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Fraternity, sorority and stereotyping:
A field experiment examining gender dynamics in referral based hiring

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Abstract
We conduct a field experiment to study same gender bias and gender stereotyping in job referrals at a business school in Sweden. Subjects were given one of two job advertisements and were instructed to refer another student at the business school to the position. Subjects were incentivized with a small fixed payoff for participating and a large variable payoff conditional on the person they referred being hired. The two job advertisements were primed with gender by one being more masculine and the other more feminine. We use information regarding subjects' personal network to proxy for choice gender homophily, and use the proportion of men in subjects' class to proxy for induced gender homophily. We find strong support for a same gender bias in referrals for both men and women with the effect partly being driven by choice gender homophily, but find no conclusive evidence of the effect being driven by induced gender homophily. In our pooled sample, we find evidence of gender stereotyping in referrals only among women. However, when separating by school campus we find strong support for gender stereotyping in the hypothesized direction for both men and women at the main campus.

Keywords: Gender Differences, Gender Bias, Homophily, Social Networks, Occupational Segregation

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1. Introduction

"Birds of a feather flock together:" the old English proverb alludes to the tendency for people with similar backgrounds, characteristics and interests to associate themselves more with each other than with dissimilar individuals. A large body of empirical evidence has been collected which suggests that this is indeed the case (McPherson et al., 2001). A related finding in social science is the tendency for humans to form groups and that once such a group is formed, for its members to discriminate between in-group and out-group members (Balliet et al., 2014).

The basis of the formation of such groups has been theorized to be due to different factors. One body of research has focused on the evolutionary advantage of showing favoritism to those within one's group so that individuals could extract benefits from gaining a reputation as a reciprocating member and avoid the cost of exclusion (Yamagishi et al., 1999). A separate body of research posits that intergroup discrimination is partly driven by social identity defined as "the part of an individual's self-concept which derives from his knowledge of his membership of a social group (or groups) together with the emotional significance attached to that membership" (Tajfel, 1974, p. 69).

An important assumption of the latter body of research is the meta-contrast principle (Turner et al., 1987), which states that in-group favoritism requires intergroup comparisons and the presence of an out-group. Whilst several societies have been and are characterized by racial, national or religious differences that could serve as points of comparison for group formation, a pervasive element of nearly all contexts in which humans interact (with only a few notable exceptions) is that of gender (Ridgeway and Smith-Lovin, 1999).[1]

Intergroup discrimination with regard to gender is particularly relevant in light of the differential outcomes between men and women with regard to the labor market is still pervasive at the present. Despite numerous efforts by individuals and organizations to improve gender equality in the private as well as public sector, disparities in both pay and occupational roles continue to exist in countries around the world (World Bank, 2012).[2] Women are underrepresented in both high level management and boards of directors: the percentage of female directors in the Fortune 500 at 16.9% has remained flat and barely budged from preceding years (Bell and Groysberg, 2014). Women continue to be overrepresented in occupations with lower pay and status and do an outsized share of domestic work relative to men (Hegewisch and Hartmann, 2014).

Hegewisch and Matite (2013) found that in the US, nontraditional occupations for women (defined as occupations or fields of work for which individuals of one gender comprise less than 25 percent of individuals employed in each such occupation or field of work) employed only six percent of all women, but 44 percent of all men. A similar result holds for occupations that are

[1] We note that the American Psychological Association (2011) makes the distinction between s*ex* (a person's biological status which is typically categorized as male, female, or intersex), g*ender* (the attitudes, feelings, and behaviors that a given culture associates with a person's biological sex) and *gender identity* (one's sense of oneself as male, female, or transgender). For the remainder of this thesis, we shall use the term gender (unless directly quoting work that explicitly uses the term sex) as we believe it is the more relevant term within the context of this study.

nontraditional for men; these employ only 5 percent of men, but 40 percent of women. The latter is particularly troubling when one takes into account the results of studies that suggest that this characteristic of current labor markets – commonly referred to as occupational segregation - explains a significant proportion of the wage gap between men and women (Anker, 1998; Bayard et al., 1999; Groshen, 1991).

There have been numerous attempts to explain the persistence of occupational segregation through such channels as different returns on human capital investment for men and women (Schultz, 1995) and elements of self-selection by which individuals of a certain gender will systematically choose not to apply for certain types of jobs and sectors (Gaucher et al., 2011). This study however shall attempt to examine two related mechanisms that to our knowledge have not been examined in conjunction with each other before in an experimental setting of referral based hiring: segregation of social networks by gender (gender homophily) and gender stereotyping in job related tasks and characteristics.

Referral based hiring has likely been a key feature of even pre-industrial labor markets and Loury (2006) notes that most research indicates that it continues to be important as roughly 50% of jobs are obtained through family, friends, or other acquaintances. Increasingly companies are putting even greater weight on referrals from their current employees in their hiring processes than what they did before. For instance, Deloitte, the accounting firm, now gets 49 percent of its experienced hires from referrals, up from 43 percent four years ago, and Ernst & Young have set internal goals to increase the proportion of hiring that come from internal referrals which account for 45 percent of non-entry-level placements at the firm, up from 28 percent in 2010 (Schwartz, 2013).

However, the use of referral based hiring, whilst potentially advantageous for employers faced with asymmetrical information about job-seekers' abilities and likeliness to shirk, poses certain risks. As those that the employer asks are naturally limited to refer people that they know, the composition of the social networks of those that are asked become a determining factor in the type of referrals they will make. It is widely recognized that social networks are characterized by homophily: the tendency of individuals to associate and bond with people similar to themselves (McPherson et al, 2001). Moreover, as recognized in early research on the topic by McPherson and Smith-Lovin (1987), homophily can be seen to come about through two distinct channels: *choice* homophily and *induced* homophily. Kossinets and Watts (2009, p. 407) define choice homophily as "the extent that some observed prevalence of homophilous ties can be attributed to individual, psychological preferences" whilst induced homophily is "the extent that it can be shown to arise as a consequence of the homogeneity of structural opportunities for interaction."

Tassier and Menczer (2008) have suggested that homophily is a probable explanation for the high levels of similarity between those that refer individuals (*referrers)* and the individual they have referred (*referrals).*[3] For example, Brown et al. (2013, p. 2) find in a firm level data set that "most referrals take place between a provider and a recipient [referrer and referral] with similar characteristics in terms of age, gender, ethnicity, education, as well as division and staff level

[3] This study follows Rubineau and Fernandez (2007) in using the terminology the *referral* for the individual who is referred for a particular job and the *referrer* an individual aware of a job opportunity who shares that information with the referral.

within the corporation." The authors found that 63.5 percent of the time the provider and the receiver were of the same gender. Similar research done by Fernandez and Mors (2008) at a call center in the US and Burks et al. (2013) looking at observational data from firms in three different sectors in the US provide further support for homophily between referrers and referrals, but do not report whether the referrer and referral were of the same gender.

Furthermore, recent experimental studies done in developing countries such as Beaman et al. (2013) find that women are disadvantaged in the use of referral based hiring. The authors found that women were systematically underrepresented in their pool of referred qualified candidates and that the largest part of the effect was driven by men referring men and women referring more women who were under-qualified.[4]

Whilst the referral process has been studied in some depth, there has been less research on the exact mechanisms that determine the choice of the person that one ends up referring. This is primarily due to the deficit of experimental studies within the literature. The exception to this is the study by Beaman et al. (2013) which used varied financial incentives along with a prompting to refer exclusively a man, woman or either, thus allowing a certain degree of insight into one potential mechanism behind subjects' decision of who to refer. They however did not vary the tasks and desired characteristics related to the job that they asked the referrers to refer to. As shall be argued below, research from other fields suggests that the degree of gender belongingness experienced by individuals has an impact on their interest and willingness to apply for certain jobs. One could therefore argue that this mechanism ought also to impact their likelihood to refer either a man or woman.

The psychology and sociology literature has examined a multitude of ways in which applicants may interpret implicit signals from employers that signal the gender composition or degree of belongingness of the workplace or tasks associated with advertised jobs. Born and Taris (2010) for example found that the wording of advertisements can increase the number of female applicants. Gaucher et al. (2011) found certain words to be much more common in job advertisements for male dominated occupations and others to be found much more often in female dominated occupations. Fernandez and Freidrich (2011) found also that job seekers for a call center expressed significantly greater levels of interest for positions corresponding to their gender role. As these and other similar studies pertained to how the subject felt about these attributes with regard to their own person and not to those in their social network, it is inconclusive if these same gender stereotypes apply to the same extent within the context of referral based hiring.

The primary research questions that shall be answered in more depth in the remainder of this thesis are:

1) Is there a same gender bias in referral based hiring?
    a. Given a same gender bias, to what extent is this effect driven by:
        i. *Choice* Gender Homophily?
        ii. *Induced* Gender Homophily?

[4] Beaman and Magruder (2012), using a similar experimental study in India, do not report the gender composition of job referrers and referrals, but only the ability to screen for ability.

2) Does gender stereotyping take place with regard to job related tasks and characteristics when giving referrals – do subjects react significantly to our treatment?

Our study involves a recruitment process for two part-time positions at a public relations company in Sweden. The two positions are described in a way that is as identical as possible apart from certain features that are varied to prime subjects with gender stereotypical tasks and characteristics. By asking students at a business school to refer another student at the school for one of the two positions (subjects only saw a single job advertisement), we are able to examine to what extent the gender of the referral varied according to our treatment and an assortment of other background characteristics pertaining to the referrer. The high degree of circularity in our data (62% of those who made referrals were also referred to a job) allows us to compare information pertaining to both the referrer and referral.

The results of our study lend further support to the findings of the aforementioned studies that referrers systematically refer individuals of the same gender as themselves. Our measurement of the gender ratios in subjects' personal networks that we use to proxy for choice gender homophily accounts for approximately half of the same gender bias. We do not however find conclusive evidence of induced gender homophily driving same gender bias in job referrals.

The treatment effect of being given a gender primed job advertisement, when looking at all observations pooled, is relatively small in comparison, but still drives variation of the referral's gender according to the hypothesized direction with significance at the 10% level for women, but not for men. When controlling for the proportion of men in the referrer's personal network and class, the treatment effect loses significance.

However, as we ran our experiment at two different campuses, we ran robustness checks for campus specific effects. This is warranted as the campuses differ significantly in the proportion of women enrolled, geographical location, curriculum, admission requirements, class size and the grade point average (from hereon, GPA) differential between men and women. When controlling for a campus specific treatment effect, the treatment becomes significant at the 1% level for women and 5% for men and in the hypothesized direction at the main Stockholm campus. The treatment effect at the affiliate campus in Norrtälje seems to go in the opposite direction contrary to our hypothesis. Despite this results being significant at the 1 or 5% levels, we are reluctant to overly draw conclusions and make strong claims given that the subsample only consists of 60 observations.

We also ran the regressions concerning same gender bias separately by the treatment groups. Furthermore we ran additional robustness checks to control for any session specific effects, type of setting of the session and degree level specific effects given the potential differences between student cohorts at the Bachelor and Master's level at the business school. Overall these robustness tests did not yield any considerable changes to our primary results.

An auxiliary study conducted with a different student sample that explicitly asked subjects to rate the degree of masculinity or femininity they associated with the job described in the advertisement found a difference between the jobs in the hypothesized direction that was significant at the 5% level. This suggests that the Norrtälje campus might be an anomalous finding.

In answering the above questions, we have structured this thesis in the following manner:

i. We first provide an overview of prior research regarding occupational segregation, referral based hiring and gender priming in relation to job tasks and characteristics;
ii. We go on to explain our experimental design and data collection procedure followed by what we hypothesize;
iii. We then proceed to our results by presenting firstly, a validation of our gender priming by an auxiliary study, secondly, results regarding the same gender bias, thirdly, results pertaining to our treatment effect and stereotyping, and, lastly, additional results concerning the quality of the referrals using self-reported GPA data;
iv. We discuss how to interpret our results, their implications for how organizations ought to think about using referral based hiring, the extent of their internal and external validity, and suggestions for future research;
v. We conclude with a brief summation of our results.

2. Literature Review

One of most researched subjects within economics is the difference between men and women with regard to the labor market. Altonji and Blank (1999) outline many of the potential causes and consequences of the differences in labor market outcomes associated with gender and race. Despite the progress made towards achieving equality, the authors find substantial differences in many areas such as labor force participation, unemployment rates, occupational location, non-wage compensation, job characteristics and job mobility associated with the aforementioned.

Several different mechanisms have been put forward to explain the historical regularity and the persistence of gender inequality in labor markets despite legislation aimed to counteract these uneven outcomes being introduced in many of the world's biggest economies in the past 40 years (see Padavic and Reskin, 2002 for a review). Further mechanisms that have been put forward include differential rates of return and accumulation of human capital between men and women (Schultz, 1995).

It is also argued that a substantial portion of differences in labor outcomes between men and women can be explained by the fact that there are significant differences in the roles and sectors that men and women work in. Bielby and Baron (1986, p. 759) argue that "job segregation by sex is the principal source of gender differences in labor market outcomes" when examining their sample of Californian employers. More recent studies such as Levanon et al. (2009) corroborate the aforementioned findings concerning the importance of occupational segregation looking at detailed US Census data from 1970-2009 whilst Blau et al. (2009) come to similar findings in a cross sectional comparison of countries' data.

The remainder of the literature review is organized as follows: i) we first examine the role that occupational segregation plays in differing labor market outcomes; we then go on to examine two separate mechanisms that have been put forward to explain its persistence in the following sections: ii) social networks and their tendency to be segregated by gender and, iii) how employers signal gender belongingness along with how job seekers may self-select according to how their perceive an occupation or sector according to how it fits with their self-perceived traits and, finally, iv) we outline our own contribution to the literature.

2.1 Occupational Segregation

Occupational gender segregation is defined consistently in the research literature as the separation of men and women into different occupations (Anker, 1997; Kmec, 2005). Chafetz (1988) posits that the roots of modern occupational segregation lies within the gendered division of labor found in early forms of human civilization in which women were associated with primarily domestic tasks and men with activities in the wider economy and polity.

The consequences of this in terms of the continued gendered division of labor between men and women continue to be felt up until the present. Despite progress, women continue to be overrepresented in professions such as teaching and nursing whilst women comprise only 5% of Fortune 500 chief executive officers (Catalyst, 2015), 21.9% of full professors in the natural sciences (Catalyst, 2013), and approximately 20% of engineers in Sweden (SCB, 2008). Whilst there are countries that have achieved significantly higher levels of equality between men and women than the US, particularly with regard to wages, Blau et al. (2012, p. 156) conclude "the US gap would be similar to that in Sweden and Australia (the countries with the smallest gaps) if the United States had their levels of wage inequality."

The findings of Groshen (1991) that almost all of the wage gap between men and women could be accounted for by occupational segregation have been put into question by further research by Bayard et al. (1999, p. 890) who find persistent wage differentials within occupations associated with gender in the US. However, even the aforementioned authors note that "a sizable fraction of the sex gap in wages is accounted for by the segregation of women into lower-paying occupations, industries, establishments, and occupations within establishments."

Bettio and Verashchagina (2009) find that occupational segregation by gender is also very prominent in many European countries. Despite its international reputation as a country with very high gender equality, Nyberg (2008) argues that Sweden has a considerable degree of occupational segregation relative to other European countries. In healthcare, education and elderly and childcare there are only 20% men employed whilst occupations within construction and technology are dominated by men (SCB, 2014). In the most recent comprehensive examination of occupation segregation with regard to the Swedish labor market to our knowledge, Vänje (2013) also observes that men and women continue to share the burden of domestic work very unevenly with women doing an outsized portion of work. Of further interest with regard to the Swedish labor market are the findings of Hederos (2014) regarding intergenerational transmission of occupational segregation. Using Swedish register data, she finds that the more sex stereotypical the occupation of parents, the more sex stereotypical that of their children are likely to be, with a larger effect for sons than for daughters.

This leads one to the question: How can one explain the persistence of men and women in different occupations? Two possible mechanisms found within the literature are outlined below.

2.2 Referral Based Hiring and Social Networks

Granovetter's early work in sociology (1973, 1974) is widely recognized as one of the principal foundations for the considerable body of research regarding the role of social networks in attaining different forms of employment. Following Granovetter's and others' empirical work, subsequent research has attempted to model explicitly the channels through which social networks impact and sustain men and women's different labor market outcomes. Altonji and Blank (1999) note in a review of the literature that the phenomena of social networks tending to be characterized by gender homophily could be one such mechanism. This is due to the fact that referrals and personal contacts are an important conduit of information in the labor market.

Several authors have noted though that the fact that networks tend to be characterized by homophily with regard to gender could be due to two different mechanisms. McPherson and Smith-Lovin (1987) distinguished between induced homophily as the level of homophily expected from random mixing within groups given group assignments, and choice homophily as the level of homophily in excess of induced homophily. Later authors such as Kossinets and Watts (2009) and Kleinbaum et al. (2013) have attempted to decompose the effect of the two different mechanisms on homophily in empirical studies within the context of a university student population and employees within an IT company, respectively.

Before proceeding, it is important to note that economists have attempted to understand for a long time why it would be rational for employers to use referrals instead of other channels. Rees (1966) argues that an employee will refer only well-qualified applicants, since his reputation is at stake personally. This highlights the role that referrals may play in lessening the moral hazard problem for employers in their search for different individuals to fill vacancies. Montgomery's (1991) theoretical model reflects the manner that employers may rely on referrals from high ability workers to alleviate a potential adverse selection problem in hiring (not being able to observe the type of a prospective employee). The employer could therefore be using homophily in worker networks to their advantage as it implies that high ability employees will be more likely to refer other high ability workers.

It has also been noted by authors such as Mencken and Winfield (1998) that smaller firms tend to rely on referral based hiring more heavily due to their comparatively scare resources to allocate for recruiting budgets for instance. Furthermore, referral based hiring may be very economically efficient, and, as such, Berthiaume and Parsons (2006) find that it is a very usual and encouraged strategy for firms to pay bonuses (otherwise referred to as finders' fees) to employees who refer candidates who are successfully recruited to the firm.

More recent theoretical contributions such as the work done by Calvo-Armengol and Jackson (2004) have however suggested that the use of networks in job search can have added risks in perpetuating inequalities across groups in the long run. This is consistent with several of the empirical studies examining the associations between referral based hiring and job segregation which have emphasized the role of homophily in job seekers' networks with regard to gender (Drentea, 1998; Hanson and Pratt, 1991; Huffman and Torres, 2001; Straits, 1998).

Additionally, in studies of firm-level observational data similarities between referrers and their referral are also consistently found. Brown et al. (2013, p. 2) find in their study of a U.S. corporation which employs between 2,000 and 5,000 workers that "most referrals take place between a provider and a recipient with similar characteristics in terms of age, gender, ethnicity, education, as well as division and staff level within the corporation." The authors found that 63.5% of the time the referrer and the referral were of the same gender.

To our knowledge the only experimental study that has been done with regard to referral based hiring that has reported the gender of both the referrer and the referral is Beaman et al. (2013) in a field experiment in Malawi. By varying the financial incentive between fixed levels and ones associated with the performance of their referral while restricting the gender of the referral the referrers can choose between, the authors were able to assess the amount of information that referrers had concerning the ability of members of their own sex. The authors found that women were systematically underrepresented in their pool of referred qualified candidates and that the largest portion of this effect was driven by men referring more men and women referring more women who were underqualified.

2.3 Employment Related Gender Stereotypes

Both economists and psychologists view the individual as bearer of significant attributes that affect behavior in response to social situations (England, 1993). The process by which people attain these attributes and consequently learn to associate different types of occupations, characteristics or sectors with gender has been studied in a variety of contexts.

Whilst the early formation of gender stereotypes in children aged six to twelve is quite crude, Woods and Hampson (2010) have found that its effect on vocational development is lasting and significant. Vervecken et al. (2013) examined the role of gendered descriptions of professions on how middle school aged children perceived the attractiveness of different forms of employment. The main conclusion was that even at very early ages children's occupational interests and their perceptions of the divergent occupational successes of women and men reflect cultural gender norms, but that the effect could partly be lessened in describing jobs in a more gender fair form.

Helwig (1998) examined the expressed preferences of children at different stages of education in a longitudinal study. A striking example was that when asked in the second grade, the proportion of boys selecting a male occupation was .83 and this proportion rose to .93 for the same boys when they were sixth graders. However, girls in her study showed the reverse tendency; the proportion of 6-8 year old girls who identified a female occupation as their aspiration was .56, but this proportion dropped to .30 in the sixth grade.

Gaucher et al. (2011) similarly found that gendered wording in job descriptions had a significant impact on how students perceived the attractiveness of different jobs described in advertisements. The authors highlight that job advertisements for more male dominant sectors tend to contain masculine words such as "Analytical" while feminine job advertisements tend to emphasize characteristics relating to communal and interpersonal character traits.

These results are further corroborated by the findings of Hentschel et al. (2014) who found that the choice of character traits used to describe an ideal job candidate in fictional job advertisements had a large impact on how many women chose to apply for certain roles. Traits associated with masculinity in their study were related to independence, aggression and analytical thinking. Traits associated with femininity included dependability, social skills and conscientiousness. Women expressed higher degrees of interest in job advertisements with feminine traits, but male subjects were not influenced by the wording of the job advertisement significantly.[5]

The sensitivity to candidate and workplace characteristics matching certain gender norms, in particular for women, can also been seen at later stages of development. In a large public business school in Texas, Kirby and Sallop (2013, p. 136) find that female students "place greater importance on work life balance and cultural fit within the organization and are more aware of, and sensitive to, gender issues" than their male counterparts.

Drawing upon responses from corporate recruiters who partook in The Wall Street Journal/Harris Interactive Business School Survey, Alsop (2005) argues that gender stereotypes are still common in the workplace. He argues that a key stereotype is that men are stronger analytically, while women are stronger in communication and strategy. He also highlights the

[5] We only had access to the summary of the results presented at a conference (*Annual Meeting of the Academy of Management*) and the press release released by the faculty of the authors. The results may therefore not have been subject to peer review.

continued tendency for male and female students to self-select into courses at university that correspond to their gender stereotype.

