(En)Gendering Marital Status in Indian Job Market: An Experimental Study

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Abstract

In India and Asia, this study presents the first field experiment on hiring discrimination with respect to marital status conducted in India and Asia. On India's largest job portal, Naukri.com, this study proposes a novel prototype experimental design for implementing resume audit study, and conducts the first online field experiment. This study aims to test the hypothesis that marital status characteristics affect hiring practices and decisions for male and female candidates at the initial contact stage of the hiring process in gender-neutral human resource (HR) domain jobs.

In six key metro cities in India, recognised as pivotal hubs in the service sector, this study implements a comprehensive online field experiment involving a total of 1964 automated job applicants for the team of female applicants and 1868 automated job applications for the team of male applicants. Employing a resume audit methodology and a matched design for same gender pairs of teams, the study strategically controls for the gender effect. Through the use of automation techniques, the marital status is systematically randomised within experimental blocks, ensuring randomisation and counterbalancing of job applications. The experiment was Pre-registered (https://aspredicted.org/) to reduce harking, publication and other biases.

The study uncovers a compelling relationship between marital status and discrimination, shedding light on a critical aspect of hiring practices. The findings distinctly demonstrate that married males tend to receive more interview invitations compared to their single counterparts, though statistically insignificant. Conversely, for females, the trend is reversed with statistical significance with single applicants being more likely to secure an interview than their married counterparts.

The study uncovers a critical gender bias related to marital status in hiring practices. As stated by various HR consultants during in-depth discussion, many times they were instructed to segregate the candidates based on their marital status, particularly in the case of female applicants. The results give insights into the declining female labour force participation in India and underscores the urgency for inclusive policies. The study highlights the pressing need for evidence-based strategies to combat discrimination in hiring.

1. Introduction

The fact that India has more people than any other country presents both opportunities and difficulties. India faces a significant challenge in transforming its promising demographic advantage into a demographic dividend. Subsequently, Ogawa et al., (2021) promote the idea of a "silver demographic dividend," which can be put to use by the underutilised potential of healthy adults in the workforce; in this regard, India has a long way to go before it fully utilises all of its healthy adult populations. However, the most recent numbers show that female labour force participation (FLFP) among Indian women has plummeted from 42.74% in 2005 to

24.53% in 2019. This precipitous drop occurs despite an increase in education enrolment and a decrease in the fertility during the same time frame. Using large-scale observational data, Gupta (2023) investigated the supply-side determinants of low female labour force participation (FLFP) from 2005 to 2019. Among the significant supply-side determinants of female labour force participation identified by the probit regression model are a woman's age, level of education, marital status, household size, number of children, social and economic status, and the type of work she does. Another study shows that marriage has a more significant negative effect on employment in urban India (Sorsa et al., 2015). These findings do not prove a causal relationship, but they do pinpoint key factors that contribute to their underrepresentation in the labour force. Several reports have highlighted the persistent problem of the wage gap (of 28% in 2018-19) between men and women in the workforce Walter & Ferguson (2022). There is only one field-experiment conducted in India (Banerjee et al., 2009), despite the growing literature of field experiments on hiring discrimination highlighting the gender gap in call back rates (Petit, 2003; Arceo-Gomez & Campos-Vazquez, 2014; Bertrand & Mullainathan, 2004). Female applicants to private sector IT jobs in Delhi face discrimination, as shown by a study (Banerjee et al., 2009). Similarly, a PLFS (periodic labour force survey) study argued that women's greater difficulty in both finding and keeping a job explains their disproportionately high unemployment rates (Singh, 2023). It was found that women, contrary to popular belief, are more likely to participate in labour force than men. Their low labour force participation rate is due to their low employment prospects and high attrition rates.

Part III of the Indian Constitutions states in Article 15 the prohibition of discrimination on grounds of religion, race, caste, sex or place of birth. Article 16 advocates that there shall be an

equality of opportunity for all the citizens in matters relating to employment (although in offices under state). Article 15 also advocates that nothing shall prevent the state from making any special provision for women and children. It has been widely reported that it is common practice for employers and recruiters to inquire about a candidate's marital and/or parental status as part of the application process (Johari, 2014). While conducting an in depth interview with HR professionals and Owners of Hiring consultancy (in Delhi-NCR) it came to light that hiring companies give special instructions to filter out candidates at screening stage who are mothers or recently had a career break due to maternity leave. One of the respondents (who works in hiring consultancy in Delhi-NCR) also highlighted that post amendment in Maternity Benefit Act, some of the employers ask us to filter out married female candidates. In addition, according to available evidence, Indian women experience considerable pressure to have children soon after getting married from their extended families. This pressure stems from prevailing social norms and expectations that consider early childbirth as a sign of a successful marriage (Dixit et al., 2022). Due to these reasons, applicants with married marital status are associated with higher probabilities to have parenthood status soon. Nonetheless, ILOSTAT uses data from 107 countries to argue that marriage has a discriminatory impact on women's and men's labour force participation (Azcona et al., 2020). Interestingly, they found that men's labour force participation rates are higher when they are married than when they are single, although this is the case for only 18% of the countries (mostly developed) surveyed (Gammarano, 2020).

Daughters, wives, mothers (whether co-parenting or raising children alone), mothers-in-law, and grandmothers are just a few of the roles that women play in the average Indian home. These identities are intertwined with notions of what it means for women to play a specific role in the

home and how societies and families expect them to behave. The extent to which a woman is employed is strongly influenced by stereotypes and biases, as well as by the increased challenges women face in labour markets. Participation in the labour force is the primary means by which women and men around the world make a decent and dignified living. It's crucial for women and men to be able to provide for their families and is one of the primary ways that people of working age can have financial independence. Moreover, women's status within their families and communities, as well as the welfare of their dependents, particularly children, is significantly impacted by their ability to exercise financial independence and control over their own assets. Gaining a steady income is a key step towards achieving financial security, social acceptance, and personal fulfilment. Key components of decent work and sustainable development are equal opportunity and treatment in the labour market. But does everyone in our society have equal opportunity to secure decent employment?

One such improvement is a 2017 amendment to the Maternity Bill Act 1961 (MB Act) that makes it easier for women to stay in the workforce despite the many challenges they face during pregnancy. The amendment in MB Act brought three changes

1. Increased duration of maternity leave from 12 weeks to 26 weeks.
2. Leave for adoptive mothers and surrogate mothers.
3. Creche for establishment with 50 or more employees.

While this amendment was long overdue, it is important to consider the social and economic effects it will have on the Indian labour market. It is of the utmost importance to ensure that the positive intent of any legislation has no unintended negative consequences, especially when that legislation is enacted to benefit specific groups. A major issue with the MB Act is that it places the financial burden of maternity leave on employers by guaranteeing female employees paid leave during their absence, a benefit that is skewed towards women. As a result, many companies

worry that hiring women will result in an increased gendered cost if those women later decide to be a mother (Mathew, 2019). Therefore, it is possible that businesses will avoid hiring married women in an effort to save money in the long run. This anticipation will encourage employers to rationalise their discriminatory behaviour, which will decrease the number of working women.

It is vitally important for researchers and policymakers to have a better understanding of the circumstances and methods by which discrimination can be reliably detected given that it has long-lasting career effects at the time of labour market entry. As a result, the current study suggests a novel correspondence testing/resume audit based on an online-field experiment to examine how marital status affects both men and women's chances of being invited for a job interview in India. As a result, this study, which was conducted in six major cities, is the first of its kind in India (and, as far as is known, Asia) to estimate hiring discrimination with respect to marital status characteristics. Thus the proposed study seeks to answer the following questions

> *Is there a difference in treatment between men and women in the Indian labour market based on whether or not they are married? In the Indian labour market, how do differences in marital status interact with gender stereotypes and discriminatory social norms? Is there discrimination against men and women in the Indian job market based on whether they are single, or married? How significantly does a person's marital status affect his or her opportunity to be contacted for an interview?*

To answer these questions this research uses resume-audit/correspondence testing methodology to identify hiring discrimination practice at the interview-call stage, in the Indian Labour Market. The correspondence testing methodology is a field experiment technique that allows for both internal and external validity[1] (Pager, 2007, #). Nevertheless, as advocated by (Heckman, 1998) the validity depends on how effectively the confounding variables are controlled, be it observable and unobservable, mitigating its impact on treatment and potential outcome (Heckman, 1998). This is a necessary and sufficient condition for establishing causality between treatment and outcome variable in resume-audit/correspondence testing methods of field experiment. The present online-field experiment implements 2*2 matched design for sending mutually exclusive automated job applications for the teams of male and female applicants using India's largest job portal Naukri.com.

2. Expectation, Marital Status and Employment Discrimination & Stereotypes

Marriage has existed in some form since the beginning of human history (Gupta, 1976). Despite variations in mate preference and marital structure, marriage is a central social institution in every culture (Kaur & Singh, 2013, #) (Jordan & Zitek, 2012, #). Marriage is the most fundamental social institution because it is the primary means by which human capital is generated and through which individuals, families, and communities can be influenced in their behaviour (Sriram, 2017). People who are not married are usually stereotyped as being immature, irresponsible, emotionally unstable, as well as less committed (Jordan & Zitek, 2012,

[1] The level of assurance that the causal relationship you are testing is not influenced by other variables or factors is known as internal validity. The degree to which your findings can be generalised to different contexts is known as external validity.

#). Several studies have been conducted to understand the discrimination and stereotypes against single people, also known as singlism (a widespread phenomena). They conclude that singlism is a widespread phenomenon, with singles facing negative attitudes and discrimination in various areas of life, including the workplace, healthcare, and housing (Morris et al., 2008, #) (DePaulo, 2007, #) (Depaulo & Morris, 2005, #).

A research conducted by (Jordan & Zitek, 2012, #) conducted three survey experiments to investigate whether people exhibit biases in their perceptions of employees or job applicants based on their marital status, especially for women with participants from West Coast American University. In the first Experiment, participants were asked to rate how they felt about a hypothetical female employee whose fictitious marital status was changed between tests. Participants ranked a married woman's job application lower than that of a single woman's. In the second experiment, we tested whether or not employers' impressions of potential workers changed depending on the gender of the applicants. Again, respondents viewed a married woman less favourably as a job candidate, whereas they viewed a married man more favourably and committed. Participants in Experiment 3 were asked to speculate on how a female or male worker's job performance would alter after marriage and whether or not the worker would be terminated in the event of a layoff. Participants expected a woman's performance and devotion to decrease after being married, while a man's was expected to improve. As a result of this difference in opinion, the woman was more likely to be fired than the guy. In addition, the study's participants were more inclined to assume that a married woman would put her family ahead of her career, viewing her as less dedicated to her position. Married guys did not share this view.

These results imply that gender and marital status prejudices and biases influence how employers see and assess employees, particularly women.

Similarly, (Arceo-Gomez & Campos-Vazquez, 2014) used (correspondence testing methodology) to conduct a field experiment in Mexico to learn about discrimination in hiring based on marital status. The study found that married women face discrimination in the workplace in Mexico City, while married men are viewed favourably by employers compared to their single counterparts. For women, the results were statistically significant (at the 5% level), but for men, they were not. The paper finds that marriage has a significant impact on female candidates but no such impact on male candidates in Mexico, a developing country.

