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Discussion Paper No. 2775  
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## ABSTRACT

### **Evidence of Unequal Treatment in Hiring against Obese Applicants: A Field Experiment\***

This study presents evidence of recruitment discrimination against obese individuals in Sweden by sending fictitious applications to real job openings. Otherwise identical applications were randomly assigned a portrait photograph of an obese or a normalweight job applicant. Applications with an obese applicant receive twenty percent fewer callbacks for an interview. It is also found that discrimination is the same against men and women and that it varies across occupations in a systematic way in that firms hiring employees in occupations with more customer contact discriminate more. The tentative conclusion is that customer discrimination and/or statistical discrimination based on the correlation between job performance and being obese is the explanation. Also, opposite to what is expected, register data show that the share of obese employees is higher in occupations where discrimination is found to be higher.

JEL Classification: J64, J71

Keywords: obesity, discrimination, correspondence testing

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## 1. Introduction

A large body of studies have analyzed the correlation between body weight and labor market outcomes.<sup>1</sup> Cawley (2004) presents three explanations to why such a correlation could exist. First, low wages/employment rates could cause obesity, for instance as a result of that poorer people consume cheaper, more fattening, foods, and second, unobserved variables, such as a lack of self confidence, could cause both obesity and low wages/employment rates. The third explanation put forward is that obesity lowers wages/employment rates, for instance by lowering productivity or because of weight discrimination.

The aim of this study is to highlight whether obese job applicants are discriminated against in the hiring process when controlling for differences in productivity. In doing so, a field experimental approach that identifies labor market outcomes exclusively caused by weight discrimination is used.

Interviews with Swedish managers show that nine out of ten managers believe that employment decisions depend upon the applicant being obese and a major reason for this belief is that obese applicants are expected to be less productive (Dagens Nyheter, 2003).<sup>2</sup> This highlights the possible role of statistical discrimination in hiring decisions. Other studies also document that obesity is correlated with bad health (see Burton et al, 1998, and Pronk et al, 1999) and higher absenteeism (Leigh, 1991, and Parkes, 1987) which further increases the probability that statistical discrimination against obese applicants is prevalent in the hiring process. Also, Agerström et al (2007), using an implicit association test, find that a large majority of Swedish managers to a great extent associate negative productivity words with being obese, while that is not the case for the non-obese.<sup>3</sup> Based on these facts one would expect weight discrimination to exist in the Swedish labor market.

Dating back from 1979, psychologists and sociologists have been documenting systematic employer discrimination against obese applicants in laboratory settings, see Roehling (1999) for an excellent overview of these studies. However, there has been no previous attempts in the literature trying to isolate the effect of weight

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<sup>1</sup> See section 2.

<sup>2</sup> See Korn (1997) for similar results for American managers.

<sup>3</sup> The implicit association test (IAT) was developed within social psychology to measure individuals implicit attitudes and/or stereotypes, see Greenwald et al. (1998) and section 3.1 below.

discrimination on real life labor market outcomes. Most studies uses survey data on wages, height and weight. Identifying the extent of discrimination is difficult using such non-experimental register data since not all differences in productive characteristics are accounted for. Making inference about discrimination against obese persons from interview data is also problematic for various reasons. When considering interviews with employers they don't necessarily express their true attitudes towards obese applicants and even if they do their attitudes are not automatically consistent with their behaviour. Hence, due to the shortcomings of traditional register and interview data and the inconsistency between attitudes and behaviour, it is clear that field experimental methods are called for.

Internationally, different forms of field experiments have been used to test for ethnic and gender discrimination, specifically in recruitment (see Riach and Rich, 2002). To our knowledge this empirical strategy has not been implemented before to measure the degree of discrimination against obese job applicants. Correspondence testing in this particular case implies that the researcher sends two equal applications to advertised job openings with the only difference being the photo attached to the job application; one being obese and the other being normally weighted.<sup>4</sup> The degree of unequal treatment is quantified by the difference in the number of call backs for interview between the two groups.

Using the correspondence testing method our field experimental data was collected between January and August 2006 by sending applications to job openings in seven different occupations in the Stockholm and Gothenburg labour market areas. In total 989 job openings were replied to. It was found that the callback rate to interview was twenty percent lower for obese applicants. Interestingly, the callback rate of obese applicants was significantly lower in occupations with personal contacts such as jobs in restaurants, business sales and shop sales and not at all evident in occupations as nursing. Also, similar results were found for men and women.