The role of gender stereotypes also continues to play a role within the context of the workplace, even if conditions may be improving. Duehr and Bono (2006) found in their study considerable change in male managers' views of women over the past 30 years, as evidenced by greater congruence between their perceptions of women and successful managers and stronger endorsement of agentic and task-oriented leadership characteristics for women. The authors find however that the stereotypes held by male students changed less, remaining strikingly similar to stereotypes held by male managers 15 years ago.

Moreover, in Fernandez and Mors (2008) study of the formation of job queues for vacancies at a calling center, they find further evidence of gender stereotyping by employers. By matching employee referrals with their referrers at the application phase, they were able to identify the gender distributions of the applicant queues of various types of vacancies. They find clear evidence of a sorting mechanism whereby applicants are placed in queues for jobs corresponding to their gender.

Fernandez and Freidrich (2011, p. 592) furthermore provide evidence from a observational data set pertaining to "the expressed level of interest that male and female candidates show in two gender-typed jobs, the stereotypically female Receptionist job, and the stereotypically male Computer Programmer job." Their study found clear differences in how job seekers self-selected into the occupation associated with their gender.

2.4 Contribution to the Literature

Our study contributes to the economics literature on hiring, an area which Oyer and Schaefer (2011) argue is significantly under-studied. Our paper also follows the prompting of authors such as Montgomery (1992, p. 586) who suggested that the results of his theoretical model meant "that researchers should focus on job seekers' network structures." We do so by designing an experiment that examines two related channels that to our knowledge have not been examined in conjunction with each other before in an experimental setting of referral based hiring: gender homophily and gender stereotyping in job related tasks and characteristics.

Furthermore, the sheer scarcity of experiments in referral based hiring, in particular those examining gender differences, further justifies our study. The only experimental study done to our knowledge examining gender differences in referrals is the study by Beaman et al. (2013). Our experiment also extends the latter study in a number of ways. Firstly, we vary the position at the company to which subjects refer another person to see if there is a systematic effect of people referring individuals in accordance with gender stereotypes. Our study may therefore replicate a manner that employers could prompt referrers for a particular position within their organization without making explicit reference to gender.

The experiment is also conducted within the context of one of the most highly ranked countries in the world in terms of gender equality at a prestigious business school. Therefore, systematic differences found in the pool of referred applicants are unlikely to be driven by different rates of educational attainment between men and women, as was likely the case of Beaman et al. (2013) in

Malawi. Similarly, simply the fact that the experiment is performed in a developed country as opposed to a developing country is a further justification for our study as significant differences have been found in the labor markets of developed and developing economies (Behrman, 1999).

We also design the experiment in such a way as to gain a degree of insight into the gender composition of subjects' social networks at the school without making explicit reference that the study is primarily focused on gender differences. In addition, we build upon the methodology put forward by Kossinets and Watts (2009) and Kleinbaum et al. (2013) in exploiting the variation in gender composition within the social structures of the subjects' surroundings by using class enrollment data to provide a measure of induced gender homophily. We use the gender composition of those in the subjects' self-reported personal network as a proxy for choice gender homophily.

Furthermore, our study is the only one to our knowledge that has examined subject's actual behavior and not just self-reported or hypothetical behavior within the context of making referrals to a real employment position. In contrast to past research our study is based on a collaboration with a real firm and we provide participants with large monetary incentives to refer a student who subjects believe is well suited for a real job and is likely to apply.

Additionally, the research Gaucher et al. (2011), Born and Taris (2010), Hentschel et al. (2014) and related literature has examined the effect of gender stereotypes on job candidates own willingness to apply and sense of belongingness. Our study extends this literature by examining the effect gender stereotypes have on candidates' behavior and beliefs regarding other job candidates and not themselves.

3. Methodology and Experimental Design

In this section, we outline the experimental design to answer our research questions relating to same gender bias, gender homophily and stereotyping in job referrals. We begin with the experimental design for our main study, continue with the design of the auxiliary study we conducted to check the extent to which we can associate our treatment effect with gender stereotypes, go on to our statistical methods used for our analysis and end with an outline of our hypotheses.

3.1 Experimental Design of Main Study

In the main experiment, students at the Stockholm School of Economics were instructed to refer another student at the school for a real part time job. Each subject was given a form to fill out in which they referred another student and filled out background information about themselves. Subjects were randomly allocated to one of two treatments that corresponded to seeing a job advertisement that was primed with a particular gender. Subjects were given a small fixed payment for returning a completed form and informed of a large variable payment conditional on the student they referred being hired.

3.1.1 Participants

In total 432 subjects (203 women, 229 men) enrolled as students at the Stockholm School of Economics partook in the main experiment. In 11 out of 13 sessions the experiments were conducted in a classroom setting in conjunction with the first break or at the end of a 2-hour lecture. 9 of the 11 classroom sessions were conducted at the main campus of the Stockholm School of Economics (N=331) and two were conducted at the school's affiliate campus in Norrtälje (N=62). Of the two remaining sessions, one was collected by asking students in a common seating area at the main campus individually or in the group they were sitting in to fill out the form (N=29) whilst a final batch was collected before a choir training session (N=10). All the sessions were run between 26th March and 9th April. We as experimenters read out the same script of instructions in each sessions (see Appendix E1 for the Script in its full form).

3.1.2 Design of Forms

The form that each subject was presented with was three pages in total. The first page contains instructions, the second page one of the two job advertisements along with questions pertaining to the referral the subject makes, and, on the third page, there were questions regarding the subject and their background (see Appendix E2 and E3 for a translated copy of each form).

In order to prevent subjects to be primed with the true purpose of the study aims, no mention of gender was made in the forms. At no point was the gender asked for of either the experimental subject, the person they were referring or for those named in their network. A risk associated with this is the misclassification of the gender of the subject and those named in the form (see section 3.1.8 for a more detailed discussion). To further control for potential order effects, we set up the order of the questions in such a way that one would first see questions regarding the referral made and only on the following page see the questions about the referrers themselves.

The questions posed to the subjects on the final page of the form included questions relating to their GPA, their age, what year of the business school the subject was in and the names of 5 people they socialize frequently with at the business school.

3.1.3 Treatment Design

The primary task that the subjects were asked to preform was to refer another student of the business school to a part-time job at a public relations and media company. They were given a form in which they were given a description of the company and were randomly allocated one of the two part-time roles that the company was hiring for. Thus our treatment consisted of which job the subjects were allocated to refer a student to.

We thereby opted to use a between subjects design in which students only saw and referred another student to one of the two jobs. This is in contrast to a within subjects design that would have entailed showing each participant both job advertisements asking for two separate referrals.

In cooperation with the company, the job advertisements were intentionally made as identical as possible apart from the competencies, tasks and names of the two roles: (translated from Swedish) “Analyst” and “Creative Content Manager”. Table 1 below summarizes the points that the two jobs ads varied between:

Table 1 - Differences Between Job Advertisements

	Analyst	Creative Content Manager
Differences	*Characteristics* • Business-minded and analytical. • Interest in measurement and analysis. • Structured. *Tasks and Responsibilities* • Judging, evaluating and summarizing clients’ and their stakeholder’s portrayal in the media and other public relations related activities. • Quantitative and qualitative analysis.	*Characteristics* • Creative and passionate. • Understanding for social media and digital platforms • Enjoys working with several projects simultaneously. • Enjoys coming up with new creative input. • Prior experience in client facing activities is viewed favorably. *Tasks and Responsibilities* • Community management and other creative activities. • Image and website management. • Follow up projects and present results.

In line with the research outlined in the prior section by Gaucher et al (2011), Hentschel et al (2014) and Aslop (2005), we argue that the primary differences found between the two job advertisements are in line with what prior research has found to be associated with different gender roles; the Analyst role being more masculine and the Creative Content Manager being more feminine. We note however that there are other differences between the jobs that could be associated with characteristics less related to gender. For example, the Creative Content Manager position indicated that applicants with prior experience of client facing responsibilities and who were creative in general giving creative input would be better suited for the job (see later section Hypothesis 3.4.2 for a fuller discussion).

There was no mention of exact pay and no exact start date was given. Whilst there was no data available from the company that cooperated with the study concerning the exact gender distributions of either the applicants or those who had been hired for the two positions in the past (that is to say, prior to the experiment), the company confirmed that a significant majority of applicants for the positions were clustered by gender in a corresponding manner – men applied to a much larger extent for the Analyst position, whilst the equivalent was true for women for the Creative Content Manager.[6]

When checking public statistics for the gender distribution for both the sector that MediaPilot is in (Media and Public Relations) and the occupations that both jobs were classified according to (Media Analyst and Marketing), we found that both were within a 45-55% gender split range over the last ten years. We were unable to find data that distinguished between the two job positions as they were both classified into the same code in the Swedish Labor Market Survey (SCB, 2015). This suggests that subjects should only have been driven by our treatment and not a sector specific gender stereotype.

All students were also made aware of the fact that the job advertisement would be posted on the University Career's Website shortly after the position being advertised. This was done to enhance the credibility of the job advertisements being for actual jobs and to avoid questions of whether one can apply directly for the jobs.

3.1.4 Financial Incentives of Experiment and Relation to Field

Each subject was given a lottery ticket worth 10 SEK (~$1.19 USD) upon handing in a completed form. Subjects were also informed about a finder's fee of 5000 SEK (~ $580 USD) which was intended to ensure that the subjects had a strong incentive to refer someone they thought had a significant likelihood relative to the rest of their social network to both apply for the job, and, given the latter, being successful in terms of attaining it. In the event of multiple subjects referring the same person who is hired, the finder's fee would be split equally among those subjects.

The practice of providing cash bonuses for referrals (the finder's fee) is an established practice in many firms with the performance of the referred individual being indexed to the size of the bonus in certain cases (Castilla, 2005; Lublin, 2010). Where this study deviates from the practices of organizations engaged in the labor market is that these bonuses tend to be reserved for individuals who are already employed at the organization in question. The vast majority, if not all of the students in our sample, were to the best of our knowledge not employed by MediaPilot at the time of the experiment.

While this may pose problems concerning the external validity of the experiment for reasons that shall be discussed below, it may also be advantageous with regard to external field validity in other ways. Primarily, it incorporates elements of another labor market practice that is common:

[6] Interview with MediaPilot Manager Lukas Sveman at Stockholm Office, March 5, 2015.

headhunting, the practice of employing third party agents who are paid a fee by employers for finding job candidates for them (Finlay and Coverdill, 2007). It also mimics further features of headhunting, by that the job applicant does not pay a fee while the referrer is only paid conditional on the person they have referred being employed.

A significant element of referral processes in many that is not incorporated into this experiment is that those who are making the referral did not share any of the risk should the referral produce unsatisfactory job performance in the eyes of the employer. As the form that the subjects filled out guaranteed the subjects' anonymity to both the person who they refer and the company, subjects could be argued not to have had an incentive to incorporate the likelihood of the person they refer being hired and doing a poor job – leading in effect to a problem regarding moral hazard.

This mechanism has been studied by Dhillion et al. (2014) and Kugler (2003) in the context of job referrals in India and America, respectively, and found to be a significant reason why employers use internal referrals as a way how to hire new individuals. Kugler (2003) highlights in particular the decreased monitoring costs for the employer making the hire as the employee who made the referral has a strong incentive to monitor and increase the effort of the individual they referred.

One further issue with the finder's fee is that subjects could realize that they might not necessarily maximize their expected payoff by referring the most qualified candidate likely to apply, independently of what other subjects decide to do. As the finder's fee decreases with more subjects referring the same person, subjects may have acted strategically in terms of referring someone they think had a good chance but not the best chance of attaining the job. Given that they thought such a candidate would receive a smaller number of referrals (making their share of the finder's fee larger) subjects could potentially refer them instead of the highest ability candidate.

A related issue is that subjects could be argued to have had an incentive to not refer the person they thought was the best suited for the position if they wanted the job for themselves. We believe this concern was counterbalanced by the fact that both advertisements begin explicitly with the phrase that the company was seeking "1-2 people" for each role. This ought to have lessened the subjects' incentive to strategically refer somebody who they thought was less well suited for the role should they have wanted the job for themselves. As previously stated, candidates were also informed that everyone could apply at a later stage, further minimizing this potential concern.

3.1.5 Ability Measurement and Grade Point Average Data

In both job advertisements, the advertisement ends with the phrase that due to the fact that the job is part-time and expected to be done alongside full time studies, it is perfectly suited for a top student. Consequently, whilst GPA is only one dimension that the firm uses to judge the quality of an applicant, subjects could reasonably be argued to consider the GPA of the referral in selecting whom to choose. Due to the regulations of the school that the study was conducted at, we were unable to attain externally validated GPA scores for the subjects and their referrals, but each subject that participated in the experiment was asked to indicate the range that their GPA was in. An important note in examining subjects' responses is that as the subjects' GPAs are merely self-reported and cannot be validated, it is with a certain degree of caution that their GPAs are evaluated.[7] Freund and Kasten (2011) find in a review of self-assessments of cognitive ability that women tend to underestimate, while men tend to overestimate, their own level of ability. They qualify this finding though by stating that these findings tend to be heavily context and task specific.

However, we argue that the study of highest relevance for our study are the findings of Maxwell and Lopus (1994) who compared university students' self-reported levels of academic achievement with their actual grades. They find that students with low GPAs and SAT scores systematically misrepresent their scores with a large upward bias or by omitting to report their academic achievements at all. They do not find however any significant gender differences in students' tendency to either overstate or omit reporting their score.

The latter motivates our decision to include a section in our results that analyzes whether there are significant gender differences in the GPAs of those who made referrals and those who the latter referred. Due to the high degree of circularity in the data (62% of subjects who referred an individual were also referred to a job), we are able to include this part of the analysis whilst maintaining (using supplementary data described below) two thirds of our sample.

We also attempted to collect GPA data for the referred individuals who were not in the sample of individuals making referrals (see 3.1.7 Procedure below for a more detailed discussion). The responses we got brought up the proportion of referrals for which we have GPA data for to 67% as some of the respondents to the survey had been referred more than once.

We are thereby able to partly test the implication of Montgomery (1991) that high ability individuals are able to discern the quality of others to a greater extent than their low ability peers.[8]

3.1.6 Choice and Induced Gender Homophily Measurement

We attempt to measure two different types of gender homophily: choice and induced gender homophily. As induced gender homophily is the homophily which can be attributed to the structural opportunities for interaction whilst choice gender homophily is that which can be attributed to the psychological preferences of the subjects', we use two main data sources to proxy for these effects.

As described above, subjects are instructed to give the names of five other students that they socialize with frequently who are also at the business school. Using this information we construct a variable measuring the gender composition of the subjects' stated network (number of males

[7] This caution can be seen as more warranted if one argues that subjects were aware of this constraint that we were under and whether subjects believed that by indicating a higher GPA range, their referral would have been seen as carrying greater weight. It is inconclusive from the data that has been collected how large an impact either effect might have had, but we argue that the results, with the above limitations in mind, are still of interest.

[8] Our reservation with regard to this assertion is that this effect may also be driven by high ability individuals potentially forming ties with similar high ability individuals who they are more likely to refer each other not because they discern their ability more accurately, but because they are more likely to refer somebody they know well.

divided by total number of people named). This variable serves as our measure of choice gender homophily.

Subjects also provide their student registration number along with the year that they are currently in of the business school's Bachelors' and Masters' Degree programs. By combining the latter two measurements, we identify which year and degree program they are enrolled in. Using enrolment statistics from the school, we construct a further variable that measures the proportion of men enrolled in the subject's class (number of males divided by total number in class). This serves as our measurement of induced gender homophily.

In line with Kleinbaum et al.'s (2013) and Kussinets and Watts' (2009) methodology, we exploit the varying degrees of control that subjects have over their social surroundings and interactions with others to distinguish between choice gender homophily and induced gender homophily. We argue that subjects only have limited degree of control over the gender composition of the class that they enroll with in a particular year whilst subjects have a considerably greater degree of control over who they choose to socialize with.

We acknowledge that this identification strategy suffers from certain pitfalls. Using a strict interpretation of McPherson and Smith-Lovin (1987) definition in which choice gender homophily is defined as the degree of homophily which is left when induced gender homophily is taken into account, would have meant that one would subtract the proportion men in class from the proportion of men in one's stated personal network.. We do not however pursue this in our primary analysis due to two main reasons. First, our measurement pertaining to choice homophily as the proportion of men in stated personal network is imprecise and staggered relative to the proportion of men in class (the former is accurate to 20% whilst the latter is accurate to 1%). Secondly, the two effects as measured in our experiment may not be entirely separate and indeed, there is a high likelihood of there being a two way form of causality between the two. For instance, those with high levels of choice gender homophily could self-select into environments that have a higher proportion of their own gender thereby increasing the degree of induced gender homophily. Similarly, the gender composition of the class or campus that subjects find themselves in will constrain the choices and possibilities to express a subject's degree of choice homophily.[9] Therefore, we do not use this particular approach.

Nevertheless, we contend that our measurements are still of interest as it is the relative difference between the two in terms of control over one's surroundings that is of interest to us and not its absolute level. Moreover, this feedback mechanism between the two effects is likely to characterize social dynamics in field behavior as well where it is very rarely the case that individuals are exogenously placed into a social structure with a gender composition unbeknownst or absent from the decision making process of subjects in the field. Indeed, exactly

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9 In the most extreme example, a subject with an exclusive preference for the same gender in an environment with only members of the opposite gender would in our design potentially only write down names of the opposite gender which could mistakenly be interpreted as low choice homophily. We argue however that due to us knowing the gender composition of those who are enrolled in the class, we could theoretically control for this. Furthermore, the most extreme forms of gender composition in our sample are 79% and 24% men in the second year Finance Master's degree program and Marketing Master's degree program, respectively.

this type of interaction between the two effects called “inbreeding” has been proposed as a mechanism by Buhai and van der Leij (2008) in explaining occupational segregation in a theoretical model of a labor market. The latter thereby motivates our decision to include this feature into our analysis.

3.1.7 Procedure

During the running of the experiment, if a subject asked about what the intention of the study was, we as experimenters always answered with the phrase (in Swedish): “We are unable to answer whilst the experiment and recruitment is in progress due to conditions associated with the funding we have received.” In the cases when subject continued to ask questions we offered to send a summary of our results by email to them once everything was completed.

Due to time and feasibility constraints, we were unable to control for experimenter effects associated with the fact that as we both ran all the sessions and are both male. Ideally, we would have randomly varied the gender of the person running the experiment to check for any systematic differences, but were unable to do so due to time and feasibility constraints.

A consequence of the procedural methodology employed is that we were unable to keep an exact record of the number of observations that we lost due to attrition. As the majority of sessions had to be conducted in a very compressed time span in order to gain permission to enter into classes, the experimenters had to rely on the subjects taking one form from a pile and passing it on. We were therefore unable to record accurately our dropout rate due to the number of forms handed out in relation to the number of students who could have filled out the forms but choose not to. This is particularly true for classroom settings in which the language used for instruction was English, and thereby contained a significant proportion of individuals who were not fluent in Swedish. Individuals who chose not to partake could thereby not be distinguished between those who did so due to the language barrier and those who did not due to an assortment of other reasons. Whilst we had access to enrollment lists for the students in each of the classes we ran sessions in, classes almost exclusively had attendance levels significantly below the number that was enrolled.

Due to all of the above, we are unable to provide an accurate measurement of our attrition rate and are thereby limited in our ability to ascertain the extent of any bias in our results that may be due to subject’s decision to self-select into the experiment.

After all the sessions had been run, we notified by email all the individuals who had been referred by subjects in the experiment that they had been referred to one or both jobs with instructions how to apply. We sent one of six different e-mails to 297 individuals. The email they received corresponded to whether they had been referred to the Analyst job, Creative Content Manager job or both and whether they had taken part in the initial stage of the experiment or not.

For the individuals who had not partaken in the study, we requested those individuals to partake in a follow up survey by including a link in the email. The follow-up survey contained the same questions as the final page of the form that was used in the initial stage of the experiment. We received 15 responses out of 163 e-mails requesting information on the referred individual’s background.

3.1.8 Identification of Individuals Involved in Study According to Gender

Once the data collection process was completed and the data entry process began, the authors of this essay had to proceed to identify the gender of each subject, the person that they referred and the individuals named within the person's network. As there was no indication of the study's purpose or question regarding the gender of either individual named in the form subjects filled in, this had to be done by reading the name of subject themselves and the individual they name whilst proceeding to check the photo associated with both individuals' names in the student search function.

It was initially considered whether one should pursue a search for each subject's "national person number" to classify them according to their legal sex (in Sweden the second to last digit of a person's identification number indicates their legal sex – even for female, odd for male). Whilst this process would have been more consistent and less prone to subjective judgment of the authors, obstacles regarding access and further methodological concerns lead to the decision to instead classify people according to how their name and appearance fit into either female or male gender norms. This study is thereby unable to capture nuances pertaining to individuals whose gender identity does not fit within the dichotomous framework used (such as individuals who are transgender) and the latter is thereby recognized as a limitation of our study.

A related limitation is that of the possibility of having misclassified any person within the study as either a man or a woman. However, as there is little reason to suspect that this source of error would systematically bias the classification in favor of either gender and that this would affect a significant number of the observations, the authors believe that it should not have impacted the results of this study in any significant way.

The methodology employed of identifying the gender of subjects by photographs in this study is also in line with articles in the literature examining gender driven effects in hiring or managerial settings in both natural and experimental data (Heilman et al, 1988; Marlowe et al, 1996; Sczesny and Kühnen, 2004).

3.1.9 Classification of Experiment

Before proceeding, we argue that our experiment is a framed field experiment despite the fact that a strict interpretation of the typology of Harrison and List (2004) would have it classified as a conventional lab experiment due to the student population used. We argue though based on the later typology of field experiments in labor economics by List and Rasul (2011) our experiment fulfills the main criteria to be classified as a framed field experiment: our study uses real incentives (the finder's fee), a real task (both jobs advertised at the company are real paid positions), subjects are aware of the recruitment process being done is part of a study, our sample consists of appropriate people (both jobs are intended for students who wish to work part time) and we as researchers intervene (both by collecting the data ourselves and the treatment design).