Nadler and Kufahl (2014) conducted an experiment in which they manipulated interview stimuli based on participants' gender, marital status, and sexual orientation. To assess the competence of job candidates in simulated interviews, 365 United States residents were enlisted via Mechanical Turk. A significant three-way interaction was found in the experiment between women's ratings, marital status, and sexual orientation, but not in men's ratings. Significant relationships were found among applicants' sexual orientation, marital status, and sex identity. The nature of the significant interaction was determined with the use of straightforward main effect testing. For lesbian women applicants, the ratings for single applicants were significantly higher than those for married applicants. On the other hand, married heterosexual female candidates were rated much higher than lesbian female applicants. In other words, when lesbian women were unmarried, they were given considerably better mean application evaluations than when they were married to a heterosexual man. Furthermore, ratings for single lesbian women were higher

than those for single gay men. This result lends validity to studies showing that males are more likely to experience discrimination on the basis of their sexual orientation than women. Furthermore, ratings for heterosexual married women were higher than those for heterosexual married men. No statistically significant differences were found between women's and men's assessments across circumstances.

As per our knowledge and two most extensive meta-analysis of almost all the recent correspondence experiment has reported very limited research has been conducted on measuring discrimination in hiring process with respect to marital status characteristics both in developed and under-developed countries Lippens et al, (2023), Baert (2018). As per the meta-analysis by Baert, (2018) there was only one study to use correspondence based field experiments in Mexico to learn about hiring discrimination based on marital status. Likewise, a meta-analysis by Lippens et al., (2023) highlighted that there has been a total of *four* experiments conducted on hiring discrimination based on marital status but failed to give the details or citation for the 4 experiments stated in their paper. In addition, we conducted a thorough search to find experiments/research papers which measures hiring discrimination with respect to marital status in google scholar and web-of-science but there was not much success even. Nevertheless, we found two survey experiments investigating whether people exhibit biases in their perceptions of employees or job applicants based on their marital status. These studies were different from correspondence based field experiments which advocated for causality (Pager, 2007).

Therefore, after extensive literature review on hiring discrimination with respect to marital status two important aspects come to light. First, the limited research on the effect of marital status on

hiring discrimination both in developed and undevelopment. This is despite so many studies highlight the marital status to be a strong predictor of low female labour participation in India (Gupta, 2023) (Sorsa et al., 2015) and other parts of the world (Azcona et al., 2020) (Gammarano, 2020). Second, even with limited research based on correspondence/resume-audit and survey experiments the results are inconclusive. Thus, in this regard, the present field experiment fill the gap and tries to estimate the causal relationship between marital status and hiring decision at first-contact stage (i.e., invitation for interview) in India. Second, it also fill methodological gap for sending mass application using India's largest job portal[2]. Third, we conducted this online-field experiment in a gender neutral sector where more that 50% of the top-management professionals are female (Avanthika, 2023) (Mishra, 2021).

3. Status Characteristics Theory and Marital Performance Expectations

Bales (1951, 1970) found that even in homogeneous groups of socially similar individuals, certain members quickly establish a hierarchical structure based on their behaviour. This hierarchy consists of four correlated behaviours - participation initiation, evaluation received, opportunities to participate, and influence over others (Bales, 1951, #) (Bales, 1970, #). Berger and colleagues formulated expectation states theory to explain the formation of status structures in groups, regardless of social similarities or differences. Their work explored how socially significant characteristics affect access to participation, influence, and positive evaluation. The

[2] In recent times several GUI and UX interfaces in job-portals have gone through a change. One such change is that job portals don't provide email-IDs of recruiters for applicants to email their job applications. Few years back this was a usual practice, as all the job-portals in India used to provide email-IDs with the job openings and applicants were supposed to email the job applications. However, due to this change, the prototype of conducting the correspondence testing methodology has to change for randomisation of status characteristics and counterbalance.

theory's explanation of status structures among people with significant social differences is the most developed and widely used aspect of the theory (Correll & Ridgeway, 2003).

Even though not all groups work together towards a common goal, those that do are an integral part of daily life in significant societal institutions like workplaces and educational institutions. Examples include formal work groups, committees, sports teams, judging panels, student project teams, formal task forces, and advisory panels. The group's collective focus on the task creates an expectation among members to assess each other's contribution to completing it. If members anticipate that a particular person will make better contributions, they unconsciously give them more chances to participate, which is known as performance expectation states. Once established, performance expectations influence actions in a circular pattern. When one agent is held to a higher standard than another, that actor is more likely to be given opportunities to perform, in contrast, the actor who is held to a lesser standard will have fewer chances to shine. As a result, the group's status hierarchy—consisting of the actors' relative levels of participation, assessment, and influence—is established and maintained on the basis of performance expectations. Relative performance expectations shapes status hierarchies, and social elements influence performance expectations in the following ways:

Performance Expectations are formed due to three factors, and it leads to behavioural inequalities or status hierarchies:

1. *Socially Significant Characteristics, for example, race, gender, physical attractiveness, parenthood, marital status, interaction of more than two characteristics.*
2. *Social Rewards*
3. *Behavioural Interchange Patterns*

The most significant of these three factors is when actors make predictions about future performance based on the socially significant attributes of persons, known as status characteristics (Correll & Ridgeway, 2003, #). In this context, "status characteristics" refer to distinguishing factors between individuals (such as gender, race, caste, parenthood, or marital status) that are widely believed to correlate with different levels of social worth and competence with one category (e.g., men or married men) than others (e.g., women or married women).

Status Characteristics Theory (SCT) is a sociological theory that examines how characteristics, such as gender, race, ethnicity, caste, marital status and education, influence people's social status and subsequent interactions. According to SCT, people often use social cues, such as caste, gender, race, parenthood, and marital status to determine their status relative to others. These cues are called status characteristics and are often used to create expectations about people's abilities, behaviours, and social worth. Once people are assigned a status, they are often treated in ways that are consistent with these expectations, which can affect their access to resources, social influence, and psychological well-being (Berger et al., 1972, #) (Berger et al., 1974, #) (Berger et al., 1977, #).

Social Characteristics Theory (SCT) emphasizes the role of social comparisons and expectations in shaping individuals' behavior, as well as how these factors can contribute to social inequality. For example, studies have shown that gender is a powerful status characteristic that can shape people's perceptions of competence and influence their behaviour in the workplace. Women are often perceived as less competent than men, which can lead to discrimination in hiring, promotions, and pay (Correll, 2001, #). Moreover, studies have found that parenthood status can also be a status characteristic that affects job opportunities and pay. Women who are mothers are

often penalised in the workplace, as they are seen as less committed to their careers than women without children (Correll et al., 2007, #).

SCT also emphasises the importance of social contexts and the role of group dynamics in shaping people's perceptions of status. For example, groups that are more homogeneous in terms of their status characteristics, such as race or gender, are often more likely to have rigid and unequal status hierarchies than more diverse groups (Ridgeway, 1991, #). Moreover, groups that are more hierarchically organised are more likely to perpetuate social inequality, as individuals who hold higher status positions often have more power to shape group norms and expectations (Ridgeway & Berger, 1986, #).

In summary, Status Characteristics Theory offers a framework for understanding how social hierarchies are constructed and maintained, as well as the ways in which they can contribute to social inequality and its justification. By highlighting the role of status characteristics and social expectations in shaping individuals' behaviour and opportunities, SCT offers insights into the mechanisms that contribute to social stratification. The theoretical framework of Status Characteristics Theory (SCT) – which is a subtheory of expectation states theory – claims that when a status characteristic is salient, actors use it to guide their behaviour and evaluations. Therefore, the present online field experiment using SCT tries to find when a status characteristic such as marital status (i.e. single and married) is salient among employers (for male and female applicants) does it guide them to have differentiated behaviours and evaluations in first-contact stage hiring process in Indian Labour Market. Notwithstanding, the theory predicts that performance expectations differentiate high-status actors (such as men, married men)[3] from

[3] The work by (Morris et al., 2008) have shown that single men are perceived to be less responsible than married men in US society. A survey conducted by pew-research highlights that respondents overwhelmingly stated that

low-status actors (such as women, married women)[4]. Therefore, the online-field experiment test the following hypothesis:

Hypothesis 1: The study expects that married women in India are less likely to be invited to a job interview than single women.

Hypothesis 2: The study expects that married men in India are more or equally likely to be invited to a job interview than single men.

4. Method

A case of workplace discrimination exists "when people who supply labour market services and who are equally efficient and productive in a physical or intellectual sense are treated unequally in a way that is related to an observable trait like race, ethnicity, or gender," as stated by (Altonji & Blank, 1999, #). They also argued that wage discrepancies are not necessarily indicative of discrimination due to missing information in observational survey data[5] . Due to the difficulties in inferring unequal treatment from observable data, researchers have utilised a variety of Quasi-Experimental Design (Q.E.D.) and experimental approaches to measure discrimination in the workplace during the first-contact stage of hiring process. In order to test whether minorities and majority (black and white; men and women; mother and non-mother; single and married) are treated differently in the workplace, researchers have conducted audit studies[6] (in-person audits)

when there is shortage of jobs in the labour market male applicants shall be given preference for employment (Evans et al., 2022).

[4] Several studies advocated that marital status is a significant determinant for low female labour force participation in India (Azcona et al., 2020) (Gupta, 2023, #) (Gammarano, 2020). Moreover, it is general practice for an interviewer to ask the marital and parenthood status of a female candidate in job interviews (Johari, 2014).

[5] It's very hard to find causality in observational survey data (such as NSSO and IHDS), as there may be several observable and unobservable confounding factors causing the treatment and outcome variables (Pearl, 2009).

[6] The matching (or not matching) approach for audit studies and the correspondence testing method are the same for both. The sole distinction is that real testers are used in the former, while hypothetical candidates' job applications are submitted in the latter.

or correspondence testing of the labour market (Bertrand & Mullainathan, 2004, #) (Bertrand & Duflo, 2017, #) (Pager, 2007, #) (Pager, 2003, #) (Pager et al., 2009, #) (Correll et al., 2007, #) (Hipp, 2020, #) (Arceo-Gomez & Campos-Vazquez, 2014, #). Nevertheless, there remain various challenges with in-person audit studies (Heckman & Siegelman, 1993, #) (Bertrand & Mullainathan, 2004, #). For in-person audit studies either the "employers" know the experiment is being done, or it is hard to be sure that the "observationally identical" people in a pair really are the same. Finally, correspondence testing studies (or resume-audit) such as this one provide the clearest evidence of different treatment based on marital status at the first contact stage of the hiring process, i.e. whether or not applicants are called in for an in-person interview (Pager, 2007). In these studies, researchers alter the perceived gender, race (or other group membership characteristic) of applicants by giving them names that signal a certain social group.

4.1 Why Discrimination is Hard to Measure

Socio-economic inequality persists due to exclusion and discrimination. However, it is probable that individuals are not as cognizant of new types of prejudice and discrimination because they are more sophisticated, implicit and understated. Contemporary societies are regulated by stringent social and legal standards that prohibit all forms of discrimination. Therefore, prejudiced individuals may feel compelled to hide their biases in a way that appears impartial. As a result, if they maintain significant biases against a particular group (such as men and women; single and married), employers (or other gatekeepers) may have a clear incentive to mask their discriminatory behaviours under performance expectation pretexts. As this type of prejudice is seldom apparent in the mainstream, it is plausible that it is quite widespread in specific circumstances.

The ongoing debates about the importance of discrimination in present times are partly due to the challenge of identifying, quantifying, and proving the existence or absence of prejudice and biases, except in the most severe cases. One potential solution to this problem is the use of field experiments (resume-audit/correspondence) to assess employment discrimination. Although such experiments have their limitations (Heckman & Siegelman, 1993, #) (Heckman, 1998, #), they offer certain advantages, such as the opportunity to directly observe discriminatory practices, as noted by (Pager, 2007, #).

Despite this, discrimination is extremely hard to quantify (Pager et al., 2009, #). Nevertheless, the proposed study intends to address the following question: Does employer's[7] in Human Resource domain[8] discriminate against marital status at first-contact stage of hiring process? Is

[7] In this experiment the jobs which hypothetical applicants applied to were from two types of recruiters, one type of jobs were from direct employers and other types were from hiring consultancies, recruiting on behalf of real employers.