The Swedish National Institute of Public Health (2006) reported that 44 percent of Swedish males and 28 percent of females in the ages 18-84 can be classified as

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<sup>4</sup> Interviews with recruiters at some large Swedish companies show that quite a few applications have a personal photo attached to it. They estimate that is the case for every third application they receive.

overweight and another eleven percent of both groups can be classified as obese.<sup>5</sup> Hence, there is large share of the population that is potentially being discriminated against.

The remainder of this article is outlined as follows. Section 2 presents a selection of previous studies within this area, while section 3 presents how obesity was signalled through the use of facial photographs. Section 4 presents the design of the experiments as regards the choice of occupations and the construction of applications while section 5 presents the descriptive results. In section 6 an effort is made to explain the obesity difference in callbacks with recruiter and/or firm/workplace characteristics, while section 7 portrays a picture of the share of obese individuals in certain occupations to address whether variation in discrimination across occupations have lead to occupational sorting. Section 8 concludes the paper.

## **2. Previous studies – obesity and labor market outcomes**

Psychologists and sociologists have documented employer discrimination against the obese in laboratory settings (see Roehling, 1999). In such experiments, subjects are asked to make hiring decisions on hypothetical employees where the only difference is the subject's weight. Results from these studies show that discrimination on the basis of a persons weight can be found in a number of employment decisions (including compensation, placement and promotion). Often have these studies found that weight discrimination is more common for women than for men. However, it is questionable to what extent these experimental results have external validity. For instance, even if not exclusively focusing on the discrimination link, the empirical economics literature on the relationship between weight/obesity and labor market outcomes is not as consistent as the psychological literature.

Most of the early work on the correlation between obesity and (real) labor market outcomes concerns US data. Register and Williams (1990), Averett and Korenman (1996), and Cawley (2004) all use the same data, i.e. the National Longitudinal

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<sup>5</sup> Body Mass Index (BMI) is calculated as the persons weight (in kilograms) divided by the square of his/her height (in meters). A male is classified as overweight if his BMI is between 25 and 30 and classified as obese if his BMI is above 30. The corresponding numbers for women is 23.8, 28.6 and above 28.6, respectively.

Survey of Youths (NLSY), to estimate an obesity effect.<sup>6</sup> Averett and Korenman use a variety of methodological approaches to address the possibility that reverse causality, i.e. that poor employment outcomes may cause obesity, and/or that an unobserved factor causes both obesity and poor employment outcomes. For example, using multiple reports of body weight and sibling differences they attempt to cancel out the effects of shared family environment and genetics. Cawley takes the analysis one step further by instrumenting mother's weight with child's weight and ends up with obesity wage penalties quite similar to those in Averett and Korenman. Overall, these studies find a sizable and statistically significant obesity wage penalty for women, while the results for males are more mixed.

However, using other US datasets, Hamermesh and Biddle (1994) and Behrman and Rosenzweig (2001) find no effect of weight on wages. In their study Behrman and Rosenzweig use data on identical twins from the Minnesota Twins Registry in order to specifically address the issue of endowment heterogeneity.

There are also a growing number of studies using European data. For instance, the studies by d'Hombres and Brunello (2005), Garcia and Quintana-Domeque (2006) and Lundborg et al (2006) document the correlation between obesity and labor market outcomes for a number of European countries. The results confirm the picture from the US studies in that there is no consensus overall "effect" between obesity and labor market outcomes. For some countries there is a zero correlation for both sexes, for others a positive correlation is found for men and a negative for women. Hence, given the mixed picture presented here it is an open question as whether, or to what extent, the obese are truly discriminated against in the labor market.