The only criteria more open to debate is whether our experiment can be strictly be considered to be in the field as our participants are students in a classroom. Despite this element, we argue that recruiters from various organization are not uncommon at the business school and indeed have given presentations in several of the classrooms in which we conducted the experiment. Of further interest with regard to our sample are the findings of the 2013 Career Placement report for Bachelor students at SSE – most notably that the two most common ways for women graduating from SSE to find employment was through acquaintances (30%) and previous internships (25%) highlighting the relevance of our study to how certain students at the business school enter the labor market.

3.2 Experimental Design of Auxiliary Study

In order to verify the internal validity of the claim that the job advertisements were systematically varied by gender, we organized an auxiliary study with a separate but similar student sample of Economics students at Stockholm University. The participants were notified by email and on the notifications panel of the course website. No financial incentive was given to students for filling out the survey and participants were able to respond between 30th April and 8th May. We received 93 responses out an unknown total enrolled.

We used a between subject format again in which each student was randomized to see only one of the two job advertisements and was asked to rank how masculine or feminine they perceived the job described in the job advertisement to be on a scale of 1 to 9 (1 being very masculine and 9 being very feminine). We choose an odd numbered scale due to the fact that we believe it was important for subjects to be able to indicate a middle value corresponding to the view that the job described in the job ad is neither feminine nor masculine.

To further match the results with the remainder of our analysis, we also asked each participant to indicate their gender and their age after having completed the first part of the survey. The online survey forced respondents to first answer the question regarding how masculine or feminine the ad was and only thereafter were they able to respond to the questions regarding their background. This final part however was optional, and we provided subjects with the possibility to respond "Other" with regard to their gender (See Appendix D for further details).

3.3 Statistical Methods

3.3.1 Choice of Model

The model that we chose to use to analyze the majority of the results of our study is the Linear Probability Model (LPM). The dependent variable that we use for the majority of our analysis is binary with regard to the gender of the person that the subject in our study refers. We argue for the use of this model as opposed to more conventional non-linear models such as the binary logistic regression model (otherwise referred to as Logit) due to the likely presence of interaction effects between our treatment effect and the gender of the referrer. As Ai and Norton (2003) argue that the interaction effect in non-linear models does not equal the marginal effect of the interaction term and moreover, can be of opposite sign, we use the LPM for all regressions in our results section.[10] Furthermore, Wooldridge (2013, p. 250) argues that it in many applications the usual OLS statistics are not far off in estimating, and it is still acceptable in applied work to present a standard OLS analysis of a linear probability model.

While this potentially poses difficulties in the predicted values of the dependent variable lying outside of the 0 to 1 range, it allows for a more natural interpretation of the interaction effects that we aim to capture within our model between the treatment that the subject is allocated to and the gender of the participant. As this interaction effect has been observed in prior studies

[10] We provide Logit estimations in our Appendices A7-8 and B5-6 as a robustness check.

such as with Kirby and Sallop (2013) and Hentschel et al. (2014) in which women showed a higher degree of sensitivity to gendered wording and gender roles, we believe that this is warranted.

As both our dependent and several of our independent variables are binary and non-continuous, two of the assumptions for the OLS estimator to be the best linear unbiased estimator are almost certainly violated in the majority of our analysis: i) homoscedasticity and ii) normally distributed error terms. To solve the first problem, all of our regressions are run with Huber-White sandwich estimators for heteroskedastic robust standard errors. The violation of the distribution of errors terms being non-normally distributed poses difficulties in terms of inference when looking at the t- and f-test statistics, but in line with prior research, we still use them to test for significance.

Furthermore, we use the Mann Whitney U-test of means, the Pearson Chi squared test, the binomial one sample test and independent sample t-tests for other shorter statistical analyses.

3.3.2 Robustness Checks

The majority of our sample comes from sessions run at the business school's main campus in Stockholm, 368 observations out of 428. The other 60 observations come from the school's smaller affiliate campus in Norrtälje. The campuses differ considerably in the following 5 ways:

- *Geography*; the Norrtälje campus is located approximately 70 kilometers north of Stockholm at a rural location, as opposed to the main campus located near the city center of Stockholm.
- *Gender distribution*; the Norrtälje campus is much more female dominated with approximately two thirds female students, in comparison to approximately the reverse relationship at the main campus with approximately two thirds men.
- *Admission requirements*; the requirements of previous math studies and the GPA required to be admitted are lower for the Norrtälje campus degree program (Retail Management).
- *Curriculum*; the degree program in Retail Management has slightly different courses than the Bachelor in Business and Economics at the main campus that has a more analytical and quantitative focus in comparison.
- *Class size*; the class sizes are also much smaller at the Norrtälje campus with 60 students enrolled compared to 300 in the main campus Bachelor program.
- *GPA differential between men and women;* at the main campus men in the Bachelor program have a 0.11 higher GPA than women on average, whereas at the Norrtälje campus women have a 0.08 higher GPA than the men on average.

Considering the fact the campuses differ in the above mentioned ways, we perform robustness checks controlling for any campus specific effects regarding same gender bias or our treatment effect. We do so using a dummy variable approach combined with the appropriate interaction terms depending on the context. We also for clarity run regressions the two samples of the two campuses separately with the results shown in the Appendix.

Furthermore we separate the sample and run regressions for each treatment group separately, and by construction this can only be done for our same gender bias analysis. We do this to ensure that our results hold across both treatment groups.

We moreover separate by the type of session, inside or outside of a classroom (concerning the 39 observations collected in the school courtyard, from the school choir and around the school, not in conjunction with a lecture). This is done to ensure that the type of session does not significantly impact our results.

We also separate and control for any Master's level specific effect. This is done due to the possibility of the students pools in the Bachelor and Master level programs might differ significantly in terms of work and life experience, and also previous educational background.

Lastly we control for any session specific effects by including dummies for all but one of the 13 sessions. This is done to verify that no specific session or groups of sessions are predominantly driving the results.

3.4 Hypotheses

Given prior research and our experimental design, we shall now outline our hypotheses for the research questions we started with: (1) is there a same gender bias in referrals and to what extent can it be attributed to choice gender homophily and induced gender homophily? and (2) does gender stereotyping take place with regard to job related tasks and characteristics?

In constructing the hypotheses for this particular study it is important to note the absence of a comprehensive literature studying exactly how the channels we propose (choice and induced gender homophily as well as gender stereotypes) impact job referrals. Therefore, it is with the aforementioned reservations that we propose the following hypotheses:

1. **Same Gender Bias**
    a. Men (women) are more likely to refer a man (woman) than women (men) are likely to refer a man (woman).
    b. There exists choice gender homophily - subjects' stated personal networks consist of their own gender to a greater extent than the proportion of people of the same gender in their class.
        i. The higher the choice gender homophily, the higher the likelihood of referring a person of the same gender – same gender bias is to some extent driven by choice gender homophily.
    c. Given a variation in induced gender homophily:
        i. The higher the induced gender homophily, the higher the likelihood of referring a person of the same gender – same gender bias is to some extent driven by induced gender homophily.
2. **Stereotyping**
    Subjects given the male primed job (Analyst) have a higher likelihood of referring a man than subjects given the female primed job (Creative Content Manager).

3.4.1 Same Gender Bias

As outlined in our literature review, we believe that the research conducted up onto this point is highly indicative of sub-hypothesis 1a that subjects will refer members of their own gender to a greater extent than that of the opposite gender will. We would also note Berger's (1995) findings from the National Longitudinal Survey of Youth, which highlight that information networks are highly segregated by gender and that 87 percent of the jobs men obtained through contacts were based on information received from other men whilst the corresponding figure for women is 70 percent. This motivates why we believe that we ought to observe a same gender bias in our results.

Regarding our sub-hypotheses 1b, we argue that, as outlined in our literature review, prior research has found that individuals' social networks tend to consist of members with similar characteristics to themselves and large amounts of job information travel through social networks which further motivates hypothesis 1bi. Within the context of our student sample being primarily made up of young adults, it is also worth noting that the most consistent finding in studies of peer relations has been that girls and boys are relatively isolated from one another in every age category leading up to Grades 12 despite relatively even gender compositions in their class (Shrum et al., 1988).

Within the context of the sector of the company we are studying, we can also note the study by Ibarra (1992) who finds whilst examining the networks of managers in an advertising firm considerable evidence for gender differences in homophily and in the ability to convert individual attributes and positional resources into network advantages. The author finds that men appeared to reap greater network returns from similar individual and positional resources, as well as from homophilous relationships. This builds upon the general finding by Brass (1985) and Ibarra (1997) that men tend to have higher degrees of gender homophily than women do, especially in organizations where they are a strong majority.

We do not feel however that this provides sufficient evidence to propose a hypothesis that network effects should be stronger for men than women given the considerable differences in research methodology employed with regard to identifying social networks and their samples consisting of individuals already employed at a firm.

Our sub-hypothesis 1c is shaped by the recognition that as the gender composition of subjects' classes shapes a significant portion of their social environment whilst at university, it acts as a limitation on who the subjects interact with regularly and get to know within the business school population. This in turn shapes the pool of people that one can choose between when making the referral. Furthermore, our hypothesis is also based on the findings of Kossinets and Watts (2009) who identify classes as essential focus points in students' interactions with each other when examining e-mail data and the concentration of interactions between students.

However, just as the aforementioned authors, we recognize that students are likely to have several other points of social interaction related to extracurricular activities or student politics which we are unable to capture in our data. We also note that as students' progress through the various degree programs at the business school, the gender composition of the classes they attend may be successively less similar to that of the class they enrolled in due to different specializations within the program and elective courses that are chosen. Nevertheless, we argue that there is still support for our (tentative) contention that there could be a lasting effect on the group level for our subjects on the gender they refer which is related to the initial gender compositions of their enrolled class.

3.4.2 Stereotyping

The hypothesis proposed regarding stereotyping is offered cautiously on the basis of the findings from prior research. Whilst there is a considerable degree of research done on the self-perception of one's own gender and how it pertains to different situations, there is much less to our knowledge on systematic classifications of members of one's own social network as fitting into certain gender stereotypes with regard to labor market outcomes.

Due to the differences between the job advertisements being in line with associated gender stereotypes and roles from the research done by Gaucher et al. (2011), Hentschel et al. (2014) and Aslop (2005), we believe that this effect ought to be as present in referring members of one's own social network as for the gender roles that one associates with oneself.

We would also like to offer our reservations though in suggesting that the only relevant differences between the two jobs has to do with typical gender roles. One may note that the jobs are also varied in accordance to being orientated towards a more creative profile in the case of the Creative Content Manager than in the case of the Analyst position. However, Stoltzfus et al. (2011) claim that despite four decades of scholarly interest in gender and creativity, no clear picture has emerged regarding the relationship between these two phenomena. It is therefore not clear to us that there should be a systematic gender effect with regard to people's propensity to associate either gender with higher levels of creativity.

4. Results

In this section, we begin with a brief overview and explanation of our variables. We then present the results from our auxiliary study done to validate the gender priming of our two job advertisements. We continue by presenting the results regarding our first research question and hypotheses related to same gender bias. We then proceed to present the results regarding our second research question and hypothesis related to gender stereotyping and our treatment. Lastly, we present some additional results regarding quality of referrals by each gender in an effort to compare our results to other findings in the literature.

4.1 Descriptive Statistics

In total 432 subjects (207 women, 225 men) enrolled as students at the Stockholm School of Economics partook in the main experiment answering a form with one of the job advertisements that they referred another student to. However, 4 of these subjects (1 woman, 3 men) referred themselves to the job (which was against the instructions of the form that they filled in) and were thereby dropped from our analysis entirely, leaving us with a total of 428 subjects, (206 women and 222 men).

Table 2 below shows a summary of the variables used in our analyses.

The first variable *Man Referred* is a dummy variable equal to 1 for when a male student has been referred in the form by the participating subject. Since the mean is 0.53, 53% of the referred subjects are men. The second variable *Man* is a dummy variable equal to 1 if the participating subject filling out the form referring another student is a man. Here 51.9% of the total are men. Thus when only looking at the aggregate data in this way, neither sex seems to be over or under-referred, but that the referrals closely follow the general gender ratio of the sample population, 51.9% compared to 53% men.

Subsequently, it is worth noting that 50% should not be the mark to which a possible over or under-referring is compared, but the gender ratio of the sample population in general. We generated the variable *Proportion of Men in Class* to correspond to the enrolling proportion of males in each specific class and year in each program. This is the variable through which we attempt to capture or proxy for the induced gender homophily of the subjects. The average of this variable is 0.535 or 53.5 percentage points and it is against this value we compare the proportions of men and women referred to determine whether there is a same gender bias. Despite the fact that in the second year Finance Masters' program there are the most men with 79% and in the first year Marketing Masters' program there are the most women with 24% men, as seen from Min. and Max. values in the table, most of our sample comes from classes with much more similar gender distribution meaning the variation in this variable is not very large. The average value is driven mostly by the biggest sessions with the largest classes in the Bachelor of Business and Economics that have an average male proportion of approximately 0.6.

Table 2 – Descriptive Statistics and Description of Variables

Variable		Obs.	Mean	Std. Dev.	Min.	Max.
Man Referred	Total	428	0.530	0.500	0	1
- Dummy variable equal to 1 for referred student	Women	206	0.291	0.455	0	1
being a man	Men	222	0.752	0.433	0	1
Man	Total	428	0.519	0.500	0	1
- Dummy variable equal to 1 for referring student	Women	206	0	0	0	0
being a man	Men	222	1	1	1	1
Analyst	Total	428	0.500	0.501	0	1
- Dummy variable equal to 1 for referring student	Women	206	0.476	0.501	0	1
receiving Analyst job ad	Men	222	0.523	0.501	0	1
Size of Network	Total	428	4.514	1.117	0	5[11]
- Total number of people listed in the network	Women	206	4.519	1.039	0	5
question requesting 5 people.	Men	222	4.509	1.187	0	5
Proportion of Men in Network	Total	415	0.535	0.374	0	1
- Number of males in the network listed divided by	Women	202	0.242	0.251	0	1
the size of the network.	Men	213	0.813	0.233	0	1
Referral within Network	Total	415	0.439	0.497	0	1
- Dummy variable equal to 1 for referred person also	Women	202	0.455	0.499	0	1
being named in network.	Men	213	0.423	0.495	0	1
Proportion of Men in Class	Total	428	0.535	0.140	0.240	0.790
- Class specific variable of the proportion of men in	Women	206	0.496	0.153	0.240	0.660
each respondent's class.	Men	222	0.571	0.116	0.240	0.790
School Year	Total	427	2.377	1.230	1	5
- 1-3 for Bachelor students and 4-5 for Master	Women	206	2.422	1.262	1	5
students.	Men	221	2.335	1.201	1	5
Age	Total	428	22.94	2.744	17	42
- 2015 minus the year of birth.	Women	206	23.05	2.872	19	38
	Men	222	22.84	2.622	17	42
GPA	Total	416	3.815	0.424	2.875	4.500
- Self-reported GPA of referring student.	Women	201	3.739	0.423	2.875	4.500
	Men	215	3.885	0.414	2.875	4.500
GPA Referred	Total	287	3.903	0.426	2.875	4.500
- Self-reported GPA of referred student.	Women	147	3.872	0.452	2.875	4.500
	Men	140	3.935	0.395	2.875	4.500
Number of Referrals	Total	297	1.441	0.880	1	7
- Each unique referred student assigned the total	Women	140	1.464	0.836	1	4
amount of referrals received.	Men	157	1.420	0.921	1	7
Norrtälje Campus	Total	428	0.140	0.348	0	1
- Dummy variable equal to 1 for students at the	Women	206	0.204	0.404	0	1
Norrtälje Campus.	Men	222	0.081	0.274	0	1

[11] One subject reported six names even though the form only asked for five.

As previously noted in the methodology section, this variable is not perfect as people also associate with students outside their class, yet we believe it is better to use class specific values than the school average. Based on previous literature discussed earlier, students' acquaintances and close network are more likely to come from within their class than from outside. The variable is also based on the entering number of males and females, if it is the case that the dropout rate is different for men and women this would cause a bias. However, we have assumed that the dropout rate should be roughly equal for men and women as we have not been able to retrieve any data from the school on this matter.

The third variable in the table *Analyst* is a dummy variable for when the job advertisement of the form is for the Analyst job and thereby indicates which of the two treatments subjects were randomized into. The variable has a mean of 0.5, showing exactly 50% of the filled out forms were for the Analyst job. However splitting the sample by men and women shows a slight variation with 47.6% of women and 52.3% of men receiving the Analyst form. This is either a random variation, or it may be the case that men to a greater extent have rejected to fill in the Creative Content Manager (from hereon in this section CCM) form. This will then have lead to us recollecting more unfilled CCM forms and in the next session distributing relatively more of them leading to this slight difference. However, it is inconclusive whether this was the case and have no way of testing for it.

The next variable in Table 2, *Size of Network,* is a discrete variable for the number of people subjects have put down in the last question of the form. Subjects were asked to name 5 people they spend a lot of time with at SSE. As the average is 4.51 for all the 428 subjects including the people leaving the question blank not reporting any network at all, the vast majority put down 5 names.

The *Proportion of Men in Network* variable is equal to the number of men named in the network question divided by the *Size of Network* variable. Thus someone who put down 3 men and 0 women would be assigned a proportion of 1 and someone who put down 3 men and 2 women would be assigned a proportion of 0.6. Here we can really see a major gender difference with women having an average *Proportion of Men in Network* of 24.2% and men 81.3%. The 13 observations with a *Size of Network* equal to 0 are not included in the *Proportion of Men in Network* variable, decreasing the total number of this variable from 428 to 415.

The *GPA* variable corresponds to the self-reported GPA subjects reported in the form, circling one of eight different ranges. The average of each span has been used to assign a specific GPA for the subjects, with the exception of the highest span where a lower value is used, as students surpassing 4.75 are extremely rare, most years not a single student does. Here 4.75 is used as a max to give an average of this span of 4.5 instead of 4.625. Furthermore if a student had specifically circled one exact number to indicate his/her GPA this number was used instead of the average of the span to give more precision.

We can see in Table 2 that men have reported higher GPAs than women. Men do in fact at the Bachelor in Business and Economics at the main campus have a 0.11 higher GPA on average than women, but at the Bachelor in Retail Management at the Norrälje Campus women have a 0.08 higher GPA than men on average. The values though are generally likely to be over-reported, as the true averages for the Bachelors programs are usually in the range of 3.4-3.6.[12] However the people present at the lecture may not be a random sample as it may be the case that more ambitious students to a higher degree attend lectures.

We have included *GPA* as a control variable when running regressions. The reason for this is that given there is a difference in GPA among men and women, it could potentially be the case that a same gender bias is driven to some extent by high GPA people referring other high GPA people and vice versa, and it just so happens one gender is overrepresented in the high GPA sample population.

School Year is a dummy for what year the student is in, 1-3 for Bachelor students and 4-5 for the Masters students in their first and second year, respectively. It is highly correlated with the *Age* variable describing subjects' age in discrete year values.

Out of the 428 referrals gathered in total from the forms, 297 unique persons were referred, meaning many people were referred more than once. The variable *Number of Referrals* is a discrete variable corresponding to how many times each of the 297 people have been referred. The most referred individual received 7 referrals in total.

4.2 Auxiliary study

Due to the fact that we wished to verify that the jobs were in fact gender primed in the hypothesized direction – Analyst being masculine and CCM being feminine – we conducted an auxiliary study. This allowed us to examine the magnitude of the difference (and indeed, if in fact there was a difference) without having to rely solely on the account of the employer and the literature described in the previous sections. Subjects were asked to rate the job advertisements in terms of the masculinity and femininity on a scale from 1-9. As we could not perform this study with the same student population as our main study without risking people discovering the true purpose, we asked Economics students at Stockholm University instead.

The results with 93 respondents gave a mean value of 4.59 for CCM and 5.14 for Analyst with 1 being the most feminine and 9 the most masculine. This is in the hypothesized direction giving CCM a value under 5 (indicating femininity) and Analyst above 5 (indicating masculinity). Performing a Mann Whitney U-test, this difference is significant at the 5% level ($z=-2.453$, p-value=0.0142) and also with an independent two-sample t-test also at the 5% level ($t=-2.080$, p-value=0.0403).[13]

4.3 Same Gender Bias

4.3.1 Main Results

As stated in the previous section when looking at referrals without separating by gender it seems to follow the underlying subject population closely. 53% of total referrals were men and our benchmark calculated from the *Proportion of Men in Class* is 53.5%. However when the sample is

[12] Correspondence with school administration, Per-Olov Edlund, May 5, 2015.

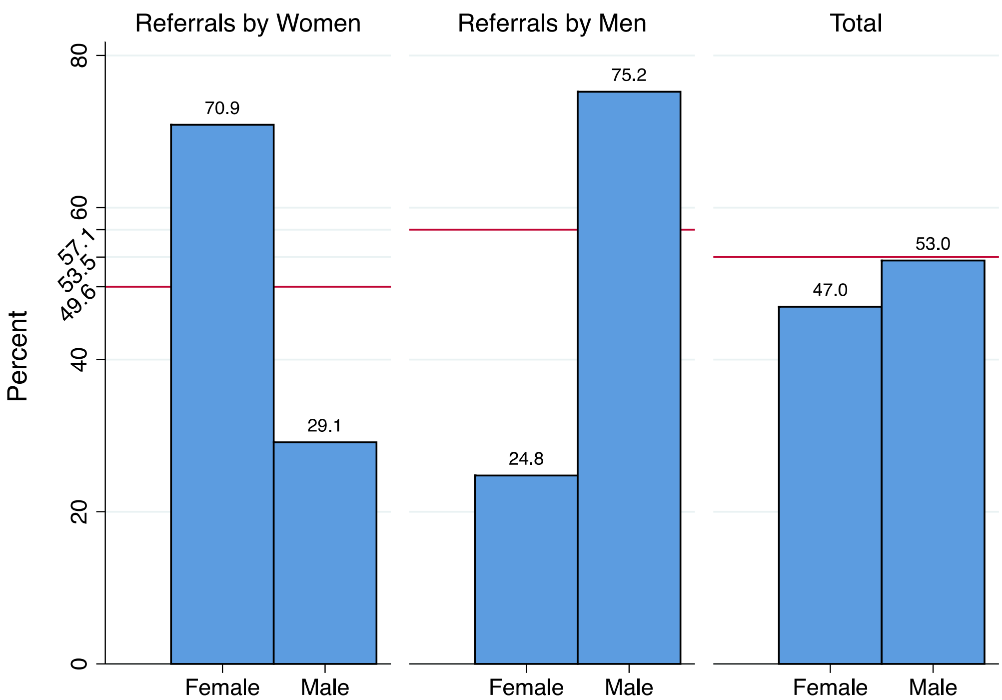
[13] As we cannot reject the null hypothesis of subjects' responses being normally distributed using the Shapiro–Wilk test (Shapiro–Wilk test statistic= 0.99496, p-value= 0.98081), the t-test is the preferred test in this instance.

separated by the gender of the referrer this gives a very different picture. Figure 1 shows referrals separated by the gender of the referrer. Women referred 29.1% men and men referred 75.2% men.

