. While the percentage of high status residents did have an effect on students’ performance, the racial composition of these potential role models did not matter. This can be seen as another example of how the perception of a shared group membership is may be
subjective. After all, to the students in this study, being neighbours might have been the basis of shared group membership rather than race.

Finally, while the group membership of role models is often important for minority group members, it is not as important to members of majorities or positively stereotyped groups (e.g., Lockwood, 2006; Parks-Stamm, Heilman, & Hearns, 2008). This makes sense for a number of reasons. First, group membership of the role model might be more salient for members of under-represented groups. Second, majority group members have fewer barriers, such as stereotype threat, to overcome, so the impact of role models on bringing down these barriers is necessarily going to be smaller. Finally, majority group members are likely to have an abundance of potential role models in their everyday life so exposure to yet another successful individual, whether an ingroup or an outgroup member, is unlikely to provide additional benefits.

Taken together, it thus becomes evident that shared group membership per se is not the characteristic that matters but rather whether the person who might serve as a role model is seen as an ingroup member by the role aspirant. Everyone is part of multiple social groups and not every shared group membership carries equal weight. Social Identity Theory suggests that shared group membership will only matter to the extent that it relates to the role aspirant’s salient and important social identities (Turner, Oakes, Haslam, & McGarty, 1994). Moreover, in her review on the effects of upward comparison, Collins (1996) points out that the extent to which upwards comparison targets share an unusual feature or group membership also affects the extent to which it matters (see also Brewer & Weber, 1994).

It thus becomes clear that shared group membership cannot tell the whole story. Indeed, simply exposing individuals to successful ingroup members might not only be ineffective, it may also have detrimental effects if other factors are ignored, as we will shortly see.
Similarity

A number of studies address role aspirant perceptions more directly and specifically examine whether the degree to which a role aspirant perceives that they are similar to a target individual impacts on the effectiveness of this person as a role model. Similarity is by no means independent of shared ingroup membership. All of the findings reviewed above might as well serve as evidence for the claim that similarity is an important factor, as a shared group membership is likely to be related to perceived similarity, especially when said group membership is highly salient as tends to be the case in the aforementioned studies (Turner et al., 1994). However, there is evidence that the effect of perceived similarity goes beyond shared group membership.

For example, Cheryan, Siy, Vichayapai, Drury, and Kim (2011) investigated how potential role models, in this case computer science students, may impact upon women’s self-efficacy in relation to computer science. Here the authors varied the computer science student’s gender and their fit with STEM stereotypes and found that while the gender of the potential role model did not matter, stereotypicality – in this case “nerdiness” – did. Moreover, the effect of STEM stereotypicality on role aspirants’ beliefs in future success was mediated by perceived similarity. In other words, the “nerdy” computer science students were seen by role aspirants to be less similar which led to lower levels of computer science self-efficacy among role aspirants. However, the fact that stereotypicality played such an important role highlights once more how similarity, social categorisation and thus shared group membership are intertwined. It might be that women in this study categorised the potential role models based on whether they were seen as “nerds” or “not-nerds”.

Nevertheless it is interesting that in an academic setting, these categories – or similarity in attributes related to these groups – can have a larger impact on role modelling than gender (see also Calvert, Kondla, Ertel, & Meisel, 2001; Cheryan, Drury & Vachayapai, 2012;
Wohlford, Lochman, & Barry, 2004; see also Buck, Clark, Leslie-Pelecky, Lu, & Carda-Lizzaraga, 2008, for a qualitative study on related issues).

Asgari, Dasgupta, and Stout (2011) tested the impact of perceived similarity more directly by giving participants false feedback about how similar in terms of traits and abilities they were to a number of successful leaders about whom they had recently read, while keeping one (highly salient) group membership constant (all participants and leaders were female). Using implicit measures, they found that women exposed to successful women who were highly similar to themselves rated themselves as more agentic and less communal (and thus less in line with gender stereotypes and more in line with leader stereotypes) compared to a control group. In contrast, those women who were told they were dissimilar to the successful women rated themselves as more communal and less agentic. In two related experiments, the researchers further manipulated perceived similarity by describing the successful women as either normal or very unusual (Asgari et al., 2011, Study 1) or by giving information about whether or not the women had graduated from the same college (Asgari et al., 2011, Study 3) – the latter being an ingroup membership manipulation at the same time. In both of these studies the authors found that successful individuals presented as similar to role aspirants could reduce implicit gender congruent self-stereotyping. Moreover, Study 3 demonstrated that dissimilar individuals also reduced role aspirants explicit ratings of own leadership ability. Furthermore, these differences in implicit and explicit self-beliefs in turn impacted on ambitions and goals such that participants who explicitly and implicitly believed themselves to have high leadership ability also reported more ambitious career goals. Marx and Ko (2012) found comparable results in relation to maths stereotype threat. Here, the positive impact of a competent women was moderated by their perceived similarity to the role aspirant.
Bringing these findings together, we conclude that perceived similarity is another key factor in determining the effectiveness of role models, and that shared group membership is only one of several routes to increase similarity. Similarity in personal attributes and abilities also increases the effectiveness of role models. This highlights that the procrustean approach of presenting negatively stereotyped group members with a successful ingroup member is not enough. Role models must also have characteristics with which the role aspirants can identify. These characteristics will vary from individual to individual – an attribute that might make one role aspirant perceive an individual as more similar might have the opposite effect for someone else. In other words, similarity is yet another characteristic that is subjective and depends on the role aspirant’s point of view.

**Sociability and Warmth**

It has been demonstrated many times that exposing women to very successful women (who might be seen as role models) can pose difficulties as such individuals run the risk of being seen as pushy and overly masculine even if no evidence for such traits is given, a phenomenon which has been termed backlash effect (Heilman, Wallen, Fuchs, & Tamkins, 2004; Rudman, 1998). Therefore, displaying stereotypically feminine traits such as sociability and warmth might be important, particularly for female role models.

Some evidence suggests that sociability and warmth are indeed factors that influence whether or not people are seen as role models. For example, Calvert and colleagues (2001) presented college students with an episode of a TV show that depicted the heroine as masculine and ruthless or as feminine and compassionate. The authors found that the degree to which participants saw the heroine as a role model was predicted (among other things) by how nurturing (in other words: warm) she was perceived to be. Moreover, those role aspirants who liked her more were also more likely to see her as a role model. It should be noted,
however, that this study does not directly speak to whether or not this feminine and compassionate role model was also more effective in influencing role aspirant outcomes.

In contrast, a study by Parks-Stamm and colleagues (2008) suggests that sociability can also have a negative effect. The authors were interested in what would happen if negative stereotyping of successful women was prevented by giving information that clearly disproves the stereotype. It turns out that such counter-stereotypical information might, in some cases, be even more deleterious. In their first study, the authors presented female and male students with information about a female vice president of a company. This potential role model was either described as having communal traits – thus preventing the negative stereotyping (or backlash) and making her more likable - or no such information was given. This manipulation indeed worked. People who were given communal information rated the vice president as less pushy and liked her more than those who were given no additional information. However, while communal information reduced negative stereotyping of the vice president, it also lowered women’s ratings of their own competence. This did not occur for men for whom the vice president was likely to be less relevant as a role model. One potential explanation for these findings is that because the potential role model was both successful and likable, she may also have appeared to be unattainable. This explanation seems likely especially in the light of a second study where the authors gave female participants fake feedback about their own managerial skills. When they were made to believe that they themselves had quite strong managerial skills, they stereotyped the role model less negatively, and the negative impact of self-stereotyping did not occur – most likely because now the combination of professional success and sociability seemed more within reach. Negative stereotyping of successful women thus seems to be a process which role aspirants may, at least in part, use to protect their own self-beliefs.
It thus seems that likability and perceived warmth can have different effects. It makes role aspirants more likely to see a person (at least if this person happens to be a woman) as a role model. However, in certain situation it might make female role models seem unattainable, especially when combined with other positive information, such as success and competence information, which we review next.

**Level of Success and Competence**

Most research from the role model literature tends to implicitly assume that role models need to exhibit at least some level of success. Studies investigating real-life role model choices in a work context – a context in which success is highly salient and certainly desirable - demonstrate that when asked about their role models, role aspirants generally mention individuals who are more successful than themselves. For example, Gibson and Lawrence (2010) found that managers tended to engage in upward comparison when identifying career referents (who could also be called role models). In other words, they choose role models who were more successful than themselves. What is more, the relative seniority of these comparison targets predicted role aspirant’s career expectations, such that comparison with more senior individuals predicted greater career expectations – although, as the study was correlational in nature, it could also be argued that role aspirant career expectations predicted the seniority of role models they chose. Interestingly, this relationship depended on role aspirants’ gender such that the success of the role models had a smaller effect for women than for men. One explanation for this might be that, due to gender stereotypes, highly successful role models may seem less attainable to women.

It should be noted, that role model success needs to be in the domain in which the role modelling takes place and might be quite specific. For example, a study by Weaver, Treviño, and Agle (2005) showed that business success was often irrelevant when it came to
identifying role models for ethical behaviour. In this case success is defined in terms of being ethical, not general success in the business world. It might thus be more about embodying a goal than being successful per se, although success is likely to be a common goal in achievement settings.

On the basis of this evidence, it may seem that the more successful a comparison target the better. However, other studies cast some doubt on this simple assumption. For example, Armour and Duncombe (2012) evaluated the changingLIVES program in which famous sport stars – who are without doubt perceived as extremely successful in their fields – visited groups of school students to act as role models. However, evaluations demonstrated that these athletes failed to inspire change in any of the outcomes desired by those who designed the program, such as school attendance, PE attendance, or self-esteem. Similar findings suggest that this lack of influence may be due, at least in part, to the unattainability of sports stars (see Walker, 2007; see also Oberle, Stowers, & Falk, 1978).

The idea that extreme levels of role model success may be detrimental is also supported by experimental research. A study by Hoyt (2013) demonstrates that extremely successful individuals can have deflating impact on role aspirants with low self-efficacy – in other words, for those to whom the high level of success may seem unattainable.

So what about studies where level of success itself is manipulated? As reported above, Marx and Roman (2002) manipulated maths competence – or, put differently, success in maths - and found that only those women who were presented as competent affected female students who identified with math positively. Buunk, Peiró, and Griffioen (2007) found a particularly positive impact on career related behaviour when final year students were exposed to a recent graduate who was successful rather than unsuccessful in the job market, but that the degree to which the students benefited also depended on their dispositional tendency to engage in social comparison.
Lockwood and Kunda (1997, Study 2) did not manipulate level of success itself, but rather looked at the impact of role models on different groups of participants, thus manipulating the attainability of success. More specifically, they presented students who were either in their first or fourth year with information about a very successful fourth year student of the same gender or with no potential role model at all. For first year students, this successful student had a positive effect – they rated themselves higher in career-relevant traits (e.g., skilful, competent) than those in the control condition. For fourth year students, on the other hand, exposure to information about the successful student had a negative effect – their self-ratings were lower than in the control condition, potentially because the same-year student seemed unattainable as they would have had to “catch up” to this extremely successful student in an unrealistically short period of time. This particular study speaks directly to our claim that it is not so much about the individual role model – after all, role model success was held constant – but about the role aspirant and his or her view on the potential role model and their success (see also Lockwood & Kunda, 1999).

But what happens if no success information is provided? There are studies which provide no explicit information about role model success and demonstrate that this might be problematic. For example, Rudman and Phelan (2010) simply presented female students with biographies of men and women in either stereotypical professions (e.g., female nurses and male surgeons) or counter-stereotypical professions (e.g., male nurses and female surgeons) without giving any information about how successful these individuals were. They then measured implicit associations between the self and either leaders or followers as well as the female students’ job preferences. Results demonstrated that under both stereotypical and counter-stereotypical circumstances, role aspirants showed a preference for stereotypically feminine jobs compared to a no role model control group. Moreover, female students that had read about atypical men and women implicitly associated themselves less with agentic traits
compared to participants in the other two conditions. Thus, presenting women with potential role models in atypical domains without any success information not only failed to have the desired positive impact – it actually had a contrary effect. One of the reasons for this might be that given no success information participants assumed that, in line with stereotypes, those women were not successful or that they were perceived as lacking stereotypical feminine traits (see Parks-Stamm et al., 2008, discussed above).

However, it should be noted that in other experiments in which no success information was given (e.g., the study Cheryan et al., 2011, we described above) this detrimental influence did not occur. This negative impact might thus be less about the lack of information itself but about the assumptions that role aspirants make in the light of a lack of information. These assumptions are likely to vary between role aspirants and depend on a variety of factors such as context and subtle cues hinting at success or lack thereof in the presented material.

Overall, it seems that the ideal degree of success follows an inverted U-shaped curve: If an individual is not seen as successful enough, they fail to inspire as their position does not seem desirable. After all, why would anyone want to be like someone who is unsuccessful? However if the individual is too successful, the success seems unattainable and a contrast effect occurs, leaving the role aspirant in a more inferior situation than if they were without this “role model”. However, the point at which a potential role model is not successful enough or is too successful is likely to be dependent on the role aspirant’s perception of the role model’s success in comparison to his or her own success. A third grader might see a successful fourth grader as an excellent role model, but their effectiveness as role models for a high school student will obviously be very limited. Moreover, the perceived reasons for the role model’s success are also likely to play an important role, an issue which we will explore next.
Attribution of Success and Other Desirable Attributes

There are a number of studies that have also examined the impact of the reasons underlying role models’ success. Using Weiner’s (1979) terminology, people are most likely to be motivated to model themselves on someone if the role model’s success seems stable, controllable, and internal. While not all studies use this terminology when investigating the effects of attribution, they corroborate this idea. Taylor and colleagues (2011), for example, examined the impact of the deservingness of potential role models, using Hillary Clinton as an example. More precisely, they examined the extent to which female participants perceived that Hillary Clinton deserved her success – in other words the extent to which the locus of control lay within her (i.e. she achieved her success through hard work or intelligence) or outside of her (she is only successful due to her husband). They then exposed some participants to a stereotype threat manipulation by reminding them of the stereotype that women are bad at maths and then half of them to a short factual biography of Hillary Clinton. This was thought to eliminate stereotype threat as she is a successful woman in the stereotypical masculine field of politics. When doing a subsequent maths test, only those participants who perceived Hilary Clinton as deserving of her success benefited from being exposed to her biography and achieved higher results on the test. Besides corroborating the idea that attribution plays an important part in the role modelling process this also further demonstrates how the same person can have very different effects for different role aspirants – serving as a role model for some but completely failing to do so for others.

Similarly, McIntyre and colleagues (2011, Study 1) manipulated the degree to which a potential role model deserved her success. They presented female students with the story of a successful female inventor who either deserved her success (she had made the inventions herself) or did not deserve it (her husband had made the inventions but made her promise to claim them as her own just before passing away). They then induced stereotype threat and
found that those who had been presented with the inventor who had made the inventions herself performed as well on a maths test as those in a no threat control condition. Moreover, the likability of the inventor did not explain the effectiveness of the role model as she was liked equally in all conditions. In a second study, the authors compared the effect of successful women in masculine domains whose success was either described as internal or external and as stable or unstable. They found that only those women who had read about other women whose success had been described as internal as well as stable outperformed those in the control condition in which no role models were presented.

Speaking more directly to the role aspirant’s perspective, other studies have examined the impact of role aspirants’ own theories of abilities, that is, their belief about whether specific abilities such as intelligence or leadership skills are malleable and can be learned or whether they are fixed and thus cannot be influenced by hard work or practice. The former could also be described as being controllable, whereas the latter is uncontrollable. Here, Lockwood and Kunda (1997, Study 3) assessed students’ theory of intelligence – namely whether they believed intelligence was fixed or malleable - before presenting them with information about an outstanding student or no potential role model. They found that for those role aspirants who believed that intelligence was malleable, the successful student did indeed have positive effects. Role aspirants rated themselves higher in traits related to career success such as being skilful or competent compared to those exposed to no potential role model. Those who believed that intelligence was fixed (and thus uncontrollable), on the other hand, did not benefit from being exposed to the successful student whose success likely seemed less attainable. On the contrary, being exposed to the potential role model ricocheted and these role aspirants’ self-ratings were lower compared to those in the no role model condition, although this effect did not reach significance.
Similarly, Hoyt and colleagues (2012) investigated the impact that theories of leadership might have on the effects of potential role models. In their first study, they assessed women's own theory about leadership (“leaders are born” versus “leaders are made”) before either asking them to write about someone they consider a role model or about a vacation (a control). They then assessed participants' confidence in their own leadership abilities as well as their anxious-depressed affect and found that thinking about their role models had a positive effect on each of these role aspirant outcomes when leadership skills were seen by role aspirants as malleable, but a negative effect when they were seen as fixed. In a second study the authors manipulated theories of leadership by presenting role aspirants with a constructed psychological article that claimed that leadership ability was either malleable or fixed. After this, participants were presented with a potential role model of the same gender. Results demonstrated that, compared to those exposed to a fixed theory of leadership, those role aspirants exposed to a malleable theory of leadership reported higher leadership confidence, lower anxious-depressed affect, and higher identification with the potential role model. Role aspirants' identification with the individual explained the relationship between theory of leadership and leadership confidence and anxious-depressed affect. Moreover, those role aspirants exposed to a malleable theory of leadership performed better on a leadership task.

A number of other studies have investigated theories about abilities more indirectly, by examining the effectiveness of individuals who had achieved their success through hard work, implying that the ability is malleable, or through talent, suggesting that the ability might be fixed. For example, in one of their studies investigating similarity Asgari and colleagues (2011) asked female students to read about a number of successful women in stereotypical masculine fields. The women were either described as showing unusual talent from a very young age or achieving their success through hard work. Results demonstrated
that the successful women only had a positive effect on self-stereotyping (measured as implicit association of the self with leadership traits) when they were described as hard working. Bagès and Martinot (2011) found similar effects when presenting fifth graders with a short text about a female or male sixth grader who was successful in maths. This success was either explained by talent, hard work, or no explanation was given. Overall, students who had been presented with a talented student performed worse in a maths test than those without explanation and those who were told the successful student was hard working. The authors also found a moderating effect of role model gender such that for girls, the gender of the successful student did not matter when the role model was hard working but when the role model was talented or no explanation was given they performed better after reading about a successful female student.

Taken together, it thus seems that attribution of an individual’s success plays a role such that only stable, controllable, and internal attributions lead to positive outcomes, probably because it makes the success more attainable. This attribution may come about in different ways, either due to beliefs role aspirants hold in relation to abilities in general, or due to the way in which success in presented. If a potential role model presents her or his success as luck or likely to come undone, they are less likely to be inspiring to role aspirants.

**Conclusion**

In this first chapter, we have reviewed the evidence on the importance of comparison targets (i.e. role models) and the various factors that make them effective. The empirical evidence suggests that shared group membership is an important factor for under-represented and negatively stereotyped groups, but that shared group membership itself is not necessarily sufficient to motivate and inspire role aspirants. Additional attributes that are related to role model effectiveness are their perceived similarity by role aspirants, role model sociability and
warmth, role model success and competence, and the attribution of desirable attributes such as success. These different factors are of course by no means independent of one another. For example, a role model’s level of success is likely to contribute to role aspirants’ perceptions of similarity to a potential role model. After all, similar levels of success increase overall similarity. Moreover, the attribution of said success might be less relevant if someone is seen as extremely similar – after all, if somebody assumes that leaders are born and is at the same time extremely similar to a leader, they might benefit from that assumption.

Taken together, we now have a better understanding of what the literature on role models has demonstrated so far and of the attributes that contribute to the beneficial impact of comparison targets who may be thought of as role models. While the limitations described in the introduction to this chapter remain, the role model literature suggests fairly clearly that ingroup members can have a range of positive effect on under-represented and stigmatised groups. The next chapter aims to empirically replicate these ideas by investigating whether and how role aspirants’ perception of ingroup and outgroup role models influences their motivation, goals and interests (Studies 1 and 2). The chapter will focus on STEM, an area in which women remain under-represented and negatively stereotyped. We will examine the impact of the availability of role models in STEM as well as other disciplines on male and female students’ motivation and test whether female researchers are better suited for kindling female students’ interest in science.
Chapter 2: Role Models, Motivation, and Interest in Science

As discussed in the Chapter 1, role models are often suggested as a remedy to the under-representation of stigmatised and negatively stereotyped groups in achievement settings. Evidence suggests that role models can indeed have a range of positive effects including changing motivation and goals (BarNir et al., 2011; Dasgupta, 2011; Lockwood, et al., 2002), an outcome that we see as particularly important because we see the persistent under-representation of different groups much more as a motivational than as a performance issue.

As we have discussed at length in Chapter 1, evidence further suggests that shared group membership matters for under-represented groups (Lockwood, 2006; Marx & Roman, 2002; Marx et al., 2009; McIntyre et al., 2003; von Hippel et al., 2011) such that ingroup members have been shown to make more effective role models than outgroup members. This chapter aims to examine whether under-represented groups in achievement settings lack role models and replicate findings suggesting that ingroup members make the most effective role models for these groups. We do this through two studies with a focus on women in STEM. Study 1 is designed to examine whether women in STEM fields do indeed lack role models and whether the perceived availability of role model affects motivation. We will investigate the availability of role models as well as levels of motivation and career intentions of female and male undergraduate students in STEM compared to other fields. Moreover, we will examine the extent to which role aspirants' perception of the availability of role models is associated with motivation over and above related social variables which have been shown to affect to motivation, namely feelings of belonging and fit. Lastly, in this first study we will test the idea that role models matter more for members of under-represented groups compared to others, that is, whether their impact on motivation is particularly strong for female students in STEM fields.
In Study 2 we will test the idea that ingroup members – in this case women – make more effective role models than outgroup members. We will experimentally examine whether male and female role models are able to foster an interest in science among female students. Taken together, these studies will provide further insights into (a) whether role models have an important function in increasing career motivation and interest, (b) whether this function is of particular relevance to under-represented groups such as women in STEM, and (c) whether shared group membership is necessary and sufficient for inspiring and motivating these groups.

**Study 1**

Despite the fact that women make up the majority of those graduating from universities in the US (National Center for Educational Statistics) as well as most European countries (European Commission, 2012) they remain under-represented further up the academic career ladder. Even at PhD level, men outnumber women in most European countries (European Commission, 2012). This is especially true in traditionally “male” disciplines such as STEM fields, where the under-representation of women has been persistent despite many efforts to alleviate it (Blickenstaff, 2005).

A range of different explanations for this under-representation have been put forward, from biological differences in ability (Baron-Cohen, 2003; Geary, 1996; see also Blickenstaff, 2005) to gender discrimination (see Blickenstaff, 2005). In relation to the former, however, it can be argued that women’s under-representation is not so much about their innate abilities as it is about their motivation, as many studies demonstrate that, on average, women and girls do not perform significantly worse than men and boys in STEM fields (e.g. Else-Quest et al., 2010; Jacobs et al., 2002; Wang, 2012). The same studies suggest that girls and women generally show less interest in such fields and therefore decide
against them (Else-Quest et al., 2010; Wang, 2012). On this basis, it could be argued that even those women who do decide to study a STEM discipline may have lower levels of interest and motivation and that this in turn translates into lower career ambitions. Similarly, some may argue that those with low motivation at the beginning of their studies get “weeded out” regardless of gender and that these students just are disproportionately female.

Research from a range of male-dominated fields, however, suggests a different explanation, namely that the social experiences that women in those fields have are markedly different from those of men and that this, over time, translates into lowered motivation and ambition (e.g., London, Rosenthal, Levy, & Lovel, 2011; Peters, Ryan, Haslam, & Fernandes, 2012; Smith, Lewis, Hawthorne, & Hodges, 2013). For example, London and colleagues conducted a longitudinal study of women majoring in STEM and demonstrated that lacking a sense of belonging in their discipline was not only correlated with their demotivation, measured as the likelihood of dropping out of one’s major, but also predictive of demotivation one semester later. Importantly, as well as unfortunately, the authors also found that female students’ sense of belonging declined over time. Similar results linking a sense of belonging with one’s domain or work field to motivation were found by Smith and colleagues (2013) for graduate students in STEM and for trainee surgeons by Peters and colleagues (2012).

Research thus suggests that motivation depends on both the availability role models directly as we have discussed at length in Chapter 1, and on perceptions of belonging and fit with peers and seniors. It is important to note that these two constructs are related in a number of ways. First, the findings relating to perceptions of fit are closely related to the construct of similarity which we discussed in Chapter 1. In other words, fit and similarity go hand-in-hand such that role aspirants are more likely to perceive seniors and peers as similar in a context where they feel they fit in compared to a context in which they do not fit. The
same is true for shared group membership. As we have argued in Chapter 1, shared group membership increases role model effectiveness to the extent that it is salient and an important part of a role aspirant’s identity – and it seems unlikely that the latter is going to be the case in a context in which role aspirants perceive low levels of fit and belonging. In other words, many of the aspects pertaining to role model effectiveness are also related to levels of fit and it is thus worthwhile to investigate whether role models increase motivation over and above the impact of levels of fit.

As we discussed in Chapter 1, research demonstrates that the presence of career role models is associated with a number of positive outcomes for women in male-dominated fields such as increased motivation (Lockwood, et al., 2002), more positive beliefs about one’s future success (BarNir et al., 2011; Dasgupta, 2011; McIntyre et al., 2003), and more positive attitudes towards math (Dasgupta, 2011; Stout et al., 2011). As already noted, this body of research further suggests that women tend to benefit more from female role models than male role models (Asgari et al., 2010; Lockwood, 2006; Marx & Roman, 2002). This is of course unfortunate as it is precisely where female role models are likely to be the scarcest, that they are likely to be the most needed, to help women in these fields overcome obstacles such as negative stereotypes. It is here that female role models could be seen as ‘vaccines’ against these stereotypes as suggested by the Stereotype Inoculation Model (Dasgupta, 2011), which we discussed in Chapter 1.

On this basis, it thus seems reasonable to assume that both the availability of role models in general, as well as feelings of fit with senior individuals, contributes to motivation. In this chapter we are interested in examining (a) whether women in male-dominated fields find it more difficult to identify role models in their fields, and (b) how this affects motivation and goals, over and above perceived levels of fit.
We therefore investigated levels of motivation in a sample of female and male undergraduate students of STEM disciplines, where the lack of role models has often been suggested as a key factor contributing to the under-representation of women. As the representation of women varies considerably across different STEM fields (see Leslie, Cimpian, Meyer, & Freeland, 2015), we included students from core STEM disciplines such as engineering and mathematics, but also students from the life sciences such as biology and psychology as well as students from non-STEM subjects to serve as a control group. Taken together, we were interested in whether the perception of having role models would influence motivation over and above the effect of perceived levels of fit and whether this effect would be stronger for women in fields in which they are under-represented. Lastly, we were interested in whether the examined variables would depend on student gender and discipline.

Based on the research summarised above we predict the following:

H1: Women in core STEM fields will perceive a lack of role models and report lower motivation (compared to their male counterparts as well as men and women in other fields).

H2: Motivation will be predicted by the availability of role models over and above effects of perceived levels of fit. In particular, we expect the availability of career role models to be negatively related to study demotivation and positively related to career ambition and career intentions.

H3: The association between the availability of role models and demotivation, career ambition, and career intentions, will be particularly strong for women in core STEM fields.
Method

Participants. Participants were 757 undergraduate students from sixteen different disciplines of a large, research-intensive British University. The majority (85.2%) of the sample was White and British or Irish. Slightly more than half of participants were female (58.1%) and 41.9% were male. The average age of our sample was 20.3 years ($SD = 3.4$). Students were relatively evenly split across years of study: first year students (36.9%), second year students (29.5%) and third or final year students (33.6%). One participant did not indicate his or her year of study. In terms of discipline, the majority of students came from STEM disciplines, which we further divided, based on the representation of women in the field, into life and environmental sciences (LES; 46.8%) and core STEM disciplines (27.5%). The remaining students (24.8%) came from the humanities and social sciences (HASS), (see Table 1 for further information about the gender distribution of our sample and the disciplines included in each category of disciplines).

Procedure. Student participants were contacted via e-mail by their head of discipline and provided with a link to the online survey. In some disciplines, they were further encouraged to take part in the survey during lectures. Upon opening the link participants were told that the survey was examining study experiences at their university and asked for their consent to participate. They were then asked to respond to the measures before filling out a short section on their demographics, including gender, discipline, and year of study. Finally, they were debriefed and informed that we were interested in how experiences differed between female and male students in different disciplines.
Table 1

**Gender Distribution Across Disciplines in Study 1**

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Male Respondents</th>
<th>Female Respondents</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core STEM</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>36</td>
<td>13</td>
<td>49</td>
</tr>
<tr>
<td>Geology</td>
<td>7</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Mathematics and Computer Science</td>
<td>33</td>
<td>45</td>
<td>78</td>
</tr>
<tr>
<td>Medical Imaging</td>
<td>9</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td>Mining and Minerals Engineering</td>
<td>7</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Physics and Astronomy</td>
<td>29</td>
<td>9</td>
<td>38</td>
</tr>
<tr>
<td><strong>Life and Environmental Sciences (LES)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biosciences</td>
<td>55</td>
<td>102</td>
<td>157</td>
</tr>
<tr>
<td>Geography</td>
<td>36</td>
<td>62</td>
<td>98</td>
</tr>
<tr>
<td>Psychology</td>
<td>9</td>
<td>38</td>
<td>47</td>
</tr>
<tr>
<td>Sports and Health Sciences</td>
<td>27</td>
<td>25</td>
<td>52</td>
</tr>
<tr>
<td><strong>Humanities and Social Sciences (HASS)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drama</td>
<td>3</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Economics</td>
<td>4</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>English</td>
<td>20</td>
<td>47</td>
<td>67</td>
</tr>
<tr>
<td>History</td>
<td>15</td>
<td>31</td>
<td>46</td>
</tr>
<tr>
<td>Politics</td>
<td>22</td>
<td>25</td>
<td>47</td>
</tr>
<tr>
<td>Sociology and Philosophy</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>317</strong></td>
<td><strong>440</strong></td>
<td><strong>757</strong></td>
</tr>
</tbody>
</table>

**Measures.** We included one measure of the availability of career role models and two measures of perceived fit, namely fit with peers (i.e. students) and fit with senior individuals of the field (i.e. academic staff). We also included motivational measures, namely study demotivation, career ambition and career intentions. All items and reliability scores for our measures are provided in Table 2. The items were presented in the form of statements and participants were asked to rate their agreement on a scale from 1 (strongly disagree) to 7 (strongly agree).
Table 2

Measures Used in Study 1

<table>
<thead>
<tr>
<th>Measure</th>
<th>Items</th>
<th>Reliability</th>
</tr>
</thead>
</table>
| Career role models | In the career path that I am considering, there is someone that I admire  
                    | I know of someone who has had a career that I want to pursue for myself  
                    | In the career path that I am considering, there is no-one who inspires me  
                    | (reversed)                                                           | .82         |
| Fit with staff     | Generally, I feel like I “fit in” with the lecturers in my discipline (i.e. the  
                    | members of academic staff that you have met during your studies)       |             |
|                    | When I think of these lecturers, I get a sense that I don’t belong with them  
                    | (reversed)                                                           | .84         |
| Fit with students  | Generally, I feel like I “fit in” with other students in my discipline  
                    | When I think of these other students, I get a sense that I don’t belong with them  
                    | (reversed)                                                           | .88         |
| Study demotivation | I sometimes think about dropping out of university                      | .69         |
|                    | I am less motivated in my studies than I used to be                      |             |
|                    | I sometimes wish that I had studied something different                  |             |
| Career ambition    | I consider myself ambitious in my plans for a career related to my discipline  
                    | It is not important that I get a job related to my discipline when I graduate  
                    | (reversed)                                                           | .79         |
|                    | My ambitions in life mainly have to do with pursuing a career related to my discipline  |             |
| Career intentions  | I am planning to look for a job related to my discipline when I graduate  
                    | I am confident that I will find a job related to my discipline after I graduate  | .70         |

Note. The Reliability coefficient refers to Cronbach’s Alpha for measures with three items and to the Spearman-Brown coefficient for measures with only two items

Results

We were interested in three major questions – to what extent student motivation and the availability of role models was dependant on gender and discipline, to what extent student motivation could be predicted by the presence of role models, and whether this association
would be stronger for female students in core STEM disciplines. Mean values, standard deviations, and correlations for all our measures are presented in Table 3.

Table 3

Means, Standard Deviations and Correlations of All Measures (Study 1)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean (SD)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Career role models</td>
<td>4.63 (1.47)</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Fit with staff</td>
<td>5.26 (1.19)</td>
<td>.17**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Fit with students</td>
<td>5.43 (1.19)</td>
<td>.17**</td>
<td>.41**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Study demotivation</td>
<td>3.11 (1.43)</td>
<td>-.15**</td>
<td>-.43**</td>
<td>-.34**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5. Career ambition</td>
<td>4.74 (1.44)</td>
<td>.26**</td>
<td>.27**</td>
<td>.19**</td>
<td>-.35**</td>
<td>-</td>
</tr>
<tr>
<td>6. Career intentions</td>
<td>4.51 (1.34)</td>
<td>.22**</td>
<td>.28**</td>
<td>.23**</td>
<td>-.36**</td>
<td>.67**</td>
</tr>
</tbody>
</table>

*Note. * p < .05; ** p < .01

Do gender and discipline predict the presence of role models and motivation? We conducted a series of 2 (Gender: Female vs. Male) X 3 (Discipline: Core STEM vs. LES vs. HASS) ANOVAs to test our hypothesis around the effects of these variables on the presence of role models and motivational variables. We also conducted a series of post-hoc Tukey tests to examine the ANOVA results relating to discipline further.

Role models. Participants generally reported levels of availability of role models which were above the midpoint of the scale. The degree to which students had career role models was not predicted by gender $F(1, 742) = .30; p = .59; \eta^2 < .01$, or discipline, although the effect of discipline was marginally significant but of negligible size $F(2, 742) = 2.67; p = .07; \eta^2 < .01$. Neither did the variables interact ($F(2, 742) = .46; p = .63; \eta^2 < .01$). These findings do not support H1.
Motivational measures. Levels of study demotivation did not depend on gender or discipline and neither did the variables interact (all $F < 1.99$; all $p > .14$), again lending no support to H1. The same was true with regards to career ambition (all $F < 1.66$; all $p > .20$).

With regards to career intentions we found an effect of discipline $F(2, 723) = 13.08; p < .01; \eta^2 = .03$. Those in HASS ($M = 4.20; SD = 1.29$) reported significantly lower intentions of pursuing a career in their discipline compared to both students in LES ($M = 4.58; SD = 1.34; p < .01$) and those in core STEM disciplines ($M = 4.71; SD = 1.35; p < .01$). The difference between the latter two groups was not significant. Gender neither had an effect on career intentions nor did it interact with discipline (all $F < .51$; all $p > .48$). Taken together, we found no support for the prediction that women in STEM perceive a lack of role models and show lower levels of motivation (H1).

Does the perceived presence of role models predict motivation? We conducted a series of multiple linear regressions to investigate the extent to which our motivational variables were predicted by the perceived availability of career role models over and above perceived levels of fit with staff and students and thus test H2.

In line with H2 and illustrated in Figure 1, the availability of career role models negatively predicted study demotivation, although the effect was only marginally significant $\beta = -.06, t(739) = -1.91, p = .06$. Significant relations were found for fit with staff: $\beta = -.36, t(739) = -9.33, p < .001$; and fit with students: $\beta = -.19, t(739) = -5.34, p < .001$; model $R^2 = .22, F(3, 736) = 67.72, p < .001$.

![Figure 1](image_url)

Figure 1. Study demotivation predicted by the availability of career role models and levels of fit.
Moreover, as predicted by H2, the availability of career role models was positively and significantly related to career ambition (Career role model: \( \beta = .21 \), \( t(743) = 6.08 \), \( p < .001 \); Fit with staff: \( \beta = .20 \), \( t(743) = 5.35 \), \( p < .001 \); Fit with students: \( \beta = .07 \), \( t(743) = 1.85 \), \( p = .07 \); model \( R^2 = .12 \), \( F(3, 740) = 63.61 \), \( p < .001 \); see Figure 2).

The same was true for career intentions (Career role model: \( \beta = .17 \), \( t(736) = 4.68 \), \( p < .001 \); Fit with staff: \( \beta = .20 \), \( t(736) = 5.15 \), \( p < .001 \); Fit with students: \( \beta = .12 \), \( t(736) = 3.15 \), \( p = .002 \); model \( R^2 = .12 \), \( F(3, 733) = 32.52 \), \( p < .001 \); see Figure 3), supporting our second hypothesis.

Is the effect of the availability of role models on motivation stronger for women in core STEM disciplines? In order to investigate this question and test H3, we used the PROCESS macro for SPSS (Model 3; Hayes, 2013). The model we tested (Model 3) is illustrated in Figure 4. We coded gender such that 0 indicated that the participant was male and 1 indicated that the participant was female and discipline such that 0 indicated that the discipline was not part of core STEM and 1 indicated that the discipline was part of core STEM. The availability of career role models was centered to make the interpretation of regression coefficients possible.
As can be gathered from Table 4, when predicting study demotivation, the availability of career role models was not associated with decreased study demotivation and none of the interactions were significant including the predicted three-way interaction between participant gender, discipline and the availability of career role models. However, it should be noted that the coefficients displayed in this table refer to values when the values of all other variables are 0. In other words, the coefficient of the availability of career role models shows that for men in HASS and LES disciplines, this variable was not associated with decreased study demotivation. This in itself does not provide enough information to definitively evaluate whether H3 is supported with regards to study demotivation. We therefore turn to the conditional effects of the availability of career role models on study demotivation. Bias corrected bootstrap confidence intervals (sample = 10,000) indicated that the association between these two variables was not different from zero among students of HASS and LES regardless of whether they were male $B = -.07$, 95% CI $[-.20, .06]$ or female $B = -.10$, 95% CI $[-.20, .00]$, but was in the predicted negative direction among students of core STEM disciplines regardless of whether they were male $B = -.28$, 95% CI $[-.46, -.11]$ or female $B = -.34$, 95% CI $[-.55, -.12]$. While this pattern is interesting, it does not support H3.
Table 4

Results of Moderated Moderation Analyses (Study 1)

<table>
<thead>
<tr>
<th>Predicting study demotivation $R^2 = .04$</th>
<th>$B$</th>
<th>$B$ se</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Career Role Model (CRM)</td>
<td>-.07</td>
<td>.07</td>
<td>-.20</td>
<td>.06</td>
</tr>
<tr>
<td>Participant Gender (PG)</td>
<td>.00</td>
<td>.13</td>
<td>-.24</td>
<td>.25</td>
</tr>
<tr>
<td>Discipline (D)</td>
<td>-.04</td>
<td>.16</td>
<td>-.37</td>
<td>.28</td>
</tr>
<tr>
<td>CRM X PG</td>
<td>-.03</td>
<td>.09</td>
<td>-.20</td>
<td>.14</td>
</tr>
<tr>
<td>CRM X D</td>
<td>-.22†</td>
<td>.11</td>
<td>-.44</td>
<td>.00</td>
</tr>
<tr>
<td>PG X D</td>
<td>.39</td>
<td>.24</td>
<td>-.08</td>
<td>.85</td>
</tr>
<tr>
<td>CRM X PG X D</td>
<td>-.02</td>
<td>.16</td>
<td>-.34</td>
<td>.30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Predicting career ambition $R^2 = .07$</th>
<th>$B$</th>
<th>$B$ se</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRM</td>
<td>.24**</td>
<td>.07</td>
<td>.10</td>
<td>.37</td>
</tr>
<tr>
<td>PG</td>
<td>.18</td>
<td>.13</td>
<td>-.07</td>
<td>.42</td>
</tr>
<tr>
<td>D</td>
<td>.09</td>
<td>.16</td>
<td>-.23</td>
<td>.41</td>
</tr>
<tr>
<td>CRM X PG</td>
<td>-.01</td>
<td>.08</td>
<td>-.18</td>
<td>.15</td>
</tr>
<tr>
<td>CRM X D</td>
<td>.11</td>
<td>.11</td>
<td>-.11</td>
<td>.33</td>
</tr>
<tr>
<td>PG X D</td>
<td>.00</td>
<td>.23</td>
<td>-.47</td>
<td>.46</td>
</tr>
<tr>
<td>CRM X PG X D</td>
<td>.00</td>
<td>.16</td>
<td>-.31</td>
<td>.32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Predicting career intentions $R^2 = .08$</th>
<th>$B$</th>
<th>$B$ se</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRM</td>
<td>.18**</td>
<td>.07</td>
<td>.05</td>
<td>.31</td>
</tr>
<tr>
<td>PG</td>
<td>-.08</td>
<td>.12</td>
<td>-.32</td>
<td>.16</td>
</tr>
<tr>
<td>D</td>
<td>.55**</td>
<td>.16</td>
<td>.23</td>
<td>.87</td>
</tr>
<tr>
<td>CRM X PG</td>
<td>.04</td>
<td>.08</td>
<td>-.13</td>
<td>.20</td>
</tr>
<tr>
<td>CRM X D</td>
<td>.04</td>
<td>.11</td>
<td>-.17</td>
<td>.26</td>
</tr>
<tr>
<td>PG X D</td>
<td>.03</td>
<td>.23</td>
<td>-.43</td>
<td>.49</td>
</tr>
<tr>
<td>CRM X PG X D</td>
<td>.13</td>
<td>.16</td>
<td>-.18</td>
<td>.45</td>
</tr>
</tbody>
</table>

*Note.* † $p < .10$; * $p < .05$; ** $p < .01$; $B$ refers to unstandardized coefficient; Confidence intervals based on bias-corrected bootstrapping procedures with a sample size of 10,000. CRM was mean-centred prior to analysis.