### **3. Signalling obesity through photos**

Our way to signal obesity is by attaching a portrait photograph to the job application. In this section the procedure through which the photos were chosen is described. First approximately one hundred photos of both young men and women (approximately 20-30 years old) that were average looking and normally weight were collected from an Internet photo site ([www.photosearch.com](http://www.photosearch.com)). From this pool of

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<sup>6</sup> See also the study by Pagan and Davila (1997).



photos approximately fifty photos were chosen by a group of five evaluators (three male and two female researchers). The criteria was to choose sets of at least five photos of individuals with similar looks. A total of twenty-five male and twenty-three female photos were selected. These photos were then distributed randomly on paper and eventually graded on looks (on a 9 point scale) and age by 150 students at Kalmar university.<sup>7</sup> In order to control for differences in average grading across students the deviance to a students average grading of the photos was calculated for each of the 48 photos. We (the evaluators) then used this information together with our initial “eye-ball” choice of groups of photos looking similar to choose sets of two photos that looked and were valued approximately the same on looks. The (somewhat) better looking individual of the two was then sent to a photo firm, [www.mikeelliottfineart.com](http://www.mikeelliottfineart.com), for manipulation into being obese. Hence, this strategy minimizes the probability that looks other than weight are driving the result.<sup>8</sup> The final cost for each pair of photos was approximately 300 euros. Finally, seven pair of photos were used in the study, see Table A1 in appendix A.<sup>9</sup>

At this stage it is still unclear to what extent the manipulated photos signal obesity or that they trigger attitudes or stereotypes towards obese applicants. To some extent this have been studied using two alternative methods. First, a total of 87 students at Kalmar university were asked to report the first three attributes that came to mind when viewing the photo of the obese applicant, being presented in the job application being sent to the employers. In order to be realistic only photographs of at least average looking individuals that smiled and looked happy were used in the experiment (see appendix B).<sup>10</sup> Not surprisingly, almost everyone (94 percent)

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<sup>7</sup> In practice five students evaluated the 48 photos in the same order and then another five students in another order and so forth. Hence, thirty different orders of the photos were used.

<sup>8</sup> If looks matter within the pairs used then we have a lower bound on the discrimination measure since the better looking individual was transformed into being obese. The optimal strategy would be to send the same photo, as normally weight and obese, to the employer but it would be too obvious that it is the same individual. One could also be worried that employers observe that the photos have been manipulated. However, when distributing the manipulated photos on paper to 87 students for evaluation, none replied that the photos looked odd or manipulated.

<sup>9</sup> At first glance there are alternative strategies available. One could for instance also use photos of obese individuals and manipulate those into being normal weight. However, it is very problematic to manipulate photographs of obese since their bone structure is often not visible. Also, just using photos of obese and normalweights will not control for looks in the same way as done here.

<sup>10</sup> It is very unlikely that a job applicant would send a personal photo where he/she looked ugly or not happy.

reported positive attributes as pleasant, happy and outgoing, while half of them (53 percent) also reported that the person looks fat, large or plump. However, a large majority of the persons not reporting a “fat” attribute were women, and quite a few of them afterwards revealed that they did not want to report that the person was fat.

In a second analysis recruiters have been asked to take the Implicit Association Test (see section 3.1 below) where participants should classify pictures into the categories “obese” or “normalweight” in order to measure their stereotypes of obese individuals. In this test the same pictures as in the experiment have been used.

### **3.1 IAT – stereotypes against obese persons**

The Implicit Association Test (IAT), developed within social psychology to measure implicit attitudes and/or stereotypes, provides one way to test whether the pictures used triggers any negative productivity stereotype against the obese. The IAT is a computer-based test designed to measure individual differences in associations between concepts. It was first introduced by Greenwald et al. (1998) and has since become a widely used measure, particularly in sensitive areas such as attitudes and stereotypes toward social groups.<sup>11</sup>

In Agerstöm et al. (2007) they have evaluated the extent of negative productivity stereotypes against obese individuals for both employers and students with the IAT method using the same photos as in our field experiment. They find that a very clear majority associate words signalling negative productivity, as “lazy” and “slow”, with being obese, which is signalled by the manipulated photos. In fact, as much as eighty percent have moderate or strong negative associations as regards obese individuals and words signalling high productivity.

It should be emphasized that in the IAT the photo is a stimuli and as such easily observed. The photo in the correspondence testing is smaller and presented together with other information in the job application. As suggested by the results from the evaluation of the photos it is not for certain that all employers have observed the obese signal and the extent of unequal treatment in hiring might therefore be underestimated.

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<sup>11</sup> See [www.implicit.harvard.edu](http://www.implicit.harvard.edu) for a test version of the IAT and appendix C for a more detailed description of the IAT.