Calculating new benchmark values from *Proportion of Men in Class* for the separate samples of men and women gives 0.496 for women and 0.571 for men as seen previously in Table 2. The difference between the outcome and the benchmark is 20.4 percentage points for women and 18.1 for men, indicating a large same gender bias for both genders. Using a binomial test to check whether the outcomes are significantly different from the respective benchmarks gives p-values less than 0.001 for both men and women. This strongly supports hypothesis 1a of a same gender bias, rejecting the null hypothesis of no same gender bias at a 1% significance level.

A Mann-Whitney U-test comparing the percentage of referred men by male and female referrers also rejects the null hypothesis at a 1% significance level (z=-9.37, p-value<0.01), as does a Pearson chi-square test (Chi2=91.16, p-value<0.01). Thus, men (women) are more likely to refer a man (woman) than women (men) are likely to refer a man (woman), confirming our first hypothesis.

Figure 1 – Referrals by Gender



The above graph is based on data collected by us, the authors, for this experiment and is our own work. The graph was created using Stata/MP 13.1.

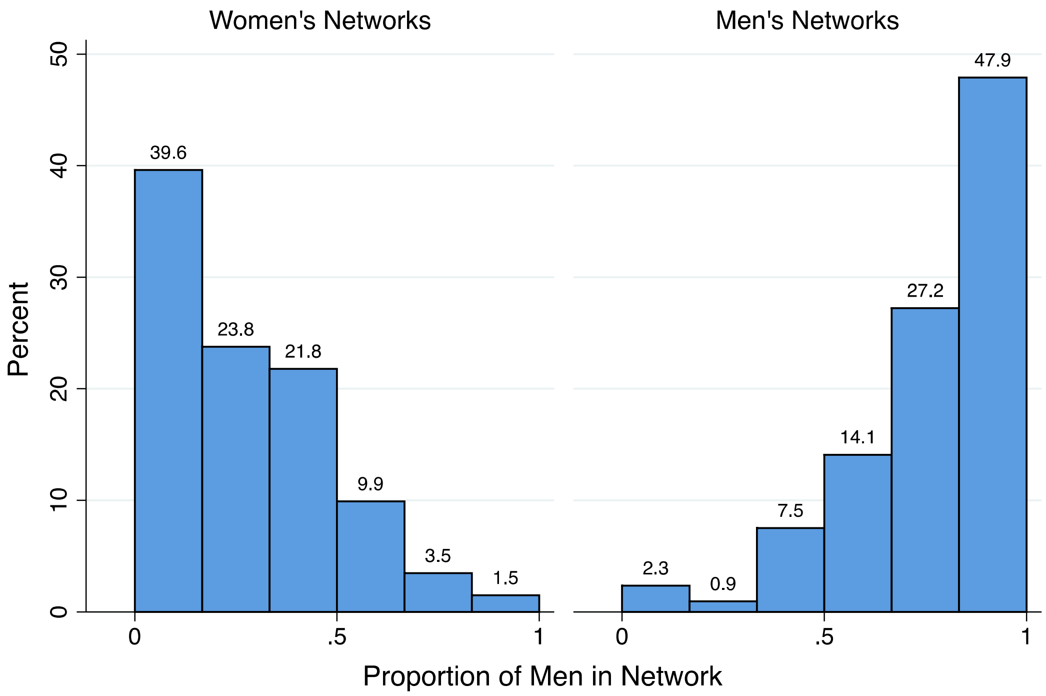
Moving on to our hypothesis 1b concerning the existence of choice gender homophily, we use as previously stated the variable *Proportion of Men in Network* to proxy for this mechanism. Figure 2 displays the outcomes of this variable separated by gender. By visual inspection, the gender compositions of men and women's networks seem to follow the reverse pattern of the other suggesting the existence of choice gender homophily in our sample.

To formally test this we use a Mann-Whitney U-test comparing *Proportion of Men in Network* for men with *Proportion of Men in Class* for men. The difference is significant at the 1% level (z=-12.29, p-value<0.01). Performing the same test for women the difference is also significant at the 1% level (z=10.48, p-value<0.001).

Furthermore, running a Mann-Whitney U-test comparing the means of men and women's *Proportion of Men in Network,* a difference is significance at the 1% level (z=-15.47, p-value<0.001), as well as a Pearson chi2 test (Chi2=257.45, p-value<0.001). These results allow us to reject the null hypothesis of no existence of choice gender homophily, and thus strongly indicate the existence of it.

The percentage of males in subjects networks for men and women are 81.3% and 24.2%, respectively. The benchmark values for men and women as calculated using the *Proportion of Men in Class* variable are 57.2% and 49.4%, respectively. Subtracting the outcomes from the benchmark values gives a difference of 24.1 percentage points for men and 25.2 for women. This suggests that the extent of choice gender homophily is approximately equal for the men and women in our sample.

Figure 2 – Distribution of Prop. Men in Personal Network for Men and Women



The above graph is based on data collected by us, the authors, for this experiment and is our own work. The graph was created using Stata/MP 13.1.

We proceed to run regressions to further test our first hypotheses and to answer our first research question regarding same gender bias and its mechanisms.

$$Referred\ Gender = \beta_0 + \beta_1 Man + \varepsilon \tag{1}$$

$$Referred\ Gender = \beta_0 + \beta_1 Man + \beta_2 Prop.Men\ Network + \varepsilon \tag{2}$$

$$Referred\ Gender = \beta_0 + \beta_1 Man + \beta_2 Prop.Men\ Class + \varepsilon \tag{3}$$

$$Referred\ Gender = \beta_0 + \beta_1 Man + \beta_2 GPA + \varepsilon \tag{4}$$

$$Referred\ Gender = \beta_0 + \beta_1 Man + \beta_2 Prop.Men\ Network + \beta_3 Prop.Men\ Class + \beta_4 GPA + \beta_5 School\ Year + \beta_6 Age + \varepsilon \tag{5}$$

We run the regression with each of the main variables separately and then add the control variables *School Year* and *Age* jointly in the last regression. We can see in Table 3 regression (1) that *Man* is significant at the 1% level when by itself, assigning a 46.1 percentage points greater chance for men to refer another man than for women. In total men then have a 46.1 + 29.1 = 75.2 percentage point likelihood to refer another man. As seen by inspecting the constant in regression (1) Table 3, women have a 29.1 percentage point chance to refer a man. These are the same numbers as shown in Figure 1. To further quantify the difference between men and women, the results indicate men have a 158% higher likelihood of referring a man than women have of referring a man.

Regression (1), in accordance with the earlier tests performed, confirms our first hypothesis of a same gender bias at a 1% significance level. The magnitude compared to our benchmarks is 20.4 percentage points for women and 18.1 percentage points for men.

Moving on to hypothesis 1b, when estimating the effect of choice gender homophily, using the proportion of men in subjects' networks in regression (2) Table 3, this halves the estimate of the *Man* variable to 22.3 percentage points, but remains significant. The constant drops considerably from 29.1 in (1) to 19 percentage points in (2) and remains significant. These findings support hypothesis 1b that choice gender homophily exists and further 1bi that roughly half of the same gender bias is driven by choice gender homophily for men and roughly one third for women.

The point estimate of *Proportion of Men in Network* in regression (2) is 0.422. This suggests that going from an all-female network to an all-male network increases your likelihood of referring a man by 42.2 percentage points.

The induced gender homophily, measured by proportion of men in the class, seems to have little effect as seen in regression (3), not changing the *Man* point estimate or the constant by much. It is also not significant by itself, however becomes significant in the complete regression (5). The sign is in the opposite direction of our hypothesis; we thought more males in one's class would make one more prone to refer other males. However, as the correlation between *Proportion of Men in Class* and *Proportion of Men in Network* is 0.30, this suggests that higher induced gender homophily by more males in one's class drives up to some extent your choice gender homophily.

Thus the induced gender homophily may affect the same gender bias in a positive direction but through increasing the proportion of men in one's network. This may be in line with the fact that the point estimate for the variable for network actually increases in regression (5) at the same time as that of the effect of male proportion in class decreases (5).

The negative sign in both (3) and (5) suggests that more males have been referred in the classes with fewer men, after having controlled for gender. However, there is little variation in this variable with most of the sample lying within a 40-60% male ratio range, which makes an estimation of the variables true effect more difficult. Furthermore, in regression (5) when the school year is included this depletes the variation even more as only the variation within each year is left.

Therefore, we cannot draw definitive conclusions based on these results to what extent induced homophily drives a same gender bias for our sample, and cannot reject the null hypothesis of induced gender homophily not driving same gender bias.

Table 3 – Regressions Examining Same Gender Bias, Choice and Induced Gender Homophily

VARIABLES	(1)	(2)	(3)	(4)	(5)
Man	0.461***	0.223***	0.468***	0.447***	0.209***
	(0.0430)	(0.0741)	(0.0448)	(0.0448)	(0.0733)
Prop. Men in Network		0.422***			0.471***
		(0.0937)			(0.0931)
Prop. Men in Class			-0.0865		-0.398**
			(0.171)		(0.174)
GPA				0.0878*	0.0532
				(0.0517)	(0.0498)
School Year					-0.0719***
					(0.0219)
Age					-0.00882
					(0.0108)
Constant	0.291***	0.190***	0.334***	-0.0346	0.552*
	(0.0317)	(0.0373)	(0.0928)	(0.194)	(0.318)
Observations	428	415	428	416	405
R-squared	0.213	0.257	0.214	0.218	0.307

Note: Dependent variable in regressions (1)-(5) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates $p<0.01$, ** indicates $p<0.05$, and * indicates $p<0.1$.

We see that GPA in regression (4) is positive and significant when included by itself but becomes insignificant in the regression including all control variables. The fact that it has a positive significant estimate at first indicates that having a higher GPA increases your likelihood of referring a man. However since the point estimate of *Man* changes so little when including GPA this indicates that very little of the same gender bias is driven by high ability people referring other high ability people. It rather captures the fact that men reported higher GPA and in general men referred men.

School Year is significant and negative, indicating the higher the school year the less prone you are to refer a man. Age is insignificant in our model.

4.3.2 Robustness Check – Separating by Campus

As explained in section 3.3.2, there are several large differences between the two campuses of the school. For this reason, we argue that it is warranted to do a robustness check to see whether our results still hold or change in any significant way when separating the effects by campus. We do this by adding a dummy variable equal to 1 for the 60 students out of 428 in our sample that go to school at this campus, and by adding the interaction variable *Norrtälje * Man*. We need to include both the dummy and the interaction term to account for a Norrtälje specific same gender bias. The results of regression (1)-(5) including a dummy variable for Norrtälje are shown in Appendix A1.

As can be seen in the table, our results for the same gender bias are still significant. For men the point estimate does not change much, but for women the point estimate is lowered by 5 percentage points. This is due to the fact that female students at Norrtälje have referred more men than the women at the main campus; a woman at Norrtälje has a 23 percentage point higher likelihood of referring a man, whereas it does not differ much between men at the two campuses. Male students at Norrtälje refer slightly more men as well, but it only differs by a few percentage points. Thus, the same gender bias is stronger for women at the main campus and weaker at the female dominated Norrtälje campus, and the same gender bias is slightly stronger for males at the Norrtälje campus.

Another interesting finding is that the *Proportion of Men in Class* point estimate changes sign, even though it remains insignificant when included by itself in (3). It also becomes insignificant in regression (5) including all controls as opposed to being negative and significant when not controlling for campus specific effects. This indicates that the previous negative significant estimate was driven by female students at Norrtälje referring more males in female dominated classes. Thus students at Norrtälje, with around two thirds women in all classes seem to react to the contrary of our hypothesis. The findings from Norrtälje would indicate that a higher induced choice homophily make people less same gender biased.

The point estimates for *Proportion of Men in Network* go up slightly, but do not differ much after controlling for Campus specific effects.

4.3.3 Robustness Check – Separating by Job

Considering that the jobs and the type of individuals subjects may have believed were interested in the two different jobs may differ, we perform our regressions for each sample separately. As 50% or 214 subjects received each job advertisement, the number of observations in theses regressions is halved. The results are shown in Appendix A2.1 and A2.2.

Table 9 in Appendix A2.1 shows the regressions for the CCM job form. Here we see that the same variables become significant in the different regressions as when running the regressions for all observations. However the point estimate for *Man* increases, indicating that the same gender bias is stronger for the CCM job than for the Analyst job. The point estimate for *Proportion of Men in Network* decreases indicating that the amount of the same gender bias driven by choice gender homophily is lower for the CCM job, since the impact of the gender composition in one's network is of less importance when referring someone to this job.

Conversely, running the regression only with the subjects that received the Analyst job form (Table 10 in Appendix A2.2) changes the estimates in the opposite direction. It is noteworthy how much the estimate for the *Man* dummy variable decreases when accounting for choice gender homophily through *Proportion of Men in Network*. The dummy variable *Man* becomes insignificant, even at a 10% level, when including *Proportion of Men in Network*. It seems then that when referring someone to the Analyst position it is almost exclusively the gender composition of subjects' networks that matters for their decision. In regression (5) Table 10 including all control variables, it is only the *Proportion of Men in Network* variable that is significant, and very large at 63.6 percentage points. Thus, choice gender homophily drives much more of the same gender bias for the Analyst job than it does for the CCM job.

To explore this finding further, we created a dummy variable for whether the referral was within the listed network of the referrer or not, *Referral within Network*. We then performed a regression with *Referral within Network* as our dependent variable, which is shown in Appendix A3. Here we see that Analyst is positive and significant both with and without including control variables, suggesting that subjects were 13.3 percentage points more likely to refer someone within their network to the Analyst job. This explains at least partly why *Proportion of Men in Network* and choice homophily drove so much more of the same gender bias for the Analyst job, as people to a greater extent referred from within their own network. This is also graphically illustrated and easy to observe by visual inspection in Appendix A6.

4.3.4 Further Robustness Checks

To control for any session setting specific gender effect, considering there were in-classroom settings and out-of-classroom settings, we included a dummy variable for the 39 observations that were collected in the school atrium and in the school choir. All other observations were collected in conjunction with classes in classrooms. We also included an interaction term with our *Man* variable to remove the entire session setting specific effect with regards to same gender bias, choice gender homophily and induced gender homophily. The results are shown in table 11 Appendix A3. When comparing the results to the main results in Table 3, the magnitudes of the point estimates for *Man* do not change in any significant manner when removing an outside-of-classroom specific effect. However, it is worth noting it seems men in an out-of-classroom setting have referred more women than their in-classroom counterparts. This effect loses statistical significance after including all control variables.

To control for any Master's level specific effects with regards to a same gender bias, we ran our regression removing any Master's level specific effect using the same approach as previously. The results are shown in Table 12 Appendix A4. When comparing to the main results in Table 3, the magnitudes of the point estimates for *Man* increase slightly in all regressions. This is consistent with the fact that men at the Master's level seem to have referred more women on average than men at the Bachelors level, and the result is highly statistically significant. Why the estimate of *Man* only goes up slightly is due to the much smaller sample size of the Master's level men, (43 obs. out of 226). Women at the Master's level also show a tendency to have referred more women, but the results are not nearly as significant as for the men at the Master's level.

Lastly, we control for any session specific effects running the regression including dummy variables for all but one of the sessions run. The results are shown in Appendix A5, and they only differ marginally in comparison with results presented in the main results section. In line with men in an out-of-classroom setting referring more women, the largest out-of-class room session (29 observations out of 39) shows evidence of increased female referrals made, but so few observations have a very marginal impact on our overall results.

4.4 Stereotyping

4.4.1 Treatment Effect

As previously stated we set out to find two jobs with clear gender priming to see whether this had an effect in a job referral process. As confirmed by the auxiliary study above, the gender priming seems to have been correct - the CCM job is seen as more feminine and the Analyst job is seen as more masculine.

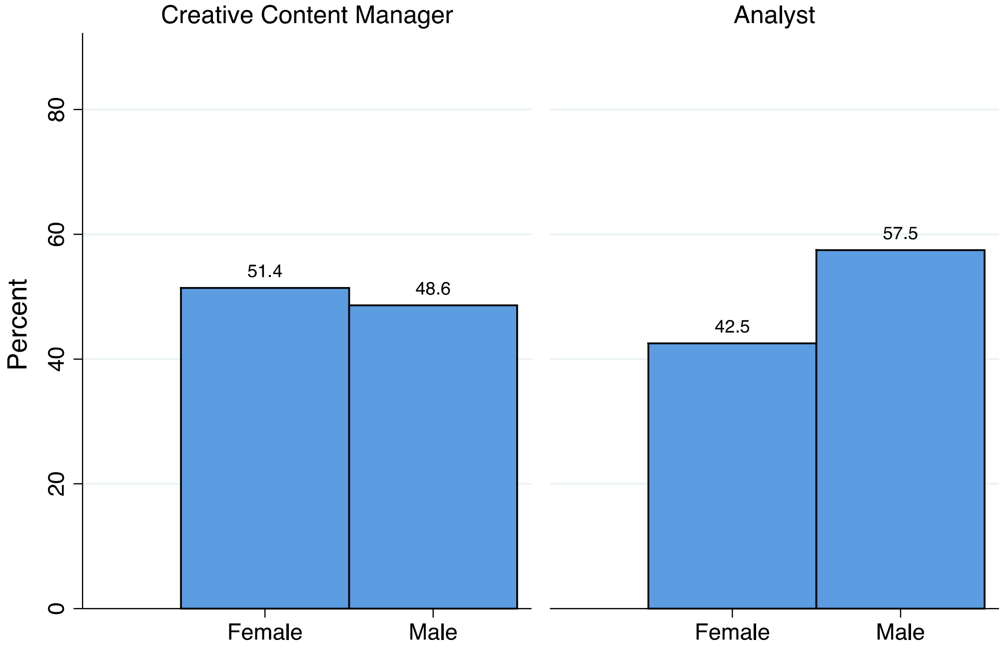
If there is a stereotyping effect more men will have been referred to the Analyst job than to the CCM job. This was also our second hypothesis that subjects in aggregate would vary the gender of the referrals in accordance with the gender priming of the two job advertisements.

We begin by presenting in Figure 3 below the total percentage of male and female referrals made to the two jobs. As can easily be seen, a higher percentage of male referrals have been made by the subjects receiving the Analyst form than those receiving the CCM form, 57.5% versus 48.6% respectively.

This difference is significant at the 10% level using a Mann-Whitney U-test (z=-1.83, p-value=0.066) and also at the 10% level using Pearson chi-square test (Chi2=3.37, p-value=0.066). However, when using a binomial test comparing the outcome percentages to the benchmark gender ratio percentages as calculated by variable *Proportion of Men in Class*, 54% for Analyst and 53% for CCM, the difference is not significant at the 10% level.

One factor that must be considered before drawing any conclusions is the fact that more men received the Analyst job form, even though the total split was 50/50. This is seen in Table 2, viewing the dummy variable Analyst when split between men and women, 52.3% men received the Analyst form and 47.6% of women. As we saw in the previous section that there exists a strong same gender bias, this means part of the observed difference is driven by the fact that more men received the Analyst form, and not by the treatment effect. However, when we later run regressions and remove the effect of same gender bias, this is controlled for.

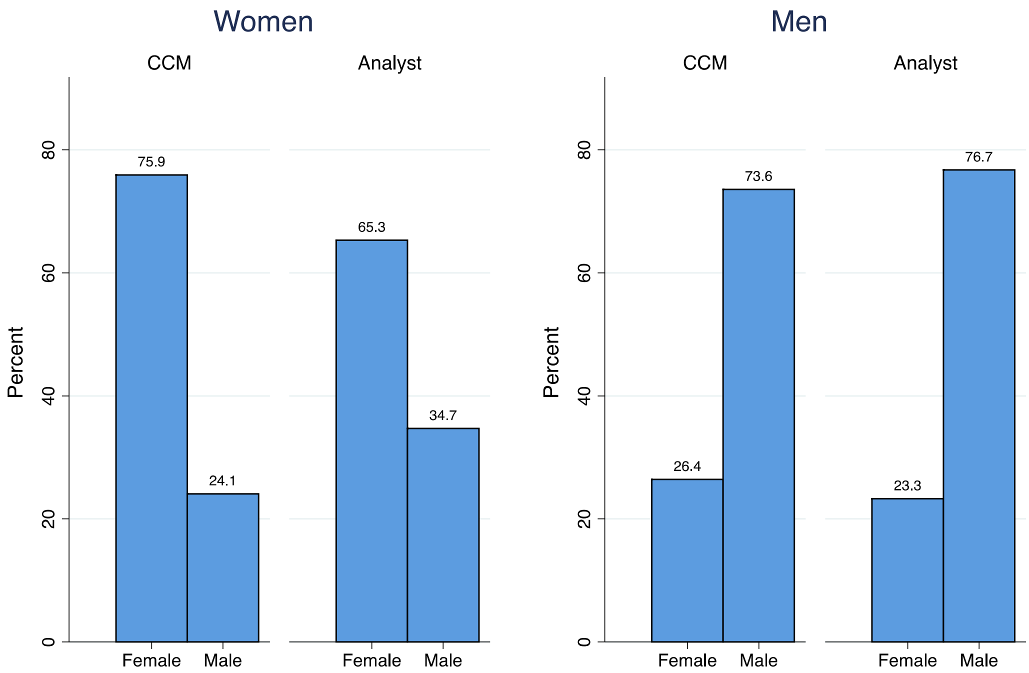
Figure 3 – Gender of Referrals by Treatment (Job)



The above graph is based on data collected by us, the authors, for this experiment and is our own work. The graph was created using Stata/MP 13.1.