Next, we ran the same analysis with career ambition as the outcome. As can be seen in Table 4, the hypothesised interaction was not significant, lending no support to H3. The availability of role models was positively associated with career ambition. This held true for men in HASS and LES disciplines $B = .24$, 95% CI [.10, .37] as well as core STEM
disciplines $B = .34$, 95% CI [.17, .52], and for women in HASS and LES disciplines $B = .22$, 95% CI [.12, .32] as well as core STEM disciplines $B = .33$, 95% CI [.13, .45].

Similar results were found with regards to career intentions. The effect of discipline (see Table 4) mirrors the results of the ANOVA reported on above indicating that those in core STEM disciplines reported higher career intentions. Once more, the three-way interaction was not significant, providing no support for H3. The availability of career role models was positively related to career intentions for men in HASS and LES disciplines $B = .18$, 95% CI [.05, .31] as well as core STEM disciplines $B = .22$, 95% CI [.05, .39], and for women in HASS and LES disciplines $B = .21$, 95% CI [.11, .31] as well as core STEM disciplines $B = .39$, 95% CI [.18, .60].

**Discussion Study 1**

We had hypothesised that female students in STEM disciplines would perceive a lack of role models and report lower motivation. However, this was not the case. While this finding is surprising, it supports a point that we have made in Chapter 1, namely that shared group membership is by no means the only important factor for increasing role aspirants’ motivation. It seems that at least to the students in our sample having a high number of same-gender role models available was not important and that female students in core STEM disciplines could find role models at the same rate as their male peers. Presenting under-represented groups with ingroup role models may therefore not be the only – or even the most effective – way to increase motivation, a point which we shall return to later in this chapter.

Moreover, we had predicted that motivation would be predicted by the degree to which role models were available to students and that this would be in addition to other social factors which have been shown to be associated with motivation, namely fit with peers and seniors. More precisely, we had predicted that study demotivation would be negatively
predicted by the availability of career role models, while career ambition and career intention
would be positively predicted by this measure. Our results supported these predictions and
demonstrate the motivational power that role models have, although the effect on study
demotivation was only marginally significant and the effects were relatively small.

Lastly, we predicted that this association between the availability of role models and
motivation would be stronger for female students in core STEM fields where they are under-
represented. We did not find any support for this hypothesis, suggesting that role models are
not necessarily more important or effective for under-represented groups.

Taken together, our findings highlight two important points. First, they demonstrate
that the perceived availability of career role models is associated with a number of
motivational variables. This is particularly true for goals and ambitions that have to do with
role aspirants’ future careers. Second, our findings suggest that female students in general as
well as female students in STEM in particular do not necessarily perceive a lack of role
models or experience lower motivation. The fact that female students in STEM feel they do
have role models is encouraging.

This study prompts interesting new research questions. First, which factors influence
the degree to which students feel that they have career role models? Our study suggests that it
is not just about gender composition of the field. Is it about actual interactions with or about
the perceived similarity to the member of one’s field? Are all role models equally efficient in
promoting and sustaining motivation? Who is chosen as a role model and how exactly do
they influence motivation, goals, and ambition?

More specifically, while this study provides evidence that role models are associated
with higher levels of students’ motivation and ambition, it also highlights that the role which
gender plays in these processes is not as straightforward as previously assumed. It begins to
question whether it is really true that women in STEM make the best role models for female
role aspirants and that they can change their interest in STEM as well as their motivation and goals most effectively. However, as we did not investigate gender directly, it remains an empirical question, one which we will address in Study 2 which will investigate whether female role models are more effective in fostering female students’ interest in science.

**Study 2**

As we have discussed in Chapter 1, there is evidence suggesting that women make more effective role models for other women, especially in male-dominated contexts (e.g., Dasgupta, 2011; Marx & Roman, 2002; Stout et al., 2011). On the other hand, Study 1 suggested that gender composition of a field may not impact upon the availability of role models for men and women. Indeed, there is experimental evidence suggesting that gender is not always the most important factor for increasing women’s interest in STEM. For example the study by Cheryan and colleagues (2011) described in Chapter 1 suggests that whether or not role models embody STEM stereotypes and are perceived as similar is more important than role model gender. While beliefs about success in computer science did not differ depending on whether women had interacted with a female or male computer science student, they were predicted by the “nerdiness” of this computer scientist.

It is therefore worthwhile exploring this issue further and thus here we will investigate how female or male role models who are presented as more or less stereotypically “sciency” influence female students’ STEM-related motivations and interest. The field of psychology is interesting in relation to this as the majority of psychology students are female and as it sits somewhere between the “hard” physical sciences and the “softer” social sciences, containing a range of approaches that vary between those two poles. For example, neuropsychology shares a lot of common features with biology and medicine and psychological statistical analyses requires a certain confidence with mathematics, “hard science” aspects of the field
that can be regarded as more stereotypical of men. Other areas of psychology such as counselling or studying the development of children as well as less maths-intensive methods might be seen as “softer science” aspects of the field and more stereotypical of women. We thus decided to avail ourselves of these unique features of psychology and present undergraduate psychology students with male and female researchers in psychology conducting different types of psychological research. In line with the extant evidence suggesting that women make more effective role models for other women, we hypothesised the following:

H1: Female students will see female researchers as role models to a greater extent than male researchers.

H2: When presented with female researchers doing hard science female students will show more interest in hard science compared to those presented with female researchers doing soft science. Similarly, when presented with female researchers doing soft science female students will show more interest in soft science compared to those presented with female researchers doing hard science. This effect will be attenuated for female students presented with male researchers.

H3: The degree to which the presented researchers are seen as role models will predict students’ motivations and interests.

H4: Women will make more effective role models for female students.

H4a: Female students presented with female researchers (compared to male researchers) will report higher career motivations, higher success beliefs, and show more interest in the type of research the researchers conduct.

H4b: The degree to which female students see the researchers as role models will have a higher impact on career motivations, success beliefs and interest in
the type of research the researchers conduct for those presented with female researchers (compared to male researchers).

Method

Participants. Participants were 163 first year psychology students from a research-intensive university in the UK. Of these, 131 (80.4%) participants were female, 32 (19.1%) male. Due to the small number of male participants and the fact that participant gender would be hypothesised to influence the investigated processes, male participants were excluded from analyses. The final sample thus consisted of 131 female students with an average age of 19.05 years ($SD = 3.47$). Of these participants, 80.20% identified as White (British). Participating in the study was part of one of their classes but inclusion was voluntary.

Design. Participants were presented with potential role models who were either male or female researchers doing either predominantly “hard” (stereotypically masculine) or “soft” (stereotypically feminine) psychological science. Participants were asked to evaluate the different researchers and, in an allegedly unrelated study, answer some questions about their own career motivations and interests. The study thus had a 2 (Gender of researchers: Male vs. Female) X 2 (Type of research: Hard vs. Soft science) between-participants design. In addition to these four role model conditions, there was a control condition in which participants were presented with a neutral version of the research projects, which mentioned neither soft nor hard science elements, and were not given any information about the researchers.

Materials and procedure. Participants took part in the experiment in six different, roughly equally sized groups, two of which were the control condition. The experiment was introduced by the female experimenter as a study about a “researcher of the year” award in the four role model conditions or “research project of the year” award in the control
condition. This award was allegedly given out by the psychology department once a year. Participants were led to believe that the study was designed to give students a voice in choosing the winner of the award and learn more about how they made their choice. The experimenter also mentioned a second study, which was allegedly run by a colleague and which was attached to this study because both of the studies were so short. This second study was described as being about in the goals and interests of first year psychology students.

The experimenter then presented four psychological research projects using slides that were projected on a screen. It was emphasised that in order to answer the questions asked in the questionnaire, they would have to pay close attention to the presentation. Participants in the four role model conditions were presented with names and pictures of four researchers and the titles of their studies while those in the control condition were only presented with the titles of the studies. The researchers were either all female or all male, manipulated through names (e.g., Erica Hilburn or Eric Hilburn) and pictures that were matched for age, facial expression, and competence, using the a-FACE database (see Appendix A for an example). The presentation of names and pictures were followed by a short description of the research projects. While the title and most of the text was held constant across conditions, the methods were either described as hard science (e.g., brain scans, hormone levels), soft science (e.g., qualitative interviews, observation of behaviour; see Appendix B for an example), or omitted (control condition). In the soft science conditions, three of the four research projects were described as soft science and one as hard science. The opposite was true for the hard science conditions. Thus, two of the four research projects stayed the same (one always being hard science and one always being soft science), while the other two varied across conditions. The last slide of the presentation showed all four researcher’s pictures and names (study titles in control condition). This slide was shown throughout the entire rest of the experiment, in an effort to increase the salience of the researchers’ gender.
After the presentation, participants were given a five-page questionnaire. First, they were again presented with the names and pictures of the researchers as well as the title of their research project and were asked to rate the deservingness of each project for the award. Next, participants in the four role model conditions were asked to indicate the extent to which they saw the researchers presented to them as role models. This was done using five items partly adapted from Stout and colleagues (2011) and aimed at incorporating different aspects of the term role model as it has been used by different researchers ($\alpha = .82$). We asked participants how much they identified with the researchers, how inspiring and similar they found them, how much they liked them, and how likely it was that they would choose one of them as a role model, all measured on a seven-point scale from 1 (not at all) to 7 (extremely).

In the allegedly unrelated Study 2, participants were asked to rate their agreement to different career motivation statements (“I am planning to get an advanced degree (MSc, PhD) in psychology”, “I am planning to do psychological research in the future”, “I am confident that I will be successful in my academic studies”) on a seven-point scale from 1 (strongly disagree) to 7 (strongly agree). On the following page they were asked to “design” their ideal third year project. For this they were asked to indicate their interest in five different topics, five different research methods and five different analyses on a scale from 1 to 10. Two of each were designed to be hard science (e.g., “the biology of cognitive biases”), two as soft science (e.g., “describing cases of cognitive biases”) and one as neutral (e.g., “explaining cognitive biases”). Their interest in the hard science topics, methods and analyses were combined into a measure of interest in hard science ($\alpha = .83$) and their interest in the soft science topics, methods and analyses were combined into a measure of interest in soft science ($\alpha = .71$). Lastly, their demographics (gender, age and ethnicity) were collected.
Chapter 2: Role Models, Motivation, and Interest in Science

Results

We first conducted a 2 (Gender of researchers: Female vs. Male) X 2 (Type of research: Soft science vs. Hard science) ANOVA to test H1 and thus investigate whether these factors influenced the degree to which participants saw the researchers as role models. Results revealed that only the gender of the researcher mattered, $F(1, 91) = 7.23; p < .01; \eta^2 = .07$. However, contrary to H1, participants saw the male researchers ($M = 4.29; SD = .94$) as better role models compared to the female researchers ($M = 3.77; SD = .87$). The type of research neither had an effect on average, $F(1, 91) = .90; p = .35; \eta^2 = .01$, nor in interaction with researcher gender $F(1, 91) = .65; p = .42; \eta^2 = .01$.

Next, we conducted a series of one-way ANOVAs with condition (four role model conditions and control condition) as the independent variable to test H2 and H4a and examine whether role model gender and type of research changed participants’ motivation to get an advanced degree in psychology and to conduct research in the future, their success beliefs in relation to their academic studies, and their interest in hard and soft science. Results revealed that the different conditions only affected participants’ interest in hard science $F(4, 125) = 2.56; p = .04; \eta^2 = .08$; all other $F < 1.17$ and all other $p > .33$. A Tukey HSD post-hoc test revealed that, somewhat paradoxically and in opposition to both H2 and H4a, this effect stemmed from the fact that those exposed to female researchers doing hard science ($M = 5.22; SD = 1.53$) were less interested in hard science compared to those exposed to male researchers doing soft science ($M = 6.39; SD = 1.19; p = .06$). None of the other conditions differed from each other (all $p > .14$) but as can be gathered from Figure 5, those exposed to the female researchers doing hard science were the only ones whose values were below those of the control condition.
Lastly, we were interested in whether the degree to which participants saw the researchers as role models would predict goals and interests (H3) and whether this relationship would differ based on role model condition (H4b). We used the PROCESS macro for SPSS (Model 3; Hayes, 2013) to test the relationships illustrated in Figure 6.

Figure 5. Levels of interest in hard science based on condition

![Bar chart showing interest in hard science by condition](chart5)

Interest in hard science

- Female, soft science
- Female, hard science
- Male, soft science
- Male, hard science
- Control

$p = .04$

Figure 6. Tested moderated moderation model predicting motivations and interests (Study 2)

![Diagram of moderated moderation model](chart6)
In order to make the regression coefficients interpretable, degree of role modelling was centred prior to analysis. Role model gender was coded such that 0 stands for female researchers and 1 stands for male researchers. With regards to type of research, 0 refers to “soft” science and 1 refers to “hard” science.

As can be gathered from Table 5, when predicting motivation to get an advanced degree, none of the effects or interactions were significant, lending no support to H3. However, bias corrected bootstrap confidence intervals (sample = 10,000) indicated that the role model measure did positively predict motivation to get an advanced degree when participants were presented with male researchers doing hard science $B = .74; 95\% \ CI [0.16, 1.32]; p = .01$ but not in any of the other conditions. This effect is in direct opposition to H4b.

Similar results were found when predicting motivation to do research in the future. Again, none of the effects or interactions were significant (see Table 5), lending no support to H3, but the role model measure predicted motivation to do research in the future for those who were presented with male researchers doing hard science $B = .73; 95\% \ CI [0.20, 1.26]; p < .01$. This is once more in opposition to our prediction (H4b). When predicting expectations of success in academic studies, none of the effects or interactions was significant in any condition.
Table 5

**Results of Moderated Moderation Analyses (Study 2)**

<table>
<thead>
<tr>
<th>Predicting advanced degree motivation $R^2 = .09$</th>
<th>$B$</th>
<th>$B_{se}$</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
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<tbody>
<tr>
<td>Role Model Measure (RM)</td>
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<td>-0.84</td>
<td>0.76</td>
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<tr>
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<tr>
<td>Type of Research (TR)</td>
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<td>-0.80</td>
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<td>-1.12</td>
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</tr>
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</tr>
<tr>
<td>RG X TR</td>
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<td>.67</td>
<td>-1.51</td>
<td>1.15</td>
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<tr>
<td>RM X RG X TR</td>
<td>0.61</td>
<td>.73</td>
<td>-0.84</td>
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<table>
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<tr>
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<th>$B$</th>
<th>$B_{se}$</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM</td>
<td>0.05</td>
<td>.37</td>
<td>-0.68</td>
<td>0.77</td>
</tr>
<tr>
<td>RG</td>
<td>0.18</td>
<td>.44</td>
<td>-0.69</td>
<td>1.06</td>
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<tr>
<td>TR</td>
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<td>.45</td>
<td>-0.72</td>
<td>1.05</td>
</tr>
<tr>
<td>RM X RG</td>
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<td>-0.87</td>
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</tr>
<tr>
<td>RM X TR</td>
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<td>.50</td>
<td>-0.54</td>
<td>1.44</td>
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<tr>
<td>RG X TR</td>
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<td>.61</td>
<td>-1.04</td>
<td>1.37</td>
</tr>
<tr>
<td>RM X RG X TR</td>
<td>0.10</td>
<td>.67</td>
<td>-1.22</td>
<td>1.42</td>
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<table>
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<tr>
<th>Predicting success beliefs $R^2 = .05$</th>
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<th>$B_{se}$</th>
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<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM</td>
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<td>-0.50</td>
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<tr>
<td>RG</td>
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<td>TR</td>
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<td>RM X RG X TR</td>
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<table>
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<th>$B_{se}$</th>
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<th>ULCI</th>
</tr>
</thead>
<tbody>
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<td>RM</td>
<td>-0.52</td>
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<td>-1.26</td>
<td>0.22</td>
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<tr>
<td>RG</td>
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<tr>
<td>TR</td>
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<tr>
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<td>1.78</td>
</tr>
<tr>
<td>RM X TR</td>
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<td>0.08</td>
<td>2.11</td>
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<td>RG X TR</td>
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<td>.62</td>
<td>-1.11</td>
<td>1.34</td>
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<tr>
<td>RM X RG X TR</td>
<td>-1.05</td>
<td>.68</td>
<td>-2.40</td>
<td>0.30</td>
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<table>
<thead>
<tr>
<th>Predicting interest in soft science $R^2 = .20$</th>
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<th>$B_{se}$</th>
<th>LLCI</th>
<th>ULCI</th>
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<tbody>
<tr>
<td>RM</td>
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<tr>
<td>RG</td>
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<td>RM X RG X TR</td>
<td>1.16*</td>
<td>.51</td>
<td>0.15</td>
<td>2.16</td>
</tr>
</tbody>
</table>

*Note.* *p < .05; **p < .01; RM was mean-centred; $B$ refers to unstandardized coefficient; confidence intervals based on bias-corrected bootstrapping procedures with a sample size of 10,000.
When predicting interest in hard science, the type of research moderated the effect of the role model measure on interest in hard science (see Table 5) in the expected direction. When presented with researchers doing soft science, seeing them as role models lead to less interest in hard science, whereas when presented with researchers doing hard science, it lead to more interest in hard science. However, while the direction of the effect changed significantly, the effect of the role model measure on interest in hard science itself was not significant in any of the conditions (all $p > 10$).

Finally, when predicting interest in soft science, the three-way interaction between the role model measure, gender of the researchers, and type of research proved significant (see Table 5). Contrary to H4, however, the effect of the role model measure was only significantly positive for participants who were presented with the male researchers doing soft science $B = .76; 95\% CI [0.36, 1.16]; p < .01$.

**Discussion Study 2**

Overall, our results are not in line with our hypotheses. While we had hypothesised that female students would be more likely to see the female researchers (compared to male researcher) as role models, the opposite was the case. This is puzzling as this is not only contradictory to a large body of evidence showing that women make more effective role models for other women but also to studies showing that when reporting on who their role models are, women are also more likely to name other women (e.g., Bosma, Hessels, Schutjens, Van Praag, and Verheul, 2012; Javidan, Bemmels, Devine, & Dastmalchian, 1995; Lockwood, 2006).

We had further predicted that female students would show more interest in the type of science the researchers were conducting when the researchers were female but not so much when the researchers were male. We did not find this effect. Rather, those presented with the
female researchers doing hard science were the least interested in hard science while those presented with male researchers doing soft science were most interested in hard science.

Moreover, we had predicted that the degree to which the researchers were perceived as role models would predict students’ interest and motivations and that this would be moderated by gender such that the effect would be stronger for female role models. This was generally not the case. While few of the effects were significant, we did again find evidence that, contrary to our predictions, male researchers made more effective role models. Only for those presented with male researchers doing hard science did the degree to which they saw these researchers as role models lead to higher career motivations. Moreover, the degree to which the researchers were seen as role models only predicted interest in soft science for male role models doing soft science but not for female role models doing soft science.

So what causes these surprising findings? The fact that those exposed to the male researcher doing soft science were the most interested in hard science could be explained in terms of a contrasting effect (see Mussweiler, Rüter, & Epstude, 2004) whereby participants were perceiving a lack of similarity between themselves and the male researchers and therefore rated themselves higher in attributes these researchers were clearly not possessing, but this explanation seems unlikely for a number of reasons. First and foremost, they rated themselves as more similar to and identified more with the male researchers. Moreover, there is no explanation as to why this contrast effect would only occur for the male researchers doing soft science – and not, for example, for the male researchers doing hard science.

Another explanation might be related to our methods. As we mentioned in the method section, we matched the pictures of the researchers on competence and in addition, the research was described as very high quality. This may, without us intending to do so, also have altered the perception of the female scientists’ warmth and in turn their likability due to prescriptive gender stereotypes. Research shows that while men can be perceived as
competent and warm at the same time, women who are perceived as being competent are usually perceived as lacking warmth, which, as it violates the idea of what women should be like, results in more negative attitudes towards these women (Rudman, 1998; Rudman & Glick, 2002). This in turn influences their effectiveness as role models (Parks-Stamm et al., 2008).

Similarly, it might have been the case that despite our efforts to control perceived competence, in line with the Stereotype Content Model (Fiske, Cuddy, Glick, & Xu, 2002) the male researchers were seen as more competent and successful, simply because they were men. As discussed in Chapter 1, success and competence are important predictors of role model effectiveness and this may therefore have enhanced the male role models’ effect.

In addition, there are a number of limitations to this study potentially impacting the validity of our findings. First, as our participants were first year students, thinking about their future careers or even a research project in two years’ time might not have been particularly relevant and not represent any realistic motivations or interests. Furthermore, we did not include any manipulation checks for our type of research variable. It is therefore unclear whether students in the different conditions actually perceived the science as hard or soft. The fact that this was described as high quality research in itself may have made it all seem like rather hard science to first year students as they might equate good science with hard science. It is equally possible that the fact that all of the researchers were presented as psychologists may have resulted in all of the research being perceived as soft science as psychology is very female-dominated, particularly at the undergraduate level.

Nevertheless, this study demonstrates that presenting individuals with ingroup role models may not always have the desired effect, although the findings need to be replicated before any conclusions can be drawn. More specifically, this study suggests that focusing on gender alone is too simplistic of an approach. Who makes a good and effective role model for
which role aspirant is likely to be more complex. So, while this study leaves many questions open it highlights the importance of a better, more theory-driven understanding of what role models are and how they can influence role aspirants’ goals, motivations and ambitions.

**General Discussion**

In this chapter we have provided evidence that role models do indeed affect motivation and goals and are a subject worth investigating. At the same time, we have also presented findings highlighting that the effects of role models, and particularly of role model gender, may not always be as straightforward as the extant literature may predict.

Study 1 found support for the notion that the availability of career role models is positively related to motivation and that this effect goes above and beyond other important social experiences such as perceived levels of fit. We did not find any support for the claim that women in male-dominated fields lack role models or that the effect of role models is stronger for these role aspirants. However, as we did not study gender directly, this study left open the question of whether gender of potential role models is an important factor in these processes, as is often claimed. We therefore set out to test the idea that women are particularly suited to spark female students’ interest in science in Study 2.

Study 2, however, showed that focussing on role model gender alone is not always sufficient to address the under-representation of women in STEM. Contrary to our predictions female role models were less effective than male role models in fostering interest in hard science among female first year students. Moreover, the degree to which female students identified with different researchers predicted science interest and motivations only for those exposed to men whose research was described as “hard science”. These surprising findings clearly highlight the need for a better understanding of role models, their effects on role aspirants and the processes leading to these effects.
Taken together, the research presented in this chapter shows that the availability of role models contributes to students’ motivation. At the same time, they suggest that role modelling is a complex process which goes beyond shared group membership. A theoretical framework is needed to understand this complex process and how it can be used to address the under-representation women in STEM as well as other under-represented groups in achievement settings.

In the next chapter, we will therefore address this issue and draw on multiple bodies of literature to present a new theoretical framework which highlights different ways in which the power of role models can be harnessed to address the under-representation of negatively stereotyped groups in achievement settings.
Chapter 3: The Motivational Theory of Role Modelling

As we have already discussed in Chapter 1, role models are often seen as a way of motivating people to perform certain behaviours and inspire them to set ambitious goals. In educational and occupational settings, this is especially true for members of under-represented and stigmatised groups. In these contexts, role models are often regarded as a panacea for inequality, by the general public, policy-makers, and the academic literature alike (e.g., Bosma et al., 2012; Dean, 2014; Peacock, 2012; Wright, Wong, & Newill, 1997). For example, many commentators voiced their hope that Barack Obama would serve as an effective role model for African Americans when he was elected as the president of the USA in the autumn of 2008. ABC News mused “Across the country, educators, community activists and students are hopeful that the election of Obama, whose mother was a white American and father a black African, will provide much-needed inspiration to black youth” (Gomstyn, 2008). In line with this idea, the utility of role models has been examined across a wide range of contexts including how role models might impart core values for doctors (e.g., Paice, Heard, & Moss, 2002), address the under-representation of women in science (e.g., Stout et al., 2011), and increase political activism in young people (Campbell, & Wolbrecht, 2006). The extant literature provides us with important and interesting insights into the various factors that impact on the effectiveness of role models such as shared group membership, similarity, as well as level and attribution of success which we have discussed in detail in Chapter 1.

However, as outlined in Chapter 1, and exemplified by the lack of support for most of our hypotheses reported in Chapter 2, the role model literature suffers from a number of limitations which make it difficult to effectively use their power to practically address the under-representation of negatively stereotyped groups. Namely, the literature is fragmented and lacks a clear consensual definition on what role models are and what they can do. What is
needed is an integrated theoretical framework. As role models are often seen as a way of inspiring role aspirants, and our findings from Chapter 2 do suggest that role models are indeed associated with higher levels of motivation, this theory needs to draw on theories of motivation. Finally, the role model literature has focused predominantly on the attributes role models need to possess in order to be effective but a new theoretical framework should give more attention to how role models can influence ambitions, motivation, choices and achievements of those who are exposed to the role model in order to fully utilise the potential of role models. We refer to those benefitting from the role model as ‘role aspirants’, a term that should be understood an individual who makes active, although not necessarily always conscious or deliberate, choices about in whose footsteps to follow. In other words, just as leaders do not exist without followers (Haslam, 2004; Haslam, Reicher, & Platow, 2011), role models do not exist without role aspirants. In this way, role aspirants are those who both create role model and benefit from them and therefore their perceptions are crucial to understanding the role modelling process.

To address the first of these limitations, fragmentation, we have already provide a targeted review of the literature on role models in occupational and educational settings in Chapter 1. Now we will build on this review to develop a much needed integrated theoretical framework which not only adds to the general understanding of role models but can also be used to develop well-informed role model interventions. We will heavily draw on expectancy-value models of motivation (e.g., Atkinson, 1957; Eccles, 1983; Eccles & Wigfield, 2002; Feather, 1982; Vroom, 1964, 1966) which have been demonstrated to predict a variety of motivational outcomes such as goals (Nagengast, et al., 2011, Plante, O’Keefe, & Théorêt, 2013; Shapira, 1976; Wang, 2012) and career decisions (Eccles, Barber, & Jozefowicz, 1998), as well as on the literature reviewed in Chapter 1. This framework, The Motivational Theory of Role Modeling (MTRM), thus draws together both the role model
literature and the motivational expectancy-value literature. By providing this framework, we will expand the focus from role model attributes to include the motivational processes of the role aspirant and the ways in which the perception of role models can be influential in these processes.

Figure 7. The Motivational Theory of Role Modelling

The MTRM, which we will develop throughout this chapter, is illustrated in Figure 7. As can be gathered from this figure, we propose that role models influence motivation and goals by changing expectancies and values associated with these goals and that three role model qualities are key to this process, namely goal embodiment, attainability and desirability. This figure also shows that these qualities are influenced by attributes of the role model as well as the role aspirant. Examples of these attributes are similarity between role model and role aspirant, levels of role model success and role aspirants’ beliefs about whether abilities are fixed or malleable. The figure further illustrates how the role model process is somewhat cyclic in nature such that exposure to role models changes expectancies, values, and goals which can at the same time be thought of as role aspirant attributes and thus influence the perception of role models. For example, being exposed to an athletic role model could inspire a role aspirant to adopt a new goal of living a healthy lifestyle. Once this goal
has been adopted, a person consuming large quantities of unhealthy food and alcohol is much less likely to be perceived as embodying the role aspirant’s goals and in turn influence his or her motivation and goals. Similarly, a role aspirant’s pre-existing math ability beliefs will determine the extent to which a potential STEM role model will be seen as attainable and, in turn, influence their expectations of success in STEM.

In order to develop this framework it is important to first clarify what we mean by role models as a construct. We will therefore discuss a range of definitions of role models from the literature to provide an understanding of the functions they may fulfil. We will argue that role models have three distinct functions: (1) acting as behavioural models, (2) representing the possible, and (3) being inspirational. Based on these functions, we will then provide our own definition of role models. Next, we will give a brief overview over expectancy-value theories of goals and motivation (Atkinson, 1957; Eccles, 1983; Eccles & Wigfield, 2002; Feather, 1982; Vroom, 1964, 1966). We will then discuss how role models, in their three different functions, might fit into this theoretical framework and the processes by which they can contribute to role aspirants’ expectations of success and the desirability of their achievement-related goals. Finally, we will discuss the practical implications of the MTRM and discuss future research directions.

**What is a Role Model?**

In Chapter 1, we have already commented on the lack of a consensual definition of role models and have given some examples of how role models have been defined by different researchers. While these definitions differed considerably from each other, in this section we will argue that there are three recurring, and interrelated, themes among existing definitions of role models: (1) they show us how to perform a skill and achieve a goal — they
are behavioural models; (2) they show us that a goal is attainable — they are representations of the possible, and (3) they make a goal desirable — they are inspirations.

Role Models as Behavioural Models

A number of definitions describe role models as those from whom we learn particular skills and behaviours. For example, Kemper defines a role model as someone who demonstrates for the individual how something is done in the technical sense … [A role model] is concerned with the "how" question. The essential quality of the role model is that he [or she] possesses skills and displays techniques which the actor lacks (or thinks he [or she] lacks), and from whom, by observation and comparison with his [or her] own performance, the actor can learn. (1968, p. 33)

Similar ideas are also reflected in more recent definitions of role models. For example, Ibarra and Petriglieri (2007) describe role models as those who are successful in a profession and imitated by those attempting to assume professional role (see also Almquist & Angrist, 1971; BarNir et al., 2011; Bell, 1970; Bosma et al., 2012; Cheryan, et al., 2011; Hoyt, 2013; Javidan et al., 1995; Lockwood, 2006; Paice et al., 2002; Sealy & Singh, 2009; Shapiro, Haseltine, & Rowe, 1978; van Auken, Fry, & Stephens, 2006; Wright et al., 1997).

Such definitions of role models are quite similar to Merton’s (1957) original definition and focus on the acquisition of skills by emulation. They are thus also very similar to Bandura’s (1977b) conceptualisation of models in his theory of social learning that is concerned with the acquisition of skills as well as the motivational consequences of observing another individual. From this perspective, motivation can be seen as both a prerequisite to role modelling as well as an outcome. Role aspirants are already motivated to pursue a certain goal and role models show them how to do it. The relevant outcome is thus often role aspirants’ performance or achievement – and, indeed, this is often the measure used
for role model effectiveness across the literature (e.g. Ainsworth, 2010; Bagès & Martinot, 2011; Hoyt et al., 2012; Latu et al., 2013).

**Role Models as Representations of the Possible**

Other definitions focus on role models as representations of what is possible or achievable. They demonstrate that something is attainable. For example, Lockwood (2006) notes: “Role models are individuals who provide an example of the kind of success that one may achieve, and often also provide a template of the behaviours that are needed to achieve such success.” (p. 36). This definition clearly includes an aspect of role models as behavioural models (they provide a ‘template’), but goes beyond being a mere behavioural exemplar to representing future opportunities or prospects. Similarly, McIntyre and colleagues (2011) describe role models as “successful members of one’s own group” (p. 301) and note that “when people find themselves in threatening situations, they often look to role models for reassurance and inspiration” (p. 301). While this certainly differs from Lockwood’s definition, McIntyre and colleagues also focus on the fact that role models send the message to role aspirants: “I can do this, so you can do this, too” (see also Bagès & Martinot, 2011; BarNir et al., 2011; Buunk et al., 2007; Dasgupta, 2011; Hoyt, 2013; Huguet & Regner, 2007; Latu et al., 2013; Marx & Roman, 2002; Sealy & Singh, 2009; Stout et al., 2011). This second function differs from that of behavioural models in that it is not concerned with vicarious learning or how to do something. Rather, it is about learning that something is possible. Observing a role model having achieved a particular goal is enough to motivate role aspirants to believe that they too can reach that goal. As representations of the possible, role models may contribute to the reinforcement of role aspirants’ already existing goals as well as the adoption of new goals.
Role Models as Inspirations

A third set of definitions focuses on how role models can influence what it is role aspirants see as desirable. Gauntlett (2002), for example, defines a role model as “someone to look up to and base your character, values and aspirations on” (p. 211). In other words, Gauntlett does not describe role models as those we look up to because they embody our aspirations but rather as someone on whom we base our evaluation of what makes a desirable character trait, value, or aspiration. Similarly, Paice and colleagues (2002) note that “excellent role models will always inspire, teach by example, and excite admiration and emulation” (p. 707; see also Almquist & Angrist, 1971; Basow & Howe, 1980; Bell, 1970; Bosma et al., 2012; Gibson & Cordova, 1999). This function is again different from the two described above. It is neither concerned with vicarious learning of role aspirants nor necessarily with making a goal attainable. Rather it is about eliciting role aspirant motivation to strive towards something new or something better than before. Thus, in their function as inspirations, role models mainly contribute to role aspirants’ adoption of new goals.

Defining Role Models

These three distinct definitions of role models necessarily focus our attention on three different outcomes of the role modelling process. While the definition of role models as behavioural models focus on a role aspirant moving towards an already existing goal – either through enhanced motivation or through skill acquisition – the definition of role models as inspirations focus on role aspirants considering and adopting new goals. As representations of the possible, role models can influence both goal reinforcement and goal adoption. However, while these foci are somewhat distinct, they cannot be separated completely. For example, moving towards an already existing goal might spark the adoption of new or more ambitious
goal. In addition to these motivational consequences, role models can also have an impact upon performance, either through the acquisition of skills in their function as behavioural models, or through increased motivation in all three of their functions. Both skills and motivation may then contribute to enhanced achievement (Chamorro-Premuzic, Harlaar, Greven, & Plomin, 2010; Weber, Lu, Shi, & Spinath, 2013).

We argue that all of these outcomes are important aspects of the role modelling process because they describe the various ways in which role models can increase the likelihood of role aspirants pursuing and reaching particular goals in achievement settings. We thus define role models as individuals who influence role aspirants' performance, motivation, and goals by acting as behavioural models, representations of the possible, and/or inspirations. This positive influence includes the reinforcement of existing goals as well as the adoption of new goals.

Motivational processes are key to this definition and to all three of the role model functions. However, there has been, to our knowledge, little theorizing directly speaking to the motivational processes by which role models may influence role aspirants. In contrast, the importance of behavioural models for skill acquisition has been explicated in other work (e.g., Bandura, 1977b; Groenendijk, Janssen, Rijlaarsdam, & van den Bergh, 2013; Zimmerman & Kitsantas, 2002). This lack of attention to the motivational aspects of role modelling is particularly problematic because many of the issues around the under-representation of certain, often stigmatised, groups in achievement settings can be seen to exist at the level of motivation rather than performance. Despite the fact that there are a number of barriers to the performance of under-represented groups, such as stereotype threat (Steele & Aronson, 1995), poor performance is generally not the biggest obstacle to overcome: For example, as we have already noted previously, women and girls do not perform worse than men and boys in male-dominated areas such as STEM (e.g. Else-Quest et
al., 2010; Jacobs et al., 2002; Wang, 2012). Rather, they seem to show less interest in, and
decline against, those fields (Else-Quest et al., 2010; Wang, 2012) – and thus we can see their
under-representation as primarily a motivational issue rather than performance issue.

It therefore seems there would be great value in understanding the processes by which
role models can motivate role aspirants. When do they function as behavioural models, as
representations of the possible, as inspirations? And how do each of these functions translate
into role aspirant motivation? It is crucial to enhance our understanding of the processes by
which role models can motivate role aspirants, and this requires a suitable theoretical
framework. We therefore turn to the motivational literature to provide the scaffolding to
allow us to integrate the three different functions of role models. In the next section, we will
argue that expectancy-value theories are best suited to explain motivation in achievement
settings and provide the theoretical framework into which we will then integrate the role
model literature.

**Motivation, Goals, and Role Modelling**

Role aspirant motivation is central to the main outcomes of role modelling – goal
adoption, goal reinforcement, and achievement - but few researchers have drawn on the
motivational literature to elucidate the role modelling process. We aim to address this lacuna
by proposing a motivational framework of role modelling which is based on expectancy-
value theories of motivation. These theories argue that the two main factors influencing
motivation are expectations of success and the perceived desirability of this success. We
focus on these theories because they are widely used in achievement domains and are
supported by over fifty years of evidence from a variety of contexts (e.g., Atkinson, 1957;
Brooks & Betz, 1990; Eccles, 1983; Eccles & Wigfield, 2002; Feather, 1982; Maddux,
Norton, & Stoltenberg, 1986; Nagengast et al., 2011; Trautwein et al., 2012; Vroom, 1964,
1966; Wang & Degol, 2013). Moreover, these theories are widely studied in achievement domains and supporting evidence comes both from studies in the laboratory using experimental designs (e.g., Maddux et al., 1986; Shapira, 1976) as well as in real-world settings (e.g., Eccles et al., 1998; Meece, Wigfield, & Eccles, 1990; Nagengast et al., 2011; Parsons, Adler, & Meece, 1984; Plante et al., 2013; Renko, Kroeck, & Bullough, 2012; Trautwein et al., 2012; Wang, 2012). Expectancy-value theories have been shown to predict a variety of outcomes relevant to the role modelling process, such as behavioural intentions (Maddux et al., 1986; Meece et al., 1990), career and achievement goals (Nagengast et al. 2011, Plante et al., 2013; Shapira, 1976; Wang, 2012), educational and occupational choices (Eccles et al., 1998), intended effort (Renko et al., 2012), and performance (Meece et al., 1990; Plante et al., 2013; Trautwein et al., 2012; Parsons et al., 1984).

In the following paragraphs we will first explain what we mean by motivation and goals. We will then provide an overview of expectancy-value theories of motivation before situating the three role model functions within this framework. We will draw on findings from both the motivational and the role model literatures to illustrate how and when role models can influence role aspirants’ motivation and goals.