#### **4. Experimental design**

The experiment was conducted between January and August 2006. During this period all employment advertisements in selected occupations found on the webpage of the Swedish employment agency were collected. In total 1,970 applications were sent to 985 employers. Callbacks for interviews were received via telephone, email or ordinary post. To minimize inconvenience to the employer invitations were promptly declined.

#### **Choice of occupations**

To make satisfactory progress in the collection of cases it was necessary that the demand for labor was relatively high in the chosen occupations. In addition, it was decided that the skill requirement and the degree of customer contact should vary across occupations. Hence, the selected occupations were both skilled and semi/unskilled and included a relatively high as well as a low contact with customers.<sup>12</sup> In the end the experiment was restricted to seven occupations and the two major cities of Sweden; Stockholm and Gothenburg. The selected occupations were computer professionals, business sales assistants, preschool teachers, accountants, nurses, restaurant workers (mostly waiters) and shop sales assistants.

#### **Construction of applications**

The applications had to be realistic while not referring to any real persons. Also, since the competition from other applicants was considerable the testers had to be well qualified. A number of real life (written) applications available on the webpage of the Swedish employment agency were used as templates and adjusted and calibrated for our purposes.

Applicants had identical human capital within occupations and were 25-30 years old, had two to four years of work experience in the same occupation as the job applied for and had obtained their education in the same type of school, but at different locations. The application consisted of a quite general biography on the first page and a detailed CV of education and work experience on the second page.

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<sup>12</sup> This information was taken from the occupational register, Statistics Sweden, 2003.

For each occupational category two applications were constructed. Applications were randomly drawn and given a name and a facial photograph of a normalweight or obese person. The application also contained an email address, a telephone number and a postal address. The email address and the telephone number (including an automatic answering service) were registered at a large Internet provider and a phone company for each fictitious applicant. Postal addresses were included in the resumes to prevent any invitations being lost or returned to the employer. The addresses were chosen to signal that the respondents lived in the same neighborhood.

In order to eliminate any “sent first” effects one should switch the order in which applications are sent. However, in order to minimize the number of firms being sampled and that always sending the “obese application” first requires much fewer sent applications this strategy was chosen. Hence, the measure of unequal treatment is in this respect a lower bound.<sup>13</sup>

### **Firm/workplace and recruiter information**

The collected workplaces were identified in Statistics Sweden’s business (workplace) register using company ID’s (so-called CFAR-no, see [www.scb.se](http://www.scb.se)).<sup>14</sup> Information was then obtained on the number of employees at the workplace and at the firm (if more than one workplace at the firm), on the number of workplaces at the firm, whether the firm is a public sector employer, and the share of male employees at the firm.<sup>15</sup>

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<sup>13</sup> In other correspondence experiments that we have conducted this “first” effect is very small.

<sup>14</sup> Company ID’s were identified from combining information on firm name and address found in the job ad with information in Statistics Sweden’s business register available on the Internet.

<sup>15</sup> In fifty-nine percent of the cases the firm only has one workplace and, hence, firm and workplace form the same unit.

## 5. Descriptive results

The last row of Table 1 gives the aggregated results of the experiment.<sup>16</sup> From the first column it is evident that the two applications were sent to 985 different job openings. Since correspondence testing only focuses on the first step of the hiring process, being called for interview, thus neglecting the second step of who actually gets the job, there are four possible interview outcomes: neither invited, both invited, or only the normalweight or obese individual being invited for an interview. In 566 cases neither applicant was invited and in the remaining 429 cases at least one of the two applicants was invited for interview. Both applicants were invited in 248 cases, while only the normalweight applicant was invited in 119 cases and only the obese applicant in 52 cases. From this information the callback rate of normal weight and obese applicants, respectively, as well as the relative callback rate have been calculated.

The design of the experiment ensures that the difference in callbacks between normalweight and obese applicants is due to firms/recruiters using obesity as a decision variable in the process of selecting who to call for an interview. It is found that the callback rate is significantly lower for obese applicants. On average, it is twenty-two percent lower compared to the one for normalweight applicants.<sup>17</sup>

\*\*\* Table 1 about here \*\*\*

Table 1 also gives the same type of data description for each of the seven job categories separately. No difference in treatment between normalweight and obese applicants is found for computer professionals or nurses, while the highest level of unequal treatment is found for restaurant workers/waiters and pre-school teachers,

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<sup>16</sup> On an aggregate level the difference in callbacks or the relative callback rate were not found to be statistically different between men and women and therefore they are merged into one (see Table B1 in appendix B for separate results for men and women). However, on an occupational level there are some variation in that the relative callback rate is especially high for women in the occupations restaurant workers and accountants. In the regression analysis in section 6 we analyze men and women separately.