[8] The experiment chose this sector as this was the only gender neutral sector in India where employees at all levels lower, middle and higher level had representation from both the gender. Nevertheless we selected HR resource for the following reasons:

- To minimise the risk of confounding effects due to personal & occupational characteristics (such as gender etc.) that may block the path of our causal inference between status characteristics and call back rates, we chose a gender balanced/neutral domain such as HR.
- Increasing the external generality of the findings was one of the key reasons for conducting the field experiment within a gender neutral occupational domain that is not concentrated in just a single economic sector or corporation type.
- The availability of job openings for Human Resources professionals in various job portals in India was a key factor in selecting this profession for the field experiment in cities such as Delhi, Bangalore, Mumbai, Chennai, Hyderabad, and Kolkata.
- Due to the increased unemployment rate in India post-COVID-19 and the ability to conduct the experiment in a gender balanced/neutral occupational domain, we restricted the study to the HR profession. This help to control the gendered effect in call-back rates.
- Given that almost all sectors in India are male-dominated, we selected the gender-balanced HR profession to conduct the experiment. The decision-making position in HR professionals being close to gender balanced made it an interesting profession to study with respect to status characteristics such as marital status.

there a magnitudinal difference in interview invitation for single and married same gender pairs (for male and female) applicants?

Discrimination is established if candidates with the trait of married and parenthood status - in both female and male pairs - have a lower probability of being invited for either telephonic or in-person interview. To measure discrimination the study created two sets of resumes/CVs for each trait, where each set of resumes consist of a pair of fictitious and equally qualified belonging to the same gender (i.e. either both male or both female). Moreover, both the sets for a particular traits/status (i.e. either for marital status or parenthood status) will be mutually exclusive for the job applications to a particular job posted by the employer. In other words, to test for hiring discrimination, we would be sending two job applicants (testers) either of female or male pairs to the particular jobs posted by employers (experimental unit) and measured whether they were called back by the employer (affirmative response) or not called for telephonic or in-person interview when one candidate is presented as married status (treatment) and the other presented as single trait (control). Likewise, when testing for parenthood status, we would be sending two job applicants (testers), where one is presented with parent status (treatment) and the other is presented as non-parent (control) for both female and male respectively.

5. Experiment Procedure and Design:

Discrimination in hiring is established when candidates who are married, regardless of gender, have a lower chance of receiving an invitation for either an online/telephonic or in-person interview. To measure discrimination, the study created two sets of resumes/CVs for each trait, where each set consists of a pair of fictitious and equally qualified individuals belonging to the

same gender (either male or female). Additionally, to test for hiring discrimination, we would send two automated online job applicants (hypothetical testers), either of female or male pairs[9], to the particular jobs posted by employers (experimental unit) in the Human-Resource (HR) domain. The online field-experiment measures whether they were called back by the employer (affirmative response) or not called for online/telephonic or in-person interview when one candidate is presented as married (treatment) and the other presented as single (control) for both females and males teams.

In order to implement resume-audit/correspondence testing in context of marital status in India Labour Market. To conduct this experiment we sent automated randomised and counterbalanced job applications in the Human Resource domain between September 3rd, 2022 to September 31st, 2022, a predefined period in the Pre-Registration[10]. By pre-registration the experiment intends to improve the transparency and reduce the potential for various types of bias, such as, conforming bias,outcome-reporting bias, publication bias (Veer & Sorolla, 2016, #). Nevertheless, the online-field experiment follows a matched design to send automated job applications for two random same gender hypothetical applicants. The prototype algorithm searched for the post of Assistant Manager in the HR domain where the elementary education qualification was Masters in Business Administration in Human Resource (MBA-HR). An important aspect of the experiment's set-up was the generation of the hypothetical applicant's name and personal information. We conducted a small survey to select names which clearly differentiate it between male and female. Moreover, all the names were kept socio-religious

[9] The experiment makes sure that automated job applications for male and female teams are mutually exclusive to online available jobs on www.naukri.com .
[10] The experiment was pre-registered on https://aspredicted.org/ for controlling the type-1 error, harking bias and publication bias.

neutral[11]. The experiment was conducted in six metro cities namely, Delhi, Kolkata, Bangalore, Mumbai, Chennai, and Hyderabad.

5.2. Online-Field-Experiment Prototype Design: For Direct Apply Button in Indian Job Portal

The present online-field experiment uses a novel prototype design on India's largest job portal in the following ways. Earlier resume-audit/correspondence testing field-experiment use to email the job applications for respective hypothetical applicants for their matched and unmatched design in India or abroad (Thorat & Attewell, 2007, #) (Siddique, 2011, #) (Banerjee et al., 2009, #) (Banerjee et al., 2009, #) (Bertrand & Mullainathan, 2004, #). Earlier, field-experiments mostly collected job openings information through news-papers (daily or weekly) (Thorat & Attewell, 2007, #). Later, with the increase in internet usage (also known as digital dividend[12]) large number of job-portals were available for employers to recruit and applicants to search and apply instantly (Singh, 2013, #). Several field-experiments used online-job portals (mostly naukri.com) to search and filter the job openings for sending CVs. Nevertheless, even though these resume-audits searched jobs from online-portals (mainly naukri.com) but sent the job applications (for hypothetical candidates) through emails (Banerjee et al., 2009, #) (Bedi et al., 2018, #) (Bedi et al., 2021, #) (Siddique, 2011, #). This was mainly because earlier, contact details of recruiting managers were provided for each job posted on job-portals. Nevertheless, with time the user-interface and web-site navigation on these Indian job portals (such as. Naukri.com, indeed.com, shine.com) has changed and improved drastically.

[11] That is, the same gender pair team had no caste or religious differentiated names.
[12] Please refer to World Development Report 2016: Digital Dividends for recent trends and usage (Group, 2016)

With the advent of the internet and its widespread usage, the process of job application has undergone a major shift. Gone are the days when job seekers would spend hours crafting a cover letter and resume, attaching them to emails and hitting send. Today, with the emergence of online-job portals, applicants can easily apply for jobs with just a single click. The ease and convenience of this direct application process has led to a significant increase in the number of people embracing this new approach to job hunting, leaving the traditional practice of emailing job applications behind (Naukri.com, 2020) (Fallon, 2023) (Recruiters, 2022). Due to these developments, naukri.com or any job portals in India does not provide contact details of the recruiter. Naukri.com do has only two modes for job seekers to apply for a job, once they upload their CV/resume (which requires regular updation), cover letter, CV/resume heading, key skills[13], IT skills (MS-Office, etc.), projects, accomplishments, preferred location and salary expectations, along with personal details[14]. First is to directly hit the apply button after login to their naukri profiles, or in a few cases the advertisement may redirect the applicants to employers web-site where they have to fill out a survey and upload the CV (Naukri.com, 2020).

Given the changes in Indian online job portals, there were two major challenges to be overcome for conducting the resume audit/correspondence-based field experiment. Firstly, we could not send job applications through email as job portals do not provide email IDs, nor could we implement automated email-audit as done by Crabtree (2018). Secondly, since job seekers have to create a profile on job portals such as Naukri.com[15], treatment salience cannot be randomised

[13] It is important to note that if the skills mentioned on the job seeker's profile on job portals match the job description, then the probability of getting a call back for the job increases.

[14] To increase the probability of getting a call, it's important for job seekers to fill in all the required information in their job portal profile. Only when all sections are appropriately filled, their profile status will indicate 100% completion. In the study, all hypothetical candidates maintained 100% profile status by ensuring all sections were filled appropriately, and their profiles were updated once in two days. Additionally, their skill sets matched the requirements for all job openings in the HR domain.

[15] No job portals in India provide contact details of recruiters, and all the applicants have to create profiles filling their details for applying to jobs on naukri.com or in other job portals.

or changed on an interval basis due to the lag between the candidate's sent application and the recruiter's actions[16]. Nevertheless, the main challenge was randomisation of treatment allocation and controlling the order effect for job application, a central aspect for matched design (even for unmatched design). To overcome these challenges, the proposed experiment offers the first prototype design for conducting online-field-experiment based on resume-audit/correspondence (refer Appendix B).

5.3. Profile on Naukri.com

The names for both male and female pair teams were kept caste and religious neutral[17]. After finalising a list of names for teams of same gender pair to use in each iteration[18] of the field experiment, we created an email account for each hypothetical applicants in male and female teams on a free email service like gmail, yahoo, and hotmail[19]. These email addresses and passwords were used to establish hypothetical (candidate) profiles for each member in male and female teams on Naukri.com[20]. There are two methods for a candidate to be considered for an interview on Naukri.com. The first one is when active recruiters[21] contact candidates directly

[16] The major challenge was treatment allocation randomisation as the nature of the profiles on job-portals were static. Though most of the interview invitations were made through phone calls, recruiters do check job seekers' profiles with time lags. Due to this we could not change the profile information or resume's uploaded on the naukri.com profiles (or in any other job-portal profiles).

[17] By neutral names we mean that there was no variation either within or between the same gender pair of teams of hypothetical job applicants.

[18] The iteration was mutually exclusive for male and female teams.

[19] Importantly, the experimenter ensured that, when sending two job applications to respective employers from either male or female teams, the two email-IDs were from separate web-based email service providers. These email addresses were deactivated once data collection ceased.

[20] We restricted our field experiment to naukri.com as it is the oldest and largest job searching platform in India (Sharma, 2022).

[21] There are two types of active recruiters on Naukri.com. The first type recruits for their own company, while the second type is a recruiting consultancy that hires on behalf of other companies. The present experiment applies to both types of jobs on behalf of hypothetical applicants.

after matching their qualifications and requirements[22]. The second method is when candidates search for jobs[23] based on their education, skills, experience, preferred location[24], and job freshness[25] (i.e. how old is the posted job), and then apply through the APPLY button on Naukri.com[26]. This method was also used in the field experiment where candidates selected jobs they wanted to apply for, and applied using the APPLY button. Therefore, the automated prototype algorithm searched for jobs everyday based on the profiles of hypothetical applicants in the human resource domain with 5 years of experience[27]. Once the applications are submitted, the recruiters review the profiles, and if they determine that the candidate meets the job requirements, they communicate with the applicant for an interview via provided email or mobile number[28]. All the hypothetical profiles (for both the genders) had filled all the relevant information (such as education, keywords, skills, experience, preferred location, experience, projects, resumes) and uploaded the relevant informations with 100% profile complete status with consistency[29]. All the profiles on naukri.com were regularly updated (on every second day) as it's a general phenomena recommended to all the job-seekers in India (Naukri Content Team,

[22] Resdex is a next-generation talent-sourcing AI algorithm offered by naukri.com to recruiters for data analytics, and exclusive features for faster and smarter recruitment decisions.

[23] Recruiter using Naurki.com publicly posts more than 1000 jobs in the HR domain each day with 5 years of experience.

[24] All the applicants stated in their respective profiles they are ready to work and move in any of the six cities such as Delhi-NCR, Mumbai, Chennai, Bangalore, Kolkata, Hyderabad to maintain the consistency in the profiles and preference for job locations.

[25] It's the number of days the job advertisement has been posted publicly on naukri.com; freshness starts with 0 (i.e. same day), 3, 7, 14 or 30 days old job advertisement.

[26] There are a few jobs posted on naukri.com that redirect candidates to the hiring company's website to fill out forms and upload resumes. These jobs were filtered out during the field experiment, as they constitute approximately 10% of the total jobs posted on naukri.com.

[27] The experiment kept 5 years of experience to indicate that the candidate is not very aged and recently got married. The median age of marriage in India has been increasing but not much. The average age at which women get married for the first time has increased by about 3 years between 1992 and 2021 and has gone beyond the minimum legal age for marriage (Singh et al., 2023).