Separating the sample by men and women as well as by job gives a different picture with regard to the magnitude of the treatment effect for the two genders. As can be seen in Figure 4 the difference in the percentage of male referrals by women for the two jobs is 10.6 percentage points, whereas the difference for men is 3.1 percentage points. The difference for women is significant at a 10% level using a Mann Whitney U-Test (z=-1.67, p-value=0.095) and Chi-square (chi2=2.81, p-value 0.094). For men it is not significant. This would suggest that women have reacted more to the treatment than men. The tendency is in the expected direction but the difference is not statistically significant.

Figure 4 - Gender of Referrals by Gender of Referrer and Treatment



The above graph is based on data collected by us, the authors, for this experiment and is our own work. The graph was created using Stata/MP 13.1.

To further test our results including control variables and interaction variables, we run the following regressions using a linear probability model with ordinary least squares:

$$Referred\ Gender = \beta_0 + \beta_1 Analyst + \varepsilon \tag{6}$$

$$Referred\ Gender = \beta_0 + \beta_1 Analyst + \beta_2 Man + \varepsilon \tag{7}$$

$$Referred\ Gender = \beta_0 + \beta_1 Analyst + \beta_2 Man + \beta_3 Analyst * Man + \varepsilon \tag{8}$$

$$Referred\ Gender = \beta_0 + \beta_1 Analyst + \beta_2 Man + \beta_3 Analyst * Man + \beta_4 GPA + \varepsilon \tag{9}$$

$$Referred\ Gender = \beta_0 + \beta_1 Analyst + \beta_2 Man + \beta_3 Analyst * Man + \beta_4 GPA + \beta_5 Prop.Men\ Network + \beta_6 Prop.Men\ Class + \beta_7 School\ Year + \beta_8 Age + \varepsilon \tag{10}$$

The results are shown in Table 4. When the job dummy variable *Analyst* is included by itself it is positive and significant at the 10% level, which is in line with our earlier presented statistical results of the treatment effect. However in regression (7) when the same gender bias is accounted for through the inclusion of *Man,* the point estimate for *Analyst* goes down slightly and becomes insignificant. Since the point estimate goes down by about 2 percentage points, about 25% of the observed treatment effect was in fact driven by 52.3% of male subjects receiving the Analyst form the analyst form and only 47.6% of female subjects.

When the interaction variable *Analyst * Man* is included to separate the treatment effect for men and women in regression (8), the estimate for women's treatment effect becomes significant at the 10% level. It is measured at 10.6 percentage points which is the same as we estimated the treatment effect to be for women earlier comparing the numbers in Figure 4. The treatment effect for men is the *Analyst* estimate plus the interaction *Analyst * Man* estimate, equal to 3.1 percentage points in (8), which is also the same difference as derived earlier from Figure 4. In line with our earlier results, the treatment effect is only significant for women at the 10% level and not significant for men, as shown by the joint F-tests in the bottom of the table. When all control variables are included, the treatment effect loses its significance at the 10% level in regression (10) for women as well.

Table 4 – Treatment Effect on Gender of Job Referrals

VARIABLES	(6)	(7)	(8)	(9)	(10)
Analyst	0.0888*	0.0674	0.106*	0.110*	0.0890
	(0.0482)	(0.0430)	(0.0636)	(0.0642)	(0.0647)
Man		0.458***	0.495***	0.483***	0.231***
		(0.0431)	(0.0597)	(0.0624)	(0.0831)
Analyst * Man			-0.0748	-0.0777	-0.0477
			(0.0863)	(0.0876)	(0.0846)
GPA				0.0893*	0.0561
				(0.0516)	(0.0497)
Prop. Men in Network					0.467***
					(0.0920)
Prop. Men in Class					-0.398**
					(0.175)
School Year					-0.0689***
					(0.0223)
Age					-0.0103
					(0.0110)
Constant	0.486***	0.259***	0.241***	-0.0932	0.525*
	(0.0342)	(0.0363)	(0.0413)	(0.192)	(0.318)
Observations	428	428	428	416	405
R-squared	0.008	0.218	0.219	0.224	0.312
F-test *Analyst* and *Analyst * Man*			1.540	1.615	1.256
Prob > F			0.216	0.200	0.286

Note: Dependent variable in regressions (6)-(10) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

4.4.2 Robustness Check – Separating by Campus

As previously stated, it may be the case that there are campus specific differences. We therefore run all the regressions including a dummy variable equal to 1 for students going to the Norrtälje

Campus. We also include the interaction variable *Norrtälje * Analyst*, since both the dummy and the interaction variable are needed to be able to capture a campus specific treatment effect if there is one.

As seen in Table 5, this significantly changes our results, and it suggests that there exists a campus specific treatment effect. The treatment effect becomes significant for both men and women at both campuses in all of the regression at either the 1% level or the 5% level. However, the point estimates have different signs; at the main campus the treatment effects is in the expected direction with more men being referred to the Analyst job, whereas the effect goes in the opposite direction at the Norrtälje campus with more women being referred to the Analyst position.

At the main campus, it can be seen from regression (8a) row 1 that receiving the Analyst form increases the likelihood of women referring a man by 17.4 percentage points, significant at the 1% level. For men the estimate is the sum of the *Analyst* and the interaction variable *Analyst * Man* which is 5.9 percentage points, significant at the 5% level as shown by the joint F-test with a P-value of 0.021. The treatment effect is significant for women at the main campus at 1% significance in all regressions, and the effect is significant at the 5% level all regression for men at the main campus.

It can be seen from regression (6a) that there seems to be a Norrtälje specific treatment for both jobs. The variable *Norrtälje* is significant and positive, accounting for the *Norrtälje* specific treatment effect of the CCM job. The variable *Norrtälje* together with the interaction term *Norrtälje * Analyst,* account for the Norrtälje specific effect of the Analyst job, which is also significant at the 1% or 5% level in all regression as shown by the F-test of the variables at the bottom.

Table 5 – Seperating Treatment Effect on Gender of Job Referrals by Campus

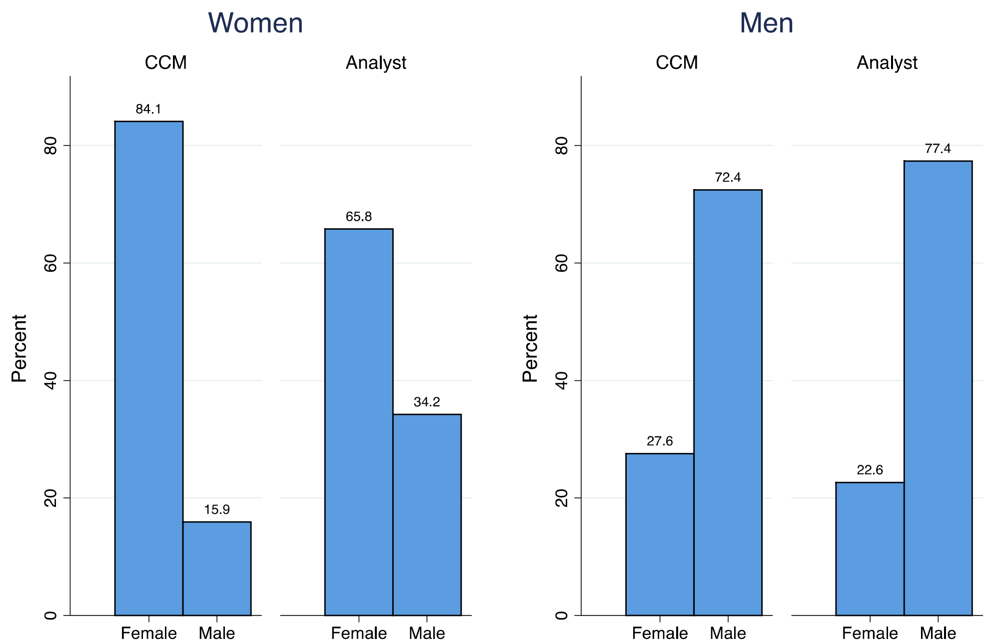
VARIABLES	(6a)	(7a)	(8a)	(9a)	(10a)
Analyst	0.136***	0.110**	0.174***	0.190***	0.175***
	(0.0518)	(0.0453)	(0.0651)	(0.0650)	(0.0666)
Man		0.477***	0.534***	0.532***	0.249***
		(0.0428)	(0.0569)	(0.0581)	(0.0825)
Analyst * Man			-0.115	-0.129	-0.100
			(0.0856)	(0.0856)	(0.0838)
GPA				0.0844	0.0588
				(0.0517)	(0.0499)
Prop. Men in Network					0.486***
					(0.0944)
Prop. Men in Class					-0.217
					(0.232)
School Year					-0.0592**
					(0.0233)
Age					-0.00867
					(0.0106)
Norrtälje	0.222**	0.337***	0.350***	0.394***	0.342***
	(0.0960)	(0.0920)	(0.0927)	(0.0847)	(0.109)
Norrtälje * Analyst	-0.346**	-0.333**	-0.362***	-0.416***	-0.426***
	(0.136)	(0.130)	(0.131)	(0.126)	(0.131)
Constant	0.457***	0.206***	0.176***	-0.151	0.294
	(0.0367)	(0.0356)	(0.0385)	(0.191)	(0.320)
Observations	428	428	428	416	405
R-squared	0.023	0.243	0.246	0.258	0.337
F-test *Analyst* and *Analyst * Man*			3.898	4.621	4.205
Prob > F			0.0210**	0.0104**	0.0156**
F-test *Norrtälje* and *Norrtälje * Analyst*	3.511	6.685	7.145	10.84	6.666
Prob > F	0.0307**	0.00139***	0.000888***	2.58e-05***	0.00142***

Note: Dependent variable in regressions (6a)-(10a) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

To explore further whether one or both genders at Norrtälje are driving the divergent treatment effect, we separate further by gender. In Appendix B1.1 and B1.2 we run the same regressions as in Table 5 but separately for the subjects of the two campuses. As can be seen in Table 18 the point estimates for the students of the main campus remain exactly the same, but with slightly higher standard errors. This due to the fact that not all 428 observations were included and instead only 368 driving up the standard errors. Thus using the dummy variable and interaction approach to account for the Norrtälje school specific effect is more efficient, although more difficult to interpret. The effect of higher standard error with fewer observations can really be seen in Table 19 Appendix B1.2 running the regression only with the 60 Norrtälje subjects. Even though the point estimates are actually larger for the Norrtälje sample than for the main campus, (albeit with the opposite signs), few become statistically significant.

By visual inspection one can observe the differences between the campuses which provides an intuitive understanding of the results. The figures below are the same as the histogram divided by job and gender earlier in Figure 4, only now split also by campus. Figure 5 shows the results for the main campus and Figure 6 shows the results for the Norrtälje campus.

Figure 5 - Gender of Referrals by Gender of Referrer and Treatment (Main Campus)



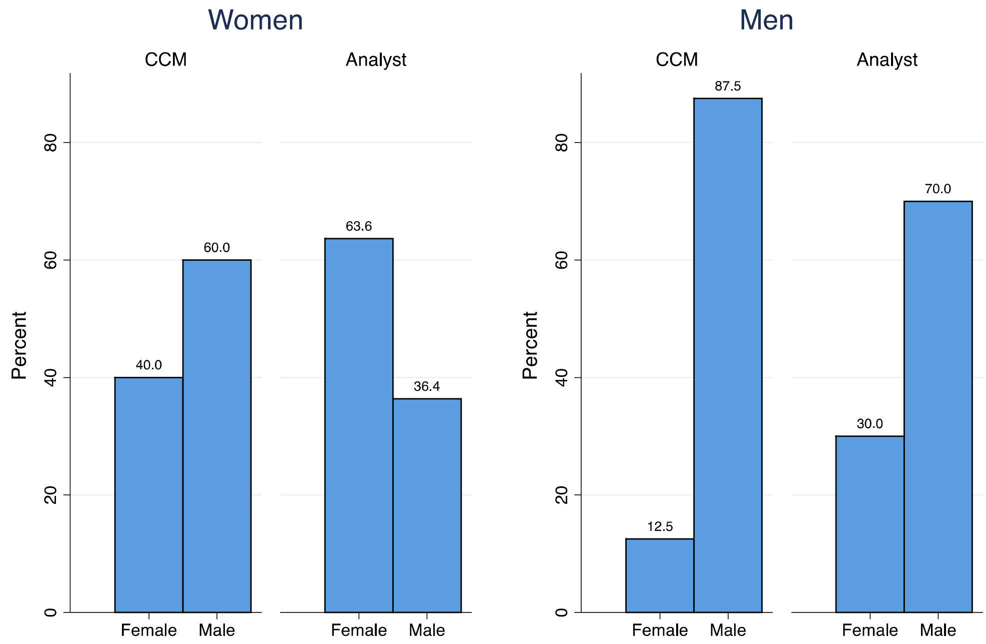
The above graph is based on data collected by us, the authors, for this experiment and is our own work. The graph was created using Stata/MP 13.1.

As observed in regression (6a) accounting for campus specific effects, we can see that the treatment effect is about 20 percentage points for women and 5 percentage points for men, 15.9 versus 34.2 and 72.4 versus 77.4 respectively.

It is significant for women at the 1% level testing with Mann-Whitney U-test (z=-2.713, p-value=0.0067) and Pearsons chi-square (chi2==7.407, p-value=0.006). For men the effect is not significant at the 10% level. This is consistent with the difference being 5 percentage points for men and almost 20 percentage points for women.

For the Norrtälje campus, we see that the treatment effect is -23.3 (= 36.4 – 60.0) percentage points for women and -18.3 (= 65.8 – 84.1) percentage points for men. Thus the reverse treatment effect seems to have been the trend for both of the genders at Norrtälje. Though the magnitude of the treatment effect is large, neither a chi-square test nor a Mann-Whitney U-test supports a significant difference at the 10% level. This is most likely due to the sample size being only 60 subjects, with 42 women and 18 men.

Figure 6 - Gender of Referrals by Gender of Referrer and Treatment (Norrtälje Campus)



The above graph is based on data collected by us, the authors, for this experiment and is our own work. The graph was created using Stata/MP 13.1.

4.4.3 Further Robustness Checks

We now proceed to run the same further robustness checks that were run in in section 4.3.4. To control for any session setting specific treatment effect, we included the same *Classroom* variable interacted with our treatment variable *Analyst.* The results are shown in Table 20 in Appendix B2. The point estimates of *Analyst* change only very marginally from those in Table 4, thus it seems that an inside or outside of classroom setting has not significantly driven our results with regard treatment effect. In the prior finding of inside versus outside classroom effects more women have been referred to both positions by out-of-class subjects. The treatment effect is however for this group in the expected direction as opposed to the Norrtälje cohort showing tendencies of the reverse effect.

To control for any Master's level specific effects with regards to our treatment, we similarly include a dummy variable for students studying at the Master's level. We also include the interaction term with our *Man* variable to remove the entire effect. As seen in Table 21 in

Appendix B3, removing the Master's level specific effect causes the point estimates for *Analyst to* go down in comparison with not removing any degree level specific effects in Table 4. It seems there is a stronger treatment effect in the Master's level compared to the Bachelors level, however this is not surprising when you consider the gender composition of the Master's level sample: 57% women and 42% men (99 observations). Women reacted more strongly to the treatment and with the sample consisting of more women the effect is greater for this group. Furthermore the Master's level sample is all at the Main Campus which according to our previous analysis seems to have had a much stronger treatment effect in the expected direction, which is also consistent with the treatment effect being greater for Master's level students.

We proceed also to control for any session specific effects. Session 1 is the Atrium session where people or groups of people who were sitting at the tables in the schools Atrium were asked to partake in the study, the only session, apart from the choir session 7, which was an out of classroom setting. The point estimates for *Analyst* do not significantly change from when not removing any treatment specific effects in Table 4. However in session 1 there seems to be an more female referrals. It is a very small sample size of 29 observations, and thus not driving of our results in any way. The composition consists of a majority of men with 17 men and 12 women. The effect diminishes considerably and loses statistical significance when including control variables, which in combination with a small sample size makes it less meaningful to attempt to draw any conclusions from this result.

4.5 Additional Results

Considering the result of Beaman et al. (2013) that men gave better referrals than women when incentivized we want to check whether we see the same tendency in our data. This is also warranted by that the GPA of the referred people is higher than that of the referrers. When running a two-sample independent t-test of the difference in means, the difference is significant at the 1% level, (t=–2.71, p-value=0.0069). It is important for the implications for our results to determine the driving factors of the quality increase among the referred, especially with regard to the impact of gender.

4.5.1 Quality Analysis – Pooled

We run the regressions:

$$Referred\ Student\ GPA = \beta_0 + \beta_1 ManReferred + \varepsilon \tag{18}$$

$$Referred\ Student\ GPA = \beta_0 + \beta_1 Man + \varepsilon \tag{19}$$

$$Referred\ Student\ GPA = \beta_0 + \beta_1 Analyst + \varepsilon \tag{20}$$

$$Referred\ Student\ GPA = \beta_0 + \beta_1 GPA + \varepsilon \tag{21}$$

$$Referred\ Student\ GPA = \beta_0 + \beta_1 SchoolYear + \varepsilon \tag{22}$$

$$Referred\ Student\ GPA = \beta_0 + \beta_1 Age + \varepsilon \tag{23}$$

$$Referred\ Student\ GPA = \beta_0 + \beta_1 ManReferred + \beta_2 Man + \beta_3 Analyst + \beta_4 GPA + \beta_5 SchoolYear + \beta_6 Age + \varepsilon \tag{24}$$

In Table 6 regression (18), we see that *Man Referred* has a significant positive estimate. Referred men generally had higher grades than referred women, consistent with the GPA of male referrers being higher.

However in regression (19) the estimate of the *Man* dummy is both small and insignificant, suggesting that the gender of the referrer does not impact the GPA of the referral. This means that neither men nor women seem to have systematically referred better or worse candidates, if GPA is used as a proxy for ability.

All other variables are significant. Subjects referred students with better grades to the Analyst job than to the CCM job. There is also a positive correlation with the GPA of the referrer and the referral, which is consistent with earlier research suggesting high ability people refer other high ability people.

School Year is negatively correlated, suggesting that students in higher grades referred students with lower GPAs. This potentially suggests subjects value other more personal characteristics and take these into account more when they are older and know people better. However, some of the effect, or maybe all of it, could be due to the fact that it used to be harder to get good grades at the SSE Bachelor before a grade reform in 2010/2011, giving older students lower Bachelor GPAs in general. If older students then refer each other, it is natural that *School Year* becomes negative and significant.

Table 6 – Quality Analysis of Referrals Made

VARIABLES	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Man Referred	0.168***						0.135**
	(0.0496)						(0.0593)
Man		0.0624					-0.0314
		(0.0500)					(0.0587)
Analyst			0.147***				0.135***
			(0.0498)				(0.0478)
GPA				0.144**			0.0884
				(0.0571)			(0.0560)
School Year					-0.0934***		-0.115***
					(0.0198)		(0.0215)
Age						-0.00816	0.0325***
						(0.0123)	(0.0113)
Constant	3.817***	3.872***	3.832***	3.354***	4.115***	4.088***	2.974***
	(0.0386)	(0.0373)	(0.0327)	(0.222)	(0.0491)	(0.278)	(0.329)
Observations	287	287	287	280	286	287	279
R-squared	0.039	0.005	0.030	0.020	0.070	0.002	0.150

Note: Dependent variable in regressions (18)-(24) is *Referred Student GPA*. The coefficients are from a Linear Regression Model. Robust standard errors using Huber-White sandwich estimators are reported in parentheses. *** indicates $p<0.01$, ** indicates $p<0.05$, and * indicates $p<0.1$.

4.5.2 Quality Analysis – Separated by Referral Gender

To examine in greater depth if gender has an impact on the referred candidate's GPA, we run the regression (19) for the referred women and referred men on our gender dummy separately. This would show if men or women refer better women or better men and if there is a trend for only one of the sexes that disappears when running the regression jointly. As can be seen in the Table 7 below, the dummy variable *Man* is insignificant running the regression for males and females separately. The point estimates actually suggest men refer better women and refer worse men in our study. Were this result significant it would be the contrary to the results of Beaman et al. (2013) that suggest men refer better men and worse women.

Table 7 - Quality Analysis of Referrals Made Seperated by Gender

VARIABLES	(19) All	(19a) Referred Women	(19b) Referred Men
Man	0.0624	0.0329	-0.0720
	(0.0500)	(0.0945)	(0.0749)
Constant	3.872***	3.809***	4.037***
	(0.0373)	(0.0436)	(0.0664)
Observations	287	140	147
R-squared	0.005	0.001	0.007

Note: Dependent variable in regressions (19)-(19b) is *Referred Student GPA*. The coefficients are from a Linear Regression Model. Robust standard errors using Huber-White sandwich estimators are reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

5. Discussion

We begin by restating our first research question – Is there a same gender bias in referral based hiring? Our results strongly suggest that there is. We can firmly reject the null hypothesis of there not existing a same gender bias in our sample using several different statistical methods. The magnitude of this bias does not seem to differ much between women and men. Women in our sample under-refer men by 20.4 percentage points compared to a weighted average of the proportion of men in their class and men over-refer men by 18.1 percentage points.

As our research question aimed to investigate the mechanisms driving this bias, we gathered information regarding the gender composition of subjects' personal networks, in an attempt to proxy subjects' choice gender homophily. We found strong evidence suggesting there exists choice gender homophily among both men and women in our sample, meaning both genders have a disproportionately large amount of their own gender represented in their personal network. The magnitude was large but again approximately equal for men and women. Women had 25.2 percentage points less men in their networks than the proportion of men in their class, whereas men had 24.1 percentage points more men than the proportion of their class. We thus strongly reject the null hypothesis of there not existing choice gender homophily confirming our hypothesis 1b.