<sup>17</sup> In the empirical analysis the obesity difference in callback rates was not found to be statistically different between the Stockholm and Gothenburg labor market areas. We therefore only discuss the merged data for the two cities.

followed by sales assistants and accountants.<sup>18</sup> At least two of these latter occupations, as compared to the first two, are characterized by having a high degree of customer contact.

The fact that the relative callback rate varies across occupations suggests the presence of statistical discrimination (see Hammermesh and Biddle, 1994). Experimental studies addressing stereotypic behaviour suggest that overweight people may be at a serious disadvantage in hiring situations (see Klassen et al, 1993, Rothblum et al, 1988, Larkin and Pines, 1979). For instance, Bellizzi and Hasty (1998) and Everett (1990) demonstrates employer perceptions of obese persons as unfit in public sales positions and more appropriate for telephone sales involving little face-to-face contact. However, since the relative callback rate is higher in occupations requiring customer contact indicates preference-based customer discrimination as a possible explanation to the results as well (see Becker, 1957).<sup>19</sup>

In another study a correspondence test was carried out using the same occupations but instead varying the name of the applicants – one having a Swedish-sounding and the other a Middle Eastern-sounding name, see Carlsson and Rooth (2007). A quite strong correlation (0.6) is found between the ethnic and obese relative callback rates in the two studies (i.e. between column 2 and 3 of Table B2 in appendix B). This indicates that it might be the same discriminating mechanisms that are at work since occupations that are found to have a larger share of firms discriminating against applications with a Middle Eastern name are also the occupations having a larger share of firms discriminating against obese applicants.<sup>20</sup>

It is also the case that unequal treatment against the obese applicant seems to be negatively correlated with how skill intensive the occupation is but uncorrelated with the average fraction of females within the occupation.<sup>21</sup> Also, the differences in weight discrimination across occupations might be due to occupational variation in labor supply. The seventh column of Table 1 show that the occupations nurses and

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<sup>18</sup> The relative callback is also high for shop sales, but that estimate is not significantly different from zero.

<sup>19</sup> An attempt was made to distinguish between jobs that required more customer contact by reading the job adds. However, they were not very detailed on this point.

<sup>20</sup> To truly identify this effect one would need to send obese and ethnic minority applications to the same employer.

<sup>21</sup> The correlation between the discrimination measure and the occupational skill level (female share) is 0.7 (0.1).

accountants have the highest callback rate, indicating that they might have fewer applicants to select from, but could also be due to recruiting practices calling more applicants for interview. Of course, these results on occupational differences are only tentative since they are based on only seven observations/occupations.

## **6. Empirical analysis**

In this section the obesity difference in the probability to be invited for interview and which, if any, workplace and recruiter characteristics that are associated with this probability difference are analyzed. First, the 1,644 applications and 822 firms for which we have data on recruiter and workplace characteristics are analyzed.<sup>22</sup> Second, the analysis condition on the workplace/recruiter having called at least one applicant for interview, thus analyzing 900 applications. These results are probably less flawed by a misclassification of the dependent variable, which might occur when firms receive a great number of applications.<sup>23</sup> It is then probably quite random who gets selected into the screening process. It is therefore suspected that at least some firms that were found not to invite any application for interview would call our applicant(s) if they had actually read the applications. Hence, by restricting the sample to only firms that have called at least one applicant for interview a somewhat different question is being answered but might result in getting a “cleaner” picture of which factors are associated with the obesity difference in callbacks for interview.

### **Obesity differences in the probability to be invited for interview**

In this section obesity differences regarding the probability of being called for interview are analyzed using probit regressions (reporting marginal effects) and how this difference varies when introducing occupation fixed effects. The data include 822 observations for obese and normalweight applicants, respectively, giving a total of 1,644 observations. The analysis starts by regressing the callback dummy on only

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<sup>22</sup> Hence, we have successfully identified 83 percent of the workplaces in the registers.