[28] All the candidates were allotted unique mobile numbers from different service providers such as Airtel, VIO, JIO. These numbers were further registered on TrueCaller (an app which detects the Name of user) by their respective hypothetical names used in the field experiment. All the mobile numbers used in the experiment were deactivated once the data collection process ended.

[29] As in the CV/resume, the experiment followed consistency of maintaining the profiles of equal quality and signal same expected productivity for the candidates.

2019)[30]. On a regular basis all the profiles on naukri.com were updated to avoid the suspicion of recruiters[31].

Therefore, all the hypothetical candidates, either in male or female teams, uploaded their resume on the profiles. The profiles also and mentioned a resume headline, key skills[32], employment history, education[33], IT skills (MS-Office, HRIS, etc.), projects completed, profile summary[34], awards & accomplishment[35], personal details[36] and marital status[37] on the profiles on job portal. All the candidates (irrespective of genders) expressed their readiness to relocate from their current location[38] by specifying their preferred work location in Delhi, Mumbai, Bangalore, Chennai, Kolkata, and Hyderabad. Likewise, all the candidates mentioned their expected salary and desired to do a permanent job with a preference of day-shift in the department of human resources.

5.4. Pool of Resumes

In this stage of the experiment, we created resumes for hypothetical candidates from different gender teams to be uploaded on Naukri.com. To conduct the experiment, the researchers had to create hypothetical resumes that were convincing enough to potential employers. To create these

[30] The regular updation of profiles also reduces the chance of detection of field experiments.
[31] It is a general practice of real job seekers (on any job portals) to update their profiles. So as to reduce the suspicion and detection of field experiments the profiles on naukri.com were updated everyday or once in two days in random order.
[32] The skills mentioned in the profile (and CV/resume) was exhaustive for post in the HR domain.
[33] All the hypothetical candidates completed Masters in Business Administration with specialisation in Human Resource.
[34] A profile summary on Naukri.com is an important component of a job seeker's profile that provides a brief overview of their professional background, skills, and experience. It consisted of information such as the job seeker's current job title, years of experience, relevant skills, achievements, and qualifications.
[35] Every hypothetical candidate had two-three awards or letters of appreciation mentioned in their CV/resume and profiles.
[36] Each candidate's gender, marital status, date-of-birth, address, and language proficiency was mentioned in personal details.
[37] Irrespective of gender teams, applicants who were randomly selected to be single or married, thier status were mentioned on naukri profile.
[38] All the candidates had correspondence addresses from Delhi-NCR. Furthermore, the address mentioned in their CV/resume or profile did not indicate any difference in their socio-economic conditions.

resumes, the experimenter (along with HR professionals expertise on CV/resume building) examined actual resumes of human resource professionals who were looking for Human Resource Manager positions with a minimum of five years of experience on job portals such as http://www.naukri.com and https://in.indeed.com. These resumes[39] served as models for creating similar resumes for both genders in the experiment. We removed personal information such as names and locations from these resumes, and also changed key details such as applicant names, addresses, employer names, and names of educational institutions. The information from each resume was then mixed with information from other real resumes[40]. To ensure the authenticity and credibility of the experiment, we took great care in creating the resumes for the teams male and female candidates. We wanted to replicate the style and format of actual job-seekers' resumes as closely as possible while avoiding the use of real ones. Keeping this in mind, we made sure to use different fonts and designs for the resumes of male and female candidates while maintaining the same level of quality for both. To reduce any potential biases in the hiring process, it was important to create a group of hypothetical candidates with similar educational and professional backgrounds. For this reason, all candidates had completed their Masters in Business Administration in Human Resource Management from a private institute in Delhi-NCR in 2015-16, and all had received three awards or recognitions from their respective employers. Additionally, the correspondence addresses of the candidates were chosen carefully to reflect similar socio-economic backgrounds, which could have a confounding effect on the callback rates for interviews (Thorat & Attewell, 2007) (Banerjee et al., 2009) (Heckman, 1998) (Heckman & Siegelman, 1993). The contact information on the resume had a mobile number for

[39] In total, we looked at 40-45 resumes of Human Resource professionals who had five years of experience and were working as Assistant Managers (HR)

[40] Tailoring the resumes to meet industry norms and consulting with HR professionals (recruiting in the HR domain) were essential steps in the experiment. This approach helped to create a real alike resume of job seekers and reduce the chances of detection or suspicion by recruiters.

each applicant along with their email-ID[41]. Along with this we also added the Linked-IN ID in the contact details to reduce the suspicion of the recruiter. As a result, we have a collection of high-quality, realistic resume templates and profiles of an equal quality[42] (on naukri.com) for human resource management professionals with 5 years of experience. To ensure the accuracy and relevance of our experiment, we took a crucial step before creating the CV/resumes and profiles on Naukri.com. We conducted in-depth interviews with Human Resource professionals and owners/managers of hiring consultants to gain insight into their decision-making process when it comes to hiring job seekers in the human resource management field. The appendix-A provides additional details about our questionnaire used in in-depth interviews with hiring professionals. While Appendix-B provides the parameters used for creatings the pool of CV/resumes and profiles for this experiment.

5.5. Blinding:

The experiment uses two levels of blinding for reducing the subjective bias. Firstly, the marital status of the applicants in a team were randomly assigned without the knowledge of the experimenter. Suppose we wanted to create two teams[43] consisting of candidates of the same gender (e.g. female for simplicity). In each team, there would be two candidates[44] of the same gender. For any two (same gender) candidates in a team, we initially randomly assign the marital

[41] The experimenter made sure that all the hypothetical applications had their respective mobile numbers, email-IDs, and LinkedIn IDs.

[42] To control the observable and unobservable confounders in the experiment between treatment and outcome variables (Heckman & Siegelman, 1993) (Heckman, 1998).

[43] The quality of the resumes within and between the teams of same gender was of an equal standard and was maintained with strict consistency to signal that their expected productivity would be identical. This approach was taken to eliminate potential biases due to variations in the quality of resumes between the treatment (married) and control (single) groups in the field experiment on hiring discrimination in the Indian Labour market.

[44] The experimenter did this because resumes and other information uploaded on naukri.com profiles cannot be changed on a regular interval. Therefore, if the candidates' resumes or other information were kept changing, it may have created inconsistencies in the profiles and raised suspicion among the recruiters, who often check the profiles on naukri.com.

status (i.e., either married or single), where each member of the (same gender) team is equally likely to be assigned a marital status of either married or single. The experiment did this for both the same gender teams. Secondly, the automated algorithm searched for job openings in the human resource domain on a daily basis which satisfied the search criteria (such as, years of experience, name of position, six cities etc.). After the jobs were searched the prototyped automated algorithm fortuitously selected[45] the job openings to be applied. Therefore, once the prototyped algorithm finalised the list of jobs openings for applying through naukri.com, it was randomly assigned to respective teams[46], without any knowledge of the experimenter. Furthermore, the experiment was pre-registered on https://aspredicted.org/ to control for Type-I Error and Harking bias. Pre-registration was intended to improve transparency and reduce the potential for various types of bias, including confirmation bias, outcome-reporting bias, and publication bias (Hardwicke & Wagenmakers, 2023).

5.6. Searching for Jobs

Everyday the prototype automated algorithm searched for job in human resource domain publicly advertised on naukri.com for six cities (namely Delhi-NCR, Mumbai, Bangalore, Chennai, Kolkata, Hyderabad)[47]. Therefore, the online-field experiment will send the job application with respective experience and hierarchical level.

[45] The job openings were randomly selected and web-scraped on a daily basis. The jobs that did not match the criteria, such as years of experience, location, and domain, etc. were removed from the list.
[46] For better clarification refers to our detailed appendix material.
[47] The experiment was conducted in these six cities as they consist of the large percentage of (private) job openings in human resources listed on naukri.com or any other job portals in India.

Level of Job Application

Status Characteristics	Position	Experience	Hierarchical Level
Marital Status (Single or Married)	Assistant Manager HR/HR Manager	5 years	Mid-Level

The online field-experiment searched for the job openings for human resource management for the positions of Assistant Manager (HR)/HR Manager with an experience of 5 years. Everyday, the prototype automated algorithm search is randomly selected for jobs in the above-mentioned six cities between the (pre-registered) time span of September 3, 2022, and ends on September 31st 2022. During this time, job vacancies that meet our requirements, and were posted the previous day, will be applied for.

5.6.1 Automated Search for Relevant Jobs on Naukri

For automated job search we will be using the Selenium Library from Python[48] (programming) language in Anaconda- JupyterNotebook[49]. The experiment used novel designed prototype automation algorithm application to search for relevant job openings in the human resource domain based on predefined criteria. To search for relevant jobs we created a separate tester profile on naukri.com[50]. The application code controlled the google chrome web-browser and mouse and searched for naukri URL (https://www.naukri.com/) and filled-in the tester User-ID and password. Once the tester logged-in, the automated web browser using Selenium library automatically searched for relevant domain jobs opening in six cities i.e. Delhi-NCR, Mumbai, Bangalore, Hyderabad, Kolkata and Chennai. The automated search algorithm looked for jobs in HR domain in the (above mentioned) six cities based on the following selection criteria:

[48] Selenium is a library in Python language that is used to control any web-browser such as internet-explorer, mozilla-firefox and google-chrome. For web-scraping key information we used selenium and beautiful soup libraries in python.

[49] Anaconda - JupyterNotebook is an Integrated Development Environment (IDE) with GUI that can be accessed using the internet and any default web-browser.

[50] To reduce the recruiter suspicion and experiment detection the experimenter created a tester profile for web scraping the jobs urls. The testers made an automated login and search for jobs filling the search criteria mentioned above.

*Automation **Inclusion Criteria** of selecting Job Urls:*

A. Experience: Minimum of 5 years and maximum of 6 years of experience in human resource management roles.

B. Sort by Date: On the first day the experiment conducted the automated scraping of Job URLs in relevant domains that was publicly advertised on naukri.com for the last seven days[51]. Furthermore, the experimenter scraped the job-URLs on an everyday basis till the time sample-size requirement was fulfilled. If there were no enough jobs advertised on naukri.com[52] (as it was the case on official holidays and weekends) then the experiment conducted the automated search on the next or alternate working day[53].

C. Relevant Domain: The experiment limits the search for the jobs opening in the HR domain in all the sectors[54].

D. Location: The field experiment was implemented in six metro cities of India. Therefore, all the scraping of job-URLs was done for Delhi-NCR, Mumbai, Bangalore, Hyderabad/Secunderabad, Kolkata and Chennai.

E. If the applicant can "Apply" from Naukri Portals: After scraping the list of relevant job-URLs, the experiment conducted a test to check whether the scraped URLs could be used to send job applications directly through Naukri.com[55]. The testing was conducted to ensure that any job-URLs that redirected the candidate to the employer's website instead of the "APPLY BUTTON" on Naukri.com were removed from the list of scraped URLs. Thus, the field experiment filtered out the URLs that redirected the applicant to the

[51] The experiment would randomly select a maximum of 100 URLs (out of total scraped URLs in a day) for sending job applications on a single day. This was because of two reasons, firstly, there is a cap of 50 applications per day for every applicant on naukri.com. Secondly, as we had two teams (for same gender pair, and each team had two applicants with random allocation of marital status) where each team applied to 50 randomly selected jobs from the list.

[52] It was observed that on national holidays and weekends (saturday and sunday) there were very few job openings advertised on naukri.com based on our search criteria.

[53] All the automated search for relevant job-URLs was done on working days only though the hypothetical applicants would send their automated job applications on any random day of the week.