### Defining Motivation and Goals

Before we begin outlining a motivational framework for understanding the role modelling process, it is useful to define what we mean by goals and motivation. In line with existing conceptualisations (e.g., Fishbach & Ferguson, 2007) we consider goals to be cognitive structures that represent some end-point or outcome that is desired, that one is committed to, and that one works towards reaching. Goals therefore could include a person’s representation of their desired career (e.g., to be an academic) or a particular point along a career path (e.g., to secure a post-doctoral research position or to become a professor). Goals
are thus directed towards the future. Motivation, on the other hand, is more concerned with the present and can be considered an energizing force resulting from existing goals that directs behaviours towards the goal (Lewin, Dembo, Festinger, & Sears, 1944). Motivation and goals are further tied to one another because the extent to which a person finds particular goal-related activities motivating increases the likelihood of that person adopting a related goal (see Vroom, 1964).

**Expectancy-Value Theories of Motivation**

In order to understand how role aspirants set their goals and how, if at all, role models can influence this process we turn to expectancy-value theories of motivation (e.g., Atkinson, 1964; Eccles, 1983; Feather, 1988; Vroom, 1964; for an overview, see Eccles & Wigfield, 2002).

Expectancy-value theories of motivation argue that the degree to which a person is motivated to achieve a particular goal is an outcome of a person’s subjective goal expectations and their goal values (Eccles & Wigfield, 2002). Expectancy refers to an individual’s perceived subjective likelihood of success in a certain task or area, for example, the likelihood of passing a difficult maths test (Eccles & Wigfield, 2002). This may very well be quite different from the actual likelihood of success. Value, on the other hand, refers to an individual’s perceived desirability of said success such as the resulting enjoyment, pride, or financial rewards as well as the enjoyment of the task itself.

Research has demonstrated that expectancy and value are positively related to one another (e.g., Bandura, 1997; Eccles, 1983). For example, Vallerand and Reid (1984) found

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1 It is important to note that both expectancy and value need not necessarily be conscious and explicit. They can also exist on a more subtle, implicit level. Moreover, both expectancy and value can be influenced by a range of factors including biases and heuristic. We would thus not call it a “rational choice” theory.
this positive association for a physical task and MacIver, Stripek, and Daniels (1991) demonstrated that for junior high school students in educational settings, ability perceptions (expectancy) predict enjoyment (value) of a subject. This makes intuitive sense – we generally enjoy things that we are good at, or believe we are good at, more than we enjoy those things in which we experience or anticipate failure.

Moreover, expectancy and value have been shown to interact with one another to influence individuals’ motivations, achievement, and choices (Nagengast et al., 2011; Trautwein et al., 2012). For example, Nagengast and colleagues (2011) asked a large international sample of 15-year-olds about their science-related ability beliefs (expectancy) and about their enjoyment of and interest in science (value). They found that both individuals’ expectancies and their values predicted involvement in science-related activities as well as science-related career goals. In addition, expectancy and value interacted such that the effect of value was especially high when expectancy was also high – and vice versa.

In the following paragraphs we will provide more detail about the constructs of both expectancy and value. Our theoretical framework is built on the theories of expectancy, value and motivation provided by others as well as empirical evidence. However, as our focus is specifically on how expectancy-value theories can further our understanding of role models, we will simplify existing models in some places and expand them in others. After outlining theories of expectancy and value we will then discuss how they can help us understand role models in their different functions.

**Expectancy.** Expectancy is the subjectively perceived probability of success, that is, the degree to which an individual sees a goal as attainable. This can refer both to a specific, short-term goal (e.g., learning an advanced statistical technique) and broader, long-term goals (e.g., becoming a successful academic). Expectancy can be influenced by internal factors (i.e.
related to the self), such as perceived ability, as well as being influenced by external factors, such as perception of discrimination or perceived goal difficulty.

**Expectancy based on perceptions of internal factors.** This aspect of expectancy is one's subjectively perceived probability of success based on one's abilities and traits. It is closely related to self-efficacy as conceptualised by Bandura (1997). He defines self-efficacy as the confidence that one can successfully perform a specific behaviour or broader task and links it to subsequent motivation and performance (Bandura & Locke, 2003) as well as to the value of a goal (Eccles & Wigfield, 2002). However, expectancy goes beyond self-efficacy in that it is also influenced by the perception of other internal factors, namely ability beliefs based on one's social identities and their associated stereotypes (Turner et al., 1994). To the extent that one sees oneself as a member of a specific group rather than as an individual in any given situation, expectancy beliefs might indeed be more influenced by one’s ability and success beliefs of said group (e.g., “I'm a woman. Women lack leadership abilities. Therefore, I will never be a good leader”).

This group-based aspect of self-efficacy is closely related to self-stereotyping, which research has also been shown to be related to interest, motivation, and goals. For example, Rudman and Phelan (2010) demonstrated that when primed with traditional gender roles, women's implicit self-stereotyping (i.e. the degree to which they saw themselves as similar to a stereotypical woman) explained, at least in part, the effect between said priming and decreased interest in stereotypically masculine occupations such as surgery (see also Asgari et al., 2011; Stout et al., 2011).

**Expectancy based on the perception of external factors.** Expectancy can also be based on the more external factors. For example, a woman may believe that being able to successfully perform managerial tasks will lead to her eventual promotion to a senior leadership position. However, she could also believe that there are other factors that may
limit her likelihood of success – such as a sexist organisational culture or individuals with discriminatory attitudes (e.g., “I am a woman. Therefore others will think I can never be a good leader and won’t appoint me to a leadership position”). Here, even if one had positive beliefs about one’s own abilities, one might still not expect to reach a goal due to external barriers and would thus have lower levels of overall expectancy and, as a result, lower levels of motivation.

This link between expectancy based on the perception of external factors and motivation has been demonstrated in studies providing evidence that external barriers such as perceived discrimination and prejudice can lower motivation in achievement settings (Alfaro, Umaña-Taylor, Gonzales-Backen, Bácama, & Zeiders, 2009; Foley, Kidder, & Powell, 2002; Foley, Ngo, & Loi, 2006; Ragins & Cornwell, 2001). For example, Alfaro and colleagues (2009) conducted a longitudinal study with Latino adolescents in an educational setting and found that perceptions of racial discrimination predicted future reductions in academic motivation. In an occupational setting, Foley and colleagues (2002) found that for female solicitors their perceptions of gender discrimination were associated with motivational indicators such as lower organisational commitment and greater intentions to quit.

**Value.** Value refers to the subjective desirability of a goal and goal-related behaviours and predicts motivation and goals in addition to, and in interaction with, expectancy (Nagengast et al., 2011; Trautwein et al., 2012). Similar to expectancy, there is a combination of factors that can contribute to the overall value of a goal (Eccles, 1983). First, value is based on attributes of the goal and goal-related activities in themselves such as interest and enjoyment. Moreover, value is also based on the perceived effects that reaching the goal might have.

**Value based on internal attributes of the goal.** This internal aspect of value refers to both the enjoyment and interest associated with a goal per se, as well as the degree to which a
goal and its associated activities are included in one's self-concept. For example, being interested in mathematics, enjoying solving mathematical problems, and a subjective importance of being good in math are internal value components of the goal of becoming a mathematician. It is thus related to both Eccles' (1983) conceptions of intrinsic value (i.e. enjoyment and interest) and attainment value (i.e. subjective importance), both of which have been linked to motivation and goals (Harackiewicz, Durik, Barron, Linnenbrink-Garcia, & Tauer, 2008; Meece et al., 1990; Pang & Sau Ching Ha, 2010; Parkes & Jones, 2012; Xiang, Chen, & Bruene, 2005). For example, Meece and colleagues (1990) investigated value in the context of mathematics in high school and found that subjective importance of maths (i.e. the degree to which it was part of students’ self-concept) was positively related to the number of maths classes students were planning to take. Similarly, Parkes and Jones (2012) found that both subjective importance and intrinsic enjoyment of teaching and performing predicted undergraduate music students' intentions of becoming music teachers or performers.

**Value based on consequences of goal attainment.** The second, external, aspect of a goal's value encompasses reasons for pursuing a goal that is linked to the outcomes of the goal rather than pursuing the goal per se, for example, higher order goals or moral values. In other words, it relates to the usefulness of a goal in achieving something else. It might include the difference one could make as a politician, the money one could make as a lawyer, or the perceived social contribution of being a nurse. What one finds useful is not fixed or objective, but rather is dependent on one’s attitudes and moral values. For example, the goal of being a stay-at-home mother and wife may be desirable for some women with traditional values, but seem undesirable for some feminists.

Evidence demonstrates that value that is based on the consequences of goal attainment does indeed impact on role aspirants’ motivation, goals, and choices in achievement domains (Bøe, 2012; Lin, Shi, Wang, Zhang, & Hui, 2012; Pang et al., 2010). For example, Lin and
colleagues (2012) demonstrated that when asked about their motivations, prospective American and Chinese teachers reported that outcomes associated with a goal such as “making a contribution to society” were most important. Similarly, Pang and colleagues (2010) found that schoolchildren’ perceived usefulness of physical activity was predictive of their engagement in sport.

In summary, we have argued that the extent to which people expect to achieve a given goal and value this goal is likely to have an important impact on their motivation, both in terms of adopting the goal and being motivated to achieve it. In the next three sections we will discuss how expectancy-value theories might be applied to better understand the role modelling process. We will explain how role models can influence role aspirant expectancies and values in their functions as behavioural models, representations of the possible, and inspirations. We will argue that a role model’s effectiveness in influencing these variables will depend on how they are perceived by the role aspirant and we will outline potential predictors of these perceptions and the potential mechanisms by which they exercise their influence. We will first describe how expectancies can be influenced by role models as behavioural models, before we turn to role models as expectations of the possible, and finally to role models as inspirations.

**Role Models as Behavioural Models in the Expectancy-Value Framework**

As mentioned above, self-efficacy is an important part of goal-related expectations and, according to Bandura (1977a), one source of self-efficacy is social modelling which leads to vicarious learning. In other words, observing someone else successfully engaging in a task is likely to increase one's confidence in being able to do the same task oneself. For example, observing other people presenting at an academic conference can help a student or early career researcher understand how to communicate their research successfully. Even
before actually presenting their work, they are likely to feel more confident in their ability to do so because they have a better idea of how to do it. As mentioned earlier, this role modelling process differs from the function of role models as representations of the possible in that the focus is on *how to do something*, not *if something is possible*.

This path from vicarious learning to self-efficacy has been demonstrated many times since it was first proposed by Bandura and has been applied to variety of domains. For example, Law and Hall (2009) conducted a survey with sports novices and demonstrated that self-reported observational learning of skills and strategies predicted individuals’ self-efficacy in relation to skills and tactics respectively. Similar results have been found in occupational contexts (Eden & Kinnar, 1991; Neff, Niessen, Sonnentag, & Unger, 2013) as well as educational settings, for example, in relation to math and statistics (Bartsch, Case, & Meerman, 2012; Lent, Lopez, & Bieschke, 1991), and with writing skills (Zimmerman & Kitsantas, 2002).

This path from vicarious learning to increased self-efficacy directly relates to role models in their function as those from whom role aspirants learn, as described above. Role aspirant self-efficacy is thus a crucial link between role modelling and role aspirant motivation. By learning vicariously from their role models in their function as behavioural models, role aspirants increase their self-efficacy and thus their expectancy beliefs, resulting in higher motivation to pursue the goal in question.

But who is seen as a behavioural model? Manz and Sims (1981) note that “whether or not a model is attractive, competent, and successful contributes to the overall probability of that model’s behavior being imitated by others” (p. 105). In other words, those who embody the goal in question. We define goal embodiment as the degree to which a role model has successfully reached the role aspirant’s goal and it is thus closely linked with the capacity to motivate the role aspirant to move towards an already existing goal. For example, to a
medical student who has the goal of becoming a successful surgeon, any successful surgeon may embody that goal as a behavioural model. However, while goal embodiment in achievement domains may often be linked to success, goal embodiment goes beyond simple success. We would argue that role aspirants generally have more than one goal related to the same domain and that the person who best embodies a combination of these goals will make the best role model. For example, a medical student whose goal it is to become a successful surgeon might also want a good work-life balance and be respected by both patients and colleagues. Thus, a surgeon who embodies all three of these goals will be more likely to become this student's role model rather than the most successful surgeon who has no work-life balance and is disliked by everyone. On the other hand, role aspirants can also have more than one role model. Our hypothetical medical student could thus also emulate one surgeon in relation to behaviours that lead to career success, another surgeon's strategies to conciliate his or her hectic and time-intensive work hours with other aspects of his or her life, and yet another surgeon's bedside manner and interactions with colleagues.

The role model literature provides evidence for the importance of goal embodiment for changing role aspirant expectancy, although, as we have seen in Chapter 1, research generally assumes success as the relevant goal in achievement settings (e.g., Bagès & Martinot, 2011; Marx & Roman, 2002). However, evidence does demonstrate that this focus on success often makes sense as success and goal-related competence are often important predictors of role modelling (Bosma et al., 2012; Buunk et al., 2007; Gibson & Lawrence, 2010; Javidan et al., 1995).

Assuming success is a common goal in achievement settings, research from the business context strengthens the evidence for the link between goal embodiment and expectancy. For example, BarNir and colleagues (2011) investigated students in a business class and the impact of their role models on self-efficacy in relation to career intentions. They
found that, in general, role models had a positive effect on career intentions and that this effect was in part explained by entrepreneurial self-efficacy. Henry, Hill, and Leitch (2005) as well as Robertson and Collins (2003) show similar effects when investigating the impact of vicarious learning from successful entrepreneurs in an educational context.

What is less understood, however, is the way in which role aspirants’ multiple goals might influence role model choice and subsequent expectancies and motivation. Indeed, there is evidence that although success might be one of the most common goals in attainment settings, the effectiveness of role models is not about success per se but depends on the nature of the role aspirant’s goals, for example whether they generally set avoidance or approach goals (Lockwood et al., 2002; Lockwood, Sadler, Fyman, & Tuck, 2004; Schokker et al., 2010). Lockwood and colleagues (2002) demonstrated that only those individuals who are promotion focused (i.e. those who focus on a positive goal they are trying to achieve such as success) benefit from a successful role model while this is not the case for those who are prevention focused (i.e. those who focus on the avoidance of a negative outcome such as failure). Moreover, a study by Weaver and colleagues (2005) demonstrated that business success was often irrelevant when it came to identifying role models for ethical behaviour. In this case, embodying the goal of being ethical was the important dimension, not general success in the business world.

In summary, role model attributes (levels of success and competence in other areas) and role aspirant attributes (goals held by the role aspirant) interplay and contribute to the perception of goal embodiment. Higher levels of goal embodiment increase the extent to which a role aspirant learns vicariously from the role model and feels more confident in reaching the goal herself or himself. In other words, this increases self-efficacy or, as we have described it earlier, expectancy based on perceptions of internal attributes. Higher levels of expectancy in turn increase motivation, reinforce existing goals and also lead to the
acquisition of new skills. These processes are illustrated in Figure 8. The figure also illustrates two points we have made before, namely that expectancy influences value and that role modelling is a cyclic process. In the case of role models of behavioural models, this could for example mean that once new skills have been acquired, a role model who was previously perceived to be high in goal embodiment is no longer seen in that way and role aspirants instead seek out new role models who embody a higher level of skills or success.

Figure 8. Role models as behavioural models.

**Role Models as Representations of the Possible in the Expectancy-Value Framework**

Role models may also influence expectations of success as representations of the possible, although the mechanisms by which they do so are different from those of behavioural role models. As we have seen above, to function as a behavioural model a role aspirant needs to have the opportunity to observe a role model performing goal-related activities. In other words, they need to learn how a goal can be reached. In contrast, when functioning as representations of the possible role models merely demonstrate to the role aspirant that a goal can be reached. For this, it is not necessary for a role aspirant to see the role model actually do anything, although this may be beneficial.
Thus, the way in which role models can influence expectancy goes beyond increasing self-efficacy in Bandura’s sense. We would argue that one way in which role models can represent the possible, and thus increase expectancy, is through changing self-stereotyping (through either decreasing negative self-stereotyping or increasing positive self-stereotyping) and thus increase expectancy. This potential link between role models, self-stereotyping, and expectations of success is supported from a theoretical perspective by the stereotype inoculation model (see Chapter 1; Dasgupta, 2011) as well as by the empirical evidence supporting it (Asgari et al., 2012; Hoyt & Simon, 2011; Stout et al., 2011).

In addition, role models in their function as representations of the possible may also change the way in which external barriers are perceived. For example, if a woman sees another woman occupying a senior leadership position, this role model might facilitate expectations of success in more than one way. First, it may give the role aspirant an example of successful behaviour she can emulate and increase group-based self-efficacy as discussed above. In addition to that, however, such a role model may also demonstrate to the role aspirant that gender does not constitute an insurmountable obstacle and might thus improve her expectations of success based on external factors as well. In other words, the role model does not just demonstrate how to succeed (a behavioural role model), but shows that “it can be done” (a representation of the possible). One potential barrier which can lower expectancies is the perception of discrimination and research shows that the presence of other ingroup members in similar or higher positions does indeed signal the absence of discrimination, for example based on ethnicity (Foley et al., 2002) and sexual orientation (Ragins & Cornwell, 2001).

However, not all potential role models will act as representations of the possible. We propose that the extent to which role models embody role aspirants’ goals and the degree to which they are seen by role aspirants as attainable will be important characteristics. A role
model's attainability refers to the degree to which a role aspirant can see him- or herself being like the role model in the future – the answer to the question “can I be like this person?” This is closely related to similarity, but differs in an important aspect. Rather than being about current similarity, it is about potential future similarity. Thus, attainability, just as goals, are related to the future rather than the present. We propose that attainability is related both to motivation in relation to existing goals and the adoption of new goals and works through influencing role aspirants’ expectations of success when combined with the embodiment of an existing or new goal. By seeing someone else reach a goal such as obtaining their PhD (goal embodiment) and believing that one can be like said person, for example because she or he comes from a similar socioeconomic background (attainability), role aspirants can see themselves in the position of this role model and thus believe in reaching the goal themselves. In this way, together, attainability and goal embodiment can increase group-based self-efficacy, but it can also influence expectancy beliefs based on external factors.

Representations of the possible and goal embodiment. As noted above, role models can change role aspirants’ ability beliefs by influencing their self-stereotyping. From a role modelling perspective, these changes are only useful if they are in line with one's goals or a potential new goal and thus goal embodiment is crucial. For example, if a role aspirant aims to become a manager, only those stereotypes that are relevant to this goal (i.e. the traits and abilities a manager needs to possess) are likely to be important to the role modelling process and these stereotypes are only likely to change in the desired direction if the role model embodies what it means to be a manager. A number of studies demonstrate that exposure to role models can indeed change role aspirants’ self-stereotypes and their beliefs about their

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2 Note that goal embodiment in the context of role models as representations of the possible can refer to either a new or an already existing goal. In the context of behavioural models, on the other hand, it refers primarily to already existing goals.
own abilities, at least at an implicit level. This research further indicates that by changing self-stereotyping, role models also change expectancy and in turn goals and ambitions.

Such evidence has been found both using experimental methodologies in the laboratory (Asgari et al., 2011; Stout et al., 2011, Study 1-2) and in longitudinal, naturalistic studies (Asgari et al., 2010; Stout et al., 2011, Study 3). In line with our arguments that goal embodiment is a crucial aspect of role modelling, the potential role models in these studies were always successful in a domain relevant to the role aspirant. For example, they were either successful professional leaders who changed the role aspirants' self-stereotypes relating to leadership (Asgari et al., 2011), successful peers in STEM fields who changed role aspirants' self-stereotypes in relation to maths (Stout et al., 2011), or professors (and thus leaders) of the role aspirants' field of study who affected leadership-related self-stereotypes (Asgari et al., 2010).

Goal embodiment is also important for expectancy beliefs based on external factors. We have already discussed how same-level peers or superiors with whom role aspirants share a group membership (and who are thus also more attainable) can act as role models and change external expectancies (see Foley et al., 2002; Ragins & Cornwell, 2001). There is further evidence that suggests that this effect is not restricted to stigmatised groups. For example, Buunk and colleagues (2007) found more positive effects on planned career-related behaviour when final year students were exposed to a recently graduated role model who was successful rather than an unsuccessful in securing a job after graduation. We suggest that this is due to changes expectancy based on external factors such as the current job market.

**Representations of the possible and attainability.** There are a number of studies that demonstrate that role models as representations of the possible need to be attainable in order to increase role aspirants’ expectations of goal success. While the construct of attainability in itself is not widely investigated within the role model literature, a number of
the factors which increase role model effectiveness discussed in Chapter 1, namely level of the role model’s success, attribution of this success, shared group membership, and similarity, speak to the attainability of role models.

Role model success and attainability. A study by Lockwood and Kunda (1997, Study 2) directly manipulated the attainability of a role models success by presenting students who were either in their first or final year with an outstanding final year student. To first year students, who still had enough time to achieve similar levels of success, this potential role model was more attainable while to final year students, “catching up” seemed out of reach. In line with our predictions they demonstrated that only those role models whose success seemed attainable positively influenced role aspirants’ expectations of success. Moreover, a study by Hoyt and Simon (2011) demonstrates that potential role models that are too successful can be detrimental for role aspirant expectancy. We have explored in Chapter 1 how the ideal degree of success is likely to follow an inverted U-shaped curve and this makes sense if we think about it in terms of goal embodiment and attainability. If a potential role model is not seen as successful enough, they are unlikely embody the role aspirant’s goal in achievement settings. However if the individual is too successful, they may seem unattainable to the role aspirant and lose effectiveness as role models. However, the optimal success of a potential role model is of course dependent on the role aspirant’s perception of the role model’s success in comparison to his or her own success as well as their own ability beliefs (Brown, Novick, Lord, & Richards, 1992; Collins, 1996; Hoyt, 2013; Wheeler et al., 1997). A PhD student might see a successful post-doc as an excellent role model, but the same post-doc's effectiveness as a role model for a professor will be very limited – at least when the goal in question is purely success. Similarly, while a confident PhD student might see the

3 This is also where the distinction between similarity and attainability becomes important. Similarity itself is at its maximum when level of success of role aspirant and role model are exactly the same. Attainability, on the other hand, can still be equally high when the role model is slightly more successful than the role aspirant as it is evaluated based on the potential future.
successful post-doc as attainable, another PhD student with low self-esteem and low self-efficacy might see her or him as out of reach.

Other studies that speak to the attainability of role models, albeit indirectly, have examined the way in which the attributions for the success of the role models impact on role aspirant expectancies. For example, if success is seen to occur by sheer luck or through nepotism, this is unlikely to be encouraging as it may be seen as unattainable. As we have noted in Chapter 1, people will most likely benefit from a role model’s success if said success seems stable, controllable, and internal – all factors which make the role model more attainable. While not all studies use this terminology when investigating the effects of attribution, they still corroborate this idea and demonstrate that the attribution of success influences role aspirant expectancy (Hoyt et al., 2012; Lockwood & Kunda, 1997) and also illustrate how this attribution depends both on actual reasons for success on the side of the role model and attributes of the role aspirant.

For example, some studies have examined the effect of theories of abilities, that is, the belief that specific abilities such as intelligence or leadership skills are malleable and can be learned or are fixed and thus cannot be influenced by hard work or practice. The former could also be described as being controllable, whereas the latter is uncontrollable and these studies show that seeing these abilities as malleable makes role models more effective in changing ability beliefs (Lockwood & Kunda, 1997).

**Shared group membership and attainability.** Another widely studied role model characteristic that, we would argue, is related to attainability, is shared group membership. This is in line with the social identity approach’s claim that individuals generally believe that it is easier to become like those who share their social identities (Turner et al., 1994) and with the literature on upward comparison which claims that assimilation to an upward target is facilitated by a shared group membership (Collins, 1996). It is important to note, however,
that everyone is part of multiple social groups and thus ingroup membership will only matter to the extent that it relates to the role aspirant’s salient and important social identities (Turner et al., 1994). Moreover, in her review on the effects of upward comparison, Collins (1996) points out that the extent to which upwards comparison targets share an unusual feature or group membership also affects the extent to which it matters (see also Brewer & Weber, 1994).

As we have noted earlier, changing role aspirants’ self-stereotyping is an important mechanism through which role models can increase expectancy, and therefore shared group membership may be one of the most important signals of attainability. While it could be argued that positive ingroup role models may impact on self-stereotyping through changing the stereotypes of the group as a whole, we would argue that the process is likely to be more complex. Rather, counter-stereotypical role models demonstrate to role aspirants that stereotypes may not apply to oneself. Let’s assume, for example, that a woman has the career goal of becoming a successful computer scientist but she does not believe that she has what it takes because of her gender. When she is exposed to a range of successful computer scientists, she makes an attainability assessment by asking herself whether she could be like said computer scientists. If her gender identity is salient, a female computer scientist is more likely to be seen as attainable than a male computer scientist, which then leads to changes in her self-stereotypes following the logic “she has the attributes of a successful computer scientist such as being analytical. I can be like her. Thus, I may have the attributes of a successful computer scientist such as being analytical”. The same logic, however, will not necessarily apply to all women. This is supported by evidence that demonstrates that role models can indeed change role aspirant self-stereotyping without necessarily changing stereotypes about the ingroup as a whole (Stout et al., 2011).
Additionally, there is evidence that demonstrates that ingroup role models can improve role aspirant group-based self-efficacy more generally by demonstrating that members of one’s own group “have what it takes”, as well as change expectations based on external factors by demonstrating that barriers for ingroup members are not insurmountable (Blanton et al., 2000; Lockwood, 2006; Marx and Roman, 2002).

**Similarity and attainability.** More evidence indicating that perceived attainability is an important factor in the role modelling process comes from research investigating impact of the degree of similarity between the role aspirant and the potential role model. After all, the degree to which one can imagine being like someone else in the future is most certainly related to the degree of similarity perceived in the present. The idea that similarity is important for role aspirant expectancy assessment is not new and has been voiced several times in the social comparison literature (e.g., Collins, 1996; Festinger, 1954; Wheeler et al. 1997). For example, Festinger (1954) argues that role aspirants tend to compare themselves to similar others when assessing their abilities and in their Proxy Model of Social Comparison Wheeler and colleagues (1997) argue that to evaluate whether one can successfully perform a task, role aspirants compare themselves to a role models (which they refer to as proxy), who is similar in prior performance as well as in attributes related to the task (e.g., similar levels of expertise or practice). The authors further argue that role aspirants then look at whether the role model can successfully perform the task in question – a notion very similar to our proposed interaction between goal embodiment and attainability.  

The examples of related attributes the authors give seem to depend mostly on past experience with the role model and would thus suggest that one needs to know the role model quite well in order to make this assessment. However, we would argue that many attributes thought to be related to success in achievement settings such as gender or ethnicity require little prior knowledge of the role model and this is in line with Wood’s (1989) observation...
that even similarity on attributes that are completely unrelated to the ability in question such as sharing a date of birth (Brown et al., 1992) or being similar in physical attractiveness when evaluating one’s ability of logical reasoning (Miller, 1982) promote positive effects when comparing with a target who is more successful than oneself.

While neither Festinger (1954) nor Wheeler and colleagues (1997) suggest that the effect of similarity on expectancy is associated with attainability, this may be the case because their theories focus on present ability rather than future goals. When evaluating whether one can perform a certain task in the present (e.g., “Can I at this point in time successfully apply for a post-doc?”) one may look to others who are as similar as possible (e.g., other PhD students who are also in their final year and similar in other related attributes such as number of publications) to see whether they have been successful with the task at hand. However, when evaluating a broader, more distant goal (e.g., “Can I be a successful academic?”), attainability (i.e. potential future similarity) may be more important.

Similarity is by no means independent of level of success or shared group membership that we have discussed above, especially when said group membership is highly salient as it tends to be the case in the aforementioned studies (Turner et al., 1994). However, as we discussed in Chapter 1, there is also evidence that the effect of perceived similarity on role aspirants’ expectations of success goes beyond shared group memberships, even for salient categories such as gender (Cheryan et al., 2011; Asgari, et al. 2011; Wohlford et al., 2004).

Taking these findings into account, we conclude that perceived similarity is likely to be another, if not the, key factor in determining the perceived attainability - and eventually the effectiveness - of role models, and that shared group membership is one of several routes to similarity. It is therefore not enough to present role aspirants who are members of under-represented or negatively stereotyped groups with a successful ingroup member.
To summarize, someone’s perceived goal embodiment and attainability can make them a role model in their function as a representation of the possible and consequently influence expectancy by changing self-stereotyping and the perception of barriers. Both perceived goal embodiment and perceived attainability are influenced by a number of attributes of the role model as well as the role aspirant (see Figure 9). This process is again cyclic in nature. For example, once a role model has changed self-stereotyping and thus increased ability beliefs, a range of new role models might become attainable.

Figure 9. Role models as representations of the possible

**Role Models as Inspirations in the Expectancy-Value Framework**

Before we go into more detail about how role models as inspirations fit into the expectancy-value framework, it is useful to discuss what we mean by inspiration. Thrash and Elliot (2004) propose that inspiration can be divided into two different processes – being inspired by and being inspired to. The first one, being “inspired by”, directly relates to role
models as they are mentioned by the authors as one of the sources that can inspire role aspirants. For example, one might be inspired by one's professor to pursue a career in academia. Thus, inspiration is one of the concepts that connect role models to role aspirant motivation and goal adoption. The authors also demonstrate that inspiration has three core qualities: Transcendence, evocation, and motivation. Transcendence refers to the way in which inspiration leads individuals to adopt new or better goals or to think in new or better ways – in other words, inspiration makes new goals desirable. Evocation recognizes that inspiration is generally evoked by something outside of one’s own will – for example a role model. Finally, motivation describes the way in which inspiration leads one to want to strive towards these new goals (Thrash & Elliot, 2004). These three qualities are exactly what we, and others, argue role models do in their function as inspirations for role aspirants. Thus, these insights not only clarify that role models may indeed cause role aspirants to be inspired but also that this inspiration leads to role aspirants seeing new goals desirable and having increased motivation.

As we have outlined earlier in this Chapter, value is an important predictor of motivation, goals, and choices and in line with Thrash and Elliot’s (2004) conceptualisation of inspiration we would argue that role models in this function can influence the perceived value of a goal. The fact that others can influence our value judgments has been noted before. For example, the Triadic Model of Opinion Comparison (Suls, Martin, & Wheeler, 2000) suggests that when predicting whether one will like a certain task or activity (i.e. whether one will intrinsically value it), role aspirants look to others and their reactions to that task. However, these models do not discuss inspiration. In particular, the aspect of transcendence is missing from these models.

Our conceptualisation of how role models can influence value is closer to the processes of identification and internalisation described in the context of transformational
leadership by both Shamir, House, and Arthur (1993) and in the context of attitude change based on social influence by Kelman (1958), as well as the emotional process of admiration as described by Schindler, Zink, Windrich, and Menninghaus (2013).

Identification, in this case, means personal identification, which refers to a process in which one individual (in this case the role aspirant) attempts to be like another person (in this case the role model) based on “the desire to emulate or vicariously gain the qualities of the other” (Shamir et al., 1993, p. 586). This is based on the attractiveness of the role model and the extent to which she or he represents desirable attributes or embodies important values (Kelman, 1958; Shamir et al., 1993). According to Kelman, identification results in satisfaction based on being like the identification target rather than the utility for any other goals. Thus, it results in an increase of what we refer to as value based on the internal attributes of a goal (i.e. enjoyment, interest, interest, and subjective importance as part of a role aspirant’s self-concept). The idea that identification is an important part of role modelling is not new (see Dasgupta, 2011) and evidence indeed indicates that it is linked to role model effectiveness (Hoyt et al., 2012; Stout et al., 2011).

This is different from internalisation, which refers to a process by which the person exposed to the source of social influence “adopts the induced behaviour because it is congruent with his [or her] value system. He [or she] may consider it useful for the solution of a problem or find it congenial to his [or her] needs. Behaviour adopted in this fashion tends to be integrated with the individual’s existing values” (Kelman, 1958, p. 53). We would argue that internalisation is therefore more likely to affect the value based on the consequences of goal attainment or behaviour. According to Kelman (1958) this form of social influence is mainly based on the credibility of the source – an attribute which shares many similarities with competence.

A recent paper by Schindler and colleagues (2013) suggests that another potential
route through which role models might influence the value role aspirants associate with the consequences of goal attainment is through admiration, a concept very closely related to inspiration. According to the authors, admiration is an emotion that is associated with the internalisation of ideals and values embodied by an outstanding role model, although the authors do not discuss what exactly makes a role model outstanding.

Alas, none of the authors are particularly precise in naming the attributes a role model needs to possess in order to inspire but we suggest that role model need to be perceived as desirable. Desirability refers to the degree to which a role aspirant perceives a role model in a positive light, and such desirability is likely to make a role aspirant want to be like the role model. Indeed, there is evidence that demonstrates that career choices are often influenced by the desire to be like someone such as a role model (Quimby & DeSantis, 2006) and this effect of desirability is in addition to effects of self-efficacy (and thus expectancy). Moreover, research has demonstrated that the degree to which leaders’ own behaviour can change followers’ behaviour depends on the degree to which they are seen as “worthy role models” – in other words, as desirable (Yaffe & Kark, 2011). This study further shows that the path between leader behaviour and follower behaviour is indeed mediated by value. In other words, when leaders who were seen as desirable behaved in a certain way, followers valued this behaviour more and in turn displayed it to a greater extent themselves.

However, the question remains: who do we see as desirable? Who can elicit identification, internalisation, and admiration? When asking these questions, it is useful to first clarify how our concept of desirability differs from admiration. We agree with Schindler and colleagues’ (2013) definition of admiration as an emotion and suggest that desirability is what elicits this emotion. In addition, however, we suggest that desirability can also prompt identification or internalisation, which could be seen as less “emotional” routes to changing
value. Desirability is therefore an umbrella term which includes admirability, but also goes beyond it.

**What predicts desirability?** The literature on admiration (e.g., Sweetman, Spears, Livingstone, & Manstead, 2012) and impression formation and social judgment (e.g., Brambilla, Rusconi, Sacchi, & Cherubini, 2011; Brambilla, Sacchi, Rusconi, Cherubini, & Yzerbyt, 2012) suggest that there are three important factors contributing to desirability: sociability, morality, and competence (which in this case does not refer to goal-related competence but to general attributes such as intelligence or skill). Particularly the notions of morality and competence are also in line with Kelman’s (1958) predictors for identification (embodying moral values) and internalisation (credibility).

The Stereotype Content Model (Fiske et al., 2002) as well as Social Role Theory (Eagly, 1987) would further suggest that the importance of these attributes varies depending on the target’s group membership. For example, as prescriptive stereotypes dictate that women should be warm and sociable, this factor might be more important for female role models.

Evidence from the role model literature on this issue is scarce and mixed. We have already discussed an abundance of evidence which speaks to the fact that competence (and success) is an important factor for role model effectiveness, but it does not necessarily speak to whether or not this competence elicits admiration. The effects of sociability are mixed. While Calvert and colleagues (2001) demonstrated that the sociability and likability of a heroine from a TV show were related to the degree to which participants perceived her as a role model. However, this does not say anything about whether perceiving her as a role model changed participants’ goals and motivation in any way. Moreover, as we have described in Chapter 1, Parks-Stamm and colleagues (2008) found that information that a potential female role model was sociable as well as competent at management tasks had a
negative influence on women’s ratings of their own competence. We suggested that the combination of sociability and managerial competence might have seemed unattainable to the female participants. However, this study does not shed light on whether or not women thought being a manager was more desirable. Nevertheless, this study illustrates the complexity of the role modelling process and how some information can be positive in some respects but negative in others.

In line with Shamir and colleagues (1993), we would argue that another important factor influencing desirability is shared group membership. As we have already discussed, Social Identity Theory suggests that we generally want to be like those in our ingroup (Turner et al., 1994) and thus ingroup members can function as inspirations and influence how we value different goals (Turner, 1991). Indeed, there are studies that explicitly investigate how ingroup role models can influence positive associations with an area on an explicit level (e.g., asking participants to rate how much they like math) and implicit level (e.g., by pairing “good” and “bad” with maths and English) and these studies demonstrate that ingroup role models can influence the valence (and thus value) of a domain (Stout at al., 2011). While these studies do not always find changes in explicit measures (in line with the stereotype inoculation model discussed above), the implicit measures they record are often also related to changes in goals (Dasgupta, 2011; Stout et al., 2011).

Related to, but distinct from, shared group membership, is similarity, another factor that we suggest as a predictor for desirability. It has long been established that we generally like those who are similar to ourselves more than those who are dissimilar (Byrne, 1997) and while desirability goes beyond likability, we would argue that they are certainly related. After all, why would we want to be like someone we dislike? Similarity has been found to predict likability in a number of contexts, ranging from romantic attraction (Byrne, 1997; Montoya, Horton, & Kirchner, 2008) to formal mentor-mentee relationships (Lankau, Riordan, &
Thomas, 2005). Findings from the role model literature support the idea that this similarity is linked to interest and thus value. For example, Cheryan and colleagues (2013) found that when female students interacted with a similar or dissimilar computer science student there were lasting effects on the female students’ interest (an important part of value) in computer science.

The relationships outlined above can be seen in Figure 10, which once more illustrates the cyclic nature of this process. For example, once a new goal has been adopted, different role models will be seen as desirable. Moreover, it should be noted that while we have included morality as a role model attribute, this is of course not an objective quality to possess. Rather, different behaviors which can be seen as moral or amoral displayed by the role model will interact with values held by the role aspirant to influence their perceptions of whether or not the role model is desirable.

*Figure 10. Role models as inspirations*
Summary

In this final section we will integrate the key points we have outlined above and present a summary of the Motivational Theory of Role Modelling. This new theoretical framework not only highlights when role models may be effective in increasing motivation, but also how they may do so.

On the previous pages, we have summarised a range of definitions of role model and from them derived three distinct functions that are served by role models. First, they can act as behavioural models from whom role aspirants can learn vicariously. Second, they can act as representations of the possible and demonstrate to role aspirants that a goal is attainable by changing ability beliefs and self-stereotyping as well as the perceived external barriers. And third, they can act as inspirations and make new goals desirable for role aspirants. Bringing these functions together we have recommended a definition of role modelling that focuses on motivational outcomes for role aspirants and have proposed that role models influence motivation and goals by increasing the associated expectancy and value that role aspirants attach to goals. Moreover, we have outlined the mechanisms by which the role modelling process may occur. In doing so, we have proposed three important qualities that role models must be perceived to exhibit in order to motivate role aspirants to strive towards pre-existing goals or embrace new goals: goal embodiment, attainability, and desirability. Each of these qualities are influenced by a number of different, but sometime inter-related, predictors such as level and attribution of success, shared group membership, similarity, competence, sociability, and morality. These variables are summarized in Table 6. By bringing together the motivational literature with the role model literature, we have now a clear and integrated theoretical framework from which to understand how role models work and when they are most effective for what purpose.
Table 6.

**Overview over Role Model Qualities and Associated Constructs and Processes**

<table>
<thead>
<tr>
<th>Functions</th>
<th>Role aspirant attributes</th>
<th>Role model attributes</th>
<th>Role model qualities</th>
<th>Mechanisms</th>
<th>Mediating Variables</th>
<th>Outcomes</th>
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</thead>
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<td>Behavioral models</td>
<td>Pre-existing goals</td>
<td>Level of role model success</td>
<td>Goal Embodiment</td>
<td>Vicarious learning</td>
<td>Expectancy</td>
<td>Skill acquisition</td>
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<tr>
<td>Representations of the possible Inspirations</td>
<td>Level of role aspirant success</td>
<td>Reasons for role model success</td>
<td>Attainability</td>
<td>Changing self-stereotypes</td>
<td>Value</td>
<td>Motivation</td>
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<td></td>
<td>Ability beliefs</td>
<td>Competence</td>
<td>Desirability</td>
<td>Changing perception of external barriers</td>
<td>Goal reinforcement</td>
<td>Goal adoption</td>
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<td>Theories of abilities</td>
<td>Sociability</td>
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<td>Self-esteem</td>
<td>Morality</td>
<td></td>
<td>Internalisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Values</td>
<td></td>
<td></td>
<td>Admiration</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Similarity between role model and role aspirant

Shared group membership of role model and role aspirant
To summarise, in order to function as behavioural models, potential role models need to embody a role aspirant’s already existing goals. In achievement settings, this is likely to be linked to high levels of success or goal-related competence. Through vicarious learning experiences the role aspirant’s self-efficacy increases. Self-efficacy is an important part of expectancy and can therefore increase motivation to work towards an already existing goal. As one generally also enjoys the things one is good at (or believes one is good at), this is also likely to increase the value role aspirants associate with the goal in question. Moreover, vicarious learning is also likely to lead to skill acquisition. It should also be noted that changes in motivation, goals, and skills is in turn likely to influence goal embodiment – once goals have changed, it might well be that a new role model is needed, a behavioural model who embodies these new goals (see Figure 8).