<sup>23</sup> Anecdotal evidence and the extremely low callback rates in some of our investigated occupations indicate that is the case for some occupations.

the obesity indicator variable (*Being obese*) and then add, one at a time, occupation fixed effects and these interacted with the obesity dummy.

The first column of Table 2 reveals that applications with a facial photograph of an obese applicant have a seven percentage point lower probability of being called for interview compared to applications for normalweight individuals.<sup>24</sup> While allowing for separate effects of obesity on the callback rate for each occupation in introducing occupation fixed effects and interacting the obesity dummy variable with these occupation indicators, some variation is found in that the effect is not significant within the group of computer professionals or nurses. For the other occupations a significant negative effect of obesity on the callback rate that varies between six and fifteen percentage points is found. Also, a similar picture is found when analyzing men and women separately.

\*\*\*\* Table 2 about here \*\*\*\*

### **Factors influencing obesity differences in callbacks for interview**

To investigate which, if any, of the firm/workplace and recruiter variables that are correlated with the obesity difference in callbacks probit regressions are estimated by including these variables into the “interaction” model of Table 2. Specifically, the callback dummy is regressed on the obesity indicator variable, the workplace/recruiter characteristics and the interaction of those characteristics with the obesity dummy. The extent to which the included characteristics are associated with obesity differences in callbacks is captured by the interaction effect, reported as a marginal effect.<sup>25</sup> Only the interaction coefficients are reported in Table 3.<sup>26</sup>

The workplace and recruiter characteristics can be divided into three broad categories; *recruiter information* (the sex of the recruiting person), *composition of*

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<sup>24</sup> In section 5 we reported the *relative* callback rate, which was twenty-two percent lower for obese applicants compared to normalweight applicants. In this section the seven percentage point *difference* in callback rates between the two groups is in focus.

<sup>25</sup> These are the estimated marginal changes in the probability for the continuous variables and estimated discrete changes for dummy variables.

<sup>26</sup> The model also controls for occupation fixed effects, fixed effects for the size of the firm and the number of workplaces within firms and the interaction of those with the obesity dummy. This is our best strategy to control for unobserved characteristics affecting the obesity difference in callbacks. The full set of results is available upon request.



*employees* (the share of male employees at the firm) and *workplace characteristics* (the number of employees at the workplace and whether the firm is a public sector employer). Variable descriptions and descriptive statistics of these variables are found in the appendix, see Table B3 and B4 in appendix B.

Using the full data of 1,644 observations not a single variable that is associated with treating the obese applicant differently is found (column 1). Next the analysis of column 1 is repeated but now the analysis condition on that the firm called at least one application for interview (see column 2). This analysis show whether the quantitative conclusions regarding the association between the workplace and recruiter characteristics and the ethnic difference in callbacks for interview change when using this restriction on the sample.

\*\*\*\* Table 3 about here \*\*\*\*

The point estimates of all variables increase, but so do the standard errors. However, one variable is found being associated with an obesity difference in callbacks. Conditional on having called at least one applicant for interview, public employer workplaces, compared to workplaces which are not, are associated with a fifteen percentage point higher probability of calling applications of an obese person to an interview. The point estimates for the sex of the recruiter at the workplace, the fraction of males at the firm and the number of employees at the workplace are large but estimated with low precision. A similar picture is found when analysing men and women separately.

## **7. Occupational sorting of obese in the Swedish labor market**

The occupation specific obesity difference in treatment that is found implies that there should be occupational sorting away from certain occupations. In this section it is studied whether occupational sorting exists for the obese using aggregate Swedish data. To our knowledge the Survey of Living Conditions (or ULF, see Statistics Sweden) is the only representative Swedish database that includes information about height and weight as well as occupation.

\*\*\*\* Table 4 about here \*\*\*\*

Aggregate information from ULF, see Table 4, show that both employed and non-employed men are somewhat more frequently overweight than women in the same states but that the sexes are similarly frequently obese. From this data (not in the table) it is also evident that obese women have a twelve percentage points lower probability to be employed compared to normalweight women. However, for obese men this difference is only four percentage points, but statistically significant. Hence, this result resembles the empirical findings for wages/earnings in section 2 in that labor market differences related to obesity are stronger for women.