[54] As the nature of the job for any HR professional is to manage the human resource for all kinds of organisations. The present experiment applied to all the sectors (such as IT, banking & financial, construction, manufacturing, etc.). Nevertheless, it is important to highlight that all the applicants had experience of working in multiple sectors such IT, banking and financials, etc.

[55] There are two ways in which a candidate could apply to any job advertisement on naukri.com. One is to directly hit the "APPLY BUTTON" for each of the jobs that the candidate wishes to send their job applications to the respective recruiter. While in a few cases when an applicant hits the "APPLY BUTTON" instead of sending the application to the employer, naukri.com redirects the candidate on employers website to fill an application form and upload their resumes for respective job openings (such cases only consist approx 10% of the total jobs available in the domain).

employer's or company's website[56]. The final list of URLs included only those jobs for which applicants could apply directly through Naukri.com by clicking on the "APPLY BUTTON".

F. **Job application between the two teams of same gender pair applicants will be mutually exclusive:** This is to say, after the automated urls search the job openings will be randomly allocated to the two different (same gender) team pairs. Each team has two applicants and their marital status characteristics were randomly assigned to them. The study follows within subjects (employers) matched design for sending the job application. In other words, while applying to each randomly selected job-URLs, the automated algorithm will make sure that two teams (of same gender) are mutually exclusive linked to the jobs or employers and the order of job applications within a team are counterbalanced[57] for controlling the order effect. The automated applications strictly follow counterbalancing.

G. **Job Portals:** We will only search and apply to jobs from naukri.com web portal. As mentioned in the Pre-Registration the URL collection for the above mentioned jobs started on September 3, 2022, and ended on September 31st 2022. During this time, our prototype automated algorithm will search Naukri.com, a leading job portal in six metro cities that satisfied our search criteria.

H. Mutually Exclusive Jobs Allocation for Male and Female Teams: It's very important to highlight that once the job URLs were scraped it was randomly divided between the pair of male and female teams. Suppose, if 200 job urls were scraped and tested then 100 was randomly allocated to male teams and the other 100 to female teams. Therefore, the job urls allocated between male and female teams are mutually exclusive.

5.7. Sending Application to Job Advertisement:

The first stage in the experiment procedure was to collect the job-URLs in the domain areas - Human Resource Management -based on the above mentioned selection criteria. The final step for this correspondence testing field experiment was to send job applications by hitting the

[56] All the jobs which were filtered-out had a title "APPLY THROUGH COMPANY WEBSITE" on naukri.com.
[57] The field experiment on correspondence testing follows with-in subject matched design. For matched design we follow strict randomization and counterbalancing before sending the application on naukri.com so as to control the order effect. The automated job applications strictly followed counterbalancing.

"APPLY BUTTON" on naukri.com. Nevertheless, the important aspect of this experiment was to follow the randomisation and counterbalancing while applying for jobs[58]. Notwithstanding, the prototype design for sending automated job applications was followed separately for male and female teams to control the gender effect with marital status. Therefore, the study conducted two separate experiments, ceteris paribus i.e. everything remained the same, for male and female teams.

Once the suitable job-URLs were identified, two matched pairs (for male and female applicants separately) applied to the jobs on naukri.com by hitting the "Apply Button". The automated algorithm kept a gap of few hours between two job applications sent to a sender to minimise suspicion or detection of the experiment[59]. Therefore, for sending the prototyped automated job applications for either the male or female team of applicants followed randomisation and counterbalancing for controlling the order effect. Everyday each member of the team could apply to only 50 jobs, this is a limit defined by naukri.com for each applicant (Naukri.com, 2020). Therefore, each day when there were a sufficient number of jobs available in the above mentioned domain the two teams (of same gender pair) sent their automated applications to 100 jobs (50 jobs for each team)[60]. Most importantly, the job application between two teams (of same gender) of hypothetical candidates will be mutually exclusive. The following section will state the procedure of randomisation and counterbalance followed while applying to jobs. The appendix-C provides additional details about randomisation and counterbalancing while sending the job applications to respective job vacancies.

[58] Randomisation and counterbalance are the most important aspects of correspondence testing using with-in subject matched design (Vuolo et al., 2015) (Vuolo et al., 2018).

[59] The experiment kept a minimum difference of two hours and maximum of 4 hours between two applicants for each randomly selected job.

[60] The experiment follows within-subject matched design meaning sending two jobs applications with respective status characteristics (single or married) following randomisation and counterbalancing to a particular employer/recruiter with time lag.

5.8. Recording the Responses

Recording the call-back response is crucial, and there are two types of call-responses that have been discussed and recorded in the literature of resume-audit/corresponding testing field experiments. However, the experimenter in this study recorded only those call-backs as an outcome variable in which the hypothetical candidate was invited for the in-person, telephonic or online interview. This is in contrast to the majority of correspondence studies on hiring discrimination (e.g. Thorat & Attewell, 2007; Banerjee et al., 2009; Siddique, 2011; Bertrand & Mullainathan, 2004; Correll et al., 2007 and others). The outcome variable of this study shows that the company has interest in the candidates as potential employees (Riach & Rich, 2006, #) (Hipp, 2019, #), although an interview invitation is not a guarantee of a job offer.

The term "callback"[61] is commonly used to describe any form of communication between a potential employer and a candidate, such as requests for additional papers, enquiries regarding relocation, current “cost to company”, notice period in addition to interview invites, etc. Since call back rates are typically greater than interview invitation rates, a larger sample size is needed for research with callbacks as the outcome variable compared to studies with invitations as the outcome variable, assuming that callbacks follow the same pattern as invitations (Vuolo et al., 2016; Vuolo et al., 2018).

We could not rely on employers leaving messages for the applicants to record callbacks for interviews because answering machines are not often used in India by the applicants and voicemail is not included in most cell phones. The experiment was able to easily monitor call-backs for interviews because each hypothetical candidate had their own dedicated

[61] Here call back indicates any kind of contact form the recruiter/employer to the candidate; it may or may not be call for in-person or telephonic interview.

mobile-phone and number. Phone calls and email addresses of respective candidates were checked for responses on every day basis. If in a few instances, as it has been, the phone calls were missed on mobile devices (for respective candidates). A return call was made for the respective hypothetical applicants on the number of received "missed calls" on the same day within an hour. As the interest of the experiment was to track the invitation for interview instead of usual call-backs for each call it was intently inquired about where the call was from?; Name of the organisation?; Did the applicant has applied to this job[62]?; Salary Offered?; Location of Job vacancy?. The call for interview by the respective employer[63] was mostly through phone calls, not only because it's convenient but over a phone it's very convenient for the recruiter to get the que for productivity expectation, communication skills and other soft skills[64]. Last but not least, the experiment also kept record of the recruiter messages in "Recruiter Communication" section on Naukri portal for recording the invitation for interview[65].

When it was established that the call from the respective employer was an invitation for interview (either in-person or online)[66] from the respective applied jobs and all the relevant

[62] For every call received on the mobile number of hypothetical applicants it was intently asked whether the applicant has applied for the specific job-vacancy the recruiter is calling or they are calling only after finding the profile.

[63] On naukri.com there were two kinds of recruiters actively looking for candidates. One kind was of the direct employer who posted their vacancies time-to-time for attracting good fit for their respective companies. The other were HR Consultancy companies who hired candidates with the given requirement and specifications provided by the actual organisation/corporates/agencies hiring the candidates. While conducting an in-depth interview with some of the HR professionals or HR consultancy owners it came to light that the actual companies and corporates give specific details (both personal and professional) what kind of candidate they are willing to hire. For instance, marital and parenthood status of a candidate was one of the prominent instructions given to the consultancies by the hiring companies apart from professional ones. Although, there is no mention of the caste instruction explicitly, one of the HR respondents did mention about the religious identities as an instruction by a few small and mid size organisations in Delhi-NCR.

[64] All the research assistants who helped in data collection had fluency in English and Hindi. In addition, they were in their final year M.B.A in Human Resource so they could easily handle the technical discussion over the calls with the recruiters.

[65] Although the experiment kept a record of the recruiter's messages in the "Recruiter Communication" section on Naukri.com, there was no response through this medium for interview invitation or any type of call backs.

[66] The majority of the invitation for the interview was for an online-interview.

information was collected from the invitation call. The offer for the interview was gently declined , by explaining that the candidate had just accepted a different job opportunity. Although, the online-field experiment on correspondence testing started sending job applications from September 3rd, 2022 till September 30th, 2022[67]. The responses for interview invitations were kept recording till 15th November 2022. The experiment kept this buffer time of 15 days as it was observed in some cases that the recruiter took 7-10 days of time to get back to job applicants.

Along with the responses from the recruiters/employers, the experiment also collected data through web-scraping for each job the hypothetical candidate applied in due course. The field experiment web-scraped the following information about the jobs selected based on **Automation Task.**

1. Title/Position of the Job
2. Name of the Company
3. Ratings of the Company
4. Experience Required
5. Salary range offered
6. Location of the job i.e. city
7. Work from Home or Office Work
8. Date of job posted on job-portals

[67] Earlier field experiments in India or any other countries had mostly used newspapers for filtering job openings. Even studies those have exploited naukri.com such as (Siddique, 2011) (Banerjee et al2009) had usually filtered the jobs manually and emailed the job applications on the email-ID given on naukri.This is the main reason why these studies took 3 to 4 months to complete the experiment. Nevertheless, in modern times most of the job vacancies on naukri.com (or on other portals) do not provide any contact details of the recruiter (including email-ID) and the candidate can directly apply through the naukri.com portal. Likewise, it was not only very convenient for the experiment to conduct an automated search for jobs and web scraped the information but to send the automated job applications. This helped the field experiment to conduct the experiment in one month's time.

9. No. of openings

10. Total job application to the job

11. About the company

5.9. Sample Size

The experiment has followed a Randomised Block within subject (Matched) design. Thus in the randomised block design, comparisons are made within the experimental blocks i.e. comparing two applicants of same gender (with distinct marital status characteristics) for a particular job opening. In other words, this design blocks any confounding variables that may affect either the treatment allocation or the potential outcome, as the hypothetical applicants only differ with respect to the experiment treatment i.e. marital status.

Statistical power is crucial in estimating sample size for resume-audit or correspondent test investigations in order to identify significant effects. The magnitude of the difference is a crucial metric in establishing potency. In other words, at what magnitude difference between the population means a certain sample size has a fair likelihood (i.e. 80 or 90%) for detecting the treatment effect with (P 0.05) of statistical significance. This is how we arrive at the number of samples required to reach statistical significance (P 0.05) in 80%-90% of cases: we pick a difference in magnitude and work backwards. Therefore, we need to grasp a few crucial values (here 1 denotes affirmative response and 0 indicates negative response), before coming to a judgement about the sample size for this study[68].

[68] A detailed analysis given by (Vuolo et al., 2016) advocates that if the distribution of concordance for a treatment (i.e. Upper Caste, Lower caste and Muslim) is more that 50% of the data set along with significance level of 0.05 and power of .80 (1-ß = 0.80) than the required sample size would be 103. Nevertheless, the experiment was conducted using naukri portal where the employer response rate is relatively very less (especially post-covid) than those experienced by earlier experiment on email-correspondence testing (Siddique, 2011) (Thorat & Attewell, 2007) (Banerjee et al., 2009). This was one of the reasons why the present field experiment sent more than 2000 job applications in a month.

$P_{S,M}$ = This represents the sample proportion for Invitation for Interview. The subscript S represents "Single" applicant (0 indicating negative response and 1 indicates affirmative response from employers). While M represents the responses for "Married".

P_{11} = all the two testers receive an affirmative response.

P_{00} = all the applicants received a negative response.

P_{01} = "Married" applicant receives affirmative and "single" receives negative responses.