Having established the existence of choice gender homophily, we proceed to test hypothesis 1bi by attempting to measure to what extent choice homophily is the driver of the same gender bias. In regression (2) Table 3, we see that the point estimate of the same gender bias for men, captured by the *Man* variable, is halved when accounting for the proportion of men in their network. We can thus say that for men, choice gender homophily drives roughly half of the same gender bias. In the same regression the constant, capturing women's same gender bias, drops by 10 percentage points from .30 to .20, and we can then thus say choice gender homophily accounts for roughly one third of the same gender bias of the women in our sample.

Proceeding to our third sub-hypothesis, we attempt to investigate to what extent induced gender homophily drives the same gender bias. Here we used the proportion of men in class as a measurement of this mechanism, and as opposed to choice gender homophily we knew from the start there was a variation in the gender ratios of the classes at the business school. Hence we do not test for its existence. Continuing directly to the measurement of how much it drives the bias, we do not find any conclusive evidence in support of our hypothesis. When the measurement variable is included by itself in regression (3) it is not significant and does not change the measurement of same gender bias notably. It does become significant in regression (5) including all control variables. However, when controlling for the school year as well in this regression this depletes the already scarce variation in the variable *Proportion of Men in Class*. This makes us reluctant to draw conclusions for this significant estimate, and if anything the negative point estimate suggests the opposite of our hypothesis.

As we collected data at both of the school's campuses that differ significantly in many ways from each other (as previously discussed), we perform a robustness check controlling for any campus specific same gender bias. The findings from this analysis do not change our results nor conclusions in any significant manner. Students at both campuses in our sample show evidence of a considerable same gender bias. However, at the Norrtälje campus more men were generally referred by both genders yet the estimates for choice gender homophily do not change much.

Nevertheless, the point estimate of induced homophily changes sign and also loses significance in regression (5) of Table 8 of Appendix A1 in which it earlier was negative and significant. This suggests that the Norrtälje campus drove the negative estimate of *Proportion Men in Class* as both genders referred men to a greater extent at the same time as being a much more female dominated school. Potential explanations could be that men become more same gender biased in situations where they are in minority or that the men present are more noticed by the women as they get more attention in female dominant settings and become more referred by the women. This effect could also be compounded by having smaller class sizes at the Norrtälje campus. In any case, we cannot draw definitive conclusions based on these results to what extent induced homophily drives a same gender bias for our sample, and cannot reject the null hypothesis of induced gender homophily not driving same gender bias.

However, as noted in our results section, there is a positive correlation between our measurement of proportion of men in class and in personal network (0.3). One explanation could be therefore be that induced homophily may drive a same gender bias through choice gender homophily to some extent. As our measurement of induced homophily also contains little variation this increases the likelihood of type II error where it does have an effect in reality but our data and model are unable to capture it.

As the people that subjects may believe are interested in the two different jobs may differ, we perform a second robustness check by separating the sample and running our regressions separately on the two sub-samples receiving the different job advertisement. Here we find that there is a strong same gender bias for both of the jobs, however choice gender homophily drives to a much greater extent the same gender bias for the Analyst job accounting for the vast majority of it. Choice gender bias only accounts for less than half of the same gender bias of the Creative Content Manager sub-sample.

To investigate this difference further we performed a network analysis that showed subjects to a much greater extent referred student from within their personal listed network when referring to the Analyst job. This explains at least part of the reason why choice gender homophily was a much greater determining factor for the Analyst job than for the Creative Content Manager job. Since people are choosing from within their personal network for this job, the gender composition of the network becomes more important. Thus when referring to jobs more unrelated to what you believe your network can or wants to do, same gender bias becomes stronger. One potential explanation could be that when one knows less about the person one is referring, one tends to compensate by choosing the more familiar gender.

One peculiar finding that arose from the inclusion of our control variables was that *School Year* was negative and significant in most of our regressions. One possible factor driving this is that the jobs are both a better fit for people studying the Marketing and Management programs at the Masters level, where there are more women enrolled. At the Bachelors level more students will be interested in a broader range of part-time jobs whereas the Masters level students are more specialized and likely to be pickier. Thus students at the Masters level probably refer more people with a relevant specialization, and as there are more women in the relevant specializations of Management and Marketing, this may explain the negative S*chool Year* estimate.

Our second research question was: Does gender stereotyping take place with regard to job related tasks and characteristics when making referrals? To be able to answer this question we set out to find two gender primed jobs. After having selected two jobs that were in line with prior research, we performed an auxiliary study to establish whether the jobs actually were gender primed in the intended manner, which the study confirmed was the case at a 5% significance level.

At first glance on an aggregate level there seemed to have been an effect of the treatment with more men being referred to the Analyst job than men being referred to the Creative Content Manager job. The difference was significant at the 10% level. However part of this effect is likely to have been driven by the fact that more men received the Analyst advert, and thus a same gender bias will have given more male referrals to the Analyst job.

When separating the sample by men and women we see that the treatment effect was much greater for women than for men. The difference in the referral rates between the two jobs is significant at the 10% level for women but not for men.

When we ran regressions, this enabled us to account for the difference in the amount of men and women receiving the two different job adverts and also separate the treatment effect by men and women. This also showed that women had reacted more strongly toward the treatment and the treatment effect was significant at the 10% level. However when all control variables were included it was not statistically significant.

We then performed a robustness check accounting for a possible campus specific treatment effect. This considerably changed the results, as the treatment effect seemed to have been the opposite at the two campuses. At the main campus the treatment effects became significant for women at the 1% level, with a magnitude of approximately 20 percentage points and for men about 5 percentage points significant at the 5 % level. Visual inspection of the graphed results, but also the separate regression results in appendix B1.1 and B1.2, indicated that both men and women at the Norrtälje campus reacted in the opposite direction referring more men to the Creative Content Manager job and more women to the Analyst job.

One possible explanation for this could be that the kind of men and women applying to Norrtälje is significantly different from those applying to the main campus. The admission requirements are lower with lower prerequisites in mathematics, and the curriculum is also different with fewer quantitatively focused courses. A potential explanation could be that the males at Norrtälje applying to a female dominated degree program, thus consciously going against the norm, have already significantly branded themselves as creatives rather than having strong analytical ability. The reversed GPA trend of men having lower GPAs in Norrtälje than women as opposed to higher GPAs at the main campus could possibly support this theory. This could then possibly have caused the reverse treatment effect.

We performed an additional analysis of the subjects GPAs, as the quality of referrals is important for the implications of the study. Our results do not find any difference in the quality of referrals made by male and female subjects, which is in stark contrast to the earlier experimental study by Beaman et al. (2013) who found men giving higher quality referrals than women when incentivized. A possible explanation of our differing results is that the latter authors' study was conducted in a developing country where gender differences in general with regards to education is much greater than in Sweden.

Our results also show that subjects referred higher GPA candidates to the Analyst job than to the Creative Content Manager job. This could be driven by subjects viewing the Analyst job as more demanding with regard to skills learnt in the courses offered at the business school. This would be in contrast to the other job in which subjects may believe high performance in courses offered at the school might have less relevance and therefore might select over other attributes such as selecting a person that they perceive as more creative in general instead. This is also in line with the fact that the gender with the better GPA at both campuses was referred to a greater extent to the Analyst job, men at the main campus and women at Norrtälje.

In other aspects our results are in line with the theoretical prediction of Montgomery (1991) that is rational for employers to use referral based hiring as high ability individuals refer other high ability individuals. In regression (22) of Table 6, one can see that there is a positive and significant relationship between the GPA of the referrer and the referral, meaning subjects with higher GPAs refer each other.

A pertinent question to pose is what incentive do subjects have to refer members of the same gender to the extent that they do in the experiment? More to the point, is it rational (in the sense of utility maximization) for subjects to refer members of the same gender to a greater extent than that of the opposite gender?

One finding within the literature on social networks that we argue is relevant to the aforementioned question is the tendency for social bonds to be longer lasting and more resilient when the degree of homophily is higher between individuals (Rivera et al., 2010). For example, and of particular relevance to our sample, are the findings of Mollica et al. (2003) which looked at the friendship network of first year MBA students and observed that homophilous friendships were significantly more likely to persist more than three and a half months than were heterophilous ones. The authors also found that the saliency of a particular social identity that subjects indicated in a questionnaire prior to their first network data collection correlated very highly with the degree of homophily of the ties subjects formed.

If one then sees the act of referring another person for either position in our experiment as a gesture that can be reciprocated within a later interaction, subjects would thereby have a strong incentive to pick a person that they believed would remain socially connected to them longer. It is of interest therefore to note that SSE has been ranked as the least diverse higher education institution in Sweden by Urank (2014) as measured primarily by the proportion of students who are first generation immigrants or have an international background. Consequently, we argue that gender therefore could be the most salient attribute by which subjects within this particular social context would ascribe to others and themselves social identities that then form the foremost basis of the degree of homophily between students.[14]

With regards to the implications of our results, our experiment suggests that if a company uses referral based hiring the gender composition of the referrals the company will receive will most likely reflect the already existing gender ratio of the company. This can be inferred as our results show that the referrals closely reflect the gender distribution of the underlying sample population, since the same gender bias is of similar magnitude for both genders.

Our results therefore suggest that a company that wishes to increase its number of female hires for example, should ask their female employees to give the referrals. Our quality analysis suggests this would not have a negative impact on the quality of referrals. However, a setback in this is that women working in male dominated firms or industries most likely have more males in their network than women who do not, reducing their likelihood of referring another woman. This makes it harder for companies in male dominated industries to solve their gender equality problems in this way. Nonetheless our results indicate that the chances of getting a female referral from a female employee are still much greater than from a man within the same company, even in a male dominated industry or firm.

Firms should also consider if the tasks of the position prime for a particular gender, as this may cause a certain effect of stereotyping referrals by gender, especially amongst women. Our results also indicate that same gender bias is likely to be greater for referrals when the position requires competencies very different from those of the referring employee and their close personal network - this given that they may have a lower likelihood of wanting or being suited for the job. As same gender bias and stereotyping are less prevalent when choosing from within one's close network, organizations may be better off asking referrals from employees with the skillset they need for their new hire.

Concerning the validity of our study and results, we believe that our between subject design positively impacts the validity of the study in comparison to a within subject design. With our between subject design, we argue that our subjects had a very small to discern to true purpose of the experiment, namely examining gender dynamics. Furthermore no mention was made concerning gender in neither instructions nor the questionnaire.

As always when using a student population within the context of an experiment the question of external validity is highly relevant. Our student sample could be argued not to be a good representation of the Swedish population as a whole, not only due to age difference, but also the fact that SSE is considered one of the most elite institutions of higher education in Scandinavia. However, due to 3 out 10 board members of Swedish listed companies being SSE graduates (Allbright, 2013), it becomes potentially a very relevant sample population for drawing conclusions of how the top people in Swedish business behave. The question of biases in hiring decisions and how to achieve more gender equal distributions is often a question focused on the

[14] It should be noted however that the design of the experiment in which the participants were guaranteed anonymity could lessen this particular motivation as those who were referred could not know with certainty who referred them (unless experimental session rules were violated), only whether or not they had been referred at all.

top positions and boards of larger listed companies. Thus an experiment on this student population sheds light on possible solutions and complications for this discussion probably better than any other student population in Sweden would.

Furthermore, given that both jobs are intended as part-time work for students, our student sample is highly appropriate. As discussed in the methodology section in relation to the experiment being a framed field experiment, students are in our case a more relevant sample population than a purely random sample from the Swedish population as a whole. Furthermore, despite the fact subjects knew they were partaking in a study for a Master's thesis and done in a classroom environment, we still argue that the stakes and tasks of our experiment brings it as close to a field study as possible.

One limitation of the study lies in the *Proportion of Men in Network* variable used to proxy for choice gender homophily (as discussed in more detail in section 3.1.6). Networks are complex, and do not necessarily consist of a maximum of 5 people. We chose the number 5 as we wanted a large enough number to give a possible variety in gender, but small enough that people still chose to fill in the question. Asking for 10 people and also the ranking of how well subjects knew each person would (if filled out) have potentially given a more nuanced and accurate insight into the exact structure of subjects' social networks. However it is likely to have caused a higher dropout rate from filling in the form. Our variable therefore could rightly be argued to not capture the degree of how well the subject knows each person. Still, we believe that the variable can act as a good proxy for how the subjects' social networks are structured with regard to gender and as a proxy for choice gender homophily.

Concerning the external validity of our study, we argue that the fact that two real jobs were used for our treatment increases the external validity. Part-time jobs were chosen for practical reasons to make the jobs relevant for a larger proportion of the student population than full time jobs would have been, that would almost exclusively targeted students in their final year. The fact that they are part-time jobs decreases our external validity if one argues that most referral based recruitment processes are for full-time positions.

Furthermore, the result of the Norrtälje campus makes it difficult to extrapolate the treatment effect as a wider trend in the Swedish population of business people. However the auxiliary study as it was coherent with the main campus and intended gender priming this increases the possibility of extrapolation of the results. Moreover, the Norrtälje sample only consists of 60 student as opposed to 368 at the main campus and 93 in the auxiliary study.

An additional concern regarding external validity is that the setting could be argued to be slightly distinct from natural field behavior in the sense that subjects had no reputational concerns to affect their decision as they otherwise would have had they been making a referral for a position at an organization they were employed at. If the hire made from the referrer's referral turned out to be a low-performing individual, it would usually in the field reflect badly on subject. Consequently, this would make referrers reluctant to give a bad referral, whereas in our study the referrer is anonymous and thereby is not exposed to any risk.

Nevertheless, the fact that we had a substantial finder's fee should have counteracted at least part of this effect, making the referral matter to the subjects participating by raising the stakes. The finder's fees should also have partly offset the effect of referring solely close members of one's social network. Yet, even with the finder's fees subjects are unlikely to solely refer the "best" candidate, but the persons they think is most likely to get hired if they apply, meaning they refer the best candidate among the people they know that they think would apply for the job. As is shown by the network analysis in Appendix A6, probably subjects did not think that most of their closer friends were interested in or suited for the Creative Content Manager job and referred more steps away from their close social network.

A potential strength of the experiment in terms of its external validity is the fact that the job advertisements were for real jobs and that people in the end would actually get hired. This increases the external validity of our findings significantly in comparison to using advertisements for hypothetical jobs. It was moreover a relatively attractive private employer which strengthens both internal and external validity with regard to the stakes involved for both subjects and their peers.

We would also like to make one further note about using subject's GPA as a quality measure. It is an open question to us to what extent it can be used as a proxy for ability with regard to the hiring decision of different companies including the one cooperating with us in this study. It would have been better if the company could have rated all the referrers' and referrals' CVs and that we could use this instead as a quality measure, but practically this is very difficult, since not all subjects will apply and also time consuming for the company. We were furthermore not granted access to the real GPA figures of the students, and considering this, we believe the self-reported GPA was the best option available to us.

For future research, it would be interesting to conduct the experiment with even stronger gender priming in the job related tasks and characteristics. For example, one possibility would be to have one job as an assistant to a Chief Financial Officer and the other job as an assistant to the Human Resources Manager. Possibly, the magnitude of the treatment effect would be stronger, and would have gone in the same direction for the Norrtälje sample as well. It would also be interesting to test the experiment on full-time jobs, and further in some way incorporate a reputational stake for the referrer to bring the experiment closer to the field.

Furthermore as the study focuses on white collar jobs and a student population predominantly aiming to work in a white collar sector, thus it would be interesting to perform the experiment using blue collar jobs, possibly with even higher levels gender segregation such as car mechanics and nursing.

Further research as a follow up to our own study is also possible. For instance, as mentioned in the previous section concerning whether the company we cooperated with could rank the applications they received, and also just following up on which candidates actually applied to the positions in the end. For example many students, namely 47, were referred to both of the jobs. One would therefore have a natural framework for a further experiment to see whether there is a gender difference in which job these 47 students applied to. However the sample is likely to be too small as not all of them will have applied.

Other follow-up studies that are possible with our data set is doing a further network analysis, mapping referrals to be either in your own network, your own networks' network, and so on. This gives more depth than our binary dummy of within or outside of just your own network and there may be interesting results which might even be different depending on the gender of the subjects.

Another interesting version of the study is having the same job but described in different ways as to priming for gender. Furthermore an experiment with the same job but in two different sectors, one male dominated and one female donated would also be interesting. However, as found in the conducting of this study, these experiments often hinge on actually getting companies to cooperate and enable this kind of research to be done.

6. Conclusion

We conducted a field experiment to study same gender bias and gender stereotyping in job referrals at a business school in Sweden. Subjects were given one of two job advertisements and were instructed to refer another student at the business school to the position. We find strong support for a same gender bias in referrals for both men and women, with the effect partly being driven by choice gender homophily, but we find no conclusive evidence of whether the effect is driven by induced gender homophily. We also find strong support for gender stereotyping at the main campus of the business school with more female referrals to the feminine job and more male referrals to the masculine job, but not at the school's smaller female dominated campus where our treatment had the reverse effect. The results from an auxiliary study at a different university corroborate the intended gender priming of the job advertisements, suggesting that the school's smaller female dominated campus could be an anomalous finding. Further findings from a quality analysis of the referrals suggest that the gender of the referrer has no impact on the quality of the referral. This provides evidence that organizations can improve gender equality in their workforce through referral based hiring by asking the underrepresented gender to refer candidates without decreasing the quality of applicants.

Given the fact that the business school we conducted the experiment at is very socially homogenous with regard to features such as foreign background and immigration history, we argue that gender is likely to be the most salient factor in terms of defining group belongingness within our sample. The experiment therefore provides further evidence of the tendency of individuals to show in-group favoritism with regard to attributes that define participants' social identity within a particular social context.

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Appendix A – Same Gender Bias, Further Regressions

A1. Robustness check – Campus Specific Gender Bias

To control for a possible campus specific gender effect, we run the same regressions outlined in 4.3.1 Results, but include a dummy variable equal to 1 for students studying at the Norrtälje campus, and the interaction term *Norrtälje * Man*. This separates the results of the gender of the referrals made by male and female students at the main campus from the male and female students in Norrtälje. We can note that this does not change our results much in comparison to Table 3, the trend of a same gender bias seems to be the same across the campuses. However both women and men, but especially women, at Norrtälje, refer men to a higher degree than men and women at the main campus.

Table 8 – Regressions Examining Same Gender Bias, Choice and Induced Gender Homophily with Campus Specific Effects

VARIABLES	(1)	(2)	(3)	(4)	(5)
Man	0.506***	0.247***	0.493***	0.490***	0.223***
	(0.0454)	(0.0764)	(0.0473)	(0.0475)	(0.0773)
Prop. Men in Network		0.466***			0.480***
		(0.0932)			(0.0939)
Prop. Men in Class			0.239		-0.207
			(0.215)		(0.232)
GPA				0.0800	0.0528
				(0.0515)	(0.0500)
School Year					-0.0600**
					(0.0233)
Age					-0.00907
					(0.0109)
Norrtälje	0.232***	0.275***	0.285***	0.226***	0.164
	(0.0844)	(0.0860)	(0.0974)	(0.0850)	(0.105)
Norrtälje * Man	-0.205	-0.183	-0.191	-0.157	-0.140
	(0.133)	(0.141)	(0.134)	(0.129)	(0.139)
Constant	0.244***	0.122***	0.115	-0.0526	0.399
	(0.0337)	(0.0377)	(0.122)	(0.192)	(0.330)
Observations	428	415	428	416	405
R-squared	0.230	0.283	0.233	0.235	0.313
F-test Norrtälje and Norrtälje * Man	3.820	5.413	4.288	3.777	1.280
Prob > F	0.0227**	0.00478***	0.0143**	0.0237**	0.279

Note: Dependent variable in regressions (1)-(5) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

A2. Robustness Check – Separating by Job

A2.1 Creative Content Manager

To control for any specific effects pertaining to each of the jobs and their differences, we run the same regressions as outlined in 4.3.1 but separately for the two sub-samples receiving the different job advertisements. Below are the results of the regressions run using only sample of subjects receiving the Creative Content Manager Job.

Table 9 – Regressions Examining Same Gender Bias, Choice and Induced Gender Homophily For Creative Content Manager Treatment Group

VARIABLES	(1)	(2)	(3)	(4)	(5)
Man	0.495***	0.328***	0.520***	0.478***	0.345***
	(0.0597)	(0.102)	(0.0601)	(0.0642)	(0.0960)
Prop. Men in Network		0.271**			0.310**
		(0.128)			(0.126)
Prop. Men in Class			-0.331		-0.840***
			(0.225)		(0.227)
GPA				0.116	0.0872
				(0.0706)	(0.0674)
School Year					-0.114***
					(0.0343)
Age					0.00739
					(0.0169)
Constant	0.241***	0.183***	0.404***	-0.194	0.375
	(0.0413)	(0.0515)	(0.126)	(0.259)	(0.435)
Observations	214	207	214	204	199
R-squared	0.245	0.256	0.254	0.259	0.358

Note: Dependent variable in regressions (1)-(5) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

A2.2 Analyst

Below are the results of the regressions run using only sample of subjects receiving the Analyst job.

Table 10 – Regressions Examining Same Gender Bias, Choice and Induced Gender Homophily For Analyst Treatment Group

VARIABLES	(1)	(2)	(3)	(4)	(5)
Man	0.420***	0.109	0.408***	0.408***	0.0622
	(0.0624)	(0.103)	(0.0661)	(0.0639)	(0.106)
Prop. Men in Network		0.588***			0.636***
		(0.130)			(0.132)
Prop. Men in Class			0.160		-0.0293
			(0.256)		(0.250)
GPA				0.0640	0.0278
				(0.0749)	(0.0734)
School Year					-0.0453
					(0.0288)
Age					-0.0185
					(0.0130)
Constant	0.347***	0.192***	0.267*	0.111	0.629
	(0.0483)	(0.0545)	(0.138)	(0.285)	(0.456)
Observations	214	208	214	212	206
R-squared	0.179	0.267	0.181	0.178	0.304

Note: Dependent variable in regressions (1)-(5) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

A3. Robustness Check – Out of Classroom Session Specific Effect

To control for any session setting specific gender effect, considering there were in-classroom settings and out-of-classroom settings, we include a dummy variable for the 39 observations that were collected in the school atrium and in the school choir. All other observations were collected in conjunction with classes in classrooms. We also include the interaction term with our *Man* variable to remove the entire session setting specific effect with regards to same gender bias, choice gender homophily and induced gender homophily. The results are shown in Table 11 below. When comparing the results to the main results in Table 3, the magnitudes of the point estimates for *Man* do not change in any significant manner when removing an outside-of-classroom specific effect. However, it is worth noting that as the F-test is significant, it seems men in an out-of-classroom setting have referred more women than there in-classroom counterparts. This effect loses statistical significance after including all control variables.