One particular occupation stands out for the employed. *Restaurant workers*, men as well as women, have by far the highest share of obese employees, while there is only little variation in the share of obese employees within the rest of the occupations. *Restaurant work* is also the occupation found to have the highest degree of weight discrimination. Hence, obese individuals are more concentrated in an occupation where discrimination against them is high, opposite to what occupational sorting theories would predict.<sup>27</sup> The explanation to this result must be that individuals are sorting themselves into this occupation prior to becoming overweight/obese and/or that the supply of obese applicants is large enough to (over)compensate for the discrimination effect.

Finally, this result also highlights the problem with regular register data when trying to uncover discriminatory behavior.

## 8. Conclusion

This study is the first, to the best of our knowledge, examining the extent of differential treatment in the hiring process against obese applicants by means of correspondence testing. Our aggregated results show that, for equivalent applications, the interview callback rate is twenty percent lower for an obese job applicant compared to a normalweight job applicant. This difference is exclusively attributed to the weight manipulation. How important this difference in callbacks is for differences in finding jobs is difficult to predict. However, the results imply that normalweight applicants get called to interview approximately four times for every

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<sup>27</sup> A similar picture was found in Carlsson and Rooth (2007) in that the relative callback rate is higher in occupations where immigrants are concentrated.

ten jobs they apply for, while obese applicants need to apply to twelve jobs to achieve the same number of callbacks. Unless jobs are scarce this effect is not likely to be strong.

However, the estimated obesity difference in callbacks is probably a lower bound. A photo of the applicant is used to signal that he/she is obese. It is not for certain that the employer have observed this signal but will when the person show up for interview. Since only the outcome being called for interview is observed the true level of discrimination will be underestimated. The ethnic difference in callbacks for interview, using an identical research strategy, is found to be nine percentage points, see Carlsson and Rooth (2007). Hence, the estimated (absolute) level of discrimination against the obese is of almost the same magnitude as against the Middle Eastern minority.

When investigating whether recruiter characteristics and/or firm/workplace characteristics could explain the difference in callbacks we do not find any patterns. The only variation in treatment between normalweight and obese job applicants is the one in between occupations. The obese job applicant is called less often to interview in occupations which include personal contacts with customers, as in sales and restaurant jobs. Still we are reluctant to draw any conclusions as regards if it is statistical discrimination, customer discrimination or a combination of both that are driving the results.

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**Tables:**

Table 1. Aggregated results for the correspondence testing. Men and women.

	Callback rates									$\chi^2$
	Jobs	Neither	At least one invited	Equal	Only normal	Only obese	Normal	Obese	Relative	
	No.	Invited	No.	Treatment	weighted invited	invited	Weighted		callback	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(7)/(8)		
Computer professionals	73	47	26	12	7	7	0.26	0.26	1.00	0.0
Business sales assistants	193	94	99	55	31	13	0.45	0.35	1.26	7.4**
Preschool teachers	103	81	22	8	11	3	0.18	0.11	1.73	4.6*
Accountants	184	69	115	81	24	10	0.57	0.49	1.15	5.8*
Nurses	124	44	80	61	8	11	0.56	0.58	0.96	0.5
Restaurant workers	164	108	56	20	30	6	0.30	0.16	1.92	16.0**
Shop sales assistant	144	123	21	11	8	2	0.13	0.09	1.46	3.6
Total	985	566	429	248	119	52	0.37	0.30	1.22	26.2**

Notes: The null hypothesis is “Both individuals are treated unfavorable equally often”, that is, (5) = (6). The critical value of the  $\chi^2$  at the one percent level of significance is 6.63 (\*\*\*) and at the five percent level of significance is 3.84 (\*\*). (a) Upper level of compulsory school.

Table 2. The probability of callback for interview.  
Marginal effects (percentage points). Men and women.