Moreover, role models can function as representations of the possible. To summarise, they need to be perceived by the role aspirant as attainable and embody an already existing or a new goal to increase motivation to move towards an existing or adopt a new goal respectively. A role model's attainability is in turn influenced by a number of factors including, but not necessarily limited to, shared group membership, similarity, as well as level and attribution of success. These factors are of course likely to be related to one another. For example, if someone shares one’s group membership, they are also likely to be perceived as more similar. Goal embodiment and attainability interact and influence the expectancy component of motivation in more than one way. First, they change the role aspirant’s self-stereotyping, and through this, his or her own ability beliefs. Second, attainability and goal embodiment can also influence the expectancy component based on external factors by demonstrating to role aspirants that potential obstacles can be overcome. This function may thus be especially relevant for stigmatised groups such as women or ethnic minorities in the workplace. Importantly, the effect of role models as representations of the possible is not
limited to already existing goals but can also contribute to role aspirants adopting new goals. As already noted when discussing role models as behavioural models, the process is likely to be cyclic – once a new goal has been adopted or an old one has been reinforced, attainability and goal embodiment of available role models may change, which in turn change motivation and goals (see Figure 9).

Finally, role models can function as inspirations. For this to occur, they need to be perceived as desirable by the role aspirant, resulting in identification, internalisation, and admiration. Shared group membership, similarity as well as perceived morality, sociability, and competence of the role model as well as values held by the role aspirant are likely to influence this quality. While we believe that role modelling is a general process that is not restricted to any certain group, some of these factors might play different roles based on group membership. For example, due to prescriptive gender stereotypes, sociability might play more into the desirability of female role models, whereas general competence might be more important for male role models. Similarly, these attributes might be of different importance to female and male role aspirants. Desirability can then positively influence the value a role aspirant places on a goal. We propose that as inspirational figures, role models mostly contribute to role aspirants adopting new goals. This is consistent with the literature on expectancy-value theories, which suggest that the value component is highly predictive of choices in achievement settings (e.g., choosing what subject to study, arguably a new goal), whereas the expectancy component is more predictive of performance (Fredricks & Eccles, 2002; Jacobs et al., 2002). This is likely due to the fact that the value associated with existing goals is already high. The adoption of a new goal, in turn, is likely to influence who we see as desirable (see Figure 10).

It is important to note that these three functions are by no means completely independent of each other. As discussed above and as illustrated in Figure 8-10, there is an
overlap between the different functions. For example, goal embodiment is important for role models as behavioural models as well as for role models as representations of the possible. On the other hand, fulfilling one function might also hinder fulfilling another. A role model who functions as an inspiration may make a goal desirable, but at the same time negatively influence role aspirants’ expectations of success when attainability is low.

**Future Research**

We have provided a framework that brings together various strands of the literature. Thus, there is considerable evidence from these strands of literature that speaks to the potential relationships proposed in our theoretical framework. Nevertheless, each of these relationships need to be tested empirically and in combination with one another. While there is strong empirical evidence for parts of the framework (e.g., the link between vicarious learning and self-efficacy), other aspects of the framework are derived mainly from theoretical analyses and specific interpretation of certain findings (e.g., the link between desirability, admiration, and value) and thus need to be examined in more detail.

Our theoretical framework introduces three new constructs for the understanding of role model effectiveness: goal embodiment, attainability, and desirability. These constructs and their predictors have not been directly investigated systematically, especially not in relation to one another not in the context of role models. Future research should fill this lacuna and provide reliable psychometric measures for these new constructs. Similarly, the impact of role models in general on expectancy and values needs to be examined directly. Our new theoretical framework provides a framework from which to do so. However, this can only be a first step in bringing the role model literature together in a theoretically grounded way.
The bulk of the motivational literature and the role model literature have focused on educational and occupational contexts and we designed our theory with achievement settings in mind. However, it is very much the case that role modelling takes place outside of these settings. For example, one could also be motivated to be a good romantic partner or to behave in altruistic ways and this could likewise be influenced by role models. Whether the same relationships hold in non-achievement settings is, however, unclear, and, again, needs to be empirically tested.

**Practical Implications**

Our emphasis on motivational processes is not only relevant for furthering our theoretical understanding of role models but also has important practical implications. Role models are often claimed as a solution to the under-representation of stigmatised groups, yet real life role model interventions often do not yield the desired effects (e.g., Armour & Duncombe, 2012). By gaining a better understanding of role models, role aspirants, and the process of role modelling we can develop better and more effective role model interventions.

Our theoretical framework indicates that the type of intervention that is likely to be effective will depend on whether it aims at motivating role aspirants towards an already existing goal or towards the adoption of a new goal. For example, when trying to motivate girls and women to go into STEM fields, the model suggests that it is likely that it will be important to make the goal both attainable and desirable (i.e. increase both expectancy and value). For this, role models who can act as representations of the possible and inspirations are likely to be needed and it therefore makes sense to present role models that are both desirable and attainable. However, the model also suggests that interventions aiming at retaining women in STEM fields, on the other hand, need to enhance *expectations* of success as success itself is likely to be already highly valued. Thus, potential role models should be
chosen based on whether they can act as behavioural models and show how to succeed in
STEM as well as whether they can act as representations of the possible and show that
success is attainable. Our theoretical framework suggests that goal embodiment and
attainability are likely to be the most important factors in this case.

It is also important to keep the interplay of desirability and attainability in mind.
Indeed, some factors that may increase desirability may at the same time decrease
attainability. For example, someone like Mother Teresa might seem extremely moral,
awesome, and inspirational, and role aspirants may admire her a great deal, but at the same
time this level of morality is likely to seem out of reach to most of us. The same can be said
for other attributes that positively influence desirability such as level of success and
sociability, as discussed earlier (Hoyt & Simon, 2013; Parks-Stamm et al., 2008). Ingroup
membership, on the other hand, influences both attainability and desirability positively and is
therefore likely to be a good mechanism through which to enhance both qualities. It has to be
kept in mind, however, that role aspirants are always members of many groups and shared
group membership on one dimension might not be enough. For example, women of colour or
women with a working-class background may not benefit from a white female role model
from an upper-class background.

These practical implications are especially relevant in the context of stigmatised
groups. We have highlighted the importance of stereotypes and perceived discrimination
throughout this chapter and both of these factors are of particular relevance for those who are
negatively stereotyped and discriminated against in a given domain. This also helps explains
why role model interventions often have considerably smaller effects on majority group
members (e.g. Bagès & Martinot, 2011; BarNir et al., 2011) – these groups are often
positively stereotyped (e.g., men are perceived to be good at math regardless of their
performance and math is often already part of their self-concept) and thus their expectations
of success are already high. Nevertheless, we propose that our model is applicable to all groups, not only those facing negative stereotypes, prejudice, and discrimination.

Conclusions

In this chapter we have provided a clear and integrated theoretical framework from which to examine the way in which role models motivate role aspirants. It contributes to the role model literature in several ways. First, it helps to bring the literature together and give it meaning that goes beyond the impact of the individual papers. Moreover, it takes a step towards understanding the processes through which role models may influence the goals and motivations of role aspirants. Role modelling cannot be understood without understanding role aspirants and the motivational processes taking place within them. By furthering the understanding of the role model process, we have also highlighted practical implications for those developing role model interventions as well as for those who may act as role models.

We began by recognising that role models are seen a panacea for the under-representation of stigmatised groups: do we think this is the case? We certainly believe they role models have great potential in making a difference on role aspirants’ lives (otherwise we would hardly have gone through the effort of writing this thesis). However, on the basis of the MTRM, we do not believe in a one-size-fits-all approach when it comes to role modelling. Role aspirants all have different goals, belong to different groups, and find different attributes desirable and attainable.

Returning to our initial example of Barrack Obama as a role model for African Americans, we would argue that he can certainly have a positive effect by acting as a representation of the possible and as an inspiration for African Americans, but this may not always be the case. African American girls may see him as unattainable due to his gender, while others may not agree with his political views and thus see him as undesirable. For those
who do not strive for the same kind of success, he may not embody relevant goals. Taken together, we believe that there is no such thing as a perfect role model for all people. There will never be a person who will be seen as attainable and desirable by everyone and embody everyone’s goals and nobody can fulfil all role model functions for all potential role aspirants.

On a more positive note, however, we would argue that role models don't need to be outstanding to be effective. Many “ordinary Joes” and “ordinary Janes” can be role models to someone. Rather than focusing on a few exceptional individuals and assuming that they will motivate all women or all African American students, we need to provide a range of diverse people who role aspirants can make their personal role models.

The rest of this thesis will be dedicated to test the ideas outlined in this chapter. Specifically, Chapter 4 will present first empirical evidence that speak to role models in all three functions. In Chapter 5, we will experimentally manipulate attainability and desirability and test their effects on role aspirants’ career intentions. Finally, Chapter 6 will focus on role models in their function as representations of the possible.
Chapter 4: How Role Models in Their Three Function Influence Career Intentions

In Chapter 1 we discussed evidence suggesting that role models have beneficial effects, particularly for members of under-represented and negatively stereotyped groups. Now that we have developed a theoretical framework to help us better understand role modelling, it is time to revisit the claim that under-represented and negatively stereotyped groups lack available role models. This idea is widespread and illustrated by the quote at the very beginning of this thesis. However, as became evident in Chapter 2, the effects of role models are not as straightforward as they are often thought to be. Contrary to our predictions, Studies 1 and 2 suggest that women in STEM may not perceive a lack of role models and that providing female students with female role models in science may not have the anticipated positive effect on their interest in science.

With the help of the theoretical framework presented in Chapter 3 that offers a multi-faceted definition of role models and how they may affect motivation and goals, we can further investigate the effect of role models and the extent to which women in male dominated fields perceive a lack of role models. Using an approach similar to Study 1 both in terms of method and sample, we can now test the availability of role models in a much more nuanced way. Do women, particularly those in male-dominated fields, lack role models who are attainable, who are desirable, or who embody relevant goals? Do such women report lower success beliefs, which may indicate that role models as behavioural models and as representations of the possible might be needed or do such women report lower levels of enjoyment and interest, in which case role models as inspirations could be more motivating?

We will shed light on these questions and empirically test the claims that women in male-dominated fields lack role models in relation to all three role model functions described in Chapter 3 (i.e. behavioural models, representations of the possible, and inspirations) and
the constructs implicated in these functions (i.e. goal embodiment, attainability and desirability as well as expectancy and value). As in Chapter 2, we will focus on gender in a university setting. In line with the overall literature outlined in Chapter 1 we predict the following:

H1: Women in male-dominated fields will report lower levels of the availability of role models who they see as embodying their goals and who they perceive as attainable and desirable, lower expectancy, lower value, and lower career intentions.

This may seem surprising in light of our findings from Study 1, but we believe that the lack of evidence supporting the claim that women in male-dominated fields lack role models might have been in part due to the rather broad and unspecific way in which we measured the availability of role models. In the present study, we will use more refined measures which speak to the availability of role models in their three different functions while avoiding the term role model and the different interpretations students might have of this term altogether.

In addition to investigating gender differences in these constructs, it is also important to examine their relationships to one another. As we have described in the Chapter 3, role models serve three distinct but related functions. They act as behavioural models, as representations of the possible, and as inspirations. Moreover, we have suggested that role models may have an impact upon role aspirant motivation, goals and intentions by changing the expectancy (i.e. the subjective probability of success) and value (i.e. the enjoyment or subjective utility) of goals or goal-related behaviour. These two factors are theorised – and have been demonstrated – to interact with one another such that the effect of expectancy is particularly high when value is also high and vice versa (Nagengast et al., 2011; Trautwein et al., 2012). In this chapter, we will provide an initial empirical test of the ideas we put forward
in Chapter 3, examining whether they hold true in a sample of students from diverse disciplines. First, however, we will summarise how, within this specific context, we expect role models, in each of their three functions, may increase role aspirant motivation, reinforce role aspirant's existing goals, and facilitate their adoption of new goals.

**Role Models as Behavioural Models**

We have suggested that, as behavioural models, role models can increase role aspirant expectancy and, in turn, lead to increased role aspirant motivation, skill acquisition, and the reinforcement of pre-existing goals. This process is closely related to Bandura's (1977a) concept of social modelling and subsequent vicarious learning, which he describes as one of the sources of self-efficacy, a concept that can be seen as part of what we refer to as expectancy. The link between vicarious learning and self-efficacy has been shown in a variety of achievement domains such as sports, (Law & Hall, 2009) as well occupational and educational settings (e.g., Bartsch et al., 2012; Eden & Kinnar, 1991; Neff et al., 2013; Zimmerman & Kitsantas, 2002).

However, it is unlikely that simply displaying a given behaviour will make an individual more likely to be selected as a behavioural model. Rather, this likelihood depends on the degree to which the potential role model embodies the role aspirant’s goals. In achievement settings, these goals may often be related to success but can go beyond it. For example, goals could include having a good work-life balance or positive relations with co-workers. Nevertheless, most of the evidence supporting the idea that goal embodiment is an important quality that role models need to display comes from studies demonstrating that the success and competence of a role model affects their effectiveness (e.g., Bosma et al., 2012; Buunk et al., 2007; Gibson & Lawrence, 2010; Javidan et al., 1995). An exception is the
study by Weaver and colleagues (2005) demonstrating that when a role aspirant’s goal is ethical behaviour, role models needed to embody to be ethical rather than successful.

However, regardless of the specific goal investigated in these studies, one should keep in mind that it is unlikely that any one role aspirant will hold only one career-related goal. Many of us want to both be successful and make a difference, to be ethical and have a good work-life balance. It is therefore important to ensure that goal embodiment is defined (and measured) more broadly. In this chapter, we will do just that, directly investigating, for the first time to our knowledge, the effect of goal embodiment on role model effectiveness.

We will further test whether this effect is mediated by expectancy. As discussed at length in Chapter 3, we have reason to believe that role models influence role aspirant motivation by changing expectancy (i.e. the subjective probability of reaching a goal) and value (i.e. the extent to which a goal and goal-related behaviours are seen as useful and enjoyable), which in turn are thought to interact. More precisely, in their function as behavioural models, role models who embody role aspirant goals are thought to increase motivation by positively influencing expectancy. In line with the MTRM, described in more detail in the previous chapter, we thus predict the following:

H2: Role models will act as behavioural models

H2a: Perceived goal embodiment of available role models will predict role aspirants’ career intentions

H2b: This effect will be mediated by expectancy

H2c: The effect of expectancy on career intentions will depend on the value associated with goals such that the effect will be greater at high levels of value
Role Models as Representations of the Possible

In Chapter 3 we discussed in detail how, in their function as representations of the possible, role models can change motivation, reinforce existing goals, and contribute to the adoption of new goals and that they do so by influencing expectancy. We have further argued that this function is particularly important for members of negatively stereotyped and under-represented groups.

In order to function as representations of the possible, role models also need to embody role aspirant goals, but moreover, they need to be perceived as attainable, that is, role aspirants need to believe that they could be like the role model in question. These two factors are also likely to interact: If a role model does not embody a role aspirant’s goal, they won’t be able to change expectancy and in turn increase motivation regardless of levels of attainability. Similarly, if a potential role model is seen as unattainable, levels of goal embodiment will not matter.

Indeed, research demonstrates that role models who are too successful may actually decrease expectancy (Hoyt & Simon, 2011). Here, even though a role model’s success may embody a role aspirant’s goal, this is only helpful if such success can be attributed to stable, controllable, and internal factors in order to lead to increases in expectancy (e.g., Hoyt et al., 2012; Lockwood & Kunda, 1997).

However, as with goal embodiment, the effects of attainability itself, as defined in the previous chapter, have not been investigated. Neither are there, to our knowledge, any studies examining whether, and how, these two factors may interact, or whether their effect on role aspirants’ motivation and goals is mediated by different types of expectancy. We will address this lacuna in this chapter. Based on what we discussed above and in more detail in the previous chapter, we predict the following:

H3: Role models will act as representations of the possible
H3a: Perceived attainability of available role models will predict role aspirant career intentions
H3b: This effect will be mediated by expectancy
H3c: Perceived attainability and goal embodiment of available role models will interact when influencing expectancy such that the effect of attainability will be absent at low levels of goal embodiment and the effect of goal embodiment will be absent at low levels of attainability

Role Models as Inspirations

Lastly, we have proposed that role models can function as inspirations and that in this function they mainly contribute to the adoption of new or more ambitious goals. Moreover, we have argued that they are likely to do so by influencing value. We have argued in Chapter 3 that role models need to be perceived by role aspirants as desirable to serve as inspirations. In other words, role aspirants need to want to be like them. So far, to our knowledge, there are no studies investigating the effect of desirability on role modelling, but studies do suggest that attributes related to desirability, such as warmth and competence, do influence role aspirants in their choice of role models and the effectiveness of role models in influencing role aspirant motivation (e.g., Calvert et al., 2001; Marx & Roman, 2002). In addition, other studies demonstrate that role models can change the value role aspirants associate with a domain such as maths (Stout et al., 2011).

Nevertheless, as outlined in the previous chapter, there is a lack of evidence supporting the ideas we put forward in relation to role models as inspirations – more so than for the other two functions. This is unfortunate, especially as we have argued that it is in this particular function that role models have the biggest influence on adopting new goals and thus to be the most effective in recruiting minorities into fields in which they remain under-
represented. We are therefore going to investigate the relationships between the availability of desirable role models, value, and career intentions. We predict the following:

H4: Role models will act as inspirations

H4a: Perceived desirability of available role models will predict role aspirants’ career intentions

H4b: This effect will be mediated by value

H4c: The effect of value on career intentions will depend on levels of expectancy such that the effect will be greater at high levels of expectancy

Method

Participants

A total of 853 undergraduate students from a British University participated in this study. As we were interested in differences in experiences based on gender and discipline we excluded seven participants who identified outside of the gender binary and twelve participants whose degree spanned multiple disparate disciplines (e.g., French and Mathematics). This left us with a final sample of 836 students. Of these, 527 (63%) were female and 209 (37%) were male. The largest group of students (45.1%) were in their first year, while 31.2% were in their second year and 23.7% were in their third or final year. The vast majority of students either identified as “British, White” (60.5%) or “White” (21.1%). The average age of the sample was 20.26 years (SD = 3.54). As can be seen in Table 7, we grouped participants into four discipline groups. Two of those were STEM disciplines, namely core STEM and Life and Environmental Sciences (LES) and two of them were non-STEM disciplines, namely Humanities and Social Sciences (HASS) and Business. The disciplines were thus similar to those of Study 1, but based on the number of students from the different disciplines, we grouped them slightly differently. We further define core STEM
and Business as male-dominated disciplines as women remain particularly under-represented in these disciplines (Fotaki, 2013; Leslie et al., 2015).

**Table 7**

*Gender Distribution across Disciplines (Study 3)*

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Respondents</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core STEM</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Science</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Engineering</td>
<td>30</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Geology</td>
<td>15</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Mathematics</td>
<td>36</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>Mining</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Natural Sciences</td>
<td>8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Physics &amp; Astronomy</td>
<td>19</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>Renewable Energy</td>
<td>7</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>152</td>
<td>65</td>
<td>87</td>
</tr>
<tr>
<td><strong>Life and Environmental Sciences (LES)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biosciences</td>
<td>105</td>
<td>77</td>
<td>28</td>
</tr>
<tr>
<td>Geography</td>
<td>18</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>Psychology</td>
<td>49</td>
<td>44</td>
<td>5</td>
</tr>
<tr>
<td>Sports and Health Sciences</td>
<td>14</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Medicine</td>
<td>29</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Medical Imaging</td>
<td>10</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Medical Sciences</td>
<td>25</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>222</td>
<td>161</td>
<td>61</td>
</tr>
<tr>
<td><strong>Humanities and Social Sciences (HASS)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Archaeology</td>
<td>8</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Art History &amp; Visual Culture</td>
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<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Classics &amp; Ancient History</td>
<td>15</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Drama</td>
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<td>Liberal Arts</td>
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<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Modern Languages</td>
<td>24</td>
<td>19</td>
<td>5</td>
</tr>
<tr>
<td>Theology and Religion</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Arab and Islamic Studies</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Law</td>
<td>29</td>
<td>20</td>
<td>9</td>
</tr>
<tr>
<td>Politics</td>
<td>36</td>
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<td>15</td>
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<tr>
<td>Sociology, Philosophy &amp; Anthropology</td>
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<td>23</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>306</td>
<td>220</td>
<td>86</td>
</tr>
<tr>
<td><strong>Business</strong></td>
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<td></td>
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<td>12</td>
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<tr>
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<td>38</td>
</tr>
<tr>
<td>Finance</td>
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<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Management</td>
<td>55</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>156</td>
<td>81</td>
<td>75</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>836</td>
<td>527</td>
<td>309</td>
</tr>
</tbody>
</table>
Chapter 4: How Role Models in Their Three Function Influence Career Intentions

Procedure

Students received an e-mail from a leader from within their discipline in which they were encouraged to take part in the study and provided with a link to the survey. Upon following the link, students were given additional information about the survey and asked for their consent to participate. They were first asked to complete a short section on their demographics including gender, ethnicity, discipline, and year of study. After this, they were asked about various study experiences. Finally, participants were debriefed and informed that we were interested in how experiences differed between female and male students across disciplines. The survey took approximately fifteen minutes to complete and participants did not receive any form of compensation other than the chance to be entered into a raffle for gift vouchers.

Measures

All items in this survey were presented as statements with which participants were asked to rate their agreement on a scale from 1 (strongly disagree) to 7 (strongly agree). First, we measured the availability of role models who exhibited the three role model qualities, namely goal embodiment, attainability, and desirability. We deliberately steered away from using the term “role model” in any of these measures as it may have been interpreted quite differently by different students. In other words, we were not interested in whether students perceived that there were people in their discipline who they might call role models, but whether there were people in their discipline who they perceived to embody their goals and who were attainable and desirable – and who we might call role models.

Next, we included three different measures of expectancy. First, we measured study expectancy, (i.e. the degree to which participants believed they could be successful in their
studies). Our other two measures of expectancy were directed towards a future career. We measured participants’ career expectancy, that is, the degree to which they believed they could be successful in a future career in their discipline as well as goal expectancy, that is, the degree to which they believed they would be able reach their goals in a career in their discipline. Similarly, we measured two facets of value. We asked about study value, that is, the degree to which students enjoyed their studies and found them interesting and career value, that is, the anticipated intrinsic value of a career in one’s discipline. Finally, we assessed two aspects of participants’ career intentions using single-item measures, namely discipline related job intentions and advanced degree intentions. All items and reliability scores for our measures are provided in Table 8.
Table 8

*Measures Used in Study 3*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Items</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal embodiment</td>
<td>There are people in my discipline who embody my goals</td>
<td>.80</td>
</tr>
<tr>
<td></td>
<td>There are people in my discipline who have already reached goals that I want to reach as well</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emulating certain people in my discipline will help me reach my goals.</td>
<td></td>
</tr>
<tr>
<td>Attainability</td>
<td>Being like certain people in my discipline seems attainable to me</td>
<td>.73</td>
</tr>
<tr>
<td></td>
<td>Being like the people in my discipline seems out of reach for me (reversed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>There are people in my discipline who I think I can be like in the future if I want to</td>
<td></td>
</tr>
<tr>
<td>Desirability</td>
<td>There are people in my discipline that I admire</td>
<td>.78</td>
</tr>
<tr>
<td></td>
<td>There is nobody in my discipline who I feel inspired by (reversed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>There are people in my discipline who inspire me to follow my goals</td>
<td></td>
</tr>
<tr>
<td>Study expectancy</td>
<td>I'm confident that I can successfully graduate from my studies</td>
<td>.71</td>
</tr>
<tr>
<td></td>
<td>I don't think I'm able to successfully finish my studies (reversed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I don't see any obstacles to my success in my academic studies</td>
<td></td>
</tr>
<tr>
<td>Career expectancy</td>
<td>I think that I can find a job or get an advanced degree (e.g., MSc, PhD) in my discipline after I graduate</td>
<td>.75</td>
</tr>
<tr>
<td></td>
<td>Finding a job or getting an advanced degree (e.g., MSc, PhD) in my discipline would be hard for me (reversed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I'm confident that I can stay in my discipline after I graduate</td>
<td></td>
</tr>
<tr>
<td>Goal expectancy</td>
<td>I think I can achieve my career goals in my discipline</td>
<td>.78</td>
</tr>
<tr>
<td></td>
<td>I think a job in my discipline will give me the opportunity to reach my goals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I don't think my discipline is a place where I can achieve what is important to me (reversed)</td>
<td></td>
</tr>
<tr>
<td>Study value</td>
<td>I enjoy my studies</td>
<td>.85</td>
</tr>
<tr>
<td></td>
<td>I don't find my studies interesting (reversed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>My studies are fun</td>
<td></td>
</tr>
<tr>
<td>Career value</td>
<td>A career in my discipline sounds like fun</td>
<td>.89</td>
</tr>
<tr>
<td></td>
<td>The work that people in my discipline do is interesting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A career in my discipline sounds like a job I would enjoy</td>
<td></td>
</tr>
<tr>
<td>Discipline related job intentions</td>
<td>I am planning to look for a job related to my discipline when I graduate</td>
<td></td>
</tr>
<tr>
<td>Advanced degree intentions</td>
<td>I am planning to study for an advanced degree (e.g., MSc, PhD) in my discipline</td>
<td></td>
</tr>
</tbody>
</table>


Results

In this section, we will first report the results of a factor analysis, followed by a series of ANOVAs testing Hypothesis 1. Then, we will report the results concerning Hypotheses 2 to 4 which we tested using a regression-based approach.

We conducted an exploratory factor analysis with Varimax rotation to test whether the different components of the tested models were distinct from each other in our data. As can be gathered from Table 9, this was generally not the case. The result was a five factor solution with the meaning of the factors somewhat hard to interpret. The items loading high on Factor 1 included all goal expectancy items as well as two of the career value items and the advanced degree intention item. Factor 2 could be described as a general role model factor with all role model related items except for one of the attainability items loading high on this factor. Study and career expectancy items as well as the remaining role model attainability item loaded high on Factor 3, which could thus be thought of as an expectations of success factor. In line with our conceptualisation, the three study value items loaded highly on a separate factor (Factor 4). Lastly, as expected, job intentions did not load highly on any of the other factors but on its own factor (Factor 5). For theoretical reasons we decided to form our scales as initially planned (and as summarised in Table 8, above) despite these results. As can be seen in Table 8, the resulting scales were reliable, but the results of the factor analysis should be kept in mind when interpreting our findings. Implications will be discussed below.
Table 9

*Factor Loadings Based on Principal Component Analysis with Varimax Rotation (Study 3)*

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
<th>Factor 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are people in my discipline that I admire</td>
<td>.66</td>
<td>.36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is nobody in my discipline who I feel inspired by (reversed)</td>
<td>.57</td>
<td>.44</td>
<td>-.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are people in my discipline who inspire me to follow my goals</td>
<td>.70</td>
<td>.29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are people in my discipline who embody my goals</td>
<td>.27</td>
<td>.74</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are people in my discipline who have already reached goals that I want to reach as well</td>
<td>.26</td>
<td>.70</td>
<td>.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emulating certain people in my discipline will help me reach my goals.</td>
<td>.77</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Being like certain people in my discipline seems attainable to me</td>
<td>.60</td>
<td>.43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Being like the people in my discipline seems out of reach for me (reversed)</td>
<td>.20</td>
<td>.59</td>
<td>-.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are people in my discipline who I think I can be like in the future if I want to</td>
<td>.63</td>
<td>.30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I enjoy my studies</td>
<td>.28</td>
<td>.31</td>
<td>.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I don't find my studies interesting (reversed)</td>
<td></td>
<td>.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My studies are fun</td>
<td>.21</td>
<td>.23</td>
<td>.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I'm confident that I can successfully graduate from my studies</td>
<td></td>
<td>.70</td>
<td>.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I don't think I'm able to successfully finish my studies (reversed)</td>
<td></td>
<td>.63</td>
<td>.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I don't see any obstacles to my success in my academic studies</td>
<td></td>
<td>.60</td>
<td></td>
<td>.22</td>
<td></td>
</tr>
<tr>
<td>I think that I can find a job or get an advanced degree (e.g., MSc, PhD) in my discipline after I graduate</td>
<td>.30</td>
<td>.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finding a job or getting an advanced degree (e.g., MSc, PhD) in my discipline would be hard for me (reversed)</td>
<td>.24</td>
<td>.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I'm confident that I can stay in my discipline after I graduate</td>
<td>.68</td>
<td>.21</td>
<td>.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think I can achieve my career goals in my discipline</td>
<td>.66</td>
<td></td>
<td>.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think a job in my discipline will give me the opportunity to reach my goals</td>
<td>.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I don't think my discipline is a place where I can achieve what is important to me (reversed)</td>
<td>.65</td>
<td></td>
<td>.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A career in my discipline sounds like fun</td>
<td>.60</td>
<td>.21</td>
<td>.50</td>
<td>.27</td>
<td></td>
</tr>
<tr>
<td>The work that people in my discipline do is interesting</td>
<td>.47</td>
<td>.27</td>
<td>.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A career in my discipline sounds like a job I would enjoy</td>
<td>.72</td>
<td>.26</td>
<td>.39</td>
<td>.23</td>
<td></td>
</tr>
<tr>
<td>I am planning to look for a job related to my discipline when I graduate</td>
<td></td>
<td></td>
<td></td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td>I am planning to study for an advanced degree (e.g., MSc, PhD) in my discipline</td>
<td></td>
<td></td>
<td></td>
<td>.77</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Factor loadings between -.2 and .2 are suppressed
Differences between Female and Male Students in Different Disciplines

We conducted a series of ANOVAs to investigate whether the availability of role models, the perceived levels of expectancy and value associated with one’s discipline as well as career intentions varied across genders and disciplines. For this, we grouped disciplines together as indicated in Table 7, thus performing a series of 2 (Gender: Female vs. Male) X 4 (Discipline: Core STEM vs. LES vs. HASS vs. Business) ANOVAs. The effects of discipline were further analysed using post-hoc Tukey tests. Mean values and standard deviations for all our measures are presented in Table 10.

Table 10

Means and Standard Deviations of All Measures (Study 3)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal embodiment</td>
<td>4.65</td>
<td>1.18</td>
</tr>
<tr>
<td>Attainability</td>
<td>4.92</td>
<td>1.01</td>
</tr>
<tr>
<td>Desirability</td>
<td>5.32</td>
<td>1.09</td>
</tr>
<tr>
<td>Study expectancy</td>
<td>5.13</td>
<td>1.08</td>
</tr>
<tr>
<td>Career expectancy</td>
<td>4.80</td>
<td>1.21</td>
</tr>
<tr>
<td>Goal expectancy</td>
<td>5.03</td>
<td>1.19</td>
</tr>
<tr>
<td>Study value</td>
<td>5.48</td>
<td>1.11</td>
</tr>
<tr>
<td>Career value</td>
<td>5.48</td>
<td>1.24</td>
</tr>
<tr>
<td>Discipline related job intentions</td>
<td>5.19</td>
<td>1.57</td>
</tr>
<tr>
<td>Advanced degree intentions</td>
<td>4.10</td>
<td>1.99</td>
</tr>
</tbody>
</table>

Role model qualities. In relation to goal embodiment we found a highly significant effect for discipline, $F(3, 811) = 4.56; p < .01; \eta^2 = .02$. Post-hoc testing revealed that this was driven by the difference between LES ($M = 4.87$, $SD = 1.09$) and HASS ($M = 4.54$, $SD = 1.20$; $p = .01$), such that students in LES (compared to HASS) were more likely to have role models that embodied their goals while the other disciplines did not differ significantly. The
effect of gender was not significant, $F(1, 811) = 1.49; p = .22; \eta^2 < .01$, and neither did the two factors interact, $F(3, 811) = 1.32; p = .27; \eta^2 < .01$, lending no support to H1.

Attainability differed between genders, although the effect was only marginally significant and very small, $F(1, 805) = 3.18; p = .08; \eta^2 < .01$. Men perceived a higher availability of attainable role models ($M = 5.01, SD = 1.03$) compared to women ($M = 4.87, SD = 1.00$). There was no significant effect of discipline, $F(3, 805) = .11; p = .96; \eta^2 < .01$, and the predicted interaction between the two variables was not significant, $F(3, 805) = .64; p = .59; \eta^2 < .01$, lending no support to H1.

Finally, with regards to desirability we found a significant effect for discipline, $F(3, 819) = 7.05; p < .01; \eta^2 = .03$, such that Business students perceived a lower availability of desirable role models ($M = 4.99, SD = 1.09$) compared to both LES ($M = 5.46, SD = 1.05; p < .01$) and HASS students ($M = 5.41, SD = 1.04; p < .01$). However, the effect of gender itself was not significant, $F(1, 819) = 1.59; p = .21; \eta^2 < .01$, and the significant interaction between gender and discipline, $F(3, 819) = 4.31; p < .01; \eta^2 = .02$, displayed patterns contrary to our prediction. As can be gathered from Figure 1, the difference between disciplines was mainly driven by male students. Analyses of simple effects revealed that among male participants, LES students perceived a significant higher availability of desirable role models ($M = 5.68, SD = 0.75$) compared to students of all other disciplines, that is compared to HASS students ($M = 5.11, SD = 1.18; p < .01$), Business students ($M = 4.85, SD = 1.15; p < .01$) and core STEM students ($M = 5.26, SD = 1.19; p = .02$). Additionally, male students in core STEM disciplines perceived a higher availability of desirable role models compared to male Business students ($p = .02$). Among female students, on the other hand, the only significant difference was between HASS students ($M = 5.53, SD = 0.95$) and Business students ($M = 5.12, SD = 1.01; p < .01$). Gender differences were only significant among HASS students, where women rated the availability of desirable role models as significantly
higher ($M = 5.53, SD = 0.95$) than men ($M = 5.11, SD = 1.18; p < .01; p < .01$). Again, this does not support H1.

Figure 11. Desirability ratings sorted by gender and discipline

Expectancy. With regards to study expectancy we found a significant effect of gender, $F(1, 804) = 8.25; p < .01; \eta^2 = .01$. Men rated their confidence in successfully finishing their degree as higher ($M = 5.27, SD = 1.03$) compared to women ($M = 5.05, SD = 1.11$). Additionally, ratings of study expectancy differed by discipline, $F(3, 804) = 4.07; p < .01; \eta^2 < .01$. Post-hoc tests revealed that this was due to differences between LES ($M = 4.96, SD = 1.18$) and HASS ($M = 5.24, SD = 1.00$) who reported the lowest and highest levels of study expectancy respectively ($p = .02$). The predicted interaction between gender and discipline, on the other hand, was not significant, $F(3, 804) = 1.11; p = .35; \eta^2 = .01$.

Career expectancy also differed by gender, $F(1, 804) = 6.42; p = .01; \eta^2 = .01$, such that men reported more confidence in succeeding in a career in their discipline ($M = 5.04, SD = 1.15$) compared to women ($M = 4.65, SD = 1.23$). Career expectancy also differed by discipline $F(3, 804) = 11.58; p < .01; \eta^2 = .04$. Post-hoc tests demonstrated that the significant effect was due to (a) HASS students ($M = 4.48, SD = 1.19$) being significantly different from core STEM students ($M = 5.20, SD = 1.14; p < .01$) and Business students ($M = 5.13, SD = 1.19$).
1.19; \( p < .01 \) and (b) LES students (\( M = 4.72, SD = 1.19 \)) being significantly different from core STEM students (\( p < .01 \)) and Business school students (\( p < .01 \)). The hypothesised interaction between gender and discipline was not significant, \( F(3, 804) = 1.83; p = .14; \eta^2 < .01 \).

Finally, goal expectancy differed by discipline, \( F(3, 801) = 8.42; p < .01; \eta^2 = .03 \). Post-hoc tests demonstrated that the significant effect was due to differences between HASS students (\( M = 4.72, SD = 1.23 \)) and students of all other disciplines (all \( p < .01 \)). Core STEM students (\( M = 5.36, SD = 1.23 \)), LES students (\( M = 5.13, SD = 1.06 \)) and Business students (\( M = 5.17, SD = 1.13 \)) did not differ from each other. Gender did neither affect goal expectancy ratings (\( F(1, 801) = .68; p = .41; \eta^2 < .01 \)) nor interact with discipline (\( F(3, 801) = .71; p = .55; \eta^2 < .01 \)). Taken together, the findings on expectancy did not support H1.

Value. Study value differed by discipline, \( F(3, 809) = 10.11; p < .01; \eta^2 = .04 \). Post-hoc tests revealed that this effect was due to differences between Business students and all other disciplines. Business students (\( M = 5.04, SD = 1.05 \)) rated the enjoyment of their studies lower compared to core STEM students (\( M = 5.43, SD = 1.28; p = .01 \)), LES students (\( M = 5.61, SD = 1.10; p < .01 \)) and HASS students (\( M = 5.63, SD = .99; p < .01 \)). There was no effect of gender, \( F(1, 809) = .82; p = .37; \eta^2 < .01 \), and no interaction between the two variables, \( F(3, 809) = .60; p = .62; \eta^2 < .01 \), lending no support to H1 with regards to study value.

Similarly, career value was only affected by discipline, \( F(3, 800) = 8.31; p < .01; \eta^2 = .03 \), such that it was lower among Business students (\( M = 5.14, SD = 1.28 \)) compared to core STEM students (\( M = 5.56, SD = 1.36; p = .02 \)) as well as LES students (\( M = 5.82, SD = 1.06; p < .01 \)) and lower among HASS (\( M = 5.35, SD = 1.22 \)) students compared to LES students (\( p < .01 \)). Gender did neither have an effect, \( F(1, 800) < .01; p = .97; \eta^2 < .01 \), nor interact with discipline (\( F(3, 800) = .37; p = .78; \eta^2 < .01 \)), again lending no support to H1.
Career intentions. The intentions to find a job related to one’s discipline also differed by discipline $F(3, 803) = 9.44; p < .01; \eta^2 = .03$. Using post-hoc tests to analyse this effect further we found that HASS students rated their discipline related job intentions lower ($M = 4.75$, $SD = 1.64$) compared to all other disciplines, namely compared to core STEM students ($M = 5.50$, $SD = 1.63; p < .01$), LES students ($M = 5.35$, $SD = 1.46; p < .01$) and Business students ($M = 5.53$, $SD = 1.31; p < .01$). We did not find an effect of gender, $F(1, 803) = .24; p = .62; \eta^2 < .01$, or an interaction effect, $F(3, 803) = .68; p = .57; \eta^2 < .01$. Once more, this does not support H1.