Table 11 – Regressions Examining Same Gender Bias, Choice and Induced Gender Homophily with Session Setting Specific Effects

VARIABLES	(1)	(2)	(3)	(4)	(5)
Man	0.484***	0.250***	0.488***	0.472***	0.225***
	(0.0444)	(0.0756)	(0.0464)	(0.0463)	(0.0753)
Prop. Men in Network		0.406***			0.461***
		(0.0936)			(0.0935)
Prop. Men in Class			-0.0452		-0.369**
			(0.171)		(0.176)
GPA				0.0850*	0.0544
				(0.0514)	(0.0499)
School Year					-0.0651***
					(0.0223)
Age					-0.00929
					(0.0108)
Out Of Classroom	-0.0984	-0.119	-0.0963	-0.0998	-0.0306
	(0.109)	(0.111)	(0.109)	(0.109)	(0.114)
Out Of Classroom * Man	-0.184	-0.120	-0.185	-0.183	-0.0975
	(0.152)	(0.152)	(0.153)	(0.153)	(0.147)
Constant	0.298***	0.201***	0.321***	-0.0170	0.532*
	(0.0333)	(0.0386)	(0.0930)	(0.193)	(0.319)
Observations	428	415	428	416	405
R-squared	0.230	0.270	0.230	0.235	0.311
F-test *Out of Classr.* and *Out of Classr. * Man*	3.922	3.209	3.836	3.904	0.858
Prob > F	0.0205**	0.0414**	0.0223**	0.0209**	0.425

Note: Dependent variable in regressions (1)-(5) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

A4. Robustness Check – Master's Level Specific Effect

To control for any Master's level specific effects with regards to a same gender bias, we include a dummy variable for students studying at the Master's level. We also include the interaction term with our *Man* variable to remove entire Master's level specific effect with regards to same gender bias, choice gender homophily and induced gender homophily. The results are shown in Table 12 below. When comparing to the main results in Table 3, the magnitudes of the point estimates for *Man* increase slightly in all regressions. This is consistent with the fact that men at the Master's level seem to refer more women on average than men at the Bachelors level, as the F-test is highly significant. Why the estimate of *Man* only goes up slightly is due to the much smaller sample size of the Master's level men, (43 observations out of 226). Women at the Master's level also show a tendency to have referred more women, but the results are not nearly as significant as for the men at the Master's level.

Table 12 – Regressions Examining Same Gender Bias, Choice and Induced Gender Homophily with Master's Level Specific Effects

VARIABLES	(1)	(2)	(3)	(4)	(5)
Man	0.508***	0.261***	0.525***	0.496***	0.255***
	(0.0477)	(0.0779)	(0.0483)	(0.0492)	(0.0780)
Prop. Men in Network		0.406***			0.456***
		(0.0926)			(0.0940)
Prop. Men in Class			-0.315*		-0.485**
			(0.182)		(0.188)
GPA				0.0880*	0.0672
				(0.0514)	(0.0504)
School Year					-0.0222
					(0.0344)
Age					-0.00890
					(0.0107)
Masters Student	-0.0812	-0.115*	-0.124*	-0.0694	-0.0929
	(0.0683)	(0.0662)	(0.0725)	(0.0694)	(0.111)
Masters Student * Man	-0.275**	-0.210**	-0.259**	-0.276**	-0.186*
	(0.106)	(0.106)	(0.106)	(0.108)	(0.108)
Constant	0.313***	0.225***	0.481***	-0.0170	0.453
	(0.0381)	(0.0438)	(0.107)	(0.196)	(0.322)
Observations	428	415	428	416	405
R-squared	0.257	0.296	0.263	0.258	0.319
F-test *Masters Stud.* and *Masters Stud. * Man*	10.22	9.166	11.54	9.168	2.782
Prob > F	0.00004***	0.00012***	0.00001***	0.00012***	0.0631*

Note: Dependent variable in regressions (1)-(5) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

A5. Robustness Check – Controlling for Session Specific Effects

As is done in many experimental studies we control for any session specific effects. Session 1 is the atrium session where people or groups of people who were sitting at the tables in the school's atrium were asked to partake in the study, the only session, apart from the choir session 7, which was an out-of-classroom setting. The point estimates of *Man* only differ marginally in comparison with results presented in the main results section. It seems however more women were referred in Session 1 for some reason, and this effects persists even after including control variables. Though, it is a very small sample size of 29 observations, and thus not driving of our results in any way. The composition consists of a majority of men with 17 men and 12 women. The effect diminishes considerably and loses statistical significance when including control variables, which in combination with the small sample size makes it less meaningful to attempt to draw any conclusions from this result.

These results are consistent with the results in Appendix A3, where the out-of-classroom men seem to have referred more women. Session 1 composes roughly three quarters of all of the out-of classroom observations, with the choir composing the remaining quarter.

Table 13 – Regressions Examining Same Gender Bias, Choice and Induced Gender Homophily with Session Setting Specific Effects

VARIABLES	(1)	(2)	(3)	(4)	(5)
Man	0.464***	0.230***	0.468***	0.458***	0.213***
	(0.0450)	(0.0749)	(0.0450)	(0.0467)	(0.0764)
Prop. Men in Network		0.432***			0.453***
		(0.0964)			(0.0977)
Prop. Men in Class			-0.515		-0.659
			(0.503)		(0.518)
GPA				0.0866	0.0766
				(0.0542)	(0.0529)
School Year					-0.0770*
					(0.0456)
Age					-0.0127
					(0.0106)
Session1	-0.369***	-0.345***	-0.385***	-0.370***	-0.267**
	(0.132)	(0.125)	(0.132)	(0.140)	(0.132)
Session2	-0.0426	-0.0458	-0.0275	-0.0346	-0.0771
	(0.108)	(0.0996)	(0.109)	(0.117)	(0.109)
Session3	-0.0490	-0.0291	-0.0628	-0.0510	-0.200
	(0.106)	(0.0977)	(0.107)	(0.118)	(0.124)
Session4	-0.174	-0.138	-0.368	-0.123	-0.243
	(0.132)	(0.124)	(0.230)	(0.142)	(0.249)
Session5	0.140	0.175	-0.0230	0.168	-0.165
	(0.147)	(0.142)	(0.217)	(0.153)	(0.224)
Session6	-0.0147	0.0708	-0.163	-0.00858	-0.172
	(0.130)	(0.127)	(0.192)	(0.139)	(0.197)
Session7	0.00222	0.0458	-0.0241	0.0273	-0.00203
	(0.159)	(0.152)	(0.157)	(0.161)	(0.151)
Session8	-0.105	-0.157	-0.104	-0.0925	-0.0803
	(0.297)	(0.416)	(0.298)	(0.282)	(0.411)
Session9	-0.196	-0.192	-0.250*	-0.203	-0.117
	(0.126)	(0.122)	(0.138)	(0.136)	(0.160)
Session10	-0.251	-0.192	-0.296*	-0.245	-0.133
	(0.168)	(0.160)	(0.173)	(0.172)	(0.188)
Session11	-0.0383	-0.0245	-0.0334	-0.0473	0.0264
	(0.123)	(0.118)	(0.123)	(0.130)	(0.118)
Session12	-0.158	-0.175	-0.158	-0.159	-0.143
	(0.165)	(0.172)	(0.165)	(0.173)	(0.176)
Constant	0.373***	0.240**	0.689**	0.0414	0.851*
	(0.105)	(0.102)	(0.327)	(0.211)	(0.439)
Observations	428	415	428	416	405
R-squared	0.262	0.309	0.264	0.269	0.328

Note: Dependent variable in regressions (1)-(5) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

A6. Further Network Analysis

To further understand why choice gender homophily and the personal network explained so much more of the same gender bias for the Analyst job than for the Creative Content Manager job, we created a dummy variable equal to 1 if the subjects referred someone in their personal network. This variable is then used as the dependent variable in the below regressions. We find that subjects have referred significantly more people from within their network to the Analyst job, and this partially explains the greater explanatory effect of *Prop. Men in* Network for the Analyst job.

The regressions we run are:

$$Refer\ within\ Network = \beta_0 + \beta_1 Man + \varepsilon \tag{11}$$

$$Refer\ within\ Network = \beta_0 + \beta_1 ManReferred + \varepsilon \tag{12}$$

$$Refer\ within\ Network = \beta_0 + \beta_1 Analyst + \varepsilon \tag{13}$$

$$Refer\ within\ Network = \beta_0 + \beta_1 GPA + \varepsilon \tag{14}$$

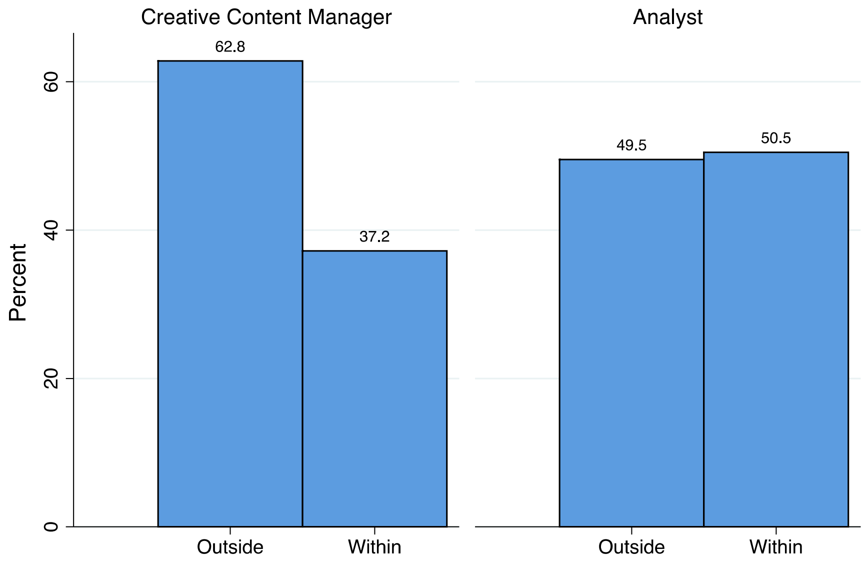
$$Refer\ within\ Network = \beta_0 + \beta_1 SchoolYear + \varepsilon \tag{15}$$

$$Refer\ within\ Network = \beta_0 + \beta_1 Age + \varepsilon \tag{16}$$

$$Refer\ within\ Network = \beta_0 + \beta_1 Man + \beta_2 ManReferred + \beta_3 Analyst + \beta_4 GPA + \beta_5 SchoolYear + \beta_6 Age + \varepsilon \tag{17}$$

These results can also be shown graphically. It is easy to see by visual inspection that more subjects referred from within their network to the Analyst job then for the Creative Content manager job.

Figure 7 – Referrals within Network by Job



The above graph is based on data collected by us, the authors, for this experiment and is our own work. The graph was created using Stata/MP 13.1.

Table 14 – Regressions Examining Referrals Within and Outside Personal Network

VARIABLES	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Man Referred	0.00501						-0.0192
	(0.0489)						(0.0547)
Man		-0.0329					-0.0430
		(0.0488)					(0.0535)
Analyst			0.133***				0.124**
			(0.0484)				(0.0493)
GPA				0.0443			0.0490
				(0.0578)			(0.0591)
School Year					-0.0516***		-0.0453*
					(0.0187)		(0.0258)
Age						-0.0189**	-0.00465
						(0.00862)	(0.0130)
Constant	0.436***	0.455***	0.372***	0.270	0.562***	0.871***	0.435
	(0.0356)	(0.0351)	(0.0337)	(0.221)	(0.0521)	(0.200)	(0.346)
Observations	415	415	415	406	414	415	405
R-squared	0.000	0.001	0.018	0.001	0.016	0.010	0.035

Note: Dependent variable in regressions (11)-(17) is *Refer within Network* which equals 1 if referral was listed in subjects' personal network, 0 otherwise. The coefficients are from a Linear Regression Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

A7. Logit Regressions

Due to the issues discussed in section 3.3 with using a linear probability model with ordinary least squares when using binary data variables, we also show our results using a logit model. The results are shown below. The same coefficients are significant in this logit regression and in the OLS regression.

Table 15 – Binary Logistic Regression Examining Same Gender Bias, Choice and Induced Gender Homophily

VARIABLES	(1)	(2)	(3)	(4)	(5)
Man	2.000***	0.949***	2.035***	1.946***	0.954***
	(0.219)	(0.320)	(0.231)	(0.223)	(0.353)
Prop. Men in Network		2.038***			2.478***
		(0.455)			(0.510)
Prop. Men in Class			-0.437		-2.286**
			(0.861)		(1.017)
GPA				0.447*	0.304
				(0.263)	(0.281)
School Year					-0.391***
					(0.127)
Age					-0.0657
					(0.0661)
Constant	-0.889***	-1.427***	-0.674	-2.556**	0.834
	(0.154)	(0.210)	(0.460)	(1.003)	(1.839)
Observations	428	415	428	416	405

Note: Dependent variable in regressions (1)-(5) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Binary Logistic Regression Model. *** indicates $p<0.01$, ** indicates $p<0.05$, and * indicates $p<0.1$.

A8. Logit Regressions – Marginal Effects

To be able to more easily compare the results from the logit regression to those of our OLS regressions, we show the marginal effects of the logit regressions in the table below. Now the point estimates are much closer to those of the OLS regressions, and again the same coefficients are significant in this logit regression and in the OLS regression.

Table 16 – Binary Logistic Regression Examining Same Gender Bias, Choice and Induced Gender Homophily (Marginal Effects)

VARIABLES	(1)	(2)	(3)	(4)	(5)
Man	0.461***	0.232***	0.468***	0.450***	0.233***
	(0.0430)	(0.0754)	(0.0450)	(0.0444)	(0.0832)
Prop. Men in Network		0.507***			0.615***
		(0.113)			(0.127)
Prop. Men in Class			-0.109		-0.567**
			(0.214)		(0.252)
GPA				0.111*	0.0755
				(0.0654)	(0.0697)
School Year					-0.0970***
					(0.0317)
Age					-0.0163
					(0.0164)
Observations	428	415	428	416	405

Note: Dependent variable in regressions (1)-(5) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are marginal effects as calculated from a Binary Logistic Regression Model. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

A9. Equal Number of Observations in All Regressions

As we do not have full data for the variable *GPA* and *Proportion of Men in Network*, we run all 5 regression outlined in 4.3.2 Results, only including the 405 observation for which we have complete data for all variables. As can be seen in the table below, this does not significantly change our results.

Table 17 – Regressions Examining Same Gender Bias, Choice and Induced Gender Homophily with Constant Number of Observations

VARIABLES	(1)	(2)	(3)	(4)	(5)
Man	0.460***	0.217***	0.474***	0.449***	0.209***
	(0.0442)	(0.0747)	(0.0458)	(0.0454)	(0.0733)
Prop. Men in Network		0.428***			0.471***
		(0.0945)			(0.0931)
Prop. Men in Class			-0.175		-0.398**
			(0.173)		(0.174)
GPA				0.0824	0.0532
				(0.0525)	(0.0498)
School Year					-0.0719***
					(0.0219)
Age					-0.00882
					(0.0108)
Constant	0.294***	0.189***	0.381***	-0.0134	0.552*
	(0.0326)	(0.0379)	(0.0944)	(0.197)	(0.318)
Observations	405	405	405	405	405
R-squared	0.213	0.256	0.215	0.217	0.307

Note: Dependent variable in regressions (1)-(5) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

Appendix B – Stereotyping and Treatment Effects, Further Regressions

B1. Robustness Check – Separating by Campus

B1.1 Main Campus Stockholm

To further show the differences in the treatment effect for the two campuses, we run the regressions outlined in 4.4.1 for the observations from the two campuses separately. Below is the sample of the main campus with 368 observations. As can be seen, the results are the same as in Table 5, but that the standard errors are slightly larger. As adding the dummy and the interaction variable as in Table 5 allows to keep all of the 428 variable but separating the result in the same way, it gives the same results but with a lower standard deviation. Here with fewer observations the standard errors become slightly larger.

Table 18 – Treatment Effect on Gender of Job Referrals (Main Campus)

VARIABLES	(6)	(7)	(8)	(9)	(10)
Analyst	0.136***	0.109**	0.183***	0.193***	0.168**
	(0.0517)	(0.0453)	(0.0673)	(0.0677)	(0.0692)
Man		0.500***	0.565***	0.549***	0.208**
		(0.0454)	(0.0600)	(0.0632)	(0.0868)
Analyst * Man			-0.134	-0.135	-0.0902
			(0.0909)	(0.0923)	(0.0889)
GPA				0.0878	0.0699
				(0.0547)	(0.0530)
Prop. Men in Network					0.574***
					(0.0919)
Prop. Men in Class					-0.237
					(0.235)
School Year					-0.0677***
					(0.0237)
Age					-0.00213
					(0.0111)
Constant	0.457***	0.194***	0.159***	-0.173	0.107
	(0.0366)	(0.0360)	(0.0392)	(0.202)	(0.339)
Observations	368	368	368	357	346
R-squared	0.019	0.266	0.270	0.273	0.375
F-test			4.019	4.509	3.954
Prob > F			0.0188**	0.0117**	0.0201**

Note: Dependent variable in regressions (6)-(10) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

B1.2 Affiliate Campus Norrtälje

To further show the differences in the treatment effect for the two campuses, we run the regressions outlined in 4.4.1 for the observations from the two campuses separately. Below is the sample of the Norrtälje campus with 60 observations. As discusses on the previous page in B1.2, separating the sample and running the regression with fewer observations increases the standard errors. For this reason, considering how small the Norrtälje sample is with 60 observations, the do not become significant, even though the point estimates for the treatment effects form men and women are even greater at this campus than at the main campus, albeit in the opposite direction.

Table 19 – Treatment Effect on Gender of Job Referrals (Norrtälje Campus)

VARIABLES	(6)	(7)	(8)	(9)	(10)
Analyst	-0.210	-0.218*	-0.236	-0.240	-0.163
	(0.127)	(0.122)	(0.155)	(0.157)	(0.176)
Man		0.309**	0.275	0.384***	0.454**
		(0.124)	(0.166)	(0.118)	(0.217)
Analyst * Man			0.0614	-0.0561	-0.184
			(0.248)	(0.217)	(0.245)
GPA				0.0671	0.00441
				(0.158)	(0.171)
Prop. Men in Network					-0.0599
					(0.323)
Prop. Men in Class					-6.100
					(17.71)
School Year					0.107
					(0.493)
Age					-0.0563
					(0.0345)
Constant	0.679***	0.590***	0.600***	0.347	3.566
	(0.0898)	(0.101)	(0.113)	(0.609)	(4.782)
Observations	60	60	60	59	59
R-squared	0.045	0.126	0.127	0.171	0.230
F-test			1.570	3.127	2.953
Prob > F			0.217	0.0519	0.0614

Note: Dependent variable in regressions (6)-(10) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

B2. Robustness Check – Outside of Classroom Session Specific Effect

To control for any session setting specific treatment effect, considering there were in-classroom settings and out-of-classroom settings, we include a dummy variable for the 39 observations that were collected in the school atrium and in the school choir, as opposed to all other observations collected in conjunction with classes in classrooms. We also include the interaction term with our *Analyst* variable to remove the entire session setting specific effect with regards to our treatment. The results are shown in Table 20 below. The point estimates of *Analyst* change only very marginally from those in Table 4, thus is seems that an inside or outside of classroom setting has not significantly driven our results regarding treatment effect. In the prior finding of inside versus outside classroom effects more women have been referred to both positions by out-of-class subjects. The treatment effect is however for this group in the expected direction as opposed to the Norrtälje cohort showing tendencies of the reverse effect.

Table 20 – Seperating Treatment Effect on Gender of Job Referrals by Session Setting Type (Outside or Inside Classroom Setting)

VARIABLES	(6)	(7)	(8)	(9)	(10)
Analyst	0.0777	0.0646	0.0941	0.0976	0.0865
	(0.0506)	(0.0444)	(0.0655)	(0.0662)	(0.0662)
Man		0.467***	0.495***	0.484***	0.237***
		(0.0432)	(0.0593)	(0.0620)	(0.0833)
Analyst * Man			-0.0579	-0.0608	-0.0399
			(0.0866)	(0.0879)	(0.0854)
Prop. Men in Network					0.456***
					(0.0924)
GPA				0.0880*	0.0575
				(0.0514)	(0.0500)
Prop. Men in Class					-0.374**
					(0.178)
School Year					-0.0631***
					(0.0225)
Age					-0.0107
					(0.0110)
Out Of Classroom	-0.172*	-0.174**	-0.175**	-0.171*	-0.0564
	(0.103)	(0.0880)	(0.0880)	(0.0891)	(0.0886)
Out Of Classroom * Analyst	0.0557	-0.0714	-0.0631	-0.0715	-0.0640
	(0.169)	(0.176)	(0.175)	(0.175)	(0.162)
Constant	0.505***	0.274***	0.260***	-0.0687	0.511
	(0.0364)	(0.0385)	(0.0436)	(0.192)	(0.320)
Observations	428	428	428	416	405
R-squared	0.016	0.231	0.232	0.238	0.314
F-test *Out of Classr.* and *Out of Classr. * Analyst*	1.760	3.308	3.204	3.139	0.546
Prob > F	0.173	0.0375**	0.0416**	0.0444**	0.580

Note: Dependent variable in regressions (6)-(10) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

B3. Robustness Check – Master's Level Specific Effect

To control for any Master's Level specific effects with regards to our treatment, we include a dummy variable for students studying at the Master's level. We also include the interaction term with our *Man* variable to remove the entire effect. As seen in Table 21 removing the Master's level specific effect, the point estimates for *Analyst* go down in comparison with not removing any treatment specific effects in Table 4. It seems there is a stronger treatment effect in the Master's level compared to the Bachelors level, however this is not surprising when you consider the gender composition of the Master's sample: 57% women and 42% men (99 observations). Women reacted more strongly to the treatment and with the sample consisting of more women the effect is greater for this group. Furthermore the Master's level sample is all at the Main Campus which according to our previous analysis seems to have had a much stronger treatment effect in the expected direction, which is also consistent with the treatment effect being greater for Master's level students.