P_{10} = "single" receives positive and "Married" receives negative responses.

$P_{DD} = P_{01} + P_{10}$ is the total **Discordance.**

$P_{CC} = P_{11} + P_{00}$ is the total **Concordance**

As the study has proposed to follow (within subject) matched design, the difference in **discordance** is the object for the statistical significance known as Mc Nemar test (Voulo et al 2018). It is advocated, that the requirement of sample size is small, for a matched design, when the value of Concordance is higher (i.e. P_{CC} >0.5). Thus, the value of total concordance greater than 0.5 represents the point at which half or more than half of the tests in experimental units (employers) have the same outcome (i.e. either $P_{11} + P_{00}$). In situations like this, matching design is efficient and preferred and the sample size requirement is small[69].

The termination of the data collection would be based on the following parameters:

A. When the data collection process satisfies the criteria of difference in discordant cell distribution (of minimum 3 %) along with the total concordance greater than 0.5 (i.e. P_{CC} >0.5).
B. When the collected data guarantees the power of 80 percent along with the value of β=0.2 and α=0.05.

[69] For clarity please refer to (Vuolo et al., 2016)

Once, the above mentioned criteria are fulfilled the data collection procedure would terminate.

Notwithstanding, the experiment exceeded the total number of sample sizes required as per the criteria of total number of concordance and power analysis. One of the major reasons was due to the very lower call-backs rate for jobs applied on naukri.com (This was highlighted in in-depth interviews with HR professionals, especially in the post-COVID-19 period). This is mainly because of two reasons, firstly, while conducting in-depth interviews with HR professionals and HR consultancy owners it came to light that naukri.com provides services for a recruiter called "ResDex" and it's very prominent among the HR professionals. To use this index, the hiring team just feeds in the key features that they are looking for in a candidate and it gives them a list of prospective candidates available on naukri.com. Secondly, in the post Covid-19 period we assume that there has been a slight decline in the number of job openings in the domain we were applying for and the competition is high, which was highlighted in the in-depth interview with HR professionals.

6. Results of the Experiment

The field experiment's key findings are broken down by hypothetical applicants' status characteristics and the percentage of their applications that resulted in an invitation for interview or an offer of employment[70]. Table.2. provides the simple descriptive statistics for the job applications sent for the correspondence testing field experiment with respect to marital status.

A total of 934 job vacancies for male applicants and 982 job vacancies for female job seekers in HR domain were applied from 3rd September 2022 to 30th September 2022 using Naukri.com

[70] The nature of recruitment for the private sector in the Indian Labour Market has changed drastically with the change in technology and digitisation (especially after COVID-19). In India recruitments for job vacancy are done in two ways: i) the company may be directly involved in the hiring process (job advertisement, inviting application, screening, shortlisting, reaching out the applicants, conducting interview, final selection); the other way through which companies do the hiring is by consultancy firms. The hiring consultancy does the job advertisement, inviting application, screening, shortlisting, reaching out the applicants, fixing the interview. The last stage in the hiring process (i.e. conducting interview and final selection) are done by the respective companies looking for candidates. The field experiment has considered both kinds of job openings advertised by recruitment consultancy and the actual companies for the candidates.

(India's largest job portal[71]). In aggregate 1964 job applications were sent (two applications for each job) for female candidates while for male 1868 job applications were sent. Job vacancies were scraped randomly from publicly advertised by the respective companies and recruitment consultancies[72].

Table 1: Confusion Matrix for Females

		Single		
		Invitation	**No-Invitation**	**Total**
Married	**Invitation**	15 (1.5%)	13 (1.3 %)	28 (2.8%)
	No-Invitation	29 (3%)	925 (94.2%)	954 (97.2%)
	Total	44 (4.5%)	938 (95.5%)	982 (100%)
Marginal Proportions	**P1 (Married) = (28/982) = 0.0285**		**P2 (Single) = (44/982) = 0.0448**	

Table 2 : Confusion Matrix for Males

		Single		
		Invitation	**No-Invitation**	**Total**
Married	**Invitation**	23 (2.5%)	27 (2.9%)	50 (5.4%)
	No-Invitation	21 (2.2%)	863 (92.4%)	884 (94.6%)
	Total	44 (4.7%)	890 (95.3%)	934 (100%)
Marginal Proportions	**P1 = (50/934) = 0.0535**		**P2 = (44/934) = 0.0471**	

[71] https://www.zimyo.com/insights/top-job-portals-in-india/

[72] The corresponding testing field experiment has applied to both kinds of jobs; the jobs advertised by respective companies/employer's and the one advertised by recruitment/hiring consultancy. The latter does all the process on behalf of the hiring company except conducting the interview and final selections (in few instances they do all), as per the in-depth interview with the hiring consultant.

In Table 1 and 2, the total number of interview invitations for female and male teams were recorded. Table 1 reveals that married women are less likely to receive a call back compared to single women for the same job. The data indicates that single women are more than twice as likely to receive an interview invitation compared to their married counterparts. Likewise, a marginal proportion for a married female applicant is 0.0285 while for a single female applicant is 0.0448. The results of the field experiment reveal that married women are doubly discriminated against in gender-neutral domains (such as Human Resource) compared to single female applicants. The results of the study indicate that despite having a significant representation of women in mid and senior management roles (in Human Resource Management), status characteristics still have a significant impact on hiring decisions. This suggests that stereotypes and prejudices against married women still exist, despite progress towards gender equality. Furthermore, the findings suggest that the Maternity Bill of 2017, which places additional gendered costs on employers, may be contributing to this discrimination. The discriminatory hiring practices against married and mother applicants were reinforced by the in-depth interviews with hiring professionals and hiring consultancy owners. The study found that employers have been giving explicit instructions to recruiters to filter out these applicants since the implementation of the Maternity Benefit (Amendment) Act in 2017, which places additional costs on employers. These findings highlight the prevalence of stereotypes and prejudices against married and mother applicants, even in areas where gender is not explicitly considered in hiring decisions and the workforce is largely dominated by females (Avanthika, 2023). Table 2, reveals that there is not much difference in interview invitations between married and single men. On the other hand, marginal proportions indicate that married men are (slightly)

more likely to receive an interview invitation (0.0535) than an applicant who has a marital status of “single” (i.e. 0.0471). This phenomenon is well documented by (DePaulo, 2007) (Depaulo & Morris, 2005) how single mens are stereotypical as less serious and committed.

"To understand the difference in interview invitation rates between male and female applicants (mutually exclusive experiment for both the genders) in a gender-neutral sector such as human resources, this study conducted hypothesis testing with statistical significance and power analysis after performing elementary analysis. In other words, the study aimed to test whether there was a significant difference in the first-contact stage (interview invitation) of the hiring process for male and female applicants. The study aimed to investigate the presence of gender biases in the initial screening of resumes and job applications based on differences in marital status.

Proportion (Risk) Differences: In the context of the study on married and single women's (or men’s) job applications, the proportion (risk) difference would measure the difference in the proportion of women (men) who received interview invitations between the married and single groups. The results (refer to **Appendix D**) highlights that the value of proportion (risk) difference is negative -0.0163 (at $\alpha = 0.05\ and\ P\ level = 0.0136$, two sided testing) for female applicants with different marital status. This negative difference means that single women are more likely to receive interview invitations compared to married women. While for the male team the value of proportion (risk) difference is positive 0.0064, indicating positive discrimination for married male (and negative discrimination for single applicants) but without statistical significance.

Proportion Risk Ratio:

In the context of the study on hiring discrimination based on marital status, the proportion (risk) ratio for married women compared to single women was found to be 0.6364 (at $\alpha = 0.05 \; and \; P \; level = 0.0136$, two sided testing). This indicates that married women are 36% less likely to receive a call back than single women applying for the same job. Moreover, a proportion (risk) ratio of 0.6364 indicates that the risk of getting a call back for married women is about 63.6% of the risk of getting a call back for single women, all other factors being equal. In other words, single women are about 1.57 times more likely to receive a call back than married women. This suggests that marital status has a significant effect on the hiring decision and that married women are discriminated against in the initial screening of job applications. While for male teams the proportion (risk) ratio for married men compared to single men was found to be 1.1364, highlighting that married men are more likely to receive interview invitations than single men, though not statistically supported.

7. Ethical Consideration:

This field experiment, like many others, requires ethical consideration. So it was subjected to a thorough ethics procedure at Indian Institute of Dalit Studies (IIDS, New Delhi) before the commencement of data collection. Since participants (employers and recruiters) have no idea they are taking part in an experiment, obtaining their informed consent presents a major ethical challenge. The explanation for the field experiment's use of deception and lack of informed consent is as follows:

1. Discrimination and bias in the workplace are hard to measure. Without observing the actual hiring decisions (by the companies or recruitment consultancies) it is difficult to

assess exactly how and under what conditions socio-religious identities shape employers' behaviour. Due to these constraints the experimenter conducted the corresponding testing field experiment of applying to job vacancies for hypothetical application with different marital status. Therefore, by sending equally qualified hypothetical applicants who only differ by marital status (for male and female teams), the field experiment observed the degree to which these status affect hiring decisions.

2. Several researchers from different countries across the world have used correspondence testing (also known as resume-audit studies).
3. The disruption and inconvenience are minimal using the experimental design proposed.
4. It's very important to measure the discrimination as it has a huge socio-economic cost for people and society at large.
5. The experimenter will never share information or identity of a specific company or person in the public domain.
6. Lastly, to reduce the unnecessary cost and pain to employers and recruitment consultancies (who actively hunt for right candidates on naukri.com) after 30 days of data collection (i.e. 30th November, 2022) all the hypothetical profiles on naukri.com were deleted permanently. Similarly, all the email-IDs and mobile phone numbers were permanently deactivated.

8. Conclusion and Discussions:

This study has two main contributions. Firstly, it is the first pre-registered field experiment to examine a discrimination mechanism based on marital status. This mechanism is believed to explain some of the disadvantages that married women and single men face in the paid Indian

labour market. It is important to note that India is the world's largest democracy. Second, this study introduces a novel online-field-experiment prototype design, which uses a direct apply button, for the first time in India's largest online job portal naukri.com.

The marital penalty has not been a widely studied phenomenon in either developed or developing countries, but this study contributes significantly by providing consistent and significant evidence supporting the status-based discrimination mechanism. In fact, this is the first study to demonstrate the penalty due to marital status in hiring decisions. The experiment involved using fictitious job applicants with identical qualifications and experiences, but differing only in marital status. The results indicated that evaluators perceived married women (and single men) as less competent and less committed to paid work compared to single women (and married men). As a result, married women (and single men) experienced discrimination in hiring and salary decisions too.

The first-of-its-kind online-field experiment conducted in India using the resume-audit method provides evidence for hiring discrimination on the basis of marital status. The study revealed that married females and single men experience discrimination during the initial contact stage of the hiring process. While the data supports the main hypothesis, there are a few limitations to the experiment. Firstly, the study only focused on high-status jobs that require high levels of commitment. It is unclear whether similar discrimination would be observed in lower-status jobs or jobs that are less gender-typed. Secondly, the study only examined discrimination at the initial contact stage of the hiring process. It is possible that married women would also face discrimination at other stages such as promotion decisions and salary negotiations. Thus, while the study highlights the status-based discrimination mechanism and its implications for hiring practices, more research is needed to understand the full extent of this phenomenon.