In relation to advanced degree intentions we found an effect of gender, $F(1, 803) = 4.44; p = .04; \eta^2 = .01$. Men rated their intentions to study for an advanced degree as higher ($M = 4.31$, $SD = 1.93$) compared to women ($M = 3.97$, $SD = 2.01$). Moreover, we found an effect of discipline, $F(3, 803) = 4.50; p < .01; \eta^2 = .02$. Post-hoc tests revealed that LES students ($M = 4.23$, $SD = 2.08$) had higher ratings compared to HASS students ($M = 3.84$, $SD = 1.91; p < .01$) and Business students ($M = 3.88$, $SD = 1.98; p = .02$). However, the two variables did not interact, $F(3, 803) = .81; p = .49; \eta^2 < .01$, lending no support to H1.

Role Models as Behavioural Models, Representations of the Possible and Inspirations

In this section, we will report the results from a series of conditional process analyses testing hypotheses 2-4, using the PROCESS macro for SPSS developed by Hayes (2013). All predicting, mediating, and moderating variables were mean-centred prior to our analyses to make the regression coefficients interpretable. The outcome variables were left in their original form. In line with Hayes’ (2013) recommendations, we report unstandardized regression coefficients throughout this chapter. As we have conceptualised role modelling as a process which is independent of group membership, we do not include gender or discipline in these analyses.
The bivariate correlations between the role model, mediating, moderating, and outcome measures used in the analysis are presented in Table 11. These demonstrate that each of the three role model qualities were positively related to both measures of career intentions, such that those individuals who had discipline role models they saw as embodying their goals, as attainable, and as desirable were more likely to have intentions to pursue a career or obtain a further degree in their discipline, supporting H2a, H3a and H4a. This table also shows that all role model qualities are highly related. While this is in line with the MTRM we described in Chapter 3, it also leads to multicollinearity, which should be kept in mind when interpreting the results reported below as it can make it impossible to discern the extent to which different predictors contribute to the outcome.

Table 11

Bivariate Correlations between All Measures used in Study 3

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Goal Embodiment</td>
<td>-</td>
<td>.45**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Attainability</td>
<td></td>
<td>-</td>
<td>.41**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Desirability</td>
<td></td>
<td>.45**</td>
<td>-</td>
<td>.64**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Study expectancy</td>
<td></td>
<td>.42**</td>
<td>.19**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Career expectancy</td>
<td></td>
<td>.25**</td>
<td>.42**</td>
<td>.20**</td>
<td>.48**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Goal expectancy</td>
<td></td>
<td>.42**</td>
<td>.44**</td>
<td>.30**</td>
<td>.30**</td>
<td>.62**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Study value</td>
<td></td>
<td>.39**</td>
<td>.42**</td>
<td>.49**</td>
<td>.41**</td>
<td>.36**</td>
<td>.45**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>8 Career value</td>
<td></td>
<td>.14**</td>
<td>.42**</td>
<td>.19**</td>
<td>.20**</td>
<td>.36**</td>
<td>.64**</td>
<td>.57**</td>
<td>-</td>
</tr>
<tr>
<td>9 Discipline related job intentions</td>
<td>.32**</td>
<td>.19**</td>
<td>.21**</td>
<td>.11**</td>
<td>.36**</td>
<td>.60**</td>
<td>.24**</td>
<td>.51**</td>
<td>-</td>
</tr>
<tr>
<td>10 Advanced degree intentions</td>
<td>.28**</td>
<td>.16**</td>
<td>.17**</td>
<td>.11**</td>
<td>.25**</td>
<td>.29**</td>
<td>.27**</td>
<td>.38**</td>
<td>.18**</td>
</tr>
</tbody>
</table>

Note. * p < .05; ** p < .01

Role models as behavioural models. To test H2, we examined the relationships between goal embodiment, expectancy, value, and career intentions. As can be seen from Figure 12, the tested model used goal embodiment as the predictor and career intentions as
Chapter 4: How Role Models in Their Three Function Influence Career Intentions

the outcome. The three measures of expectancy were entered as mediators and the two measures of value as moderators of the relationship between expectancy and career intentions. We ran this analysis twice, once for discipline-related job intentions and once for advanced degree intentions. As our variables were centred prior to analysis, the regression coefficients can be interpreted as the variable’s effect at average levels of the other variables. All bootstrapped confidence intervals reported were calculated using a sample of 10,000.

Figure 12. Model tested for role models as behavioural models

We first tested the model for discipline-related job intentions. Results of the conditional process analysis (Model 16) revealed that when all variables were included in the model, discipline-related job intentions were positively predicted by goal expectancy and career value and, surprisingly, negatively by study value. Moreover, the interactions between career expectancy and study value as well as between goal expectancy and career value were significant (see Table 12). However, only the interaction between career expectancy and study value went into the predicted direction (i.e. the effect of career expectancy was higher at high levels of study value compared to lower levels of study value). So while, in line with H2c, those who highly enjoyed their studies benefitted more from high levels of career
expectancy, the opposite was true for career value and goal expectancy. Those who didn’t think they would enjoy a career in their discipline benefitted more from believing that they could reach their goals in their discipline.

Bias corrected bootstrap confidence intervals further indicated that the indirect effect of perceived goal embodiment through goal expectancy was positive and different from zero regardless of levels of the other moderators ($B = .25; 95\% \text{ CI } [.19, .32]$)$^4$, supporting the idea that the effect of goal embodiment is mediated by the extent to which role aspirants believe they can reach their personal career goals in their disciplines (H2b). This was not the case for the other two measures of expectancy, which did not mediate the effect of goal embodiment, regardless of the levels of the two measures of value (study expectancy: $B = -.01; 95\% \text{ CI } [-.03, .00]$; career expectancy: $B = .01 95\% \text{ CI } [-.01, .05]$). We thus had partial support for the hypothesis that the effect of goal embodiment would be mediated by expectancy (H2b).

These findings are illustrated in Figure 13 in which, with the exception of the direct effect, only effects different from zero directly speaking to the moderated mediation are included. Here, as well as similar figures throughout this thesis, the coefficients of the interaction is indicated next to the respective arrow and values in brackets refer to coefficients whose confidence intervals include zero.

$^4$ The confidence intervals reported throughout this thesis refer to average levels of all other moderators if not specified otherwise.
Table 12

Results of the Conditional Process Analysis of the Variables Relating to Role Models as

Behavioural Models

<table>
<thead>
<tr>
<th>Predicting</th>
<th>$B$</th>
<th>$B_{se}$</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>study expectancy; $R^2 = .02$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goal Embodiment (GE)</td>
<td>.12**</td>
<td>.03</td>
<td>.06</td>
<td>.18</td>
</tr>
<tr>
<td>Predicting career expectancy $R^2 = .06$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GE</td>
<td>.25**</td>
<td>.04</td>
<td>.18</td>
<td>.33</td>
</tr>
<tr>
<td>Predicting goal expectancy $R^2 = .18$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GE</td>
<td>.43**</td>
<td>.03</td>
<td>.36</td>
<td>.49</td>
</tr>
<tr>
<td>Predicting discipline related job intentions $R^2 = .42$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GE</td>
<td>.07</td>
<td>.04</td>
<td>-.01</td>
<td>.16</td>
</tr>
<tr>
<td>Study Expectancy (SExp)</td>
<td>-.07</td>
<td>.05</td>
<td>-.17</td>
<td>.03</td>
</tr>
<tr>
<td>Career Expectancy (CExp)</td>
<td>.06</td>
<td>.05</td>
<td>.47</td>
<td>.70</td>
</tr>
<tr>
<td>Goal Expectancy (GExp)</td>
<td>.59**</td>
<td>.06</td>
<td>-.01</td>
<td>.16</td>
</tr>
<tr>
<td>Career Value (CVal)</td>
<td>.24**</td>
<td>.06</td>
<td>.13</td>
<td>.35</td>
</tr>
<tr>
<td>Study Value (SVal)</td>
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<td>.06</td>
<td>-.24</td>
<td>-.02</td>
</tr>
<tr>
<td>SExp X CVal</td>
<td>-.05</td>
<td>.04</td>
<td>-.12</td>
<td>.03</td>
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<tr>
<td>SExp X SVal</td>
<td>-.03</td>
<td>.04</td>
<td>-.11</td>
<td>.05</td>
</tr>
<tr>
<td>CExp X CVal</td>
<td>-.06</td>
<td>.04</td>
<td>-.15</td>
<td>.03</td>
</tr>
<tr>
<td>CExp X SVal</td>
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<td>.05</td>
<td>.04</td>
<td>.22</td>
</tr>
<tr>
<td>GExp X CVal</td>
<td>-.09*</td>
<td>.04</td>
<td>-.18</td>
<td>-.01</td>
</tr>
<tr>
<td>GExp X SVal</td>
<td>.01</td>
<td>.05</td>
<td>-.08</td>
<td>.10</td>
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<tr>
<td>Predicting advanced degree intentions $R^2 = .18$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GE</td>
<td>.19**</td>
<td>.06</td>
<td>.06</td>
<td>.31</td>
</tr>
<tr>
<td>SExp</td>
<td>-.08</td>
<td>.07</td>
<td>-.23</td>
<td>.06</td>
</tr>
<tr>
<td>CExp</td>
<td>.25**</td>
<td>.07</td>
<td>.10</td>
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<tr>
<td>GExp</td>
<td>-.07</td>
<td>.09</td>
<td>-.24</td>
<td>.10</td>
</tr>
<tr>
<td>CVal</td>
<td>.43**</td>
<td>.08</td>
<td>.27</td>
<td>.60</td>
</tr>
<tr>
<td>SVal</td>
<td>.14</td>
<td>.09</td>
<td>-.02</td>
<td>.31</td>
</tr>
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<td>SExp X CVal</td>
<td>.03</td>
<td>.06</td>
<td>-.09</td>
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<tr>
<td>SExp X SVal</td>
<td>-.00</td>
<td>.06</td>
<td>-.12</td>
<td>.11</td>
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<tr>
<td>CExp X CVal</td>
<td>-.03</td>
<td>.07</td>
<td>-.16</td>
<td>.10</td>
</tr>
<tr>
<td>CExp X SVal</td>
<td>-.09</td>
<td>.07</td>
<td>-.22</td>
<td>.04</td>
</tr>
<tr>
<td>GExp X CVal</td>
<td>-.05</td>
<td>.06</td>
<td>-.17</td>
<td>.08</td>
</tr>
<tr>
<td>GExp X SVal</td>
<td>.18**</td>
<td>.07</td>
<td>.05</td>
<td>.32</td>
</tr>
</tbody>
</table>

Note. * $p < .05$; ** $p < .01$; All predictors are mean centred. $B$ refers to unstandardized coefficient. Confidence intervals based on bias-corrected bootstrapping procedures with a sample size of 10,000.
Figure 13. Results of moderated mediation examining role models as behavioural models and predicting discipline related job intentions

Next, we analysed the same model with advanced degree intentions as the outcome. When entering all variables into the model, goal embodiment, career expectancy, and career value were all significantly and positively predictive of advanced degree intentions (see Table 12). Additionally, the interaction between goal expectancy and study value was significant and in the predicted direction, supporting H2c (see Table 12). In other words, the degree to which one enjoyed one’s studies moderated the effect of goal expectancy such that for those who reported high levels of study value, goal expectancy had a stronger effect on advanced degree intentions compared to those who reported low levels of study value.

The significant effect of goal embodiment in Table 12 indicates that it has a direct effect on advanced degree intentions that isn’t mediated by expectancy. However, as can be seen in Figure 14, we also found evidence for partial mediation, supporting H2b. Bias corrected bootstrap confidence intervals suggested that while the indirect effect through study expectancy and goal expectancy was not different from zero regardless of the levels of the moderators (study expectancy: $B = -.01; 95\% \text{ CI} [-.04, .01]$; goal expectancy: $B = -.03; 95\% \text{ CI} [-.10, .06]$), a more complex pattern emerged for career expectancy. The indirect effect
through this variable was different from zero, but only when levels of both study value and career value were either low or medium \(^5\) (see Table 13), despite the interaction terms not being significant, indicated by the brackets in Figure 14.

**Figure 14.** Results of moderated mediation examining role models as behavioural models and predicting advanced degree intentions.

<table>
<thead>
<tr>
<th>Career Value</th>
<th>Study Value</th>
<th>B</th>
<th>B se</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
<td>.10</td>
<td>.04</td>
<td>.03</td>
<td>.18</td>
</tr>
<tr>
<td>Low</td>
<td>Medium</td>
<td>.07</td>
<td>.04</td>
<td>.01</td>
<td>.15</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td>.05</td>
<td>.05</td>
<td>-.04</td>
<td>.15</td>
</tr>
<tr>
<td>Medium</td>
<td>Low</td>
<td>.09</td>
<td>.03</td>
<td>.03</td>
<td>.16</td>
</tr>
<tr>
<td>Medium</td>
<td>Medium</td>
<td>.06</td>
<td>.02</td>
<td>.02</td>
<td>.11</td>
</tr>
<tr>
<td>Medium</td>
<td>High</td>
<td>.04</td>
<td>.03</td>
<td>-.02</td>
<td>.11</td>
</tr>
<tr>
<td>High</td>
<td>Low</td>
<td>.08</td>
<td>.05</td>
<td>-.01</td>
<td>.18</td>
</tr>
<tr>
<td>High</td>
<td>Medium</td>
<td>.05</td>
<td>.03</td>
<td>-.01</td>
<td>.12</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
<td>.03</td>
<td>.03</td>
<td>-.04</td>
<td>.09</td>
</tr>
</tbody>
</table>

**Note.** All predictors are mean centred. \(B\) refers to unstandardized coefficient.

Confidence intervals based on bias-corrected bootstrapping procedures with a sample size of 10,000. Low: 1 SD below the mean; Medium: Mean; High: 1 SD above the mean.

---

\(^5\) When we refer to high, medium, or low levels of moderators, we mean one standard deviation above the mean, the mean or one standard deviation below the mean.
Role models as representations of the possible. To test H3, we added attainability to the model described above. Attainability served as the main predictor and goal embodiment as the moderator of its effect on expectancy as well as career intentions. The three different measures of expectancy again served as mediators and the two different measures of value as moderators of the effect of expectancy on career intentions. This model is illustrated in Figure 15.

![Figure 15. Model tested for role models as representations of the possible](image)

When predicting discipline-related job intentions and entering all variables into the model (Model 40), goal embodiment, goal expectancy and career value were positively related to career intentions. Surprisingly, attainability and study value were negatively associated with career intentions. Moreover, as in the previous analysis testing H2, the interaction between career expectancy and study value was positive and in the expected direction. Goal embodiment and attainability did not interact, neither when predicting career intentions, nor when predicting expectancy, lending no support to H3c (see Table 14).
### Table 14

Results of the Conditional Process Analysis of the Variables Relating to Role Models as Representations of the Possible

<table>
<thead>
<tr>
<th>Predicting study expectancy; $R^2 = .18$</th>
<th>$B$</th>
<th>$B_{SE}$</th>
<th>Lower CI</th>
<th>Upper CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attainability (A)</td>
<td>.48**</td>
<td>.04</td>
<td>.40</td>
<td>.56</td>
</tr>
<tr>
<td>Goal Embodiment (GE)</td>
<td>-0.06</td>
<td>.03</td>
<td>-.13</td>
<td>.00</td>
</tr>
<tr>
<td>A X GE</td>
<td>.00</td>
<td>.02</td>
<td>-.04</td>
<td>.05</td>
</tr>
</tbody>
</table>

Predicting career expectancy $R^2 = .21$

| A                                      | .52** | .04      | .43      | .60      |
| GE                                     | .06   | .04      | -.01     | .13      |
| A X GE                                 | .02   | .03      | -.04     | .07      |

Predicting career expectancy $R^2 = .26$

| A                                      | .35** | .04      | .27      | .44      |
| GE                                     | .30** | .04      | .23      | .37      |
| A X GE                                 | -.00  | .03      | -.05     | .05      |

Predicting goal expectancy $R^2 = .26$

| A                                      | -.15** | .06     | -.26     | -.04     |
| GE                                     | .11*   | .05      | .02      | .20      |
| Study Expectancy (SExp)                | -.04   | .05      | -.14     | .06      |
| Career Expectancy (CExp)               | .08    | .05      | -.02     | .18      |
| Goal Expectancy (GExp)                 | .60**  | .06      | .48      | .71      |
| Career Value (CVal)                    | .25**  | .06      | .14      | .36      |
| Study Value (SVal)                     | -.14*  | .06      | -.25     | -.02     |
| SExp X CVal                            | -.04   | .04      | -.12     | .04      |
| SExp X SVal                            | -.04   | .04      | -.12     | .04      |
| CExp X CVal                            | -.06   | .04      | -.15     | .03      |
| CExp X SVal                            | .12**  | .05      | .03      | .21      |
| GExp X CVal                            | -.09   | .04      | -.17     | .00      |
| GExp X SVal                            | -.00   | .05      | -.09     | .09      |
| A X GE                                 | -.00   | .03      | -.07     | .06      |

Predicting career related job intentions $R^2 = .42$

| A                                      | -.15** | .06     | -.26     | -.04     |
| GE                                     | .11*   | .05      | .02      | .20      |
| Study Expectancy (SExp)                | -.04   | .05      | -.14     | .06      |
| Career Expectancy (CExp)               | .08    | .05      | -.02     | .18      |
| Goal Expectancy (GExp)                 | .60**  | .06      | .48      | .71      |
| Career Value (CVal)                    | .25**  | .06      | .14      | .36      |
| Study Value (SVal)                     | -.14*  | .06      | -.25     | -.02     |
| SExp X CVal                            | -.04   | .04      | -.12     | .04      |
| SExp X SVal                            | -.04   | .04      | -.12     | .04      |
| CExp X CVal                            | -.06   | .04      | -.15     | .03      |
| CExp X SVal                            | .12**  | .05      | .03      | .21      |
| GExp X CVal                            | -.09   | .04      | -.17     | .00      |
| GExp X SVal                            | -.00   | .05      | -.09     | .09      |
| A X GE                                 | -.00   | .03      | -.07     | .06      |

Predicting advanced degree intentions $R^2 = .19$

| A                                      | -.15** | .08     | -.32     | .01      |
| GE                                     | .25**  | .07      | .11      | .38      |
| SExp                                   | -.05   | .08      | -.20     | .10      |
| CExp                                   | .26*   | .08      | .11      | .41      |
| GExp                                   | -.08   | .09      | -.25     | .10      |
| CVal                                   | .42**  | .09      | .26      | .59      |
| SVal                                   | .17    | .09      | -.00     | .34      |
| SExp X CVal                            | .01    | .06      | -.11     | .13      |
| SExp X SVal                            | .00    | .06      | -.11     | .12      |
| CExp X CVal                            | -.05   | .07      | -.18     | .08      |
| CExp X SVal                            | -.09   | .07      | -.22     | .05      |
| GExp X CVal                            | -.04   | .07      | -.17     | .08      |
| GExp X SVal                            | .18**  | .07      | .05      | .32      |
| A X GE                                 | .03    | .05      | -.06     | .13      |

Note. * $p < .05$; ** $p < .01$; All predictors are mean centred. $B$ refers to unstandardized coefficient. Confidence intervals based on bias-corrected bootstrapping procedures with a sample size of 10,000.
However, while the direct effect of attainability was negative, it was positively related to all three measures of expectancy indicating that it does positively influence all three mediators. It should also be kept in mind that attainability and discipline-related job intentions are positively associated when no other variables are taken into account (see Table 11). Moreover, as illustrated in Figure 16, the indirect effect on discipline-related job intentions through goal expectancy was positive at all levels of the moderators ($B = .21; 95\% \text{ CI} [.16, .28]$) and the indirect effect through career expectancy was positive when study value was high regardless of levels of the other moderators ($B = .11; 95\% \text{ CI} [.03, .20]$), supporting H3b. The indirect effect through study expectancy, on the other hand, was not different from zero ($B = -.02; 95\% \text{ CI} [-.07, .03]$).

![Figure 16](image_url)

*Figure 16. Results of moderated mediation examining role models as representations of the possible and predicting discipline related job intentions*

We next analysed the same model with advanced degree intentions as the outcome. When all variables were entered into the model, advanced degree intentions were positively predicted by goal embodiment, career expectations, and career value. Additionally and unsurprisingly, the interaction between goal expectations and study value was significant, positive, and similar in value to that found in the analysis testing H2. Again, goal
embodiment and attainability did not interact (see Table 14), lending no support to the hypothesis that goal embodiment would moderate the effect of attainability (H3c). Moreover, as illustrated in Figure 17, the indirect effect through career expectancy was positive, but only when both study value and career value were low or moderate ($B = .13; 95\% \text{ CI} [.05, .22]$) but not when one of these variables were high, lending partial support to H3b. Study expectancy and goal expectancy did not mediate the effect of attainability on advanced degree intentions (study expectancy: $B = -.03; 95\% \text{ CI} [-.10, .05]$; goal expectancy: $B = -.05; 95\% \text{ CI} [-.10, .04]$). Overall, the support for mediation (H3b) is thus not as strong as it was when predicting discipline-related job intentions.

![Figure 17](image)

*Figure 17. Results of moderated mediation examining role models as representations of the possible and predicting advanced degree intentions*
Role models as inspirations. Next we tested H4 by using desirability as the predictor and our two measures of value as the mediators. As the PROCESS macro does not offer models with three moderators of the relationship between the mediators and the outcome, we entered goal expectancy and career expectancy as moderators based on the fact that study expectancy had not interacted with value in the previous analyses. The model we tested is illustrated in Figure 18.

![Model tested for role models as inspirations](image)

*Figure 18. Model tested for role models as inspirations*

We first tested the model (Model 16) with career-related job intentions as the outcome. As can be seen in Table 15, desirability was positively related to both measures of value. When all variables were entered into the model, career-related job intentions were positively predicted by career value and goal expectancy and negatively by study value. Moreover, the interaction between study value and goal expectancy was once more significant and in the expected direction.
Table 15

**Results of the Conditional Process Analysis of the Variables Relating to Role Models as Inspirations**

<table>
<thead>
<tr>
<th>Predicting study value; $R^2 = .23$</th>
<th>$B$</th>
<th>$B_{se}$</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
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<td>Desirability (D)</td>
<td>.48**</td>
<td>.03</td>
<td>.43</td>
<td>.55</td>
</tr>
<tr>
<td>Predicting career value $R^2 = .19$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>.49**</td>
<td>.04</td>
<td>.41</td>
<td>.56</td>
</tr>
<tr>
<td>Predicting career related job intentions $R^2 = .41$</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>D</td>
<td>.04</td>
<td>.05</td>
<td>-.05</td>
<td>.13</td>
</tr>
<tr>
<td>Study Value (SVal)</td>
<td>-.15**</td>
<td>.06</td>
<td>-.26</td>
<td>-.04</td>
</tr>
<tr>
<td>Career Value (CVal)</td>
<td>.26**</td>
<td>.05</td>
<td>.15</td>
<td>.37</td>
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<td>Career Expectancy (CExp)</td>
<td>.05</td>
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</tr>
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<td>CVal X CExp</td>
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<td>.04</td>
<td>-.16</td>
<td>.00</td>
</tr>
<tr>
<td>Predicting advanced degree intentions $R^2 = .17$</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>-.03</td>
<td>.07</td>
<td>-.17</td>
<td>.11</td>
</tr>
<tr>
<td>SVal</td>
<td>.15</td>
<td>.08</td>
<td>-.02</td>
<td>.31</td>
</tr>
<tr>
<td>CVal</td>
<td>.48**</td>
<td>.08</td>
<td>.31</td>
<td>.64</td>
</tr>
<tr>
<td>CExp</td>
<td>.19**</td>
<td>.07</td>
<td>.06</td>
<td>.33</td>
</tr>
<tr>
<td>GExp</td>
<td>-.01</td>
<td>.09</td>
<td>-.18</td>
<td>.16</td>
</tr>
<tr>
<td>SVal X GExp</td>
<td>-.09</td>
<td>.06</td>
<td>-.22</td>
<td>.03</td>
</tr>
<tr>
<td>SVal X CExp</td>
<td>.18**</td>
<td>.07</td>
<td>.05</td>
<td>.32</td>
</tr>
<tr>
<td>CVal X GExp</td>
<td>.00</td>
<td>.06</td>
<td>-.12</td>
<td>.12</td>
</tr>
<tr>
<td>CVal X CExp</td>
<td>-.07</td>
<td>.06</td>
<td>-.19</td>
<td>.06</td>
</tr>
</tbody>
</table>

*Note. * $p < .05$; ** $p < .01$; All predictors are mean centred. $B$ refers to unstandardized coefficient. Confidence intervals based on bias-corrected bootstrapping procedures with a sample size of 10,000.

With regards to mediation, our analysis revealed that while the direct effect was not different from zero (see Table 15), the indirect effect of desirability through career value was positive at most levels of the moderators ($B = .13; 95\%$ CI [.07, .20]), lending partial support to H4b (see Table 16 for more detail) and thus the idea that desirability influences career intentions by changing the value associated with this career, albeit not necessarily for those with high levels of expectancy. Contrary to our predictions, the indirect effect through study
value was negative, but only when career expectancy was low regardless of levels of goal expectancy \((B = .14; 95\% \text{ CI} [-.22, -.07])\) and when both career expectancy and goal expectancy were moderate \((B = .07; 95\% \text{ CI} [-.13, -.01])\). The results are illustrated in Figure 19.

![Diagram](image-url)

**Figure 19.** Results of moderated mediation examining role models as inspirations and predicting discipline related job intentions

<table>
<thead>
<tr>
<th>Career Expectancy</th>
<th>Goal Expectancy</th>
<th>(B)</th>
<th>(B) se</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
<td>.23</td>
<td>.04</td>
<td>.16</td>
<td>.30</td>
</tr>
<tr>
<td>Low</td>
<td>Medium</td>
<td>.18</td>
<td>.04</td>
<td>.10</td>
<td>.27</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td>.13</td>
<td>.06</td>
<td>.01</td>
<td>.26</td>
</tr>
<tr>
<td>Medium</td>
<td>Low</td>
<td>.18</td>
<td>.04</td>
<td>.10</td>
<td>.26</td>
</tr>
<tr>
<td>Medium</td>
<td>Medium</td>
<td>.13</td>
<td>.03</td>
<td>.07</td>
<td>.20</td>
</tr>
<tr>
<td>Medium</td>
<td>High</td>
<td>.08</td>
<td>.04</td>
<td>-.00</td>
<td>.17</td>
</tr>
<tr>
<td>High</td>
<td>Low</td>
<td>.12</td>
<td>.06</td>
<td>.01</td>
<td>.26</td>
</tr>
<tr>
<td>High</td>
<td>Medium</td>
<td>.08</td>
<td>.05</td>
<td>-.01</td>
<td>.17</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
<td>.03</td>
<td>.04</td>
<td>-.05</td>
<td>.13</td>
</tr>
</tbody>
</table>

**Note.** All predictors are mean centred. \(B\) refers to unstandardized coefficient.

Confidence intervals based on bias-corrected bootstrapping procedures with a sample size of 10,000. Low: 1 \(SD\) below the mean; Medium: Mean; High: 1 \(SD\) above the mean.
We then ran the same analysis with advanced degree intentions as the outcome. When all variables were entered, advanced degree intentions were positively predicted by career value as well as career expectancy but not by desirability, indicating that there is no direct effect of this variable on advanced degree intentions. Moreover, the interaction between study value and career expectancy was once more significant and in the expected direction, supporting H4c (see Table 15), although it should be noted that this effectively is the same interaction we already reported on when testing H2. Lastly, the indirect effect through career value was positive at all levels of the moderators (\( B = .23; 95\% \text{ CI} [0.15, 0.33] \)) and the indirect effect through study value was positive at certain levels of the moderators, although the patterns are hard to interpret (see Table 17). These findings lend partial support to H4b and are illustrated in Figure 20.

Table 17

**Conditional Indirect Effect of Desirability on Advanced degree Intentions through Study Value at Different Levels of the Mediators**

<table>
<thead>
<tr>
<th>Career Expectancy</th>
<th>Goal Expectancy</th>
<th>( B )</th>
<th>( B \text{ se} )</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
<td>.02</td>
<td>.04</td>
<td>-.06</td>
<td>.11</td>
</tr>
<tr>
<td>Low</td>
<td>Medium</td>
<td>.13</td>
<td>.06</td>
<td>.02</td>
<td>.25</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td>.24</td>
<td>.10</td>
<td>.05</td>
<td>.45</td>
</tr>
<tr>
<td>Medium</td>
<td>Low</td>
<td>-.03</td>
<td>.06</td>
<td>-.15</td>
<td>.07</td>
</tr>
<tr>
<td>Medium</td>
<td>Medium</td>
<td>.07</td>
<td>.04</td>
<td>-.01</td>
<td>.16</td>
</tr>
<tr>
<td>Medium</td>
<td>High</td>
<td>.18</td>
<td>.08</td>
<td>.03</td>
<td>.35</td>
</tr>
<tr>
<td>High</td>
<td>Low</td>
<td>-.09</td>
<td>.09</td>
<td>-.27</td>
<td>.09</td>
</tr>
<tr>
<td>High</td>
<td>Medium</td>
<td>.02</td>
<td>.07</td>
<td>-.10</td>
<td>.15</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
<td>.12</td>
<td>.07</td>
<td>-.01</td>
<td>.27</td>
</tr>
</tbody>
</table>

*Note.* All predictors are mean centred. \( B \) refers to unstandardized coefficient.

Confidence intervals based on bias-corrected bootstrapping procedures with a sample size of 10,000. Low: 1 SD below the mean; Medium: Mean; High: 1 SD above the mean.
Figure 20. Results of moderated mediation examining role models as inspirations and predicting advanced degree intentions

**Discussion**

Our results generally support the theoretical framework put forward in Chapter 3 but also raise some interesting questions. First, we had predicted that women in male-dominated fields would perceive a lower availability of role models and therefore also report lower expectancy, value, and career intentions. These ideas were not supported. We did find some evidence that women perceived a lack of attainable role models compared to men, although this effect was only marginally significant and extremely small and, most importantly, did not depend on discipline. Moreover, we found gender effects on two of the measures of expectancy and on advanced degree intentions, but once more these effects were not dependent on discipline. We did not find any gender difference with regards to desirable role models nor role models embodying role aspirants’ goals, nor with regards to value and discipline related job intentions regardless of discipline. This is somewhat surprising and at the same time encouraging, particularly as it replicates what we found in Study 1. It may indicate that gender is not as important as previously thought when it comes to the selection of role models or that female role aspirants for whom it does matter are able to find female
role models even in fields in which they are under-represented. A less optimistic explanation may be that many of the members of their discipline who undergraduate students interact with are rather junior and therefore more likely to be female, and while this may be useful for undergraduate students, it suggests that as students advance in their careers, gender difference may be more likely to emerge.

In many ways these findings mirror the findings we reported in Study 1 in Chapter 2, indicating that female students in male-dominated fields do not necessarily lack role models. This does not necessarily mean that gender is not an important factor in the role modelling process. We did not measure whether participants perceived male or female role models as more attainable, more desirable, and thought they embodied their goals to a higher degree. Nevertheless, the fact that the availability of role models was not affected by whether or not a large number of same-gender role models were available suggests that gender is just one factor out of many influencing perceived goal embodiment, attainability, and desirability of potential role models.

**The Motivational Effects of Role Models as Behavioural Models**

We had further hypothesised that role models would function as behavioural models and, as part of this hypothesis, that goal embodiment would predict career intentions. This was indeed confirmed for both discipline related job intentions and advanced degree intentions. Moreover, we had predicted that this effect would be mediated by expectancy.

In relation to discipline related job intentions we found that of the three measures of expectancy we took, only goal expectancy mediated the effect of goal embodiment on discipline related job intentions. In other words, having role models who embody one’s goals in one’s discipline leads to more confidence in being able to achieve one’s own goals in a similar career and this results in higher intentions to find a job related to one’s discipline.
It is perhaps not surprising that the same was not true for study expectancy. After all, it could be argued that the degree to which a role aspirant believes she or he can successfully finish her or his degree is not directly related to future goals, especially considering that quite different skills might be required. Had we measures study motivation as an outcome instead, we may have found a mediating effect of this measure. In other words, it may well be that role models as behavioural models can change study motivation and in this case we would expect that those who embody the goal of being a successful student would increase study expectancy and in turn study motivation. This is particularly likely in the light of research repeatedly showing the association between constructs similar to expectancy and study motivation and goals (see Eccles & Wigfield, 2002; Zimmerman, Bandura, & Martinez-Pons, 1992).

The fact that career expectancy did not mediate the effect of goal embodiment is slightly more puzzling considering that it relates to a future career and therefore should be predictive of career intentions (e.g., Segal, Borgia, & Schoenfeld, 2002). However, it may simply be the case that as success is often an important goal in achievement settings, these two forms of expectancy are closely related, leading to multicollinearity which makes it impossible to tease out the individual effects of both constructs.

We found some support for the predicted interaction between expectancy and value, albeit only for few of the measures taken. More precisely, we found that the effect of career expectancy was higher at high levels of study value compared to lower levels of study value. Further research is needed to test whether this pattern replicates.

The predicted pattern was overall less pronounced when predicting advanced degree intentions. The degree to which available role models embodied role aspirant goals directly influenced the extent to which students were planning to obtain an advanced degree in their discipline. In addition to this direct effect, we also found evidence of mediation through
career expectancy. The availability of role models who embodied a role aspirant’s goals led to higher expectations of success in a career in the role aspirant’s discipline and in turn to higher intentions to study for an advanced degree in one’s discipline. However, this was not the case when role aspirants either really enjoyed their studies or anticipated that they would really enjoy a career in their discipline. While this goes against the predicted direction of the interaction between expectancy and value, a potential explanation could be that under such circumstances, role models are not needed to boost expectancy. If that is indeed the case, however, it is surprising that we found the opposite effect when predicting discipline related job intentions. As discussed above, in that case the positive effect of career expectancy was higher for those who also enjoyed their studies, as we would predict. Similarly, high goal expectancy led to higher levels of advanced degree intentions particularly when study value was high.

To summarise, we found that goal embodiment was indeed positively related to career intentions and that this effect could be explained by changes in expectancy. However, this was only true for expectancy which was directed at students’ future careers rather than their current studies. The predicted pattern was more pronounced for discipline related job intentions than advanced degree intentions. Finally, we found some support for the prediction that the effects of expectancy depend on levels of value, but only some of these effects were in the predicted direction.

The Motivational Effects of Role Models as Representations of the Possible

We had also predicted that role models would act as representations of the possible and thus that attainability would also positively predict career intentions. This was confirmed for both discipline-related job intentions and advanced degree intentions. Moreover, we had predicted that this effect would be mediated by expectancy. Results were very similar to
those on goal embodiment. We found that attainability increased discipline related job intentions by positively influencing both goal expectancy and career expectancy. However, career expectancy only had this positive effect when study value was high. In other words, only those students who really enjoyed their studies benefitted from the availability of attainable role models who increased their confidence in being able to have a successful career in their discipline. As with goal embodiment, there was less evidence for mediation when predicting advanced degree intentions. The availability of attainable role models influenced advanced degree intentions through its effect on career expectancy but not among students who either really enjoyed their studies or believed that they would really enjoy a career in their discipline.

We did not find any evidence for our prediction that goal embodiment and attainability would interact, neither when predicting the different measures of expectancy, nor when predicting career intentions directly. This may be due to the high correlation between the two variables or the fact that values for both of these variables were generally high in our sample. Both of these points could be addressed by an experimental design in which attainability and goal embodiment are manipulated. On the other hand, these findings could also be a reflection of the fact that attainability and goal embodiment simply do not interact and that we were wrong in predicting that they would.

Taken together, we found that attainability, in addition to goal embodiment, predicted career intentions and that it did so, at least in part, by changing career expectancy and goal expectancy. Once more, study expectancy did not mediate the effect of attainability on career intentions. The prediction that goal embodiment and attainability would interact was not supported.
The Motivational Effects of Role Models as Inspirations

We had also predicted that role models would function as inspirations and that, in line with this, the availability of desirable role models would be predictive of career intentions. This was supported by our data. Moreover, we had hypothesised that this effect would be mediated by value, a construct that we measured both as the enjoyment of current studies and the anticipated enjoyment of a career in one’s discipline. We did find evidence supporting this prediction. When predicting both discipline related job intentions and advanced degree intentions, career value mediated the effect of desirability. In other words, role aspirants who perceived a high availability of role models who they wanted to be like also believed that they would enjoy a career in their discipline and were in turn more motivated to pursue a career in their discipline. For discipline related job intentions, this effect depended on levels of expectancy such that when expectancy was high, the mediating effect disappeared. This of course mirrors the interaction reported on above where value was considered a moderator of the effect of expectancy. As we’ve said before, it is slightly puzzling as it is in opposition to what would be predicted based on expectancy-value theories of motivation.

Another unanticipated finding was that when predicting discipline related job intentions, the indirect effect through study value was negative, at least when career expectancy was low. Put differently, for those students who did not believe they could succeed in a career in their discipline, the availability of desirable role models led them to enjoy their studies more but this then led to lower intentions to find a job related to their discipline. A potential explanation for this effect might be the findings with regards to advanced degree intentions, where we found a positive mediating effect of study value, at least at some levels of expectancy. As students generally either study for an advanced degree or look for a job related to their discipline, it could thus be argued that the effect that desirable role models have by influencing study value steers them towards getting an
advanced degree and therefore away from finding a job. This explanation is also plausible as getting an advanced degree is likely to be more similar to students’ current studies which they enjoy.

To summarise, we found that the availability of desirable role models was positively associated with higher career intentions and that this effect was mediated by value. As with expectancy, the anticipated career value was more predictive of career intentions than the value associated with participants’ current studies. Moreover, we found an unanticipated negative effect of study value on discipline related job intentions, particularly when students did not believe they could succeed in a career in their discipline.

With regards to all of these results discussed above it is important to keep in mind that many of the variables were highly correlated. While this is to be expected as they partially share the same predictors such as similarity and shared group membership, it nevertheless leads to multicollinearity and affects the accuracy of discerning the effects of specific predictors. This is especially relevant with regards to the mediating effects of the different measures of expectancy and value. Future research needs to find a balance between measuring all relevant aspects of the multi-faceted constructs of expectancy and value and not including too many overlapping constructs which make it hard to disentangle the observed effects.

Moreover, the results of the exploratory factor analysis we conducted unfortunately did not produce a factor solution that matched the different constructs put forward in the MTRM and used in our analyses. This has several implications. First, it calls into question claims made about mediation outlined above. More importantly, however, it calls into question the constructs of the MTRM proposed in Chapter 3. This is particularly relevant for the three role model qualities which were not distinct from each other in our data, suggesting that a revised, more parsimonious model, might be more appropriate. On the other hand, a
lack of empirical distinctiveness does not necessarily mean that the constructs do not theoretically differ from each other in important ways. It is also interesting to note that some of the expectancy and value measures – two empirically and theoretically established constructs - were not empirically distinct from each other in this study either. More research is needed to evaluate both the necessity of the different constructs in the MTRM and the mediating and moderating role they might play. In this thesis, we will continue to treat the constructs as separate factors, but the fact that they might not be should be kept in mind when interpreting our results.

**Practical Implications**

Taken together, these results support the theoretical framework outlined in the MTRM, but lend less support to the idea that women in male-dominated fields perceive a lack of role models. However, this should by no means be taken as an indication that there is no need to provide under-represented or negatively stereotyped groups in general or women in particular with a wider range of role models. As we have demonstrated in this chapter, role models in all three functions contribute to the intentions to stay in one’s discipline in one way or another and this is crucial for addressing the under-representation of minority groups. There are many obstacles that members of these groups face and the fact that a lack of role models may not always be one of them by itself does not mean that role models cannot contribute to an increase in motivation among members of these groups and eventually in an increase in numbers of these groups.