Table 21 – Seperating Treatment Effect on Gender of Job Referrals by Educational Level (Bachelor Level versus Master Level)

VARIABLES	(6)	(7)	(8)	(9)	(10)
Analyst	0.0457	0.0268	0.0615	0.0736	0.0602
	(0.0545)	(0.0469)	(0.0715)	(0.0721)	(0.0723)
Man		0.443***	0.474***	0.467***	0.231***
		(0.0431)	(0.0590)	(0.0614)	(0.0824)
Analyst * Man			-0.0638	-0.0715	-0.0424
			(0.0863)	(0.0875)	(0.0859)
GPA				0.0849*	0.0657
				(0.0505)	(0.0497)
Prop. Men in Network					0.461***
					(0.0916)
Prop. Men in Class					-0.514***
					(0.189)
School Year					-0.0216
					(0.0345)
Age					-0.0114
					(0.0109)
Masters Student	-0.311***	-0.266***	-0.262***	-0.243***	-0.217*
	(0.0710)	(0.0681)	(0.0693)	(0.0712)	(0.113)
Masters Student * Analyst	0.132	0.134	0.128	0.106	0.101
	(0.110)	(0.106)	(0.108)	(0.109)	(0.107)
Constant	0.566***	0.335***	0.318***	-0.00672	0.520
	(0.0395)	(0.0418)	(0.0483)	(0.190)	(0.317)
Observations	428	428	428	416	405
R-squared	0.056	0.250	0.251	0.252	0.320
F-test *Masters Stud.* and *Masters Stud. * Man*	11.92	8.765	8.479	7.194	1.885
Prob > F	0.00001***	0.00019***	0.00025***	0.00085***	0.153

Note: Dependent variable in regressions (6)-(10) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

B4. Robustness Check – Controlling for Session Specific Effects

As is done in many experimental studies we control for any session specific effects. Session 1 is the Atrium session where people or groups of people who were sitting at the tables in the schools Atrium were asked to partake in the study, the only session, apart from the choir session 7, which was an out of classroom setting. The point estimates for *Analyst* do not significantly change from when not removing any treatment specific effects in Table 4. However in session 1 there seems to be more female referrals. It is a very small sample size of 29 observations, and thus not driving of our results in any way. The composition consists of a majority of men with 17 men and 12 women. The effect diminishes considerably and loses statistical significance when including control variables, which in combination with a small sample size makes it less meaningful to attempt to draw any conclusions from this result.

Table 22 – Treatment Effect on Gender of Job Referrals Controlling for Session Specific Effects

VARIABLES	(6)	(7)	(8)	(9)	(10)
Analyst	0.0610	0.0446	0.0756	0.0815	0.0775
	(0.0482)	(0.0434)	(0.0654)	(0.0655)	(0.0666)
Man		0.462***	0.492***	0.491***	0.233***
		(0.0451)	(0.0591)	(0.0605)	(0.0865)
Analyst * Man			-0.0595	-0.0692	-0.0436
			(0.0861)	(0.0865)	(0.0857)
GPA				0.0871	0.0788
				(0.0540)	(0.0530)
Prop. Men in Network					0.450***
					(0.0967)
Prop. Men in Class					-0.686
					(0.512)
School Year					-0.0799*
					(0.0453)
Age					-0.0138
					(0.0107)
Session1	-0.453***	-0.354***	-0.350***	-0.350**	-0.243*
	(0.139)	(0.133)	(0.134)	(0.142)	(0.133)
Session2	-0.124	-0.0357	-0.0344	-0.0259	-0.0712
	(0.121)	(0.107)	(0.108)	(0.117)	(0.108)
Session3	-0.167	-0.0413	-0.0418	-0.0437	-0.200
	(0.120)	(0.105)	(0.106)	(0.118)	(0.124)
Session4	-0.439***	-0.163	-0.159	-0.108	-0.235
	(0.135)	(0.131)	(0.132)	(0.142)	(0.245)
Session5	-0.0595	0.146	0.147	0.175	-0.177
	(0.150)	(0.147)	(0.148)	(0.155)	(0.222)
Session6	-0.242*	-0.00968	-0.0103	-0.00395	-0.179
	(0.139)	(0.130)	(0.131)	(0.140)	(0.194)
Session7	-0.0386	0.0104	0.0136	0.0396	0.00616
	(0.182)	(0.159)	(0.157)	(0.159)	(0.148)
Session8	-0.239	-0.0971	-0.0969	-0.0840	-0.0742
	(0.291)	(0.307)	(0.308)	(0.292)	(0.424)
Session9	-0.337**	-0.187	-0.184	-0.190	-0.102
	(0.147)	(0.125)	(0.126)	(0.136)	(0.157)
Session10	-0.332**	-0.239	-0.245	-0.240	-0.124
	(0.169)	(0.167)	(0.168)	(0.172)	(0.184)
Session11	-0.172	-0.0305	-0.0292	-0.0389	0.0363
	(0.143)	(0.123)	(0.124)	(0.131)	(0.118)
Session12	-0.180	-0.153	-0.151	-0.151	-0.134
	(0.165)	(0.163)	(0.165)	(0.172)	(0.175)
Constant	0.708***	0.344***	0.328***	-0.00901	0.847*
	(0.115)	(0.110)	(0.110)	(0.213)	(0.432)
Observations	428	428	428	416	405
R-squared	0.069	0.264	0.265	0.272	0.332

Note: Dependent variable in regressions (6)-(10) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

B5. Logit Regressions

Due to the issues discussed in section 3.3 with using a linear probability model with ordinary least squares when using binary data variables, we also show our results using a Logit model. The results are shown below. The same coefficients are significant in this logit regression and in the OLS regression.

Table 23 –Treatment Effect on Gender of Job Referrals (Binary Logistic Regression)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Analyst	0.357*	0.344	0.516*	0.536*	0.489	1.171***
	(0.195)	(0.219)	(0.310)	(0.314)	(0.355)	(0.438)
Man		1.997***	2.173***	2.127***	1.067**	1.315***
		(0.219)	(0.315)	(0.327)	(0.421)	(0.464)
Analyst * Man			-0.348	-0.364	-0.234	-0.783
			(0.439)	(0.449)	(0.486)	(0.537)
GPA				0.460*	0.316	0.357
				(0.265)	(0.283)	(0.294)
Prop. Men in Network					2.485***	2.732***
					(0.510)	(0.560)
Prop. Men in Class					-2.297**	-1.332
					(1.035)	(1.413)
School Year					-0.379***	-0.345**
					(0.128)	(0.134)
Age					-0.0710	-0.0571
					(0.0652)	(0.0615)
Norrtälje						2.093***
						(0.684)
Norrtälje * Analyst						-2.576***
						(0.795)
Constant	-0.0561	-1.059***	-1.149***	-2.878***	0.636	-1.015
	(0.137)	(0.188)	(0.225)	(1.008)	(1.838)	(1.904)
Observations	428	428	428	416	405	405

Note: Dependent variable in regressions (1)-(5) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Binary Logistic Regression Model. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

B6. Logit Regressions – Marginal Effects

To be able to more easily compare the results from the logit regression to those of our OLS regressions, we show the marginal effects of the logit regressions in the table below. Now the point estimates are much closer to those of the OLS regressions, and again the same coefficients are significant in this logit regression and in the OLS regression.

Table 24 –Treatment Effect on Gender of Job Referrals (Binary Logistic Regression with Marginal Effects)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Analyst	0.0888*	0.0853	0.128*	0.133*	0.121	0.284***
	(0.0481)	(0.0541)	(0.0759)	(0.0767)	(0.0870)	(0.101)
Man		0.460***	0.495***	0.486***	0.259***	0.316***
		(0.0431)	(0.0596)	(0.0625)	(0.0979)	(0.105)
Analyst * Man			-0.0866	-0.0906	-0.0584	-0.193
			(0.109)	(0.111)	(0.121)	(0.129)
GPA				0.114*	0.0784	0.0888
				(0.0658)	(0.0704)	(0.0730)
Prop. Men in Network					0.617***	0.680***
					(0.127)	(0.140)
Prop. Men in Class					-0.571**	-0.331
					(0.257)	(0.351)
School Year					-0.0941***	-0.0859**
					(0.0318)	(0.0336)
Age					-0.0176	-0.0142
					(0.0162)	(0.0153)
Norrtälje						0.414***
						(0.0928)
Norrtälje * Analyst						-0.488***
						(0.0793)
Observations	428	428	428	416	405	405

Note: Dependent variable in regressions (1)-(5) is *Man Referred* which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are marginal effects as calculated from a Binary Logistic Regression Model. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

B7. Equal Number of Observations in All Regressions

As we do not have full data for the variable *GPA* and *Proportion of Men in Network*, we run all 5 regression outlined in 4.4.1 Results, only including the 405 observation for which we have complete data for all variables. We also add a regression including *Norrtälje* and *Norrtälje * Analyst* to account for campus specific treatment effects in the final regression below. As can be seen in the table below, only running the regression on the subjects we have complete data for does not significantly change our results.

Table 25 –Treatment Effect on Gender of Job Referrals with Constant Number of Observations

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Analyst	0.0953*	0.0718	0.102	0.102	0.0890	0.175***
	(0.0495)	(0.0443)	(0.0651)	(0.0649)	(0.0647)	(0.0666)
Man		0.457***	0.487***	0.472***	0.231***	0.249***
		(0.0443)	(0.0622)	(0.0636)	(0.0831)	(0.0825)
Analyst * Man			-0.0595	-0.0538	-0.0477	-0.100
			(0.0887)	(0.0888)	(0.0846)	(0.0838)
GPA				0.0851	0.0561	0.0588
				(0.0525)	(0.0497)	(0.0499)
Prop. Men in Network					0.467***	0.486***
					(0.0920)	(0.0944)
Prop. Men in Class					-0.398**	-0.217
					(0.175)	(0.232)
School Year					-0.0689***	-0.0592**
					(0.0223)	(0.0233)
Age					-0.0103	-0.00867
					(0.0110)	(0.0106)
Norrtälje						0.342***
						(0.109)
Norrtälje * Analyst						-0.426***
						(0.131)
Constant	0.482***	0.260***	0.245***	-0.0727	0.525*	0.294
	(0.0355)	(0.0375)	(0.0428)	(0.195)	(0.318)	(0.320)
Observations	405	405	405	405	405	405
R-squared	0.009	0.218	0.219	0.224	0.312	0.337
F-test *Analyst* and *Analyst * Man*			1.485	1.581	1.256	4.205
Prob > F			0.228	0.207	0.286	0.0156
F-test *Norrtälje* and *Norrtälje * Analyst*						6.666
Prob > F						0.0014***

Note: Dependent variable in regressions (1)-(5) is Man Referred which equals 1 if referral was a man, 0 if referral was a woman. The coefficients are from a Linear Probability Model. Robust standard errors using Huber-White sandwich estimators reported in parentheses. *** indicates p<0.01, ** indicates p<0.05, and * indicates p<0.1.

Appendix C – Session Schedule

Below, Table 26 shows when and where and other information about each of the 13 sessions in which we collected our 428 observations.

Table 26 – Details of Experimental Sessions

	Room	Campus	Date	Time	Lecture	School Year	MSc/BSc	Program	No. Obs.	% Men
Session 1	Atrium	Main Campus	Misc.	Misc.	-	Misc.	Misc.	Misc.	29	59%
Session 2	Aula	Main Campus	Mar-26	16.00-16.15	Finance II	2	BSc	Business & Economics	86	62%
Session 3	Aula	Main Campus	Mar-27	11.00-11.15	Marketing II	1	BSc	Business & Economics	105	53%
Session 4	Room 350	Main Campus	Mar-27	14.00-14.15	Marketing	1	MSc	Marketing	34	21%
Session 5	Aula	Norrtälje	Mar-30	11.00-11.15	Statistics II	1	BSc	Retail Mgmt	22	36%
Session 6	Aula	Norrtälje	Mar-30	14.00-14.15	Retail Marketing	2	BSc	Retail Mgmt	36	31%
Session 7	Rotunda	Main Campus	Mar-31	19.30-19-45	-	Misc.	Misc.	Misc.	10	70%
Session 8	Room 350	Main Campus	Mar-31	17.00-17-15	Marketing Spec.	3	BSc	Business & Economics	4	50%
Session 9	Ragnar	Main Campus	Mar-31	11.00-11.15	Health Economics	Misc.	MSc	Misc.	25	48%
Session 10	Torsten	Main Campus	Apr-09	09.00-09.15	Organization	1	MSc	Management	15	60%
Session 11	Ragnar	Main Campus	Apr-09	11.00-11.15	Law	3	BSc	Business & Economics	30	50%
Session 12	PC Lab	Main Campus	Apr-09	15.00-15-15	Excel Course	3	BSc	Business & Economics	16	75%
Session 13	PC Lab	Main Campus	Apr-09	17.00-17-15	Excel Course	3	BSc	Business & Economics	16	81%

Appendix D – Auxiliary Study

Below are the questions asked online through a Qualtrics survey to Economics students at Stockholm University, filled out between the 20th April to the 9th of May. Table 27 shows the results of the study.

(Translated from Swedish)

1. How masculine or feminine do you think the job that is described in the job advertisement is? Indicate your answer on a scale of 1 to 9 (1 is very feminine and 9 is very masculine)

[Numbered multiple choice options from 1-9]

[Analyst OR Creative Content Manager Job Advertisement]

2. What gender are you?

Man Woman Other Prefer Not To Respond

3. How old are you?

[Free Text Entry]

Table 27

Variable		Obs.	Mean	Std. Dev.	Min.	Max.
Score Creative Job	Total	42	4.548	1.452	1	9
- On scale 1-9, 1 being the most feminine and 9	Women	26	4.615	1.061	3	7
being the most masculine	Men	14	4.571	1.989	1	9
Score Analyst Job	Total	51	5.137	1.281	2	8
- On scale 1-9, 1 being the most feminine and 9	Women	27	5.037	1.344	2	8
being the most masculine	Men	23	5.261	1.251	3	7
Age	Total	87	24.4	6.757	19	62
- The respondents were asked to report their age in	Women	51	24.3	7.347	19	62
years, 87/93 respondents reported their age	Men	34	24.7	6.027	19	42

Appendix E – Experimental Materials

E1. Script

Below is the script the experimenters used at each classroom session, translated from Swedish:

Hello everyone!

Erik and I are two students writing our Masters' thesis here at SSE about recruitment processes. If you just stay and participate in our study by filling out a questionnaire we will give you a "trisslott"(a lottery ticket), and you can also earn up to 5000 SEK in the few minutes it takes filling it out.

You will be given a job advertisement, and what we ask you to do is to refer another student at SSE you think is well suited for this *real* part time position, that *will* be filled during the spring. For each student that actually gets employed in the end, we will hand out finder's fees of 5000 SEK to the referrer or referrers. The questionnaire also has a few short follow-up questions, and we would like you to complete the form in its entirety. To make this even quicker you will only be given one job advertisement out of several.

We ask you to not to speak with those around you until you are finished with filling out the survey. When you have completed the questionnaire give it to me and Erik and you will get your "trisslott" (a lottery ticket).

We would like to point out that these are in fact real positions and that you all have a good chance of getting the finder's fee as the only people who are able to participate in this study are students at SSE.

Thank you for your time!

(*Original Swedish script available upon request from the authors*)

E2. Form – Analyst

(Translated from Swedish – Swedish version available upon request from authors)

Instructions

On the next page there is a job advertisement for a part time position at the company *Mediapilot*. Your task is to read through the ad and thereafter *refer another SSE Student* that you think is well suited for the position. In return for participating in the study you are given a lottery ticket, and *additionally*, if the student that you have referred gets the job you will be given **5 000 SEK** as a finder's fee.

This survey is anonymous, who you refer and other details will not be given out to other students.

(If there would be several students who refer the same student to the same position they will share the fee, but 5 000 SEK is given out per student hired).

Analyst

Mediapilot is a Swedish analytics company that helps companies like Tele2, Trygg-Hansa, McDonald's, Coca-Cola, Spotify and Ferrari to evaluate, analyze and improve their communication and Public Relations activities. From our offices in Sweden, Norway and USA, we work with global assignments in both editorial and social media, by providing a unique mix of specialist analysis and innovative IT-systems. We have received several international awards and place a heavy emphasis on business development and profitable expansion.

We are looking for 1-2 analysts on a part time basis and are looking for a person who…

- … is business minded and analytical
- … likes to work in a growing company, where both employees and the company are constantly developing
- … recognizes themselves in our values positive, efficient and innovative
- … has a strong interest in measurement and analysis
- … is considerate and efficient.

As a junior analyst you will work with assessing, evaluating and summarizing our clients' and their stakeholder's media portrayal and communication related activities. The position involves both quantitative and qualitative tasks, but prior knowledge of SPSS and related skills is not necessary.

We would prefer for you to have worked with client facing tasks before. You should also have very strong language skills in both Swedish and English, and it is a big bonus if you speak additional languages. You are mindful of correct spelling and find it easy to communicate with others.

You will be working in a focused environment with a fast pace where it is very important that you take responsibility and keep to deadlines.

The position is on a part time basis at our head office in Stockholm. The job can however be done usually at times and places that are suitable for you, which makes it perfect for you if you are a top student.

I would like to refer the following SSE student for the above position:

Name:____

In what year is this student in? (Circle):

Bachelor *Master*

Year 1 *Year 2* *Year 3* *Year 1* *Year 2*

Circle 3 Qualities that distinguish the above candidate:

responsible decisive co-operative logical good leadership potential dedicated confident reliable analytical communicative perseverant modest independent considerate

How well do you know the student you have referred?

(Not at all) 1 2 3 4 5 6 7 (Very Well)

(Referred students will be contacted through their school e-mail)

Turn Page!

Details about you

Name: ____

Registration Number: ____

Year of Birth:____

In what year are you? (Circle):

	Bachelor			*Master*
Year 1	*Year 2*	*Year 3*	*Year 1*	*Year 2*

What high school did you attend? ____

What high school program did you attend? ____

In what city was your high school? ____

In what city did you grow up (mainly)? ____

Within what range does your Bachelor GPA (Grade Point Average) lie within? Circle.
(1.0=E-average, 2.0=D-average, 3.0=C-average, 4.0=B-average, 5.0=A-average)

1.0–2.75 2.75–3.0 3.0–3.25 3.25–3.50 3.50–3.75 3.75–4.0 4.0–4.25 4.25–5.0

Name 5 people you socialize much with (First and Last Name):
(*preferably* 5, but if you are unable to name 5, name fewer)

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(In the event of you being allocated a finder's fee, you will be contacted through the school e-mail.)

E3. Form – Creative Content Manager

(Translated from Swedish – Swedish version available upon request from authors)

Instructions

On the next page there is a job advertisement for a part time position at the company *Mediapilot*. Your task is to read through the ad and thereafter *refer another SSE Student* that you think is well suited for the position. In return for participating in the study you are given a lottery ticket, and *additionally*, if the student that you have referred gets the job you will be given **5 000 SEK** as a finder's fee.

This survey is anonymous, who you refer and other details will not be given out to other students.

(If there would be several students who refer the same student to the same position they will share the fee, but 5 000 SEK is given out per student hired).

Creative Content Manager

Mediapilot is a Swedish analytics company that helps companies like Tele2, Trygg-Hansa, McDonald's, Coca-Cola, Spotify and Ferrari to evaluate, analyze and improve their communication and Public Relations activities. From our offices in Sweden, Norway and USA, we work with global assignments in both editorial and social media, by providing a unique mix of specialist analysis and innovative IT-systems. We have received several international awards and place a heavy emphasis on business development and profitable expansion.

We are looking for 1-2 Creative Content Managers on a part time basis and are looking for a person who

- … is creative and passionate
- … likes to work in a growing company, where both employees and the company are constantly developing
- … recognizes themselves in our values positive, efficient and innovative
- … has a strong interest in and understanding of social media and digital platforms
- … likes working with several projects simultaneously
- … is considerate and likes to come up with creative input and new ideas

As a Creative Content Manager your responsibilities will also include…

- … community management and other creative content for our clients (e.g. on Facebook and Instagram)
- … web
- … image management
- … follow up and present the results of different projects
- … presentations and reports

We would prefer for you to have worked with client facing tasks before. You should also have very strong language skills in both Swedish and English, and it is a big bonus if you speak additional languages. You are mindful of correct spelling and find it easy to communicate with others.

You will be working in a focused environment with a fast pace where it is very important that you take responsibility and keep to deadlines.

The position is on a part time basis with at our head office in Stockholm. The job can however be done usually at times and places that are suitable for you, which makes it perfect for you if you are a top student.

I would like to refer the following SSE student for the above position:

Name:____

In what year is this student in? (Circle):

Bachelor *Master*

Year 1 *Year 2* *Year 3* *Year 1* *Year 2*

Circle 3 Qualities that distinguish the above candidate:

responsible decisive co-operative logical good leadership potential dedicated confident reliable analytical communicative perseverant modest independent considerate

How well do you know the student you have referred?

(Not at all) 1 2 3 4 5 6 7 (Very Well)

(Referred students will be contacted through their school e-mail)

Turn Page!

Details about you

Name: ____

Registration Number: ____

Year of Birth:____

In what year are you? (Circle):

Bachelor *Master*

Year 1 *Year 2* *Year 3* *Year 1* *Year 2*

What high school did you attend? ____

What high school program did you attend? ____

In what city was your high school? ____

In what city did you grow up in (mainly)? ____

Within what range does your Bachelor GPA (Grade Point Average) lie within? Circle.
(1.0=E-average, 2.0=D-average, 3.0=C-average, 4.0=B-average, 5.0=A-average)

1.0–2.75 2.75–3.0 3.0–3.25 3.25–3.50 3.50–3.75 3.75–4.0 4.0–4.25 4.25–5.0

Name 5 people you socialize much with (First and Last Name):
(*preferably* 5, but if you are unable to name 5, name fewer)

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(In the event of you being allocated a finder's fee, you will be contacted through the school e-mail.)