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APPENDIX A

Pilot Survey with HR professionals and Hiring Consultant in India

1. How frequently do you use Naukri.com to hire job seekers for HR positions?
2. What criteria do you consider when shortlisting candidates on Naukri.com for HR positions?
3. How much importance do you give to a candidate's work experience when shortlisting them for an HR position on Naukri.com?
4. What level of education do you look for in an HR candidate when using Naukri.com?
5. What are the key skills you look for in an HR candidate when shortlisting them on Naukri.com?
6. How do you verify the authenticity of the information provided by candidates on their resumes on Naukri.com?
7. How important is it for a candidate to have a LinkedIn profile when you are hiring for an HR position on Naukri.com?
8. Do you consider social media profiles when shortlisting candidates for HR positions on Naukri.com?
9. What is your process for conducting interviews with candidates shortlisted on Naukri.com for HR positions?
10. What are the most common reasons for rejecting candidates during the recruitment process on Naukri.com for HR positions?
11. How do you determine a candidate's fit for the company culture when using Naukri.com to hire for HR positions?
12. What are the challenges you face when hiring through Naukri.com for HR positions?

13. How do you keep yourself updated with the latest HR trends and practices when hiring through Naukri.com?
14. How effective do you find Naukri.com in helping you find suitable candidates for HR positions?
15. Have you experienced any change in hiring practices pre- and post-COVID-19?
16. Have you ever faced any fraudulent activities on Naukri.com during the hiring process for HR positions?
17. In your opinion, do individuals with different status characteristics such as marital status, parenthood, LGBTQ+ identity, or those with career breaks face any difficulties during the hiring process or in the workplace if they are hired?
18. Are individuals from diverse socio-religious backgrounds likely to face any challenges during the hiring process or in the workplace if they are selected?
19. Do you think men/women working in corporate offices/private companies are delaying their marriages and family planning?

APPENDIX B

The application material for conducting this field experiment consists of a CVs/Resumes and a cover letter (if applicable) for respective applicants. To create a realistic and suitable resume for the respective group, we collected 40-45 real CVs/Resumes of the HR professional from online job portals in India. To ensure the authenticity and credibility of the experiment, we took great care in creating the resumes for the teams of male and female candidates. The experiment included the following details of resumes and cover letters with respect to the Marital status characteristics in question.

1. **Job Position:** All the applicants were currently working in Delhi-NCR as Assistant Manager HR
2. **Name of the Applicant:** For respective pairs of applicants of the same gender the name would only highlight the gender and the study would strictly keep the social and cultural identities (such as caste and religion) constant. In other words, with two pairs of applications of the same gender both will have the same caste or religion. Therefore, the study would use the most common names of female and male candidates.
3. **Age/D.o.B:** 29 years (1994)
4. **Experience:** 5+ years of experience i.e. more than 5 but less than 6 at the time of applying for a job.
5. **Highest Educational Qualification:** Master in Business Administration in Human Resources (MBA-HR) from equally ranked business school in Delhi-NCR. While they graduated from delhi university college.
6. **Working Status:** At the time of application, all the applicants in both treatment and control conditions, regardless of gender, will have the same amount of work experience and will be employed in a similar type of company. Specifically, each

of the four applicants (in two teams of same gender) will be currently employed in an organisation with a 30-day notice period.

7. **Employer's Name:** The name of current and previous employer of the candidates will be modelled after a real but moderately small firm. The choice to use fictitious employers rather than real ones was guided by legal consideration and the fear of detection.
8. **Re-allocation:** It was clearly mentioned in each candidate's profiles that they are ready to relocate anywhere among the six metro cities. Profiles also highlighted that they prefer to work in any of these cities such as Delhi-NCR, Mumbai, Chennai, Bangalore, Hyderabad, and Kolkata.
9. **Marital Status:** It is a standard norm in India to include the personal information in their CVs and resumes. In the respective CVs there is a dedicated section which highlights the personal information of a candidate at the bottom of their resumes. Therefore, for the silence of the marital status we would mention in the resume that the candidate is married along with the name of the husband. In other words, for candidates in treatment conditions mentioned married in marital status (and husband's name instead of father's name in case of female applicants) and single for candidates in control conditions (and father's name for all the applicants). Likewise, the profile also stated their marital status in the personal information section.
10. **Skills:** The skills of all the candidates in the resumes will be kept constant so that there is a confounding effect due to the differences in skill signalling to the employers about candidates' expected productivity.
11. **Caste and Religion:** While sending the same gender paired application we would not incorporate the caste and religion dynamics. In other words, both the pair in same gender condition will belong to the same caste and religion to control for any confounding affect in our causal inference.
12. **Awards and Recognition:** All the candidates (either in male or female teams) mention three awards or letters of appreciation in their respective resumes and profiles.

13. **Extra-Curricular Activities:** All the candidates (either in male or female teams) mention two to three extracurricular activities in their respective resumes and profiles.

Appendix C

Randomisation and Counterbalancing in Sending Job Applications

For simplicity, let us understand the process of randomisation and counterbalancing for female pairs of teams. One of the main aspects of this experiment was to randomly assign the marital status (i.e. single and married) among three applicants in a team. For the experiment, we created two (same gender) team[73] where each of them had two candidates[74]. For any two candidates in a team we initially randomly assigned the marital status (i.e. single or married), where each member of the team was equally likely to be assigned as "*single*" or "*married*". The first resume in a team had an equal chance to be assigned the marital status of either "*single*" or "*married*". Once the name marital status assignment had been made to the first resume, the second resume was assigned either "*single*" or "*married*"; if the first resume had been assigned status of "*single*" the second resume was assigned to be of a "married". This was done for all the three teams and this forced one-third of the resumes to be high-caste, one-third of the resumes to be low-caste, and one-third of the resumes to be muslim.

The study follows a Within-Subject matching design for controlling the confounders and then within each pair, one applicant is randomised to receive one of the status characteristics (i.e. either single or married) and the other members of a team receives the opposite identity for any particular job opening. In other words, each team (pair of two applicants) can be thought of as a

[73] The quality of the resumes with-in and between the team was of equal standard and maintained a strict consistency for signalling their expected productivity to be identical and same.

[74] We had to do this because the Naukri.com profile information and resume can't be changed on a daily basis. This will create inconsistency in the naukri profile and may raise suspicion among the recruiters.

separate experiment, conforming to a complete randomised block design, where the employer represents as a block. Nevertheless, the major challenge was to mimic this randomisation on naukri profiles. The issue with the profile on naukri.com was that once we feed in the personal information and resume (consisting gender, marital status, etc.) , they must not keep on changing as it increases the chance of detection[75]. To overcome this challenge the experiment created a total of four (same gender) profiles on naukri portal. Let us understand this with an help of an example:

Let us suppose that we have two applicants to start for different marital status characteristics. For each job-URL, the experiment followed a matched design by sending two job applications with two different marital status (single and married). So to start, the status were randomly assigned the marital status to the first team consisting of two applicants[76] A and C i.e. (A, C).

A - (Single)	C - (Married)

To proceed further we have created one additional (same gender) team consisting of two applicants profiles.

A - (Single)	C - (Married)
B - (Married)	D - (Single)

The above indicates that we have two teams (A,C) and (B,D), however, the important thing is that A and B are identical (i.e. consistent in quality) only differs in marital status, similarly for C

[75] This is because once the applicant applies to a job the employer/recruiter reviews the application and naukri profile after a few days. If the main treatment variable keeps on changing on the profile it will raise the suspicion and chances of detection.

[76] The first profile in a team had an equal chance to be assigned a status of being “single” or “married”. This was done for all the teams and this forced half of the profiles to be “single” and the other half to be “married”.

and D[77]. Therefore for randomised and counterbalanced job applications we have the following tupples (A,C), (C,A), (B,D) and (D,B).

1st Step	First Selecting which pair between (A, C) and (B, D) will apply to first URL
	Suppose between the two automated algorithm randomly selected (**B**-102 , **D**-104)
2nd Step	In this step, the automated algorithm randomly decides which applicants will **FIRST** send the job applications in the **1st URL.**
	Suppose in the 1st URL, the FIRST application is sent for **B**-102. So the second applicant in the 1st URL will be **D**-104 after a time lag
3rd Step	Now, suppose for the **2nd Job URL** in the list, the alogorithm selects the (**A**-101 , **C**-103) pair. So, for **2nd URL** we must **first** which among the two will randomly apply first.
	Suppose we randomly selected the **A**-101 to apply first in the 2nd **URL.** So the second application in **2nd URL** will be of **C**-103, after a time lag.
4th Step	Suppose for the **3rd URL** application, the algorithm **AGAIN** randomly selected the pair of **(A**-101 , **C**-103). But, since we have already sent this pair in the **2nd URL job application. So we use the pairs from the counterbalance i.e.** (C-103, A-101)
	So in the **3rd URL** we first send the application for **C**-103 and the second application in the 3rd URL will be of **A**-101
5th Step	Suppose for the 4th URL the automated algorithm randomly selected the pair of (**B**-102 , **D**-104). But as in the last **URL** application B applied first followed by D. So for the **4th URL** we will choose the pair from counterbalance i.e. (D-104,B-102)
	So in the 4th URL automated algorithm will first send job application for **D**-104 followed by the second application in the same URL for **B**-102, after a time lag
We will follow the above mentioned prototype protocol for randomization and counterbalancing for the nth URLs	
NOTE	Most important thing to note is that the distribution between to MAIN PAIRS shall be normal distributed in the total Data Frame

[77] There should be any confusion to A distinct from C or B from D, all the four resumes and profiles are identical in quality.

For example, the table below shows the data frame that follows randomisation and counterbalancing for sending automated job applications.

Block Number	Serial Number	unique_id	url_to_apply	Marital Status
	0	B-102	https://www.naukri.com/job-listings-hr-hiring-from-tier-1-tier-2-polestar-solutions-and-services-india-pvt-ltd-noida-7-to-10-years-110222003714?src=jobsearchDesk&sid=16447652545134383&xp=1&px=1	Married
1	1	D-104	https://www.naukri.com/job-listings-hr-hiring-from-tier-1-tier-2-polestar-solutions-and-services-india-pvt-ltd-noida-7-to-10-years-110222003714?src=jobsearchDesk&sid=16447652545134383&xp=1&px=1	Single
	2	A-101	https://www.naukri.com/job-listings-hr-recruiter-for-niyukti-management-consultants-bfsi-niyukti-management-consultants-kolkata-ghaziabad-new-delhi-3-to-8-years-291121008903?src=jobsearchDesk&sid=164476525451 34383&xp=2&px=1	Single
2	3	C-103	https://www.naukri.com/job-listings-hr-recruiter-for-niyukti-management-consultants-bfsi-niyukti-management-consultants-kolkata-ghaziabad-new-delhi-3-to-8-years-291121008903?src=jobsearchDesk&sid=164476525451 34383&xp=2&px=1	Married
3	4	C-103	https://www.naukri.com/job-listings-management-trainee-human-resources-vision-india-services-private-limited-noida-0-to-1-years-240122001540?src=jobsearchDesk&sid=16447652545134383&xp=3&px=1	Married

	5	A-101	https://www.naukri.com/job-listings-management-trainee-human-resources-vision-india-services-private-limited-noida-0-to-1-years-240122001540?src=jobsearchDesk&sid=16447652545134383&xp=3&px=1	Single
4	6	D-104	https://www.naukri.com/job-listings-management-trainee-hr-apollo-home-healthcare-limited-new-delhi-1-to-1-years-010222001298?src=jobsearchDesk&sid=16447652545134383&xp=4&px=1	Single
	7	B-102	https://www.naukri.com/job-listings-management-trainee-hr-apollo-home-healthcare-limited-new-delhi-1-to-1-years-010222001298?src=jobsearchDesk&sid=16447652545134383&xp=4&px=1	Married
5	8	A-101	https://www.naukri.com/job-listings-management-trainee-hr-srl-limited-gurgaon-gurugram-0-to-5-years-100222003621?src=jobsearchDesk&sid=16447652545134383&xp=5&px=1	Single
	9	C-103	https://www.naukri.com/job-listings-management-trainee-hr-srl-limited-gurgaon-gurugram-0-to-5-years-100222003621?src=jobsearchDesk&sid=16447652545134383&xp=5&px=1	Married
6	10	B-102	https://www.naukri.com/job-listings-management-trainee-hr-executive-firm-delhi-pms-consulting-delhi-ncr-0-to-1-years-110222006377?src=jobsearchDesk&sid=16447652545134383&xp=6&px=1	Married
	11	D-104	https://www.naukri.com/job-listings-management-trainee-hr-executive-firm-delhi-pms-consulting-delhi-ncr-0-to-1-years-110222006377?src=jobsearchDesk&sid=16447652545134383&xp=6&px=1	Single