At the same time, it might be that role model gender is just less relevant for those who have already started a career path in a specific discipline. For those still making this decision (e.g., young children or high school students), gender of potential role models might well be very important. Further research is needed to test this idea.
Furthermore, while these results suggest that all three role model qualities contribute to students’ career intentions, they also highlight that they do so in different ways and may thus be of different importance to different role aspirants. Both value and expectancy are important predictors of the choices we make and our results show that female students experience lower levels of expectancy. They may therefore benefit most from role models who function as behavioural models and representations of the possible and it is thus particularly important for potential role models to embody a range of goals and present themselves as attainable.

Future Research Directions

In this chapter we have presented evidence that goal embodiment, attainability, and desirability are important characteristics for role models to have and that these qualities influence career intentions by changing levels of expectancy and value. However, this study was purely correlational in nature and cannot make any claims regarding causality. It is therefore important to study these mechanisms using experimental designs. Apart from being able to speak to causality, experimental work has further benefits such as addressing the aforementioned problem of multicollinearity present in our data. For example, by orthogonally manipulating attainability and goal embodiment, it may be easier to tease out their individual effects and observe their interaction should it exist.

This study used undergraduate students as a sample. The fact that gender differences did not depend on discipline may not necessarily replicate in samples that are further along in their career. For example, while women generally make up about half of undergraduate students this changes as they move up the academic career ladder (Bain & Cummings, 2000; Carrington & Pratt, 2003; Silander, Haake, & Lindberg, 2013; Winkler, 2000), at which point women in male-dominated fields might have a much harder time finding suitable role models.
Future research should therefore use different, more senior samples to investigate the effect of role models.

We will address some of these issues in the following two chapters, which will present further evidence supporting the MTRM in samples of PhD students. In Chapter 5, we will manipulate the attainability and desirability of a potential role model and in Chapter 6, we will focus on role models in their function as representations of the possible and the effects of goal embodiment and attainability.
Chapter 5: The Motivational Effects of Attainable and Desirable Role Models

In Chapter 3, we have theorised that the effectiveness of role models is dependent on how they are perceived by role aspirants. In particular, our theoretical framework argues that the perception of a role model’s goal embodiment, attainability, and desirability are key to their effectiveness. The MTRM assumes that both perceived attainability and perceived desirability impact on role aspirants’ motivation and that perceived attainability does so by influencing expectancy. In other words, perceiving a successful role model as attainable leads role aspirants to perceive such success as attainable for themselves. In turn, they are more motivated to pursue this success themselves.

In Chapter 4 we have provided initial evidence supporting this theoretical framework by showing that the availability of attainable role models is associated with higher levels of expectancy and, in turn, motivation and that the availability of desirable role models is associated with higher levels of value and in turn motivation. However, as the data were correlational, we, as yet, cannot make any claims about causation. Moreover, although the extant research provides some evidence for the importance of both desirability and attainability for understanding the effectiveness of role models, these two concepts have not been tested experimentally, directly, and in combination with each other. In this chapter we fill this gap by providing a first experimental test of the MTRM by examining the joint effects of role model desirability and attainability on role aspirants’ career intentions. This will help us answer a number of important questions. Is a desirable successful role model enough to elicit inspiration and change career intentions? Is attainability the key ingredient to role model success? Or is it more complex than either of those foci might suggest?
In order to answer these questions and study the effects of attainability and desirability experimentally, it is useful to revisit the factors which we have identified as potentially contributing to these two role model qualities.

As we have outlined in the Chapter 3, the impression formation and social judgment literature (e.g., Brambilla, Rusconi, Sacchi, & Cherubini, 2011; Brambilla, Sacchi, Rusconi, Cherubini, & Yzerbyt, 2012) as well as the admiration literature (e.g., Sweetman, Spears, Livingstone, & Manstead, 2012) suggest that there are (at least) three factors contributing to desirability. These are sociability, morality, and competence and evidence from the role model literature does indeed suggest that both sociability and competence affect the role modelling process (e.g., Calvert et al., 2012; Marx & Roman, 2002).

However, the literature on role models further shows that the positive effects of role model desirability are not always present (Parks-Stamm et al., 2008) particularly when role models are seen as unattainable because their level of success is perceived as too high (Hoyt & Simon, 2011) or undeserved (McIntyre et al., 2010; Taylor et al., 2011), or because the attribute in question is seen as unchangeable (Hoyt et al., 2012; Lockwood & Kunda, 1997). In these cases, the potential role models can actually stymie role aspirants’ ambitions and motivation rather than enhance it.

In this chapter, we will investigate the interplay of attainability and desirability for the first time. Expectancy-value theories of motivation suggest that value and expectancy interact (e.g., Atkinson, 1957; Nagengast et al., 2011; Trautwein et al., 2012) such that expectancy has a particularly large effect when value is also high and vice versa and we found some evidence supporting this idea in Chapter 4. Moreover, the MTRM and our findings from Study 3 suggest that desirability influences value, while attainability influences expectancy. It could therefore be argued that the effect of desirability may be particularly high when
attainability is also high. We endeavour to shed light on these issues within the context of the career motivation of PhD students in STEM fields.

As suggested by the theoretical framework presented in Chapter 3 and the evidence cited above, we predict the following:

H1: Role aspirants presented with a highly desirable academic role model and those presented with a highly attainable academic role model will show stronger intentions to stay in academia after finishing their degree compared to those presented with an unattainable role model or undesirable role model respectively.

H2: Attainability and desirability will interact when influencing role aspirants’ academic career intentions such that the effect of attainability will be greater when desirability is high compared to low and vice versa.

H3: Role aspirants presented with a highly attainable role model will have higher expectations of success than those presented with an unattainable role model.

H4: Perceived desirability and perceived attainability will predict the degree to which role aspirants plan to stay an academia but the effect of attainability will be mediated by expectations of success.

We choose to present PhD student participants with female role models only and do therefore not expect any effects of participant gender on the effectiveness of role models as previous research suggests that while male role models may not be as effective for women, female role models work equally well for male and female role aspirants (Lockwood, 2006).

Method

Participants

Participants were 155 full-time PhD students from various science disciplines from three British universities. The sample was comprised of 69 women (45%) and 86 (55%) men.
Of these, 19% were in the first year of their PhD, 30% in their second, 30% in their third, 21% in their fourth, and 3% in their fifth year. The remaining 1% had been working on their PhD for longer than 5 years. The average age of participants was 28 years ($SD = 6$ years).

**Material and Design**

Participants were asked to take part in the study in an e-mail that included a link to one of four versions of the study, corresponding to the four experimental conditions of our 2 (Desirability: High vs. Low) X 2 (Attainability: High vs. Low) between-participants design. Conditions were assigned randomly. After providing their demographic details participants read information about a (fictional) female post-doctoral researcher at their University called Elizabeth Pearce. Participants were led to believe that this potential role model actually existed. Participants first read about the role models academic career to date, which was described as being extremely exceptional (low attainability condition) or as excellent, but not exceptional (high attainability condition; keeping in mind the high standard of PhD students). This was manipulated at all stages of her educational path so far, from school, to her undergraduate studies, to her PhD (see Appendix C). For example, the low attainability condition contained the following statement from her undergraduate lecturer: “I’ve never seen an undergraduate student produce such high quality work.” In the high attainability condition the statement was altered to “It’s rare to see an undergraduate student produce such high quality work”.

Next, to manipulate desirability, participants were presented with statements from three people in the potential role model’s life describing her personality. As sociability is a likely predictor of desirability, she was either described as sociable by using traits such as humble and considerate (high desirability condition) or not particularly sociable by describing her in a manner that made her appear arrogant and blunt (low desirability
condition). Attributes speaking to her competence and morality (e.g., intelligent and honest) were held constant. For example, in the high desirability condition her mother said about her: “She never had trouble making friends… even though she was smarter than the other kids she never showed off.” In the low desirability condition, her mother noted: “She had some trouble making friends some time… she just knew she was smarter than the other kids and wasn’t afraid to show it” (see Appendix D for more detail). After responding to the dependent variables described below, participants were fully debriefed.

**Measures**

We first included manipulations checks which also serve as our measures of perceived desirability and perceived attainability. These questions were asked on a seven point scale from 1 = “not at all” to 7 = “very much”. Next, participants were asked to rate their agreement with statements about their expectations of future success in academia and their academic career intentions on a seven point scale from 1 = “strongly disagree” to 7 = “strongly agree”. The items of each scale as well as their respective reliability are listen in Table 18.
Table 18

Measures Used in Study 4

<table>
<thead>
<tr>
<th>Measure</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desirability</td>
<td>How much do you like Elizabeth Pearce?</td>
</tr>
<tr>
<td></td>
<td>How much do you admire Elizabeth Pearce?</td>
</tr>
<tr>
<td></td>
<td>How much do you want to be like Elizabeth Pearce?</td>
</tr>
<tr>
<td>Attainability</td>
<td>How attainable does Elizabeth Pearce's success seem to you?</td>
</tr>
<tr>
<td></td>
<td>How much do you think you can be like Elizabeth Pearce?</td>
</tr>
<tr>
<td>Expectations of</td>
<td>I am confident that I have a good chance in succeeding in academia after my PhD in comparison to my peers.</td>
</tr>
<tr>
<td>success</td>
<td>I am confident that I can be successful in publishing my work in comparison to my peers.</td>
</tr>
<tr>
<td>Academic</td>
<td>I will try to stay in academia after I finished my PhD</td>
</tr>
<tr>
<td>career intentions</td>
<td>I want to stay in academia after finishing my PhD.</td>
</tr>
<tr>
<td></td>
<td>I feel a sense of belonging in academia.</td>
</tr>
</tbody>
</table>

Note. The Reliability coefficient refers to Cronbach’s Alpha for measures with three items and to the Spearman-Brown coefficient for measures with only two items.

Results

As with the previous study, we first performed an exploratory factor analysis with Varimax rotation to test the distinctiveness of the constructs investigated in this study. The results are displayed in Table 19. As seen in this table, the items pertaining to desirability and attainability loaded on different factors (Factor 2 and 3 respectively). Moreover, academic career intentions items also loaded on a separate factor (Factor 1). Unfortunately, however, the items pertaining to expectations of success loaded on the same factor as attainability. These results are different from our expectations but also different from the results of Study 3. So, while our preconceived scales are reliable (see Table 18), results of the factor analysis should be kept in mind when interpreting our results, particularly those testing H4.
Table 19

**Factor Loadings Based on Principal Component Analysis with Varimax Rotation (Study 4)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>How much do you like Elizabeth Pearce?</td>
<td>.82</td>
<td>.22</td>
<td></td>
</tr>
<tr>
<td>How much do you admire Elizabeth Pearce?</td>
<td>.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How much do you want to be like Elizabeth Pearce?</td>
<td>.27</td>
<td>.82</td>
<td>.81</td>
</tr>
<tr>
<td>How attainable does Elizabeth Pearce's success seem to you?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How much do you think you can be like Elizabeth Pearce?</td>
<td>.43</td>
<td>.71</td>
<td></td>
</tr>
<tr>
<td>I am confident that I have a good chance in succeeding in academia after my PhD in comparison to my peers.</td>
<td>.55</td>
<td>.65</td>
<td></td>
</tr>
<tr>
<td>I am confident that I can be successful in publishing my work in comparison to my peers.</td>
<td></td>
<td></td>
<td>.78</td>
</tr>
<tr>
<td>I feel a sense of belonging in academia.</td>
<td>.79</td>
<td></td>
<td>.31</td>
</tr>
<tr>
<td>I want to stay in academia after finishing my PhD.</td>
<td>.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I will try to stay in academia after finishing my PhD.</td>
<td>.92</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. Factor loadings between -.2 and .2 are suppressed*

Means, standard deviations, and bivariate correlations of all our measures are displayed in Table 20. As can be gathered from this table, participants generally rated the role model as quite desirable and attainable (i.e. above the midpoint), had high expectations of success and reported high academic career intentions.

Table 20

**Means, Standard Deviations and Correlations of All Measures (Study 4)**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean (SD)</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1. Desirability</td>
<td>4.18 (1.31)</td>
<td>-</td>
</tr>
<tr>
<td>2. Attainability</td>
<td>4.40 (1.41)</td>
<td>.36**</td>
</tr>
<tr>
<td>3. Expectations of success</td>
<td>4.85 (1.24)</td>
<td>.02</td>
</tr>
<tr>
<td>4. Academic career intentions</td>
<td>4.99 (1.57)</td>
<td>.29**</td>
</tr>
</tbody>
</table>

*Note. * p < .05; ** p < .01*
Initial analyses, a 2 (Attainability: High vs. Low) X 2 (Desirability: High vs. Low) X 2 (Gender: Male vs. Female) ANOVA, revealed that our manipulations of attainability and desirability were indeed successful. Participants in the low attainability condition perceived the potential role model as less attainable ($M = 4.16; SD = 1.46$) than those in the high attainability condition ($M = 4.66; SD = 1.32$) $F(1, 150) = 5.01; p = .03; \eta^2 = .03$. The desirability manipulation did not influence attainability by itself $F(1, 150) = 1.49; p = .22; \eta^2 = .01$ nor did it interact with attainability $F(1, 150) = 1.69; p = .20; \eta^2 = .01$. Those in the low desirability condition ($M = 3.56; SD = 1.02$) reported less desire to be like the potential role model than those in the high desirability condition ($M = 4.77; SD = 1.28$) $F(1, 151) = 41.31; p < .01; \eta^2 = .22$. The attainability manipulation did neither affect perceived desirability $F(1, 151) = .43; p = .51; \eta^2 < .01$ nor interact with desirability $F(1, 151) = .01; p = .93; \eta^2 < .01$. Gender of participant did not influence perceived attainability or desirability nor did it interact with the desirability or attainability manipulations (all $F < 2.10$; all $p > .15$). Participant gender was thus not included in any further analyses.

With regards to academic career intentions we found a significant main effect of attainability, supporting H1. Those in the high attainability condition reported greater intentions to pursue a career in academia ($M = 5.38; SD = 1.38$) compared to those in the low attainability condition ($M = 4.63; SD = 1.64$) $F(1, 151) = 9.40; p < .01; \eta^2 = .06$. We did not find the hypothesised effect of desirability, $F(1, 151) = 1.57; p = .21; \eta^2 = .01$, nor an interaction between attainability and desirability, $F(1, 151) = 2.51; p = .12; \eta^2 = .02$, although the observed trend is in line with H2 (see Figure 21). Analyses of the simple effects revealed that within the low attainability condition, there was no significant difference between the low desirability and the high desirability condition ($p = .81$) but in the high attainability condition, the difference was marginally significant ($p = .05$). Moreover, within the low desirability condition there was no significant difference between the low attainability and the
high attainability condition \((p = .30)\) but in the high desirability condition, the difference was significant \((p < .01)\).

We then conducted a 2 (Attainability: Low vs. High) X 2 (Desirability: Low vs. High) ANOVA to investigate how these variables influenced expectations of success. In line with H3, results demonstrated a significant effect of attainability. Those exposed to the highly attainable role model expressed higher expectations of success \((M = 5.11; SD = 1.06)\) than those exposed to the less attainable potential role model \((M = 4.60; SD = 1.35)\) \(F(1, 151) = 6.55; p = .01; \eta^2 = .04\). In line with our hypotheses, desirability did not influence expectations of success either on its own, \(F(1, 151) = .42; p = .52; \eta^2 < .01\) nor in interaction with attainability, \(F(1, 151) = .01; p = .91; \eta^2 < .01\).

Next, we tested H4 by investigating whether levels of perceived attainability and desirability predicted academic career intentions and whether the effect of perceived attainability was mediated by expectations of success (see Figure 22). We used the continuous manipulation checks for this analysis and used the PROCESS macro for SPSS (Hayes, 2013; Model 4). As can be seen in Table 21, perceived desirability significantly
predicted career intentions when all other variables were included, but perceived attainability did not, indicating that there was no direct effect of attainability on academic career intentions. The indirect effect through expectations of success, on the other hand, was positive ($B = .26; 95\% \text{ CI} [.11, .42])$.

**Figure 22**. Model predicting academic career intentions

**Table 21**

*Results of the Mediation Analysis Predicting Academic Career Intentions*

<table>
<thead>
<tr>
<th></th>
<th>$B$</th>
<th>$B_{se}$</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived attainability</td>
<td>.03</td>
<td>.10</td>
<td>-.16</td>
<td>.23</td>
</tr>
<tr>
<td>Perceived desirability</td>
<td>.32**</td>
<td>.09</td>
<td>.14</td>
<td>.50</td>
</tr>
<tr>
<td>Expectations of success</td>
<td>.51**</td>
<td>.11</td>
<td>.30</td>
<td>.72</td>
</tr>
</tbody>
</table>

*Notes. $R^2 = .26; * p < .05; ** p < .01; All predictors are mean centred; B refers to unstandardized coefficient. Confidence intervals based on bias-corrected bootstrapping procedures with a sample size of 10,000*

**Discussion**

Our results support our claim that both desirability and attainability of a role model are important factors in the role modelling process. A role model who was both desirable and attainable proved to be more effective in increasing academic career intentions than a role
model who was attainable but not desirable or a role model who was desirable but not attainable (see Figure 21). Furthermore, in line with the MTRM outlined in Chapter 3, role aspirants’ perceptions of both attainability and desirability predicted career intentions. Perceived attainability did so by increasing role aspirants' expectations of future success, a measure of expectancy.

We did not find any gender differences that would indicate that female role models are less desirable or less attainable for male role aspirants compared to female role aspirants, although it should be noted that this may also have been a result of a sample size which may have been too small to detect gender differences. Nevertheless, the results suggest that women can make effective role models for both men and women. Whether men can act as equally effective role models for women, on the other hand, is a different question altogether. Evidence so far suggests that men are less effective as role models for women (e.g. Asgari, Dasgupta, & Cote, 2010; Stout et al., 2011), but it is unclear whether that is due to a lack of desirability, attainability, or goal embodiment. Our findings from Study 1 to 3 also illustrate that gender may not always have these effects, but future research is needed to answer this question.

This study opens up further questions. First, it is important to replicate these results in different contexts such as outside of academia, with different groups, and different role models (e.g., male role models; more or less successful role models). Moreover, we did not include a control condition in which no role model was presented. It is thus unclear whether undesirable and unattainable role models were just less effective, ineffective, or even detrimental. Furthermore, there are a number of factors that can potentially influence both attainability and desirability, including the aforementioned shared group membership (Blanton et al., 2000; Lockwood, 2006; Marx & Roman, 2002; von Hippel et al., 2011), attribution of success (McIntyre et al., 2011; Taylor et al., 2011), or similarity (Asgari et al.,...
More research is needed that looks specifically at how they can be used to optimise both attainability and desirability at the same time as well as how they might moderate the effect of attainability and desirability.

Moreover, the factor analysis performed to test the distinctiveness of the constructs suggested that desirability and attainability were distinct, but attainability and expectations of success were not. The former point is in line with the MTRM but not with the results from Study 3, while the opposite is true for the latter point. This might be a reflection of the fact that desirability and attainability were manipulated orthogonally, rather than just measured, in this study. It might well be that role models in real life are often seen as both attainable and desirable and that the situation created in this study is not representative of real life role models. However, we would argue that there are many situations in which this might not be the case. Very successful members of one’s field, for example, might be seen as very desirable but not necessarily attainable. In addition, it should be kept in mind that the fact that the constructs were measured slightly differently might also have contributed to differences in the results. Further research is needed to investigate these questions.

Maybe most importantly, while this study provides evidence for the importance of desirability and attainability and the mediating role of expectancy, it still leaves many aspects of the MTRM unanswered. It does not examine the effects of perceived goal embodiment, nor does it investigate whether in an experimental setting the effect of perceived desirability is mediated by changes in value as suggested by the MTRM and the evidence presented in the previous chapter. The next empirical chapter will address some of these issues. More specifically, the next chapter will investigate the effects of role models in their functions as representations of the possible, namely whether and how perceived goal embodiment and attainability influence career intentions in another sample of PhD students.
Chapter 6: Role Models as Representations of the Possible

In the previous chapter we have presented the first experimental evidence supporting the MTRM and the claim that desirability and attainability are important role model qualities. In this chapter, our focus will narrow to one of the three role model functions we described in Chapter 3: role models as representations of the possible. While definitions vary greatly, role models are often defined as those who demonstrate to us that success or a certain goal is not out of reach (Lockwood, 2006; McIntyre et al., 2011). In other words, they act as instantiations of what is possible. In this chapter we aim to investigate how role models in this function can influence career intentions, by examining the specific case of those deciding whether or not to start an academic career. We will first summarise the processes involved when role models function as representations of the possible. We then present two studies to test the theorised relationships between the variables involved.

We have argued in Chapter 3 that in order to understand the way in which role models work it is important to focus on role aspirants’ motivations and goals. Whether or not a potential role model can effectively influence a role aspirant’s motivation and goals depends on how she or he is perceived by the role aspirant. In their function as representations of the possible, it is particularly important to examine whether role models are perceived by role aspirants as attainable and whether they embody role aspirant goals. Goal embodiment refers to the degree to which a potential role model has reached a goal held by the role aspirant while attainability refers to the degree to which the role aspirant believes she or he could be like the potential role model. Such definitions suggest that no single individual is likely to be an effective role model for everyone, as we all have different goals and perceive different achievements as attainable. Even in the same general context, individuals may hold very different specific goals. For example, while one person might pursue an academic career to
gain status, another person may do so because she or he enjoys research and teaching for their own sake.

In the MTRM we hypothesised that these two factors would interact to influence expectancy, which refers to the subjective likelihood of succeeding in a certain task (e.g., finding a job in academia), although we did not find any support for this interaction in Study 3 (Chapter 4). Expectancy, in turn, is thought to interact with value, which refers to the subjective worth of a goal or goal related tasks (e.g., how enjoyable or useful an academic job would be). Both expectancy and value have been shown to influence a variety of outcomes such as career and achievement goals (Nagengast et al. 2011, Plante et al., 2013; Shapira, 1976; Wang, 2012), actual engagement in activities related to the domain in question (Nagengast et al., 2011; Wang, 2012), and educational and occupational choices (Eccles et al., 1998).

We have outlined the proposed relationships between these variables in Chapter 3, and these are illustrated in Figure 23 which focuses on academic career intentions as an example. As can be gathered from this figure, a number of variables, such as the level of success of the role model and similarity between the role model and the role aspirant, influence the levels of attainability and goal embodiment perceived by the role aspirant. Moreover, the attribution of success is an important predictor of attainability such that internal, controllable and stable attributions increase attainability (e.g., McIntyre et al., 2011; Taylor et al., 2011) and this should be equally true for other goals. Attainability and goal embodiment in turn influence expectancy by changing self-stereotyping (e.g., the degree to which a role aspirant might see herself as lacking competence solely because she is a woman) and the perception of obstacles outside of the self (e.g., the degree to which a role aspirant believes she will not be hired because of her gender). In other words, seeing someone who has reached one’s goal and believing that one could be like that person is likely to increase
the belief that one could reach this goal. This in turn positively influences the value of the
goal and, more importantly, influences motivation, reinforces the existing goal and increases
the probability of adopting a new, more ambitious goal. However, the degree to which these
motivational outcomes are achieved also depends on the value of the goal. For example,
believing that one could become a successful academic will not be motivating if one does not
think being an academic would be either useful or enjoyable.

Figure 23. Role models as representations of the possible and academic career intentions

In this chapter we test these proposed relationships in two studies (Studies 5 and 6)
 focusing on academia as an example of an area in which women remain under-represented.

While it is true that women make up the majority of those graduating from universities in the
US (National Center for Educational Statistics) as well as most European countries (European
Commission, 2012), their numbers decrease further up the academic career ladder: Even at
PhD level, women remain outnumbered by men in most European countries (European
Commission, 2012) and this under-representation of women tends to be exacerbated in more
senior academic positions (Bain & Cummings, 2000; Carrington & Pratt, 2003; Silander et al., 2013; Winkler, 2000).

**Study 5**

One potential reason why women remain under-represented in male-dominated fields is the perceived lack of work-life balance that is associated with such fields and which is seen as incompatible with the disproportionate amount of household chores and childcare responsibilities shouldered by women (Britt & Roy, 2014; Craig & Mullan, 2010; Kan, Sullivan, & Gershuny, 2011). As academia is a domain where often perceived that work-life balance is hard to come by for anyone (Kinman & Jones, 2008) it is thus not surprising that women are more likely to abandon their careers in academia compared to men (Bain & Cummings, 2000; Carrington & Pratt, 2003; Silander et al., 2013; Winkler, 2000). We therefore decided to focus on work-life balance goals of PhD students and investigated how a potential role model who either does or does not embody said goal and is presented as more or less attainable influences intentions of pursuing an academic career.

In line with the MTRM we hypothesised the following:

H1: Goal embodiment and attainability will positively influence role aspirant academic career intentions.

H2: This influence of goal embodiment attainability will be mediated by expectancy.

H3: Goal embodiment and attainability will interact such that high levels of attainability will not be as beneficial if goal embodiment is low and vice versa.

H4: The effect of expectancy on career intentions will depend on the perceived value of an academic career.
Method

Participants. Participants were 193 full-time PhD students from a range of British universities. The sample comprised 97 women (50%) and 94 (49%) men. Two participants (1%) identified as falling outside of the gender binary and were excluded for analyses of gender differences but included in the overall sample. Of these participants, 21% were in the first year of their PhD, 28% in their second, 29% in their third, 20% in their fourth, and 2% in their fifth year or beyond. The average age of participants was 27 years ($SD = 5$ years).

Material and Design. In this study, we manipulated both goal embodiment and attainability in a 2 (Goal embodiment: High vs. Low) X 2 (Attainability: High vs. Low) between-participants design.

Participants were asked to take part in the study in an e-mail that included a link to one of four versions of the study, corresponding to the four different experimental conditions. Conditions were assigned randomly. In the online questionnaire we first gathered demographic information. In order to ensure work-life balance was an important goal for participants, they were then asked to think about their personal career goals and select the one they found most important from two options: achieving a good work-life balance or making a difference in the world. Of the 311 students who took part in this initial screening, only those who rated a good work-life balance as more important were included in our sample of 193.

These participants were then presented with an interview with a fictional potential role model, a female post-doctoral researcher, Amanda Roberts. Participants were led to believe that the person they were reading about was selected at random from a range of people. In order to manipulate goal embodiment, the potential role model was either portrayed as having achieved a good work-life balance (e.g., she said “Work-life balance has always been really important to me and I am so glad that I have a job where I can have that balance”) or not (“Work-life balance is not really something that is important to me. I have a
job I love and I like devoting most of my time to it”). In both conditions, she was presented as being happy with her work situation (see Appendix E). Moreover, we portrayed the potential role model as either attainable or unattainable by either having reached her goals based on internal factors (her own choices) or external factors (luck). Some additional information was held constant across conditions in order to make the interview longer and more believable.

**Measures.** After reading about the potential role model participants were first asked to respond to two manipulation check items about perceived goal embodiment and three items about perceived attainability. Next, participants were asked to rate their agreement with different statements about motivational variables in relation to academia. These included two measures of expectancy, namely three items about their future expectations of success in academia and four items about expectations of reaching their personal career goals in academia. In line with the different aspects of value we described in Chapter 3, we further included three statements about the utility value of academic work and three statements about the intrinsic value of academic work. Finally, we included four statements about academic career intentions. All questions were asked on seven-point scales from 1 = “strongly disagree” to 7 = “strongly agree”. A full list of all items as well as the reliability of the scales can be seen in Table 22.
### Table 22

**Measures Used in Study 5**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Items</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal embodiment</td>
<td>Amanda Roberts embodies my goals</td>
<td>.74</td>
</tr>
<tr>
<td></td>
<td>Emulating Amanda Roberts will help me reach my goals</td>
<td></td>
</tr>
<tr>
<td>Attainability</td>
<td>Being like Amanda Roberts seems attainable to me</td>
<td>.81</td>
</tr>
<tr>
<td></td>
<td>Being like Amanda Roberts seems out of reach for me (reversed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I don’t think I could ever be in Amanda Roberts’ position</td>
<td></td>
</tr>
<tr>
<td>Expectations of success</td>
<td>I think I will/would be able to find a job in academia after I finished my PhD</td>
<td>.79</td>
</tr>
<tr>
<td></td>
<td>Finding a job in academia after I finished my PhD will/would be hard for me (reversed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I am confident that I can stay in academia after I finished my PhD</td>
<td></td>
</tr>
<tr>
<td>Goal expectations</td>
<td>I think I can achieve my career goals in academia</td>
<td>.89</td>
</tr>
<tr>
<td></td>
<td>I think academia will give me the opportunity to reach my goals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I don’t think academia is a place where I can achieve what is important to me (reversed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A career in academia will give me the chance to reach my career related goals</td>
<td></td>
</tr>
<tr>
<td>Utility value</td>
<td>Academic work in my discipline is important</td>
<td>.72</td>
</tr>
<tr>
<td></td>
<td>The work that academics in my discipline do is useful</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The things that researchers in my discipline do are not important</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(reversed)</td>
<td></td>
</tr>
<tr>
<td>Intrinsic value</td>
<td>Having an academic career sounds like fun</td>
<td>.82</td>
</tr>
<tr>
<td></td>
<td>I find academic work in my discipline interesting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Being an academic sounds like a job that I would enjoy</td>
<td></td>
</tr>
<tr>
<td>Academic career intentions</td>
<td>I want to stay in academia after I finished my PhD</td>
<td>.93</td>
</tr>
<tr>
<td></td>
<td>I will try to find a job in academia after I finished my PhD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I will look for a job outside of academia after I finished my PhD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(reversed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I have no intention of staying in academia after I finished my PhD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(reversed)</td>
<td></td>
</tr>
</tbody>
</table>

*Note. The Reliability coefficient refers to Cronbach’s Alpha for measures with three items and to the Spearman-Brown coefficient for measures with only two items.*
Results

We first conducted an exploratory factor analysis with Varimax rotation to test the distinctiveness of our constructs. As can be seen in Table 2, results unfortunately did not match the scales we had constructed. The items measuring goal expectations, intrinsic value, and academic career intentions all loaded highly on Factor 1. Both role model qualities loaded highly on Factor 2. Expectations of success and utility value, on the other hand, were separate constructs forming Factor 3 and 4 respectively. As in Study 3, we decided to nevertheless use the preconceived scales, but implications of these results should be kept in mind and will be discussed below.

Next, we tested whether our manipulations had been successful. A 2 (Attainability: High vs. Low) X 2 (Goal Embodiment: High vs. Low) X 2 (Participant Gender: Female vs. Male) ANOVA on perceived goal embodiment revealed that the perceived goal embodiment was indeed greater in the high goal embodiment condition ($M = 4.87; SD = 1.10$) compared to the low embodiment condition ($M = 3.85; SD = 1.35$) $F(1, 183) = 34.00; p < .01; \eta^2 = .16$. We also found an unexpected, marginally-significant interaction between goal embodiment and attainability $F(1, 183) = 3.55; p = .06; \eta^2 = .02$ such that participants in the high goal embodiment condition perceived the potential role model to embody their goals to a greater extent when attainability was also high, but this was not the case in the low goal embodiment condition (see Figure 2). Neither attainability nor gender had any effect on perceived goal embodiment and none of the other interactions were significant (all $F < 2.52; \text{all } p > .11$).
### Table 23

**Factor Loadings Based on Principal Component Analysis with Varimax Rotation (Study 5)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amanda Roberts embodies my goals</td>
<td>.23</td>
<td>.75</td>
<td>-.28</td>
<td></td>
</tr>
<tr>
<td>Emulating Amanda Roberts will help me reach my goals</td>
<td>.26</td>
<td>.62</td>
<td>-.35</td>
<td></td>
</tr>
<tr>
<td>Being like Amanda Roberts seems attainable to me</td>
<td>.72</td>
<td>.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Being like Amanda Roberts seems out of reach for me (reversed)</td>
<td>.64</td>
<td>.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I don’t think I could ever be in Amanda Roberts’ position</td>
<td></td>
<td></td>
<td>.75</td>
<td>.29</td>
</tr>
<tr>
<td>I think I will/would be able to find a job in academia after I finished my PhD</td>
<td>.44</td>
<td>.22</td>
<td>.69</td>
<td>.81</td>
</tr>
<tr>
<td>Finding a job in academia after I finished my PhD will/would be hard for me (reversed)</td>
<td></td>
<td></td>
<td></td>
<td>.81</td>
</tr>
<tr>
<td>I am confident that I can stay in academia after I finished my PhD</td>
<td>.47</td>
<td>.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think I can achieve my career goals in academia</td>
<td>.67</td>
<td>.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think academia will give me the opportunity to reach my goals</td>
<td>.78</td>
<td>.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I don’t think academia is a place where I can achieve what is important to me (reversed)</td>
<td>.81</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A career in academia will give me the chance to reach my career related goals</td>
<td>.81</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic work in my discipline is important</td>
<td>.32</td>
<td>.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The work that academics in my discipline do is useful</td>
<td></td>
<td></td>
<td>.88</td>
<td></td>
</tr>
<tr>
<td>The things that researchers in my discipline do are not important (reversed)</td>
<td></td>
<td></td>
<td>.76</td>
<td></td>
</tr>
<tr>
<td>Having an academic career sounds like fun</td>
<td>.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I find academic work in my discipline interesting</td>
<td>.71</td>
<td>.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Being an academic sounds like a job that I would enjoy</td>
<td>.89</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I want to stay in academia after I finished my PhD</td>
<td>.92</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I will try to find a job in academia after I finished my PhD</td>
<td>.89</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I will look for a job outside of academia after I finished my PhD (reversed)</td>
<td>.69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have no intention of staying in academia after I finished my PhD (reversed)</td>
<td>.87</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. Factor loadings between -.2 and .2 are suppressed*
We then conducted a 2 (Attainability: High vs. Low) X 2 (Goal Embodiment: High vs. Low) X 2 (Participant Gender: Female vs. Male) ANOVA on perceived attainability. Analysis revealed that, unfortunately, our attempted manipulation of attainability had not been successful. While the expected effect of attainability was not significant $F(1, 183) = 1.48; p = .23; \eta^2 = .01$, we found a highly significant effect for goal embodiment such that those role models who embodied the participants’ goal were perceived as more attainable ($M = 5.14; SD = 1.20$) than those who didn’t embody the goal ($M = 4.63; SD = 1.29$) $F(1, 183) = 7.60; p = .01; \eta^2 = .04$. None of the other effects were significant (all $F < 1.48$; all $p > .23$).

We therefore only used the continuous measures of attainability and goal embodiment in our analyses. While this means we cannot make causal claims about the relationships we might observe, it can still shed light on how the perception of potential role model, career intentions, expectancy, and value are related. The unexpected effect of our goal embodiment

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It should be noted that as participants were nevertheless exposed to different role models, perceived attainability might mean something different to those in the high or low goal embodiment conditions. While this should be kept in mind when interpreting the findings, attainability nevertheless refers to the degree to which participants felt they could be like a successful academic, regardless of goal embodiment condition. As everyone is exposed to different role models in real life, the findings can be interpreted in a similar matter to those reported in Chapter 4.
manipulation on perceived attainability also lead to perceived goal embodiment and perceived attainability correlating with each other (see Table 24). The consequences of this correlation are discussed below.

Table 24

Means, Standard Deviations, and Bivariate Correlations between all Measures (Study 5)

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Goal embodiment</td>
<td>4.37 (1.33)</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Attainability</td>
<td>4.89 (1.26)</td>
<td>.39**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Expectations of success</td>
<td>4.39 (1.27)</td>
<td>.01</td>
<td>.43**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Goal expectancy</td>
<td>4.81 (1.33)</td>
<td>.31**</td>
<td>.36**</td>
<td>.47**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Intrinsic value</td>
<td>5.20 (1.20)</td>
<td>.30**</td>
<td>.27**</td>
<td>.37**</td>
<td>.81**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>6. Utility value</td>
<td>5.63 (1.07)</td>
<td>.14</td>
<td>.09</td>
<td>.08</td>
<td>.37**</td>
<td>.31**</td>
<td>-</td>
</tr>
<tr>
<td>7. Academic career intentions</td>
<td>6.24 (2.09)</td>
<td>.29**</td>
<td>.26**</td>
<td>.42**</td>
<td>.83**</td>
<td>.78**</td>
<td>.32**</td>
</tr>
</tbody>
</table>

Note. * p < .05; ** p < .01

Next, we used the PROCESS macro for SPSS (Hayes, 2013) to test the hypothesised relationships between perceived goal embodiment, perceived attainability, our two measures of expectancy, our two measures of value, and academic career intentions. All measures except for the outcome (i.e. career intentions) were mean-centred prior to our analyses to make the regression coefficients interpretable and we report the unstandardized regression coefficients throughout this paper.

As can be seen from Figure 25, we included perceived attainability as a moderator of the relationship between perceived goal embodiment and expectancy as well as between perceived goal embodiment and career intentions.
As a first preliminary step, we conducted two multiple linear regression analyses to examine which variables directly influence career intentions without moderation or mediation taken into account. The initial model included perceived goal embodiment and perceived attainability as predictors of career intentions and found significant effects for both goal embodiment $B = .34$, $t(191) = 2.90$, $p < .01$, and attainability $B = .30$, $t(191) = 2.44$, $p = .02$; $R^2 = .11$; $F(2, 190) = 11.66$, $p < .001$, supporting H1. However, as these two measures were correlated (see Table 24), the unique effects of both variables are hard to interpret. We then included the two measures of expectancy (expectations of success and goal expectations) and value (intrinsic value and utility value) in a linear regression and found that goal expectations, $B = .84$, $t(191) = 7.48$, $p < .001$, and intrinsic value $B = .57$, $t(191) = 5.00$, $p < .001$ predicted career intentions, but expectations of success $B = .07$, $t(191) = .94$, $p = .35$ and utility value did not $B = .03$, $t(191) = .37$, $p = .71$; $R^2 = .72$, $F(4, 188) = 121.42$, $p < .001$. We nevertheless included all four variables in our conditional process analysis, first because this was our hypothesised model, and second because the lack of a direct effect says nothing about whether a variable might still function as a moderator.

Thus, we next estimated a model (Model 40) with perceived goal embodiment as the predictor and both measures of expectancy as mediators. We included perceived attainability
as a moderator for the effect of goal embodiment on the two measures of expectancy as well as on the effect of goal embodiment on career intentions. Both measures of value were included as moderators of the effects of both measures of expectancy on career intentions (see Figure 25). As can be seen from Table 25, the interaction between perceived goal embodiment and perceived attainability significantly predicted both measures of expectancy, supporting H3. In other words, the effect of perceived goal embodiment on these measures depended on levels of perceived attainability or – the other way around – the effect of perceived attainability on the two measures of expectancy depended on levels of perceived goal embodiment. As our variables were centred prior to analysis, the coefficients of perceived goal embodiment and perceived attainability can be interpreted as their effect at average levels of the other variable. We will examine in more detail these conditional effects in later analyses.