	12	D-104	https://www.naukri.com/job-listings-assistant-manager-hr-square-yards-consulting-private-limited-faridabad-gurgaon-gurugram-delhi-ncr-3-to-5-years-1102220072?src=jobsearchDesk&sid=16447652545134383&xp=7&px=1	Single
7	13	B-102	https://www.naukri.com/job-listings-assistant-manager-hr-square-yards-consulting-private-limited-faridabad-gurgaon-gurugram-delhi-ncr-3-to-5-years-1102220072?src=jobsearchDesk&sid=16447652545134383&xp=7&px=1	Married
	14	C-103	https://www.naukri.com/job-listings-hr-talent-management-od-3rd-party-hinduja-global-solutions-limited-mumbai-all-areas-3-to-8-years-310122600011?src=jobsearchDesk&sid=16447652545134383&xp=8&px=1	Married
8	15	A-101	https://www.naukri.com/job-listings-hr-talent-management-od-3rd-party-hinduja-global-solutions-limited-mumbai-all-areas-3-to-8-years-310122600011?src=jobsearchDesk&sid=16447652545134383&xp=8&px=1	Single
	16	B-102	https://www.naukri.com/job-listings-hr-talent-management-od-3rd-party-hinduja-global-solutions-limited-mumbai-all-areas-3-to-8-years-310122000009?src=jobsearchDesk&sid=16447652545134383&xp=9&px=1	Married
9	17	D-104	https://www.naukri.com/job-listings-hr-talent-management-od-3rd-party-hinduja-global-solutions-limited-mumbai-all-areas-3-to-8-years-310122000009?src=jobsearchDesk&sid=16447652545134383&xp=9&px=1	Single
10	18	A-101	https://www.naukri.com/j	Single

			ob-listings-sr-hr-executive-assistant-hr-manager-legalo2-private-limited-delhi-ncr-3-to-5-years-110222002367?src=jobsearchDesk&sid=16447652545134383&xp=10&px=1	
	19	C-103	https://www.naukri.com/job-listings-sr-hr-executive-assistant-hr-manager-legalo2-private-limited-delhi-ncr-3-to-5-years-110222002367?src=jobsearchDesk&sid=16447652545134383&xp=10&px=1	Married
	20	D-104	https://www.naukri.com/job-listings-hr-executive-manager-qubora-technologies-private-limited-delhi-ncr-1-to-4-years-110122004762?src=jobsearchDesk&sid=16447652545134383&xp=11&px=1	Single
11	21	B-102	https://www.naukri.com/job-listings-hr-executive-manager-qubora-technologies-private-limited-delhi-ncr-1-to-4-years-110122004762?src=jobsearchDesk&sid=16447652545134383&xp=11&px=1	Married
	22	B-102	https://www.naukri.com/job-listings-hr-hiring-from-tier-1-tier-2-polestar-solutions-and-services-india-pvt-ltd-noida-7-to-10-years-110222003714?src=jobsearchDesk&sid=16447652545134383&xp=1&px=1	Married
12	23	D-104	https://www.naukri.com/job-listings-hr-hiring-from-tier-1-tier-2-polestar-solutions-and-services-india-pvt-ltd-noida-7-to-10-years-110222003714?src=jobsearchDesk&sid=16447652545134383&xp=1&px=1	Single
13	24	C-103	https://www.naukri.com/job-listings-hr-recruiter-for-niyukti-management-consultants-bfsi-niyukti-management-consultants-kolkata-ghaziabad-new-delhi-3-to-8-years-291121008903?src=jobsearchD	Married

			esk&sid=164476525451 34383&xp=2&px=1	
	25	A-101	https://www.naukri.com/job-listings-hr-recruiter-for-niyukti-management-consultants-bfsi-niyukti-management-consultants-kolkata-ghaziabad-new-delhi-3-to-8-years-291121008903?src=jobsearchDesk&sid=164476525451 34383&xp=2&px=1	Single
	26	D-104	https://www.naukri.com/job-listings-management-trainee-human-resources-vision-india-services-private-limited-noida-0-to-1-years-2401220015 40?src=jobsearchDesk&sid=164476525451 34383&xp=3&px=1	Single
14	27	B-102	https://www.naukri.com/job-listings-management-trainee-human-resources-vision-india-services-private-limited-noida-0-to-1-years-2401220015 40?src=jobsearchDesk&sid=164476525451 34383&xp=3&px=1	Married
	28	B-102	https://www.naukri.com/job-listings-management-trainee-hr-apollo-home-healthcare-limited-new-delhi-1-to-1-years-0102220 01298?src=jobsearchDesk&sid=1644765254513 4383&xp=4&px=1	Married
15	29	D-104	https://www.naukri.com/job-listings-management-trainee-hr-apollo-home-healthcare-limited-new-delhi-1-to-1-years-0102220 01298?src=jobsearchDesk&sid=1644765254513 4383&xp=4&px=1	Single

Appendix D

Analysis for Male Team

Two Correlated Proportions Report

Confidence Intervals of the Difference (P1 - P2)

Confidence Interval Name	p1	p2	Difference p1 - p2	Lower 95% C.L. of P1 - P2	Upper 95% C.L. of P1 - P2	Confidence Interval Width
Nam RMLE Score*	0.0535	0.0471	0.0064	-0.0084	0.0217	0.0301
Wilson Score	0.0535	0.0471	0.0064	-0.0086	0.0217	0.0302

* It is recommended that N be at least 25 when using the Nam RMLE Score method.

Two-Sided Hypothesis Tests of the Difference (P1 - P2)

H0: P1 - P2 = 0 vs. Ha: P1 - P2 ≠ 0

Test Statistic Name	p1	p2	Difference p1 - p2	Test Statistic Value	Prob Level	Reject H0 at α = 0.05?
McNemar	0.0535	0.0471	0.0064	0.750	0.3865	No

Two-Sided Hypothesis Test of the Ratio (P1/P2)

H0: P1/P2 = 1 vs. Ha: P1/P2 ≠ 1

Test Statistic Name	p1	p2	Ratio p1/p2	Test Statistic Value	Prob Level	Reject H0 at α = 0.05?
Nam Score*	0.0535	0.0471	1.1364	0.750	0.3865	No

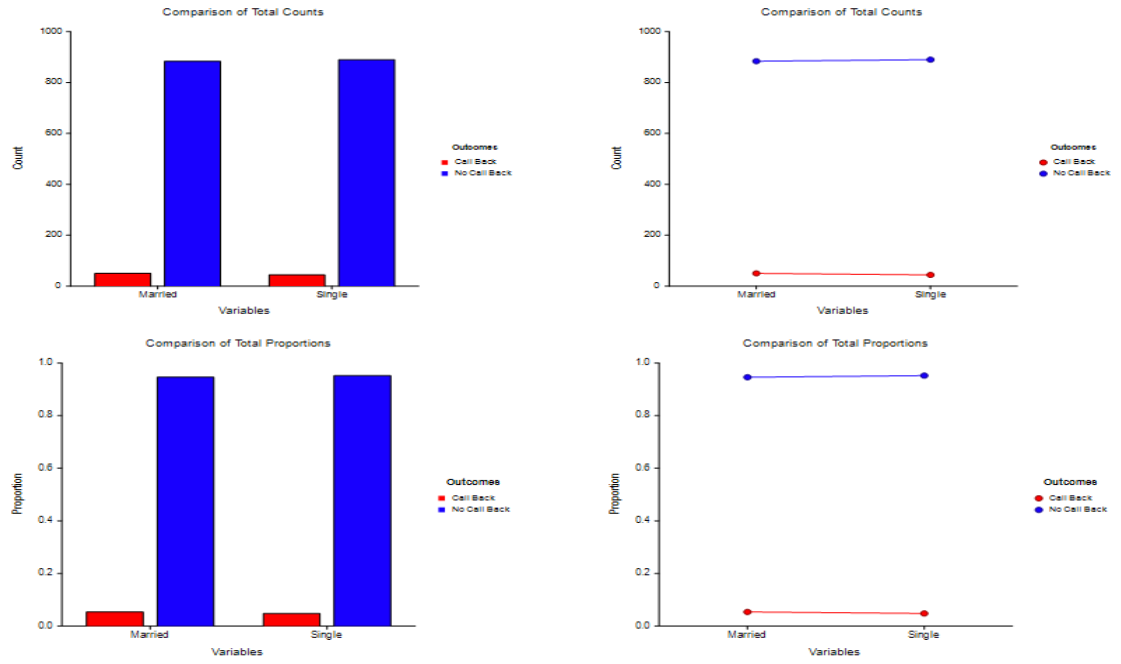
* It is recommended that N be at least 25 when using this test.

Confidence Intervals of the Odds Ratio (O1/O2)

Confidence Interval Name	p1	p2	Odds Ratio o1/o2	Lower 95% C.L. of O1/O2	Upper 95% C.L. of O1/O2	Confidence Interval Width
Exact Cond. Bin.	0.0535	0.0471	1.2857	0.7001	2.3921	1.6920
Max. Likelihood	0.0535	0.0471	1.2857	0.7269	2.2741	1.5472

Two Correlated Proportions Report

Plots Section



Analysis for Female Team

Two Correlated Proportions Report

Confidence Intervals of the Difference (P1 - P2)

Confidence Interval Name	p1	p2	Difference p1 - p2	Lower 95% C.L. of P1 - P2	Upper 95% C.L. of P1 - P2	Confidence Interval Width
Nam RMLE Score*	0.0285	0.0448	-0.0163	-0.0303	-0.0035	0.0267
Wilson Score	0.0285	0.0448	-0.0163	-0.0302	-0.0032	0.0270

* It is recommended that N be at least 25 when using the Nam RMLE Score method.

Two-Sided Hypothesis Tests of the Difference (P1 - P2)

H0: P1 - P2 = 0 vs. Ha: P1 - P2 ≠ 0

Test Statistic Name	p1	p2	Difference p1 - p2	Test Statistic Value	Prob Level	Reject H0 at α = 0.05?
McNemar	0.0285	0.0448	-0.0163	6.095	0.0136	Yes

Two-Sided Hypothesis Test of the Ratio (P1/P2)

H0: P1/P2 = 1 vs. Ha: P1/P2 ≠ 1

Test Statistic Name	p1	p2	Ratio p1/p2	Test Statistic Value	Prob Level	Reject H0 at α = 0.05?
Nam Score*	0.0285	0.0448	0.6364	6.095	0.0136	Reject H0

* It is recommended that N be at least 25 when using this test.

Confidence Intervals of the Odds Ratio (O1/O2)

Confidence Interval Name	p1	p2	Odds Ratio o1/o2	Lower 95% C.L. of O1/O2	Upper 95% C.L. of O1/O2	Confidence Interval Width
Exact Cond. Bin.	0.0285	0.0448	0.4483	0.2139	0.8899	0.6759
Max. Likelihood	0.0285	0.0448	0.4483	0.2330	0.8623	0.6293

Two Correlated Proportions Report

Plots Section