When predicting career intentions, none of the proposed interactions were significant (see Table 25), thus lending no additional support to H3 and no support to H4. Furthermore, neither perceived attainability nor perceived goal embodiment significantly predicted career intentions at average levels of the other variables. However, both the proposed mediator goal expectations and the moderator intrinsic value were significantly predictive of career intentions at average levels of the other variables.
### Results of the Conditional Process Analysis (Study 5)

<table>
<thead>
<tr>
<th>Predicting expectations of success ( R^2 = .49 )</th>
<th>( B )</th>
<th>( B \text{ se} )</th>
<th>( \text{LLCI} )</th>
<th>( \text{ULCI} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal Embodiment (GE)</td>
<td>-.17**</td>
<td>.07</td>
<td>-.30</td>
<td>-.04</td>
</tr>
<tr>
<td>Attainability (A)</td>
<td>.54**</td>
<td>.07</td>
<td>.40</td>
<td>.68</td>
</tr>
<tr>
<td>GE X A</td>
<td>.11*</td>
<td>.05</td>
<td>.02</td>
<td>.19</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Predicting goal expectations ( R^2 = .44 )</th>
<th>( B )</th>
<th>( B \text{ se} )</th>
<th>( \text{LLCI} )</th>
<th>( \text{ULCI} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE</td>
<td>.22**</td>
<td>.07</td>
<td>.08</td>
<td>.36</td>
</tr>
<tr>
<td>A</td>
<td>.33**</td>
<td>.08</td>
<td>.18</td>
<td>.48</td>
</tr>
<tr>
<td>GE X A</td>
<td>.13**</td>
<td>.05</td>
<td>.03</td>
<td>.23</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Predicting career intentions ( R^2 = .72 )</th>
<th>( B )</th>
<th>( B \text{ se} )</th>
<th>( \text{LLCI} )</th>
<th>( \text{ULCI} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expectations of success (ExS)</td>
<td>.12</td>
<td>.08</td>
<td>-.04</td>
<td>.28</td>
</tr>
<tr>
<td>Goal Expectations (GEx)</td>
<td>.83**</td>
<td>.12</td>
<td>.60</td>
<td>1.06</td>
</tr>
<tr>
<td>GE</td>
<td>.06</td>
<td>.07</td>
<td>-.08</td>
<td>.21</td>
</tr>
<tr>
<td>Intrinsic Value (InV)</td>
<td>.56**</td>
<td>.12</td>
<td>.31</td>
<td>.80</td>
</tr>
<tr>
<td>Utility Value (UtV)</td>
<td>.03</td>
<td>.09</td>
<td>-.14</td>
<td>.21</td>
</tr>
<tr>
<td>GEx X InV</td>
<td>-.00</td>
<td>.06</td>
<td>-.12</td>
<td>.11</td>
</tr>
<tr>
<td>GEx X UtV</td>
<td>.03</td>
<td>.07</td>
<td>-.10</td>
<td>.16</td>
</tr>
<tr>
<td>ExS X InV</td>
<td>-.01</td>
<td>.06</td>
<td>-.12</td>
<td>.10</td>
</tr>
<tr>
<td>ExS X UtV</td>
<td>-.03</td>
<td>.07</td>
<td>-.16</td>
<td>.10</td>
</tr>
<tr>
<td>A</td>
<td>-.11</td>
<td>.08</td>
<td>.27</td>
<td>.06</td>
</tr>
<tr>
<td>GE X A</td>
<td>-.03</td>
<td>.05</td>
<td>-.12</td>
<td>.07</td>
</tr>
</tbody>
</table>

Note. * \( p < .05 \); ** \( p < .01 \). All predictors are mean centred. \( B \) refers to unstandardized coefficient.

Confidence intervals based on bias-corrected bootstrapping procedures with a sample size of 10,000.

Bias corrected bootstrap confidence intervals (sample = 10,000) indicated that the indirect effect of perceived goal embodiment through goal expectations was positive at moderate (mean; \( B = .18 \); 95% CI [.04, .35]) and high (mean + 1SD; \( B = .32 \); 95% CI [.13, .57]) levels of perceived attainability regardless of levels of the other moderators, supporting

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The confidence intervals reported throughout this chapter refer to average levels of all other moderators if not specified otherwise.
H2. The conditional indirect effect through expectations of success, on the other hand, was not different from zero.

The conditional direct effect of goal embodiment, was also not significantly different from zero; neither at low levels of attainability, nor at moderate or high levels, indicating that the effect is fully mediated by goal expectations. These findings are illustrated in Figure 26. Only effects different from zero directly speaking to the moderated mediation are included. The coefficients of the interaction between goal embodiment and attainability is indicated next to the respective arrow and values in brackets refer to coefficients whose confidence intervals include zero.

![Diagram](image)

*Figure 26. Results of moderated mediation (Study 5)*

In order to further examine the interaction between perceived goal embodiment and perceived attainability when predicting goal expectations (as this was established as a mediator) we conducted an additional simple moderation analysis with perceived goal embodiment as the predictor, goal expectations as the outcome, and perceived attainability as the moderator. Using the Johnson-Neyman Technique (Bauer & Curran, 2005; Johnson & Neyman, 1936; see also Hayes, 2013) we found that perceived goal embodiment had a positive effect on goal expectations when values of (mean centred) perceived attainability were above -.55, meaning that for the 34.20% per cent scoring lowest on perceived
attainability in our sample, higher levels of goal embodiment did not lead to higher goal expectations. In other words, at low levels of attainability, levels of goal embodiment did not matter. When the roles of predictor and moderator were reversed (i.e. perceived attainability was entered as the predictor and perceived goal embodiment as the moderator), the Johnson-Neyman Technique revealed a significantly positive effect of perceived attainability on goal expectations for those scoring -1.19 or higher on perceived goal embodiment, meaning there was no positive effect for the bottom 20.21% of our sample. Again, this means that when goal embodiment was very low, attainability did not predict goal expectations. These findings further support H3.

Discussion Study 5

In Study 5 we investigated how role aspirants’ perceptions of attainability and goal embodiment contribute to the effectiveness of role models as representations of the possible. In line with our predictions derived from the MTRM, the effect of perceived attainability and perceived goal embodiment on PhD students’ academic career intentions was mediated by expectancy. Interestingly, however, only the degree to which PhD students believed they could achieve their personal career goals in an academic career mediated the effect and not the degree to which they generally believed they could be successful in an academic career. In fact, expectations of success was not predictive of career intentions which is somewhat surprising as prior evidence demonstrates that expectations of success (e.g., conceptualized as self-efficacy) is highly predictive of occupational choices and ambitions (Eccles et al., 1998; Nagengast et al. 2011, Plante et al., 2013; Shapira, 1976; Wang, 2012). A potential explanation for this finding is that personal goals and goal attainment was very salient in this study and might thus have overshadowed the usual effect of general success beliefs.
We also found the hypothesised significant interaction for perceived attainability and perceived goal embodiment on expectancy. Goal embodiment did not positively contribute to beliefs about whether or not one could reach one’s goals in academia if the role model seemed unattainable and, similarly, believing that one could be like a potential role model did not affect goal expectations positively if the potential role model was not perceived as actually embodying these goals. This lends support to the mechanisms by which role models as representations of the possible are effective but it should be pointed out that we were unable to find the interaction in the correlational study presented in Chapter 4. Further research is therefore necessary.

While the effects of value on career intentions was not the main focus of our study, we nevertheless included two measures of value and found that only intrinsic value (i.e. the degree to which PhD students thought an academic career would be enjoyable) was predictive of career intentions, while utility value (the degree to which they thought academic work in their discipline was useful and important) was not. Contrary to our predictions, we did not find an interaction between value and expectancy. However, this is not necessarily surprising. Many studies supporting modern expectancy-value theories do not find this interaction effect (e.g., see Trautwein et al., 2012). Reasons may lie in the fact that very few recent studies are lab-based and do not directly manipulate value and expectancy (Trautwein et al., 2012). This results in situations in which it is highly unlikely that either value or expectancy are extremely low – and this is where we would expect to find evidence for the interaction as we would expect value to not matter if one does not expect to achieve something and expectancy should not matter if one does not value the outcome. In real world situations in which participants have already entered certain career trajectories, neither of these situations is very likely and thus interactions would be hard to detect. These limitations also apply to our study. One way to avoid potential Type 2 errors (i.e. not finding the
interaction although it actually exists) is using larger sample sizes and, indeed, the only two studies testing modern expectancy-value theories which have found the proposed interactions used very large samples (Nagengast et al., 2011; Trautwein et al., 2012). This idea is also in line with the fact that we did find evidence for this interaction in Chapter 4, where our sample was much larger than the sample in the present study.

Our study has a number of other limitations. First and foremost, we failed to successfully manipulate perceived attainability, and thus our reliance on the continuous variable makes causal claims impossible. Moreover, our manipulation of goal embodiment influenced both goal embodiment and attainability. In hindsight we believe that this is because our manipulation of goal embodiment was at the same time a manipulation of more generalized similarity, which in turn influenced perceived attainability. When designing our materials we decided that potential role models high in goal embodiment and low in goal embodiment should both have reached their personal goals rather than all of them holding the same relevant work-life balance goal but some having reached it and some not having reached it. We made this decision in order to hold job satisfaction constant across all conditions because this might be related to desirability. However, this meant that those low in goal embodiment were also quite different from our participants as they held completely different career goals rather than holding the same goals but either having reached them or not. Considering this, it is not particularly surprising that participants did not think they could ever be like the role model not embodying their goals as that would mean changing their own goals completely.

This failure of our manipulation introduces another potential problem as it means that in our study, perceived goal embodiment and perceived attainability were again correlated and, in fact, not empirically distinct from each other. It is of course unclear whether the manipulation failure lead to both goal embodiment and attainability not loading on separate
factors or whether the fact that goal embodiment and attainability are in reality part of the same construct meant that we could not manipulate them separately. While the MTRM acknowledges that the two qualities are related, these issues nevertheless introduce problems associated with multicollinearity (although it should be noted that the correlations were at an acceptable level). This makes it difficult to interpret the individual contributions of attainability and goal embodiment. Furthermore, in their discussion of mediated moderation and moderated mediation Muller, Judd, and Yzerbyt (2005) state that in order to make causal inferences, the moderator (in this case attainability) and the predictor (in this case goal embodiment) should not share a common cause and that the moderator should be measured prior to any manipulation. We clearly did not do this and, in fact, it clearly is difficult to measure a role model’s perceived attainability prior to actually exposing participants to said role model, and because perceived attainability and perceived goal embodiment are likely to correlate in any circumstances, although possibly not as highly as in our study. Nevertheless, this should be taken into consideration when interpreting our results.

It should also be noted that the items we used to measure goal embodiment and attainability do not stem from a validated scale. As these constructs were newly introduced by us, there is no existing scale measuring exactly what we mean by goal embodiment and attainability. The fact that our manipulation of goal embodiment also influenced attainability may therefore also stem from problems of measurement, namely a lack of discriminant validity. It is possible that our measures of attainability actually partly measured goal embodiment and vice versa, contributing to the high correlation of these two measures in our study.

Based on the findings from this study, we conducted a second study in which we aimed to address these limitations where possible and replicate the results from Study 5. In order to do so, we first conducted two pilot studies.
Chapter 6: Role Models as Representations of the Possible

Pilot Study 1

This pilot study aimed to improve the scales we used to measure goal embodiment and attainability. Participants were 42 members of the general population recruited via social media and provided with a link to the study. They were asked to think about a person they either knew personally or who they were familiar with and who they considered successful in some way. They were asked to write down who this person was and were then presented with seven different statements about this person related to either goal embodiment or attainability we created on the basis of our definitions outlined in the MTRM (see Table 26 below). Participants were asked to rate their agreement with these statements on a scale from 1 (strongly disagree) to 7 (strongly agree).

We performed an exploratory factor analysis with Varimax rotation with a forced two-factor solution to determine which of the items we used measured the two hypothesised constructs. All of the items clearly scored on one of the two factors while not scoring on the other factor (see Table 26). These factors corresponded to our conceptualisations of attainability and goal embodiment.

Table 26

<table>
<thead>
<tr>
<th>Item</th>
<th>Attainability</th>
<th>Goal Embodiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being like this person seems out of reach for me</td>
<td>-.87</td>
<td></td>
</tr>
<tr>
<td>I think I can be like this person in the future if I want to</td>
<td>.83</td>
<td></td>
</tr>
<tr>
<td>Being like this person seems attainable to me</td>
<td>.78</td>
<td>.21</td>
</tr>
<tr>
<td>I don’t think I could ever be in this persons’ position</td>
<td>-.76</td>
<td></td>
</tr>
<tr>
<td>This person embodies my goals.</td>
<td></td>
<td>.94</td>
</tr>
<tr>
<td>This person has already reached a goal that I want to reach as well</td>
<td></td>
<td>.81</td>
</tr>
<tr>
<td>Emulating this person will help me reach my goals.</td>
<td></td>
<td>.44</td>
</tr>
</tbody>
</table>

*Note. Factor loadings between -.2 and .2 are suppressed*
Pilot Study 2

The aim of the second pilot study was to find an effective way to manipulate attainability in a scenario similar to that used in Study 5. A total of 31 participants were recruited via social media and provided with a link to the questionnaire. They were informed that we were examining how the way in which potential role models present themselves may affect the perception of these role models. They were then presented with four short excerpts from an interview similar to the materials we used in Study 5. These excerpts always included the role model’s answer to whether or not she thought she had a good work-life balance. We attempted to manipulate attainability in two ways. First, we either described the role model as very similar to other academics in relation to work-life balance (high attainability condition) or as exceptional (low attainability condition). In the remaining two excerpts, we described the role model as someone who had to overcome obstacles to achieve a good work-life balance (high attainability condition) or as someone who has always found it easy (low attainability condition). For each excerpt, participants were asked to rate the role model’s attainability using the attainability items described above (see Table 26). Additionally, they were asked how much they thought they would like the potential role model if they met her. Excerpts were presented in random order.

We ran two separate one-way repeated-measures ANOVAs, once for the exceptionality manipulation and once for the overcoming obstacles manipulation. Results revealed that the exceptionality manipulation was not successful in changing the perceived attainability of the role model $F(1, 29) = .10; p = .75; \eta^2 < .01$. The overcoming obstacles manipulation, on the other hand, did successfully change the perceived attainability of the role model $F(1, 29) = 5.74; p = .02; \eta^2 = .17$. Those presented with a potential role model who did not have to overcome obstacles to obtain a good work-life balance ($M = 4.82, SD = \ldots$)
1.47) found her less attainable compared to those exposed to a potential role model who did have obstacles in her way ($M = 5.53, SD = 1.05$).

It should be noted, however, that in addition to influencing attainability, this manipulation also influenced likability $F(1, 29) = 7.46; p = .01; \eta^2 = .21$ such that the less attainable role model was also seen as less likable ($M = 4.30, SD = 1.62$) compared to the more attainable role model ($M = 5.27, SD = 1.26$). We nevertheless used this manipulation for Study 6.

**Study 6**

In Study 6 we sought to replicate the findings from Study 5 while addressing some of the limitations. Specifically, we nuanced our manipulation of attainability and included a smaller number of variables. Once again we investigated how role models who either did or did not embody work-life balance goals and who were presented as attainable or not attainable would influence PhD students’ career intentions and hypothesised the following:

- **H1**: Goal embodiment and attainability will influence role aspirants’ academic career intentions.
- **H2**: This influence of goal embodiment and attainability will be mediated by goal expectations.
- **H3**: Goal embodiment and attainability will interact such that high levels of attainability will not be as beneficial if goal embodiment is low and high levels of goal embodiment will not be as beneficial when attainability is low.

Based on our previous findings as well as the arguments outlined above, we did not hypothesise this effect to necessarily be moderated by value, but we included this interaction for exploratory reasons.
Chapter 6: Role Models as Representations of the Possible

Methods

Participants. Participants were 169 full-time PhD students from a range of British universities who indicated that work-life balance was an important goal to them. This was equal to 62% of a larger sample of 272 full-time PhD students who had indicated their consent in taking part of the study. The final sample comprised 85 women (50%) and 81 (48%) men. Three participants (2%) identified as falling outside of the gender binary. Of participants, 23% were in the first year of their PhD, 29% in their second, 27% in their third, 20% in their fourth, and 1% in their fifth year or beyond. The average age of participants was 28 years (SD = 5 years).

Material and Design. The procedure was similar to Study 5 in that PhD students were presented with an interview of a female academic. There were some changes in the material (see Appendix F). The interview material was shortened so it only included information that was relevant to the two manipulations in order to ensure that nothing else influenced attainability. Moreover, we altered the attainability manipulation based on results of the pilot test reported above. In the low attainability condition, the potential role model stated that she had always found it easy to achieve her career goal (e.g., “I’ve actually always found it really easy to do. I mean, I know that some people struggle with balancing work and life the way they personally want quite a lot and I wish I could give them some great advice on how I do it, but I really don’t know”). In the high attainability condition she stated that she found achieving a good work-life balance hard in the past (“I’ve actually struggled quite a bit with it in the past, though. I mean, I know that a lot of people in my field struggle with balancing work and life the way they personally want quite a lot and so have I, but it’s really something you can learn.”).

As results from Study 5 suggested that participant gender did not influence any of the variables of interest, we did not include it as a factor in this study. The two manipulations
Chapter 6: Role Models as Representations of the Possible

thus resulted in a 2 (Goal Embodiment: High vs. Low) X 2 (Attainability: High vs. Low) between-participants design.

**Measures.** We measured perceived goal embodiment, perceived attainability, expectancy, value and academic career intentions using 7-point scales ranging from “strongly disagree” to “strongly agree”. Measures were identical to those of Study 5 with the exception of two items that were newly added based on Pilot Study 1. The item “I think I can be like Amanda in the future if I want to” was added to the perceived attainability scale (α = .83) and the item “Amanda has already reached a goal that I want to reach as well” was added to the perceived goal embodiment scale (α = .81). Moreover, based on findings from Study 5, we only included one measure of expectancy (i.e. goal expectations) and one measure of value (i.e. intrinsic value).

**Results**

We first conducted an exploratory factor analysis with Varimax rotation to test the distinctiveness of our constructs. As can be seen in Table 27, results were slightly different from those of Study 5 and revealed 5 factor solution rather than a four factor solution. Similar to the data of the previous study, the items relating to goal expectations, intrinsic value and academic career intentions all loaded highly on Factor 1 with the exception of the item “I find academic work in my discipline interesting” which did not clearly load on any of the factors. However, this time perceived goal embodiment and perceived attainability formed two separate factors (Factor 2 and 3). Utility value items once more loaded highly on Factor 4 and expectations of success items loaded highly on Factor 5. Overall, these results are more in line with our conceptualisations, although the fact that goal expectations, intrinsic value, and academic career intentions were not empirically distinct remains problematic.
Table 27

Factor Loadings Based on Principal Component Analysis with Varimax Rotation (Study 6)

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
<th>Factor 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amanda Roberts embodies my goals</td>
<td>.20</td>
<td>.32</td>
<td>.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emulating Amanda Roberts will help me reach my goals</td>
<td></td>
<td></td>
<td></td>
<td>.85</td>
<td></td>
</tr>
<tr>
<td>Amanda has already reached a goal that I want to reach as well</td>
<td>.31</td>
<td>.21</td>
<td>.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Being like Amanda Roberts seems attainable to me</td>
<td>.80</td>
<td>.26</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Being like Amanda Roberts seems out of reach for me (reversed)</td>
<td>.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I don’t think I could ever be in Amanda Roberts’ position</td>
<td>.69</td>
<td>.25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think I can be like Amanda in the future if I want to</td>
<td>.79</td>
<td>.29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think I will/would be able to find a job in academia after I finished my PhD</td>
<td>.55</td>
<td>.51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finding a job in academia after I finished my PhD will/would be hard for me (reversed)</td>
<td></td>
<td></td>
<td></td>
<td>.76</td>
<td></td>
</tr>
<tr>
<td>I am confident that I can stay in academia after I finished my PhD</td>
<td>.50</td>
<td>.66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think I can achieve my career goals in academia</td>
<td>.76</td>
<td>.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think academia will give me the opportunity to reach my goals</td>
<td>.73</td>
<td>.24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I don’t think academia is a place where I can achieve what is important to me (reversed)</td>
<td>.79</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A career in academia will give me the chance to reach my career related goals</td>
<td>.78</td>
<td>.28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic work in my discipline is important</td>
<td></td>
<td></td>
<td>.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The work that academics in my discipline do is useful</td>
<td></td>
<td></td>
<td>.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The things that researchers in my discipline do are not important (reversed)</td>
<td></td>
<td></td>
<td>.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having an academic career sounds like fun</td>
<td>.72</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I find academic work in my discipline interesting</td>
<td>.42</td>
<td>.32</td>
<td>.35</td>
<td>-.21</td>
<td></td>
</tr>
<tr>
<td>Being an academic sounds like a job that I would enjoy</td>
<td>.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I want to stay in academia after I finished my PhD</td>
<td>.92</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I will try to find a job in academia after I finished my PhD</td>
<td>.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I will look for a job outside of academia after I finished my PhD (reversed)</td>
<td>.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have no intention of staying in academia after I finished my PhD (reversed)</td>
<td>.86</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Factor loadings between -.2 and .2 are suppressed

As in the previous study we next conducted a 2 (Attainability: High vs. Low) X 2 (Goal Embodiment: High vs. Low) ANOVA on perceived goal embodiment. Analysis revealed that perceived goal embodiment was indeed higher in the high goal embodiment condition ($M = 4.51; SD = 1.04$) compared to the low goal embodiment condition ($M = 3.23; SD = 1.21$), $F(1, 165) = 52.49; p < .01; \eta^2 = .24$. Attainability had no effect $F(1, 165) = .19; p = .67; \eta^2 < .01$ on perceived goal embodiment and neither did it interact with goal embodiment $F(1, 165) < .01; p > .99; \eta^2 < .01$. 

Next, we conducted a 2 (Attainability: High vs. Low) X 2 (Goal embodiment: High vs. Low) ANOVA on perceived attainability. This time, we found that our manipulation of attainability had a marginally significant effect such that those in the high attainability condition ($M = 4.74; SD = 1.18$) perceived the potential role model as more attainable than those in the low attainability condition ($M = 4.46; SD = 1.29$) $F(1, 165) = 2.99; p = .09; \eta^2 = .02$. As in Study 5, we found a highly significant effect of goal embodiment such that those in the high goal embodiment condition ($M_l = 4.25; SD = 1.21$) found the potential role model more attainable than those in the low goal embodiment condition ($M = 5.03; SD = 1.14; F(1, 165) = 18.87; p < .01; \eta^2 = .10$). The interaction was not significant $F(1, 165) = 1.18; p = .28; \eta^2 = .01$. Because of our recurrent failure to successfully manipulate attainability and the effect of our goal embodiment manipulation on perceived attainability, we again used the continuous measures of perceived goal embodiment and perceived attainability rather than the dichotomous conditions. Once again, causal interpretation of any findings is thus unfortunately impossible.

As in Study 5, we used the PROCESS macro for SPSS to test the hypothesised relationships between perceived goal embodiment, perceived attainability, expectancy, value, and academic career intentions. Again, all measures except for the outcome career intentions were mean centred prior to our analyses and we report the unstandardized regression coefficients. The bootstrapping sample of the analyses is 10,000. As a preliminary step we conducted two multiple linear regression analyses to assess whether the same variables as in Study 5 significantly predicted career intentions in this study. First, we included perceived goal embodiment and perceived attainability. Perceived goal embodiment was highly predictive of career intentions, $B = .42, t(166) = 4.29, p < .001$, but, surprisingly, perceived attainability was not $B = .01, t(166) = .09, p = .93; R^2 = .13, F(2, 166) = 11.98, p < .001$, although this might be a result of multicollinearity. Next, we found that, in line with Study 5,
both goal expectations $B = .59, t(166) = 8.94, p < .001$ and intrinsic value $B = .55, t(166) = 7.17, p < .001$ predicted career intentions $R^2 = .73, F(2, 166) = 225.61, p < .001$. We included all four of these variables in a modified model (Model 22), illustrated in Figure 27.

Figure 27. Conditional process model predicting academic career intentions in Study 6

As can be seen from Figure 27, we entered perceived goal embodiment as the main predictor of career intentions, goal expectancy as a mediator of this effect, perceived attainability as a moderator of the direct effect on career intentions as well as the effect on goal expectations, and intrinsic value as a moderator of the effect of goal expectations on career intentions. Conditional process analyses revealed that, at average levels of perceived attainability, perceived goal embodiment did indeed predict goal expectations. The interaction with perceived attainability was positive and marginally significant, lending partial support to H3. When predicting career intentions, goal expectations and intrinsic value were positively and significantly related to career intentions at mean levels of the other variables. The effect of goal expectations was not moderated by intrinsic value but the direct effect of perceived goal embodiment was moderated by perceived attainability. However, this effect was in the opposite direction of what we had predicted (see Table 28). Probing this interaction using bias-corrected bootstrapping procedures with a sample of 10,000 demonstrated, somewhat puzzlingly, that the direct effect of goal embodiment on career intentions was significantly positive only at low levels (mean – 1SD = -1.24) of perceived
attainability ($B = .19$; 95% CI [.05, .32]). The indirect effect through goal expectations, on the other hand, was always significantly positive, regardless of levels of the moderators ($B = .21$; 95% CI [.10, .32]), supporting H2. These results are illustrated in Figure 28.

Table 28

*Results of the Conditional Process Analysis (Study 6)*

<table>
<thead>
<tr>
<th></th>
<th>$B$</th>
<th>$B$ se</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicting goal expectations $R^2 = .13$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GE</td>
<td>.35**</td>
<td>.08</td>
<td>.18</td>
<td>.52</td>
</tr>
<tr>
<td>A</td>
<td>.04</td>
<td>.09</td>
<td>-.14</td>
<td>.21</td>
</tr>
<tr>
<td>GE X A</td>
<td>.11†</td>
<td>.06</td>
<td>-.01</td>
<td>.22</td>
</tr>
<tr>
<td>Predicting career intentions $R^2 = .75$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEx</td>
<td>.58**</td>
<td>.07</td>
<td>.45</td>
<td>.71</td>
</tr>
<tr>
<td>GE</td>
<td>.08</td>
<td>.06</td>
<td>-.03</td>
<td>.19</td>
</tr>
<tr>
<td>InV</td>
<td>.55*</td>
<td>.08</td>
<td>.39</td>
<td>.71</td>
</tr>
<tr>
<td>GEx X InV</td>
<td>-.02</td>
<td>.04</td>
<td>-.09</td>
<td>.06</td>
</tr>
<tr>
<td>A</td>
<td>-.08</td>
<td>.06</td>
<td>-.19</td>
<td>.03</td>
</tr>
<tr>
<td>GE X A</td>
<td>-.08*</td>
<td>.04</td>
<td>-.16</td>
<td>-.01</td>
</tr>
</tbody>
</table>

*Note.* *p* < .05; **p* < .01. All predictors are mean centred. $B$ refers to unstandardized coefficient.

Confidence intervals based on bias-corrected bootstrapping procedures with a sample size of 10,000

*Figure 28.* Results of moderated mediation (Study 6)
Furthermore, when estimating a simple moderation model predicting goal expectations in order to probe the marginally significant interaction between perceived goal embodiment and perceived attainability using the Johnson-Neyman technique, we found that the positive effect of perceived goal embodiment on goal expectations was only significantly positive at levels of perceived attainability of \(-1.30\) or higher which translated to \(79.89\%\) of our sample. Note that this conditional effect is in line with H3, contrary to the conditional direct effect that we reported above.

**Discussion Study 6**

In this study we attempted to replicate findings from Study 5 while addressing some of its limitations. Despite a pilot test, we were only marginally more successful at manipulating attainability, which was still more strongly dependent on our manipulation of goal embodiment. Despite goal embodiment and attainability still being highly correlated, the factor analysis revealed that these two constructs were distinct from each other in our data.

With regards to our hypotheses we found that those who perceived the potential role model as better embodying their goals did indeed report higher career intentions and that this was because it increased their expectations of reaching their personal career goals. The degree to which they perceived the potential role model as attainable, on the other hand, did not predict career intentions, but seemed to moderate the indirect effect of perceived goal embodiment as well as its direct effect. While the (only marginally significant) moderation of the effect on goal expectations was as predicted, such that the positive effect of goal embodiment was not present for those perceiving the potential role model as highly unattainable, the moderation of the direct effect was somewhat puzzling. It seems that the part of the effect of goal embodiment that *isn’t* mediated by goal expectations behaves in the opposite way – it is only positive for those perceiving the role model as *unattainable*. As in Study 5, the effect of goal
expectations did not depend on levels of intrinsic value (i.e. the degree to which participants believed an academic career to be enjoyable).

This study partly suffers from the same limitations we already mentioned in our discussion of Study 5, either for reasons inherent to the variables studied and their relationships to each other or due to our intention to keep this study as similar to Study 5 as possible. These points include the lack of independence between moderator and predictor and the inability to measure the moderator prior to our manipulation and have already been discussed in greater detail above. Most importantly, causal claims cannot be made based on this study despite its design.

**General Discussion**

In this paper, we presented two studies testing the theorised effects of role models as representations of the possible. Our findings generally support our hypotheses. Both perceived goal embodiment and perceived attainability played a role in increasing role aspirants’ career intentions. This effect is at least partly due to increasing the expectations of reaching personal career goals. While our focus was on goal embodiment, our findings also made clear that goal embodiment only increases goal expectancies when role aspirants believe they can be like the potential role mode (i.e. when the role model is attainable). We did not find evidence for an interaction between expectancy and value, but this might simply be due to our method and sample size rather than an absence of the interaction. More research is needed to come to a definite conclusion on this question. However, this is not the focus of this thesis – there are already many studies on the effects of expectancy and value on educational and occupational choices and ambitions (e.g., Eccles et al., 1998; Nagengast et al. 2011, Plante et al., 2013; Shapira, 1976; Wang, 2012). We are much more interested in how
role models can potentially increase expectancy in their roles of representations of the possible and our studies have shone some light on these processes.

It is nevertheless interesting to note that expectancy as it is generally defined and measured, that is, as expectations of success, was not predictive of career intentions in Study 5. Rather, it was expectations about whether or not one could reach one’s personal career goals that predicted academic career intentions among PhD students. This again highlights the importance of conceptualising expectancy in multiple ways which we have already pointed out in Chapter 4. Success might only be one of many goals that people hold in relation to their careers and this study demonstrates that others might be equally – or more – important. Traditional conceptualisations of expectancy rarely take this into consideration.

**Limitations**

Our studies have a number of limitations. While our manipulation of goal embodiment was highly successful and the effects of it very similar across both studies, this cannot be said about attainability resulting in us analysing the continuous variables. Future research should thus shed more light on the causal effects of attainability and goal embodiment of role models in their function as representations of the possible. Furthermore, the fact that perceived goal embodiment and perceived attainability were correlated in both of our studies and not distinct from each other in Study 5 means that interpretation of the individual contributions of perceived attainability and perceived goal embodiment as well as their interaction term is difficult.

While these issues regarding our manipulations are problematic, they also support the notion voiced in previous chapters that it may not be possible to present a group of role aspirants with just one role model and expect everyone to perceive them in the same way. Our manipulation of goal embodiment was partly as effective as it was because participants
had been screened to specifically fit the goal in question. The same was not true for attainability which we attempted to manipulate in a way much less specific to our participants. Future research could attempt to address this issue by using a procedure similar to the one we used for goal embodiment. By pre-selecting participants based on what they perceive as attainable, manipulation of this variable might be more successful. In hindsight we believe that using a sample of PhD students when pilot-testing our manipulation of attainability might have served a similar purpose.

Practical Implications

Despite the aforementioned limitations, these studies have important practical implications for those who seek to inspire and motivate others or who are chosen as role models by role aspirants whether they wish to be role models or not. First, as a large number of PhD students who were pre-tested indicated that work-life balance was an important goal for them, it is important that academic role models – and role models in general - not only model how to be successful, but also how to achieve a range of other goals, work-life balance being one of them.

While work-life balance may be something with which many struggle, it is important as otherwise the anticipated lack of work-life balance may keep a lot of bright minds from pursuing certain careers. This is especially relevant in areas in which women remain under-represented and in which work-life balance is generally seen as hard to come by. At the same time, it is also clear that systematic changes are necessary to enable more people in these areas to actually achieve a good work life balance. Only then can a large number of diverse people manage to achieve – and thus embody – this goal.

The fact that expectations of reaching one’s goals was more predictive of career intentions than expectations of success is also important as it highlights how those who are
traditionally thought of as role models – exceptionally successful members of a field – might actually be harmful to motivation as this success might be at odds with other goals such as a good work-life balance.

Our studies also demonstrate that goal embodiment alone is not enough to change the degree to which role aspirants believe they can reach their personal goals. Rather, potential role models also need to be perceived as attainable. In other words, role aspirants need to believe that they can be like these role models.

This is especially relevant in relation to the lack of women in senior academic positions discussed at the beginning of this paper. It might very well be that certain goals such as work-life balance might be more important to women, or that they might find it harder to achieve due to a disproportionate burden of housekeeping and caring responsibilities. These women need to be able to see others who have managed to achieve this balance. But there is more to it. While we don’t believe that role modelling is necessarily a gendered process, seeing senior academic figures with a seemingly perfect work-life balance might not quite have the desired effect if these figures are men. Regardless of their actual responsibilities, women might consciously or unconsciously infer that only men can achieve high levels of work-life balance, perhaps because they have a supportive (most likely female) partner at home who is taking care of domestic responsibilities. In this case, being like these men may not be an attainable option and these men can thus not become representations of the possible for women.

However, it is also important to note that PhD students and early career researchers are likely to hold a diverse range of career goals and while work-life balance might be important to many of them, other factors such as status or success might be more important to others. Luckily, there are many different academics holding many different goals (although more diversity would certainly be desirable). Our advice to academics based on our studies
and our theorising would thus be to make the achievement of various goals salient – but at the same time acknowledge the path and struggles that lead to said achievement in order to become an attainable role model for those who might want to follow in their footsteps.

In the last three chapters we have presented evidence from four empirical studies testing the predictions of the theoretical framework presented in Chapter 3. These studies generally support our predictions and make an important contribution to the role model literature. In the next chapter, we are going to integrate that findings and highlight the key contributions but also discuss limitations and future research directions.
Chapter 7: General Discussion and Conclusion

We began this thesis with the aim of providing a better understanding of the effectiveness of role models. More specifically, we aimed to systematically investigate the processes by which role models can motivate role aspirants and inspire them to set new and more ambitious goals with a particular focus on negatively stereotyped and under-represented groups in achievement settings. In this final chapter, we will summarise, integrate, and discuss our findings, their theoretical and practical implications as well as their limitations. We will start by summarising each chapter and discussing the contributions it has made to our aim of furthering our understanding of role modelling. Next, we will highlight the theoretical contributions this thesis has made, followed by a discussion of practical implications of our work. Finally, we will outline the limitations of this thesis and how they can be addressed in future research.

Summary of the Previous Chapters

In our first chapter, we highlighted the contributions of role models to a variety of factors such as motivation, goals, and performance and consolidated the evidence on the various factors that may contribute to role models effectiveness. We discussed how shared group membership is an important factor for under-represented and negatively stereotyped groups (Asgari et al., 2010; Blanton et al., 2002; Dasgupta, 2011; Lockwood, 2006; Marx & Roman, 2002; Stout et al., 2011; von Hippel et al., 2011), but that other factors may play equally important roles. Evidence from the role model literature suggests that similarity, sociability and warmth, success and competence, and the attribution of desirable attributes such as success also contribute to the effectiveness of role models (Calvert et al., 2001; Cheryan et al., 2011; Gibson & Lawrence, 2010; Marx & Roman, 2002; McIntyre et al., 2011; Taylor et al., 2011). Moreover, these factors are likely to be interrelated. For example,
shared group membership will often contribute to perceptions of similarity. We further discussed that role model effectiveness will also depend on the way in which role aspirants perceive these factors and thus there is no single generalised or objectively effective role model, but rather that the effectiveness of role models will vary from role aspirant to role aspirant depending on their attitudes, beliefs, and goals as well as contextual factors such as whether their group is in the minority or majority. It is thus unlikely that any one given individual will make an effective role model for everyone. What one role aspirant perceives as similar or attainable, another role aspirant may perceive as very dissimilar to themselves or unattainable.

In Chapter 2 we presented evidence from two studies using undergraduate student samples demonstrating that role models do indeed affect role aspirants’ motivation and goals but also that the impact of ingroup role models may not always be as straightforward as one might expect. Both of these studies focused on women in STEM. Study 1 demonstrated that women in core STEM disciplines in which they are vastly under-represented do not necessarily perceive a lack of role models. We did, however, find support for the idea that having career role models affect study motivation, ambition, and career intentions over and above the effects of other social experiences related to these outcomes such as fitting in with peers and seniors. In this sense, Study 1 replicated findings from previous studies linking the availability of role models to motivational outcomes (e.g., BarNir et al., 2011; Lockwood et al., 2002) and provided evidence for the close link between role models and motivation. On the other hand, our unexpected findings with regards to gender and discipline challenge the idea that shared group membership between role models and role aspirants is the single most important factor contributing to role model effectiveness. The fact that female students in male-dominated fields reported equal availability of role models both compared to male
students in the same field and female students in other fields suggests that role modelling is a more complex process which requires a more nuanced approach.

This idea was further corroborated by the unexpected results from Study 2 which also highlighted the need for a better understanding of role models, their effects on role aspirants, and the processes leading to these effects. Contrary to our predictions, men generally made more effective role models for female students. Not only were they more likely to be perceived as role models – role models only changed interest in science for those exposed to male role models who conducted research that was more in line with their gender role (i.e. that was presented as “hard” science). Taken together, these two studies demonstrate the motivational potential that role models hold but at the same time show that we lack an understanding of how these motivating effects come to be. To answer this question, we needed a better theoretical understanding of the construct of role models and the process of role modelling and we set out to gain this understanding in Chapter 3.

In Chapter 3, and in response to previously identified limitations of the role model literature, and in light of the unexpected findings in Chapter 2, we developed our own theoretical framework, the Motivational Theory of Role Modelling. The aim of this theoretical framework was to consolidate existing research and develop a more nuanced understanding of how role models can influence role aspirants’ motivation and goals. For the purpose of this theory, we put forward a new, multi-faceted definition of role models, that disentangles the various functions that are examined in the existing body of literature on role models and that brings role aspirant perceptions front and centre. In our definition, role models serve three functions and are individuals who influence role aspirants' performance, motivation, and goals by acting as behavioural models, representations of the possible and/or inspirations. We then drew on expectancy-value theories of motivation (e.g., Eccles, 1983;
Eccles & Wigfield, 2002) to explain how role models can influence motivation and goals in these three functions.

We argue that in their function as behavioural models, role models influence expectancy by showing role aspirants how to perform certain behaviours or reach certain goals role aspirants already hold. In order to do so, they must embody role aspirant goals. In achievement settings, these goals may often be linked to success but they can also include goals such as having a good work-life balance or being supportive. In this function, role models not only contribute to the reinforcement of existing goals but also skill acquisition.

We suggest that in their function as representations of the possible, role models also influence expectancy, but not necessarily by showing role aspirants how to reach a goal but instead by demonstrating that reaching the goal is feasible. They can do so by changing both the perception of abilities (e.g., by reducing negative self-stereotyping) and by changing the perception of the surmountability of potential obstacles (e.g., by reducing the perception of the effects of discrimination). This function is particularly relevant for under-represented and negatively stereotyped groups. We further argue that in order to function as representations of the possible, role models need to embody new or already existing goals and be seen as attainable.

Finally, we propose that in their function as inspirations, role models influence the value of a goal and goal-related activities. This is particularly important for the adoption of new goals. Identification, internalisation, and admiration are likely to play an important part in this function and role models need to be perceived as desirable in order to function as inspirations.

This theoretical framework not only adds to the role model literature in that it draws together two bodies of research and offers a more nuanced model of how role models influence role aspirants’ goals and motivations, but also offers some potential explanations of
the unexpected findings of Chapter 2. For example, with regards to Study 1, examining the availability of role models in general might have been too broad a question to find any of the expected gender effects. First, we do not know how our participants interpreted the term “role model”. Did they think of role models as inspirations? As role models as behavioural models? It could well be, that women in male-dominated fields do lack attainable role models but that this is not what our participants thought about when responding to the questions. Our measure of role modelling in Chapter 2 was similarly broad and did not distinguish between role models in their three functions. If anything, the measure most closely matched what we described as desirability, meaning that the two qualities that are important for role models as representations of the possible – namely goal embodiment and attainability – were not included in the measure at all. As we suggested in Chapter 3, this might be the most important function for under-represented and negatively stereotyped groups and neglecting these measures means we only captured a small part of what role modelling is. So, while the framework put forward in Chapter 3 cannot necessarily explain the findings from Chapter 2, it clearly shows the limitations of these two studies and offers guidelines of how to approach these questions in a more nuanced and theoretically driven way – and this is exactly what we did in Chapter 4.

Chapter 4 was designed to answer similar questions to those we tried to answer in Study 1, but in a more nuanced, theory-driven way. Here, we investigated the effects of role model qualities rather than of the perceived availability of role models as defined by our participants. In addition, this study was the first empirical test of the MTRM. In this chapter, we presented the findings of a correlational study with a large undergraduate student sample. Interestingly, we once more found very little support for the idea that women in male-dominated fields necessarily lack role models, mirroring the findings from Chapter 2. We interpret this as additional evidence that shared group membership is only one out of many
factors which influence goal embodiment, attainability, and desirability and thus the effectiveness of role models.

Overall, the findings provide clear initial support the ideas put forward in Chapter 3. We were able to demonstrate that goal embodiment, attainability, and desirability influenced career intentions and that they did so by changing expectancy and value respectively. We also found some evidence for an interplay between expectancy and value, as predicted, but often not found, by expectancy-value models of motivation. Attainability and goal embodiment, on the other hand, did not influence one another’s impact. Moreover, this study also demonstrates that different types of expectancy and value may be more or less important with regards to different goals. For example, believing that one can reach one’s personal career goals in one’s discipline seems to be particularly relevant for intentions to find a job in one’s discipline, while believing one could have a successful career in one’s discipline seems to be more important for intentions to obtain an advanced degree. Overall, expectancy and value associated with one’s current studies rather than one’s future career seem to be less important in predicting career intentions. They are, however, also influenced by the availability of role models who are perceived as embodying goals, as attainable, and as desirable.

Overall, this study again demonstrates that having role models is associated with increased motivation, replicating findings from Study 1. In addition, it shows that this is true for all three role model functions and that they increase career intentions by changing expectancy and value. Lastly, this chapter cast further doubt on the idea that the demographic composition of a field – at least with regards to gender – is the single most important factor in determining whether role aspirants have role models available to them. However, as this study was correlational in nature, causal claims cannot be made. The final two of the empirical chapters were therefore dedicated to testing the MTRM using experimental designs.
In Chapter 5, we presented the findings of an experimental study in which we provided PhD students with a potential role model in academia who was either described as low or high in attainability and as either low or high in desirability. In line with our predictions, we found that those exposed to a highly attainable role model reported higher levels of academic career intentions compared to those exposed to a less attainable role model. While the effect of desirability was less pronounced, we did find that those who were presented with role models high in desirability and attainability reported higher academic career intentions than those who were presented with a highly attainable but not desirable role model. We also found that the effect of perceived attainability was explained, at least in part, by expectancy. This finding replicates what we found in Chapter 4, but the experimental design allows us to make causal claims. It provides evidence that attainable and desirable role models are not merely associated with higher levels of motivation but that they increase motivation as would be predicted by the MTRM. The fact that the effect of desirability was somewhat weaker is not necessarily surprising. As we discussed in Chapter 3, role models as inspirations may be particularly important for the adoption of new goals, while role models as representations of the possible also contribute to the reinforcement of already existing goals. As becoming an academic can be assumed to be a pre-existing goal for many PhD students, attainable role models may therefore be more important. Overall, this chapter further supports the predictions made in Chapter 3, at least with regards to attainability and desirability. However, as we did not manipulate goal embodiment in this study, we attempted to do so in Chapter 6.

In this final empirical chapter we focused on role models as representations of the possible and attempted to manipulate both attainability and goal embodiment in two studies investigating once more the academic career intentions of PhD students and focusing on work-life balance goals. Unfortunately, we were not able to manipulate the two factors
orthogonally, most likely due to the fact that manipulating goal embodiment also changed perceived similarity and, in turn, attainability. Moreover, our manipulation of attainability was unsuccessful in both studies. We therefore used perceived levels of goal embodiment and attainability as predictors and cannot make causal claims based on this study. Nevertheless, results from the two studies presented in this chapter support many of the ideas proposed by the MTRM. First, we found that both perceived attainability and goal embodiment were predictive of career intentions, replicating findings from Chapter 4. Similarly, we found evidence that the effect of perceived goal embodiment was explained, at least in part, by expectancy. As in Chapter 4, goal expectancy, but not career expectancy, proved to explain the effect of goal embodiment. Additionally, we did find evidence supporting the idea that goal embodiment and attainability interact when predicting expectancy – something we were unable to find in the data presented in Chapter 4. Moreover, as these studies focused on work-life balance goals rather than success, they provide evidence supporting the claim that simply presenting role aspirants with the most successful ingroup member may not always yield the best results. Taken together, these two studies suggest that perceptions of attainability and goal embodiment of a potential role model interact and influence career intentions by changing levels of goal expectancy. They lend further support to the ideas put forward in Chapter 3 relating to role models as representations of the possible while at the same time highlighting difficulties in disentangling the different role model qualities.

**Theoretical Contributions**

This thesis makes strong contributions to the role model literature by addressing its key limitations outlined in Chapter 1. First, we identified that the role mode literature lacks a clear definitional consensus on what role models are. We addressed this issue by providing a new definition of role models. This definition is unique in that it encompasses the various
ways in which role models have been defined in the past, thus not discounting the important research on role models that has been executed in the past. Indeed, we let previous definitions and research guide our understanding of what role models are. This bottom-up approach ensured that the theoretical framework we developed can not only guide future research but also be used to situate and integrate previous findings in and develop a better understanding of the disparate role model literature. The research presented in our empirical chapters further supports our definitions by showing that role models in all three functions can influence motivation and goals and by showing that role models are not simply successful ingroup members.

Second, we criticised the lack of an integrated theoretical framework. In response, we provided and tested an integrated theoretical framework which was previously lacking from the role model literature. We focused on motivation and goals as the most important outcomes of role modelling and drew on various bodies of theories as well as evidence, but most notably expectancy-value theories of motivation (Eccles, 1983; Eccles & Wigfield, 2002) which are widely used in achievement settings and are supported by over fifty years of evidence (e.g., Atkinson, 1957; Eccles, 1983; Eccles & Wigfield, 2002; Feather, 1982; Maddux et al., 1986; Trautwein et al., 2012; Vroom, 1964, 1966; Wang & Degol, 2013) and have been shown to predict a range of motivational outcomes such as intentions (Maddux et al., 1986; Meece et al., 1990), career and achievement goals (Nagengast et al. 2011, Plante et al., 2013; Shapira, 1976; Wang, 2012), and educational and occupational choices (Eccles et al., 1998). Most importantly, they often acknowledge that social factors such as role modelling can influence expectancy and value (Bandura, 1997; Fishbach & Ferguson, 2007) and are therefore a good fit with the role model literature. With the help of these models, we brought together the disparate literature on role models into an integrated framework, which
generates new hypotheses and allows us to study role modelling in a more nuanced way, taking different key aspects of role modelling and their interactions into account.

Many of the ideas put forward in the MTRM are by no means new or revolutionary. Quite the contrary, they draw on established ideas and theories such as Eccles’ (1983) expectancy-value model and Bandura’s (1977b) conceptualisation of models and social comparison theories (e.g., Festinger, 1954; Wheeler et al., 1997). However, by drawing together well-established, as well as relatively new, strands of the motivational and role model literature, we were able to provide a framework which can serve as an informative structure to the role model literature, giving a better understanding of the processes through which role models effectively influence role aspirants’ goals and ambitions and highlighting how different role model attributes might be more or less relevant depending on the function potential role models are hoped to fulfil. This not only helps explain mixed findings in the literature but also allows us to take things forward both in terms of understanding role modelling theoretically but also in terms of informing interventions for real, complex and diverse role aspirants.

Third, we highlighted that the role model literature generally does not draw on the motivational literature in order to understand how role models can be most effective in influencing motivation and goals, despite the fact that role models are often seen as those who motivate role aspirants to set novel or more ambitious goals and work towards achieving them. We addressed this point by developing the MTRM – a model that has motivation at its very heart and which integrates the role model literature in a well-established expectancy-value framework.

Fourth, we criticized the fact that the role model literature focussed almost exclusively on the role model and their attributes rather the processes by which role models can inspire and motivate role aspirants. By including a focus on role aspirants’ perceptions of
potential role models, this framework provides a better understanding of how role models can effectively influence different motivational outcomes such as the reinforcement of existing goals or the adoption of new goals. In addition to the theoretical merit, this of course also has practical implications, which we will discuss below. Taken together, this thesis has thus taken important steps towards addressing the issues outlined in Chapter 1.

In addition to furthering the role models literature, we have also contributed to the advancement of the literature on expectancy-value models of motivation. In the expectancy-value literature, value has been presented as a multi-facetted construct (e.g., Eccles & Wigfield, 2002). Expectancy, on the other hand, has often been reduced to one of its facets such as ability beliefs and self-efficacy (e.g., Bandura, 1977a) or conceptualized very broadly as general expectations of success (e.g., Eccles & Wigfield, 2002). We have argued that this is not necessarily correct and that different facets of expectancy are influenced by different processes. For example, while self-efficacy can be increased through vicarious learning as well as through changes in self-stereotyping, these processes may not influence another aspect of expectancy, namely whether or not external barriers may prevent success. As we have argued in Chapter 3, even if a woman believes she would make a great manager, she is not going to be particularly motivated to put herself forward for a leadership role of she is at the same time convinced that she would never be selected because of her gender.

Indeed, the evidence presented in Chapters 4 and 6 highlights the importance of conceptualising expectancy in more than one way. More specifically, we found that the degree to which one believes that one can reach one’s personal goals in a field or career is an important predictor of career intentions. The temporal distinction between expectations of succeeding at one’s present career stage and expectations of succeeding in future endeavours is another distinction we made in Chapter 4 and our results support the idea that these two forms of expectancy influence intentions differently.
Lastly, the findings reported in this thesis add to the literature of women in STEM. The evidence presented in Study 1 of Chapter 2 and in Chapter 4 demonstrates that women in male-dominated fields such as STEM do not necessarily perceive a lack of role models. It appears that they are able to find role models who embody goals and who they perceive as attainable and desirable even when female role models are scarce – at least at an undergraduate level. As all of this research was conducted at the same University, and indeed one which has implemented strategies to specifically address the under-representation of women in STEM, it is of course necessary to replicate this finding in other institutions and a wider sample. Moreover, it might be that these patterns change in later career stages, where gender imbalance worsens and where gender roles are more salient and more impactful due to caring responsibilities. Nevertheless, these findings show that our ideas about what keeps women from staying in STEM fields may not always be correct.

**Practical Implications**

In addition to furthering the theoretical understanding of role models, the work presented in this thesis also has practical implications. As illustrated by the quote by Chelsea Clinton at the very beginning of this thesis, a lack of role models is often cited as one of the key reasons for the under-representation of certain groups such as women in STEM or ethnic and racial minorities in leadership positions. However, real life interventions which aim at providing role aspirants with inspirational role models often fail to yield the desired effects (e.g., Armour & Duncombe, 2012). Just as the theoretical and empirical work presented in this thesis can help us understand mixed findings in the literature, it can also help us understand this mixed success in real-world interventions. By gaining a better understanding of the processes involved in role modelling, it becomes possible to develop more effective role model interventions and tailor them to the audience and to the desired effect.
More precisely, the theoretical framework we described in Chapter 3 along with the supporting evidence we presented in Chapters 4-6 suggests that those designing role model interventions should keep in mind whether the goal of the interventions is the retention of those who are already involved in a domain or the recruitment of new members to the field. Put differently, some role models will have more of an effect on goal reinforcement, while others may stimulate the adoption of new goals. For example, if an intervention aims at motivating school children with a working class background to take on leadership roles, desirable, inspirational role models are needed. These role models should not only share an important group membership (e.g., also come from a working class background) but also be seen as competent, warm, and moral. On the other hand, when aiming at retaining women in science careers, it may be more important to provide attainable role models who embody a variety of goals such as having a good work-life balance, overcoming gender-specific barriers, and being successful.

Moreover, it is time to abandon the idea that providing an entire group of people with a few outstanding individuals will motivate and inspire everyone. While it is true that categories such as gender and ethnicity are very salient, that negative stereotypes associated with these categories need to be broken down and that role models can play an important part in doing so, these groups are also tremendously diverse. Some women may look for a role model who shows them that success is possible while holding stereotypically feminine attributes, while other women may be looking for the exact opposite and gain motivation from a female role model who demonstrates that it is not important to embody feminine traits. For another group of women, gender may not be important for role model selection altogether. In other words, what makes a role model desirable, attainable and what it means to embody goals will be different for everyone. Rather than focusing on selecting the “best” role model to present, it is important to acknowledge that it is impossible to know what the best
role model will be for any individual and instead aim at providing a range of diverse role models who embody different goals, and are attainable and desirable in a number of ways. The studies we have presented highlight a number of ways in which goal embodiment, attainability and desirability can be communicated but also demonstrate how difficult it can be to increase qualities such as role model attainability for a diverse group of people.

These ideas are of course not limited to the development of specific role model interventions. Rather, as we have alluded to throughout this thesis, it is likely that everyone is a potential role model and has the potential to positively influence others’ lives. Thus, everyone can contribute to the motivation of role aspirants by making their own goals and how they achieved them more explicit while also highlighting potential barriers in their way and how they overcame them. While it is certainly pleasurable to be perceived as extremely competent – and thus tempting to emphasise one’s successes while neglecting one’s failures or even just one’s struggles along the way – this is less conducive to the motivation of those who aim to achieve similar goals to those we have reached.

In this thesis, we have focussed on role models in achievement settings. While future research is needed to address the effect of role models in other settings, the MTRM is not limited to achievement goals and there is no reason to believe that it should not be applicable outside of achievement settings. Goals are part of our lives outside of our careers and role models can certainly have an impact in these areas as well, although some factors such as success might be less important in these settings. For example, we can learn vicariously from others such as our parents how to raise a child, friends can show us that being openly gay and happy at the same time is attainable, and athletes can inspire us to lead a healthier lifestyle. Similar to what we described above, the MTRM can not only be used to design interventions that specifically seek to address these issues, but can also guide everyone’s behaviour to be a good role model in everyday life.
Limitations and Future Research Directions

While this thesis has contributed to the role model literature in substantial ways, it does have a number of limitations and leaves certain questions unanswered. Future research should address these questions in order to maximise the impact that role models can have, particularly on under-represented and negatively stereotyped groups. This includes further testing the proposed model and potentially revising it in the light of new findings.

First, it is not clear whether all components of the model are truly needed and help in explaining the effect role models can have on role aspirants’ goals and motivation. The exploratory factor analyses performed in Chapters 4-6 cast some doubt on this assumption. For example, the three role model qualities (i.e., goal embodiment, attainability, and desirability) were not empirically distinct from each other in Study 3. They were, however, distinct from expectancy and value. Similarly, goal embodiment and attainability were not distinct from each other in Study 5. On the other hand, the results of Studies 4 and 6 supported the idea that the role model qualities are distinct from each other. More precisely, Study 4 indicated that attainability and desirability were distinct (although in this case, attainability was not distinct from expectancy) and Study 6 suggested the distinctiveness of attainability and goal embodiment. These results might also be a reflection of the fact that in some situations, all three role model qualities do indeed occur simultaneously and cannot be distinguished from each other empirically while they and their influence differ from each other in other contexts. Taken together, more research is needed to evaluate the distinctiveness of the constructs proposed in the MTRM.

Second, while we did find support for the relationships proposed in the MTRM, it should be noted that we did not perform any competitive model testing. So while we did, for example, find evidence that goal embodiment influenced career intentions by changing levels of expectancy, we do not know whether the effect of attainability is not also mediated by
value or whether a model in which value was entered as the mediator might not have been a better fit with our data. This is equally true for the proposed effect of attainability on goals through expectancy and of desirability through value.

Moreover, additional experimental research is needed to ascertain the causal relationships proposed by in this thesis. We have provided first experimental evidence supporting the causal chain in relation to attainability and desirability in Chapter 5, but these findings need to be replicated and extended, particularly considering that we did not use our manipulations, but rather the measures of perceived attainability and desirability, in some of our analyses. This is particularly relevant in light of the findings from the Chapter 6 in which we failed to successfully manipulate attainability and goal embodiment independently. Future research needs to find a way to address the difficulty of manipulating these attributes for an entire group considering they are subjective and their perception varies between role aspirants.

While the causal relationship between expectancy, value, and motivation is well established (e.g., Maddux et al., 1986; Shapira, 1976), this is not the case for the three role model qualities we introduced. It could be argued that those who have higher expectations of their own success, perceive role models as more attainable rather than the other way around. For example, if a woman believes she can become a successful manager for reasons unrelated to role modelling, she would in turn believe that she could be like other managers. In other words, she would see those other managers as more attainable because of her own initial level of expectancy. Similarly, maybe enjoying one’s work leads role aspirants to see other individuals in their discipline as more desirable. Of course it could be the case that both causal directions are true, but more experimental research is needed to resolve this question.

Future experimental research should also aim at disentangling the different role model qualities (i.e. goal embodiment, attainability, and desirability) in order to demonstrate their
individual contribution. This is especially relevant with regards to attainability and goal embodiment but as we have seen in Chapter 4, all three role model qualities were highly interrelated in the survey data. Moreover, the factor analysis performed on these data indicated a lack of empirical distinctiveness between the three qualities. While it might be challenging, a study manipulating all three concepts independently in one study would help shed further light on the processes involved in role modelling. In addition, research should manipulate these concepts in various ways not only to get a better understanding of how they relate to each other, but also how other factors such as similarity or competence influences them in different ways.

Moreover, we have exclusively focussed on educational and academic settings. Chapter 2 and 4 used undergraduate students as a sample and Chapter 5 and 6 focused on PhD students. It is therefore pivotal to test these ideas in other contexts such as the workplace and at different levels of seniority, where individuals hold different goals and where negative stereotypes and other obstacles for under-represented groups might be more pronounced. This is not only important in order to replicate our findings and lend further support to our theoretical framework, but also to see how role models in their three different functions might be of different importance in different contexts and throughout one’s career. It could be argued, for example, that role models in their function as inspirations are particularly important at an early age before starting on a career path as research suggests that value is particularly predictive of the adoption of new goals (see Fredricks & Eccles, 2002; Jacobs et al., 2002). Role models as behavioural models, on the other hand, might be of particular importance at early stages of one’s career when learning new behaviours and feeling confident about performing novel tasks might be the most important. We would argue that role models as representations of the possible are likely to be relevant at all career stages, particularly for under-represented and negatively stereotyped groups, but they might be
harder to come by for those higher up on the career ladder, thus giving them more weight at that stage (see Chapter 3).

It is also worth investigating how the effects of role models in their different functions interplay with group membership, especially in light of the surprising findings from Chapter 2 and Chapter 4. For example, role models as behavioural models may generally be less important at later career stages as we have suggested above – although this remains an empirical question -, but this may not be true for those belonging to minority groups. To them, vicariously learning how to overcome obstacles and avoid barriers from role models may remain important throughout their entire careers. This seems especially likely as some group-specific barriers such as the glass ceiling only need to be overcome at an advanced career stage.

Furthermore, the way in which we measured goal embodiment, attainability, and desirability as well as, to a lesser extent, expectancy and value, has changed throughout this thesis. Some items were added, others were removed between studies. This partly reflects the development of our understanding of these concepts but makes it harder to compare the results from different studies. It is therefore important to develop scales which can reliably measure the key concepts of the MTRM. We took a first step towards this in the first pilot study reported in Chapter 6, but a more thorough process of scale construction is desirable. This scale construction should particularly focus on finding ways to measure these constructs as independently from one another as possible to enhance discriminant validity, a facet of validity which might be particularly problematic in the measures used thus far as indicated by their high correlations and the lack of empirical distinctiveness when subjecting the items to factor analyses.

Lastly, while we criticised the role model literature for not focusing enough on how role models can motivate role aspirants and have discussed several processes by which we
believe they do so in Chapter 3, we have not tested these empirically. Examining the mediating effect of expectancy and value can only be a first step and more research needs to be done on how role models change these mediating variables. We have proposed vicarious learning, changes in self-stereotyping and in the perception of external barriers, as well as identification, internalisation, and admiration as links between role models in their different functions and expectancy and value, but we have not tested these links empirically. It is true that there is evidence supporting some of those links, for example the work by Dasgupta (2011) and Stout and colleagues (2011). However, other links such as the one between desirable role models and changes in value are much less clear. More research is needed in order to fully understand how role models affect role aspirant motivation and goals.

Taken together, the limitations outlined above highlight that the MTRM should not yet be viewed established model. While our findings are overall encouraging and lend support to our predictions, they also raise some questions, for example about the distinctiveness of the three role model qualities. Further research is clearly needed and the MTRM should be seen as work in progress rather than a finalised product.

**Concluding Comment**

In this thesis, we have provided a new theoretical framework which draws together the role model literature and the motivational literature in order to gain a better understanding of how role models influence role aspirant motivation and have provided evidence supporting this framework. By taking the perspective of the role aspirant, this thesis helps explain not only when role models are effective but also how they influence role aspirant motivation. Our findings show that the availability of role models who are attainable, desirable, and who embody goals is closely linked with motivation and goals and suggest that shared group membership is just one out of many factors that influence these processes. While much still
remains to be done, it is our hope that with this thesis we have taken an important step
towards using role models effectively to address the under-representation of negatively
stereotyped groups in achievement settings.

Going back to the quote which opened this thesis, we would like to conclude that, yes,
girls need more role models in STEM and many girls may benefit from a higher number of
female role models in this area. However, more importantly, members of all groups, and
especially minority groups, need role models who are attainable, desirable and embody a
range of goals – and these role models are likely to be as diverse as the members of the
groups they seek to inspire.
References


Carrington, K., & Pratt, A. (2003, June 16). *How far have we come? Gender disparities in the*
References


References


Appendices

Appendix A: Manipulation of researcher gender

*Female researchers condition (example)*

Erica Hilburn

Age Restrictions on Educational Games?
The Effects of Different Video Games on Aggressive Behaviour in Children
Male researchers condition (example)

Eric Hilburn

Age Restrictions on Educational Games?
The Effects of Different Video Games on Aggressive Behaviour in Children
Control condition (example)

Age Restrictions on Educational Games?

The Effects of Different Video Games on Aggressive Behaviour in Children
Appendix B: Manipulation of research type

**Hard science (female researcher condition)**

In this longitudinal study, the effect of regular marijuana use on adolescents’ (age 14 to 17) emotions was investigated. Participants who had recently started smoking marijuana on a regular basis and a non-smoking control group were examined three times over the course of two years. Shannon Green and her colleagues measured positive as well as negative emotional reactions to short video clips, that contained sad, frightening or positive pictures and messages using a variety of measures such as saliva cortisol and blood dopamine levels. They found that levels of both cortisol, a hormone related to stress and fear, and dopamine, which is related to positive emotions such as happiness and euphoria, were lower in participants that smoked marijuana on a regular basis, indicating decreased emotional reactions to the films. Shannon Green also reported that this effect became stronger over time, which emphasizes how detrimental the effects of regular marijuana use are in the long-run for the still developing emotions of adolescents.

**Soft science (female researcher condition)**

In this longitudinal study, the effect of regular marijuana use on adolescents’ (age 14 to 17) emotions was investigated. Participants who had recently started smoking marijuana on a regular basis and a non-smoking control group were examined three times over the course of two years. Shannon Green and her colleagues measured positive as well as negative emotional reactions to short video clips that contained sad, frightening or positive pictures and messages using a variety of measures such as questionnaires and open questions. They found that participants that smoked marijuana on a regular basis reported experiencing less stress and fear as well as less positive emotions such as happiness, indicating decreased
emotional reactions to the films. This was true for intensity of those emotions, measured by the questionnaire, as well as number of times emotional reactions were mentioned in the open questions. Shannon Green also reported that this effect became stronger over time, which emphasizes how detrimental the effects of regular marijuana use are in the long-run for the still developing emotions of adolescents.
Appendices

Appendix C: Attainability manipulation (Study 4)

Low attainability:

Meet Elizabeth Pearce, who recently secured a prestigious Post-Doc position at the [participant’s University] after managing to set herself apart from the other 20 applicants. She impressed the committee with her intelligence and unprecedented previous academic successes. After scoring in the country’s top 0.1% when graduating high school she went on to get her undergraduate degree at Bath University. Her lecturers in Bath described her as “Exceptional. I’ve never seen an undergraduate student produce such high quality work.” She then came to [participant’s University] to get her Master’s degree and, following that, her PhD. During that time she published several papers in top journals and presented her work at several international conferences.

High attainability:

Meet Elizabeth Pearce, who recently secured a prestigious Post-Doc position at the [participant’s University] after managing to set herself apart from the other 20 applicants. She impressed the committee with her intelligence and previous academic successes. After scoring in the country’s top 10% when graduating high school she went on to get her undergraduate degree at Bath University. Her lecturers in Bath described her as “Excellent. It’s rare to see an undergraduate student produce such high quality work.” She then came to [participant’s University] to get her Master’s degree and, following that, her PhD. During that time she published several papers and presented her work at a number of conferences.
Appendix D: Desirability manipulation (Study 4)

Low desirability

Mother:
“We’re really proud of Elizabeth. It’s incredible how much she has achieved. I really wish her the best. She has always been very smart. She had some trouble making friends some time… she just knew she was smarter than the other kids and wasn’t afraid to show it. Of course that can come across as quite arrogant. I remember even when she was quite young she would question my explanations for things and make fun of me – her own mother! But that’s just what you get when you have a little genius in the family, right?”

Friend:
“Liz is great. We met in our first year of Uni and have been friends ever since. She always speaks her mind, so I guess she can come across as somewhat blunt and rude, but you just have to see past that, that’s just the way she is. I mean… at least she’s honest, even though that honesty sometimes hurts… just avoid asking her whether you look good in your new pair of jeans, I guess.”

Colleague:
“Elizabeth is a quite serious and somewhat negative person, so working with her isn’t always fun, especially when things get busy or something bad happens. For example the other day the continued funding of one of our research projects was rejected and everyone was pretty down already, and she was like “we’ll never make it work” and just depressed everyone even more.”


Mother:

“We’re really proud of Elizabeth. It’s incredible how much she has achieved. I really wish her the best. She has always been very smart. But she never had trouble making friends… even though she was smarter than the other kids she never showed off. So she never came across as arrogant. I remember even when she was quite young she knew a lot more on certain subjects than I did but she never made fun of me, maybe just because I’m her mother. So I was always happy to have a little genius in the family.”

Friend:

“Liz is great. We met in our first year of Uni and have been friends ever since. She always speaks her mind, but never in a blunt or rude way, which is something you don’t find a lot. It’s great that she’s honest and at the same time her honesty never hurts… you don’t have to worry about asking her whether you look good in your new pair of jeans, you know.”

Colleague:

“Elizabeth is a very happy and positive person, so working with her is always fun, even when things get busy or something bad happens. For example the other day the continued funding of one of our research projects was rejected and everyone was pretty down, but she was just like “We’ll make it work” and kept everyone’s spirits up.”
Appendices

Appendix E: Stimulus materials used in Study 5

High goal embodiment, high attainability

Interviewer: So, Amanda, you’ve been working in Academia for a while now. What do you like most about your job?

Amanda: I think the thing I like most about my job is that it is so flexible. You have a lot of freedom in what you do and when you do and that is incredibly valuable for me.

Interviewer: I see. Well, that nicely fits with my next question, actually. Work-life balance is a big topic these days. Do you think that this flexibility you just talked about helps you achieve a good work-life balance?

Amanda: Oh, yes, definitely. Work-life balance has always been really important to me and I am so glad that I have a job where I can have that balance.

Interviewer: So you have a good work-life balance. How do you think you have achieved that? What did you do to get that balance?

Amanda: It’s just about making the right choices, I would say. I think most people can get a good work-life balance in academia because it is so flexible and you have so much control over your work days. You just have to learn how to prioritise and then plan accordingly and there are lots of resources out to help you learn that such as books and courses. I try to plan ahead and really think about what is important to me. So for example, during school holidays I work from home quite a bit so I can look after the kids.

Interviewer: Was there anything that you found difficult in your career path? Any barriers you had to overcome?
Amanda: Well, I don’t know if I’d call it a barrier, but I guess there were times in which I doubted whether academia was the right path for me, especially during my time as a PhD student. But I think that’s normal and everyone goes through that. But I’m glad that I stuck to it even when I didn’t feel like it. I love what I am doing now.

Interviewer: So what made you overcome those doubts?

Amanda: I’m not sure. I think mainly engaging with other people in the field. I always find conferences and things like that really inspiring. I remember going to this big conference during the third year of my PhD and seeing all these amazing talks by really inspiring people. I also went to a summer school that year and met a lot of really bright people who were also doing there PhD and chatting to them was really motivating.

Interviewer: Finally, what advice would you give to someone who is at the beginning of their academic career, for example a PhD student?

Amanda: Think about what is important for you and plan accordingly, keep your eyes on what you want to achieve. Academia is a great work environment because it is so flexible. You are in control of your future – and if you make the right choices, you can achieve the things you want. It’s really in your hand.

**High goal embodiment, low attainability**

Interviewer: So, Amanda, you’ve been working in Academia for a while now. What do you like most about your job?

Amanda: I think the thing I like most about my job is that it is so flexible. You have a lot of freedom in what you do and when you do and that is incredibly valuable for me.
Interviewer: I see. Well, that nicely fits with my next question, actually. Work-life balance is a big topic these days. Do you think that this flexibility you just talked about helps you achieve a good work-life balance?

Amanda: Oh, yes, definitely. Work-life balance has always been really important to me and I am so glad that I have a job where I can have that balance.

Interviewer: So you have a good work-life balance. How do you think you have achieved that? What did you do get that balance?

Amanda: It’s mostly about luck, I would say. Not everyone can have a good work-life balance in academia even if you learn how to prioritise and then plan accordingly. I don’t think there is much you can do about it because the level of flexibility and of the control you have over your work days can vary a lot. I am lucky enough to be able plan ahead and really think about what is important to me. So for example, during school holidays I mostly work from home so I can look after the kids, but I didn’t know whether that was possible before I started the position. I was just lucky to end up in a lab that values work-life balance, that’s how I got where I am now.

Interviewer: Was there anything that you found difficult in your career path? Any barriers you had to overcome?

Amanda: Well, I don’t know if I’d call it a barrier, but I guess there were times in which I doubted whether academia was the right path for me, especially during my time as a PhD student. But I think that’s normal and everyone goes through that. But I’m glad that I stuck to it even when I didn’t feel like it. I love what I am doing now.

Interviewer: So what made you overcome those doubts?
Amanda: I’m not sure. I think mainly engaging with other people in the field. I always find conferences and things like that really inspiring. I remember going to this big conference during the third year of my PhD and seeing all these amazing talks by really inspiring people. I also went to a summer school that year and met a lot of really bright people who were also doing there PhD and chatting to them was really motivating.

Interviewer: Finally, what advice would you give to someone who is at the beginning of their academic career, for example a PhD student?

Amanda: Try to get a job that enables you to get what you want. And then just keep your fingers crossed and don’t give up. That’s the most important thing. Accept that you are not always in control of your future – but if you’re lucky and have what it takes, you will be successful. So mostly, don’t give up hope – and good luck!

Low goal embodiment, high attainability

Interviewer: So, Amanda, you’ve been working in Academia for a while now. What do you like most about your job?

Amanda: I think the thing I like most about my job is that it is so flexible. You have a lot of freedom in what you do and when you do and that is incredibly valuable for me.

Interviewer: I see. Well, that nicely fits with my next question, actually. Work-life balance is a big topic these days. Do you think that this flexibility you just talked about helps you achieve a good work-life balance?
Amanda: I don’t know. Work-life balance is not really something that is important to me. I have a job I love and I like devoting most of my time to it. I guess a lot of people would say I have a terrible work-life balance, but I am happy with my situation.

Interviewer: So you don’t have a good work-life balance but you are happy. How do you think you have achieved that? What did you do to make sure your work makes you happy?

Amanda: It’s just about making the right choices, I would say. I think most people can reach their goals in academia because it is so flexible and you have so much control over your work. You just have to learn how to prioritise and then plan accordingly and there are lots of resources out to help you learn that such as books and courses. I try to plan ahead and really think about what is important to me. So, for example, if there is a research project that I really want to do but it doesn’t fit into my schedule, I spend my Friday night in the office rather than going out with friends.

Interviewer: Was there anything that you found difficult in your career path? Any barriers you had to overcome?

Amanda: Well, I don’t know if I’d call it a barrier, but I guess there were times in which I doubted whether academia was the right path for me, especially during my time as a PhD student. But I think that’s normal and everyone goes through that. But I’m glad that I stuck to it even when I didn’t feel like it. I love what I am doing now.

Interviewer: So what made you overcome those doubts?

Amanda: I’m not sure. I think mainly engaging with other people in the field. I always find conferences and things like that really inspiring. I remember going to this big conference during the third year of my PhD and seeing all these amazing talks by really inspiring people.
I also went to a summer school that year and met a lot of really bright people who were also doing there PhD and chatting to them was really motivating.

Interviewer: Finally, what advice would you give to someone who is at the beginning of their academic career, for example a PhD student?

Amanda: Think about what is important for you and plan accordingly, keep your eyes on what you want to achieve. Academia is a great work environment because it is so flexible. You are in control of your future – and if you make the right choices, you can achieve the things you want. It’s really in your hand.

Low goal embodiment, low attainability

Interviewer: So, Amanda, you’ve been working in Academia for a while now. What do you like most about your job?

Amanda: I think the thing I like most about my job is that it is so flexible. You have a lot of freedom in what you do and when you do and that is incredibly valuable for me.

Interviewer: I see. Well, that nicely fits with my next question, actually. Work-life balance is a big topic these days. Do you think that this flexibility you just talked about helps you achieve a good work-life balance?

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Interviewer: So you don’t have a good work-life balance but you are happy. How do you think you have achieved that? What did you do to make sure your work makes you happy?
Amanda: It’s mostly about luck, I would say. Not everyone can reach their goals in academia even if you learn how to prioritise and then plan accordingly. I don’t think there is much you can do about it because the level of flexibility and of the control you have over your work days can vary a lot. I am lucky enough to be able plan ahead and really think about what is important to me. So for example, if there is a research project that I really want to do but it doesn’t fit into my schedule, I spend my Friday night in the office rather than going out with friends, but I didn’t know what the situation would be like before I started the position. I was just lucky to end up in a lab that values the same things I do, that’s how I got where I am now.

Interviewer: Was there anything that you found difficult in your career path? Any barriers you had to overcome?

Amanda: Well, I don’t know if I’d call it a barrier, but I guess there were times in which I doubted whether academia was the right path for me, especially during my time as a PhD student. But I think that’s normal and everyone goes through that. But I’m glad that I stuck to it even when I didn’t feel like it. I love what I am doing now.

Interviewer: So what made you overcome those doubts?

Amanda: I’m not sure. I think mainly engaging with other people in the field. I always find conferences and things like that really inspiring. I remember going to this big conference during the third year of my PhD and seeing all these amazing talks by really inspiring people. I also went to a summer school that year and met a lot of really bright people who were also doing there PhD and chatting to them was really motivating.

Interviewer: Finally, what advice would you give to someone who is at the beginning of their academic career, for example a PhD student?
Amanda: Try to get a job that enables you to get what you want. And then just keep your fingers crossed and don’t give up. That’s the most important thing. Accept that you are not always in control of your future – but if you’re lucky and have what it takes, you will be successful. So mostly, don’t give up hope – and good luck!
Appendices

Appendix F: Stimulus material used in Study 6

High goal embodiment, high attainability:

Interviewer: So, Amanda, you’ve been part of Academia for a bit now. How do you like it?

Amanda: Oh, I really like it. No, seriously, I absolutely love my job. The people I work with a great, I get to do work that I find really interesting... it's awesome!

Interviewer: That's great to hear. We would like to hear a little bit more about different aspects of your work. Work-life balance is a big issue these days. Let's talk a bit about that. Do you feel like you have a good work-life balance?

Amanda: Oh, yes, definitely. Work-life balance has always been really important to me and I am so glad that I have a job where I can have that balance. I've actually struggled quite a bit with it in the past, though. I mean, I know that a lot of people in my field struggle with balancing work and life the way they personally want quite a lot and so have I, but it's really something you can learn. It's definitely been a problem for me in the past, but now I almost always dedicate my evenings and weekends to my family, friends and hobbies and that seems to work out great for me. It was a learning experience, but I definitely got there.

Interviewer: Finally, what advice would you give to someone who is at the beginning of their academic career, for example a postgraduate student?

Amanda: That's a hard question. I'm not sure if I'm good at this whole advice giving thing. Well, I guess, just keep in mind that everyone struggles with things. As I said earlier, I found it quite hard when I first got into Academia to get a good work-life balance, because you have
so much freedom over when you work and I felt like there was always something I could do. But I've learned how to do it. And it's the same with other things as well. It's a learning curve, but you'll get there eventually. Good luck!

*High goal embodiment, low attainability:*

Interviewer: So, Amanda, you’ve been part of Academia for a bit now. How do you like it?

Amanda: Oh, I really like it. No, seriously, I absolutely love my job. The people I work with are great, I get to do work that I find really interesting... it's awesome!

Interviewer: That's great to hear. We would like to hear a little bit more about different aspects of your work. Work-life balance is a big issue these days. Let's talk a bit about that. Do you feel like you have a good work-life balance?

Amanda: Oh, yes, definitely. Work-life balance has always been really important to me and I am so glad that I have a job where I can have that balance. I've actually always found it really easy to do. I mean, I know that some people struggle with balancing work and life the way they personally want quite a lot and I wish I could give them some great advice on how I do it, but I really don't know. It's just never been a problem for me. I almost always dedicate my evenings and weekends to my family, friends and hobbies and that seems to work out great for me and always has. But I'm really not sure how exactly I do that.

Interviewer: Finally, what advice would you give to someone who is at the beginning of their academic career, for example a postgraduate student?
Amanda: That's a hard question. I'm not sure if I'm good at this whole advice giving thing. As I said earlier, I wish I had some great advice, for example on how to get a good work-life balance, but I've just always found it quite easy to do because you have so much freedom over when you work. And it's the same with other things as well... somehow I've just always found it relatively easy to achieve my career goals in Academia. But anyway, good luck!

*Low goal embodiment, high attainability:*

Interviewer: So, Amanda, you’ve been part of Academia for a bit now. How do you like it?

Amanda: Oh, I really like it. No, seriously, I absolutely love my job. The people I work with a great, I get to do work that I find really interesting... it's awesome!

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Amanda: I don’t know. Work-life balance is not really something that is important to me. I have a job I love and I like devoting most of my time to it. I guess a lot of people would say I have a terrible work-life balance, but I am happy with my situation. I've actually struggled quite a bit with that in the past, though. I mean, I know that a lot of people in my field struggle with balancing work and life the way they personally want quite a lot and so have I, but it's really something you can learn. It's definitely been a problem for me in the past, but now I almost always dedicate considerable parts of my evenings and weekends to my work and now my family and friends are accepting of that and that seems to work out great for me. It was a learning experience, but I definitely got there.
Interviewer: Finally, what advice would you give to someone who is at the beginning of their academic career, for example a postgraduate student?

Amanda: That's a hard question. I'm not sure if I'm good at this whole advice giving thing. Well, I guess, just keep in mind that everyone struggles with things. As I said earlier, I found it quite hard when I first got into Academia to dedicate as much time to my work as I wanted, because of demands from my family and my friends. But I've learned how to do it. And it's the same with other things as well. It's a learning curve, but you'll get there eventually. Good luck!

Low goal embodiment, low attainability:

Interviewer: So, Amanda, you’ve been part of Academia for a bit now. How do you like it?

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