Variable	All:		Men:		Women:	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Being obese	-0.07*** [0.01]		-0.06*** [0.02]		-0.07*** [0.02]	
Occupation:						
Shop sales assistants	b.m.	-0.11** [0.04]	b.m.	-0.11** [0.04]	b.m.	-0.11 [0.10]
Computer professionals	0.22*** [0.09]	0.00 [0.06]	0.23** [0.11]	0.06 [0.07]	0.29* [0.17]	0.09 [0.09]
Business sales assistants	0.35*** [0.07]	-0.08** [0.03]	0.36*** [0.08]	-0.12*** [0.04]	0.44*** [0.13]	-0.04 [0.05]
Preschool teachers	0.06 [0.08]	-0.12** [0.05]	-0.09 [0.09]	-0.05 [0.11]	0.31** [0.16]	-0.17*** [0.05]
Accountants	0.49*** [0.06]	-0.06** [0.03]	0.48*** [0.07]	-0.06 [0.04]	0.58*** [0.11]	-0.07* [0.04]
Nurses	0.47*** [0.06]	0.02 [0.04]	0.48*** [0.07]	0.03 [0.04]	0.50*** [0.12]	0.02 [0.06]
Restaurant workers	0.25*** [0.07]	-0.15*** [0.03]	0.16** [0.08]	-0.11** [0.05]	0.45*** [0.13]	-0.19*** [0.04]
No of observations						

Notes: This table report marginal effects on the probability of being invited for interview using probit regressions. Column 1 report the marginal effect of being obese without any controls. Model 2 and column 2 reports occupational marginal effects for normalweight applicants, while column 3 report the difference in the occupational marginal effect for obese applicants relative to the effect in column 2. \*, \*\*, and \*\*\* denote the ten, five and one percent significance level, respectively. Reported standard errors (in brackets) are adjusted for clustering on workplace.

Table 3. Factors influencing the obesity difference in callbacks. Marginal effects (percentage points).

Interaction Variable	<b>All:</b>		<b>Men:</b>		<b>Women:</b>	
	Model 1	Model 2 Work places inviting at least one applicant	Model 1	Model 2 Work places inviting at least one applicant	Model 1	Model 2 Work places inviting at least one applicant
Recruiter information:						
Male responsible	0.00 [0.04]	-0.04 [0.09]	-0.01 [0.06]	-0.05 [0.13]	0.04 [0.05]	-0.04 [0.10]
Composition of employees:						
Fraction males	-0.05 [0.07]	-0.14 [0.17]	-0.07 [0.10]	-0.03 [0.26]	-0.04 [0.12]	-0.15 [0.20]
Workplace characteristics:						
Number of employees: 0-19	-0.05 [0.04]	-0.09 [0.10]	-0.08 [0.06]	-0.10 [0.13]	-0.02 [0.07]	-0.02 [0.10]
Public sector employer	0.08 [0.06]	0.15* [0.06]	0.16** [0.09]	0.20** [0.07]	0.01 [0.07]	0.10 [0.06]
Occupational fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm size fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
No of observations						

*Notes:* This table report the interaction effects between the obesity dummy and different firm/workplace and recruiter characteristics on the probability of being invited for interview.. \*, \*\*, and \*\*\* denote the ten, five and one percent significance level respectively. Reported standard errors (in brackets) are adjusted for clustering on workplace.










Table 4. Share of overweight/obese individuals within categories, men and women 31-55 years old, 2001-2005.

	Men			Women		
	Overweight+ obese	Obese	Relative callback	Overweight+ obese	Obese	Relative callback
Not employed	58	16	-	46	18	-
Employed	56	11	-	34	8	-
as (occupation):						
Computer professionals (213)	45	6	1.38	25	2	0.73
Business sales assistants (341)	54	8	1.37	24	6	1.18
Accountants (241)	47	7	1.13	24	6	1.17
Preschool teachers (331)	60	0	1.33	26	6	1.88
Nurses (323)	33	0	0.98	33	5	0.91
Restaurant workers (913)	66	33	1.57	47	18	2.33
Shop sales assistants (522)	59	11	1.45	33	7	1.50

*Source:* Aggregate information from the Surveys of Living Conditions (ULF), Statistics Sweden. Very few observations of men in preschool teachers and nurses and none found to be obese. Being “overweight” is defined as having a BMI score above 25 but less than 30, while being “obese” is defined as having a BMI score above 30. The occupational three-digit code (SSYK) is given within parentheses.

**APPENDIX A:**

Table A1. Set of photos sent to the same employer. The photo of the person to the left has been manipulated into being obese.

Applicant set (males/females): 1	2	3	4
 <p data-bbox="157 755 596 787">Obesity difference in callback: -2</p>	 <p data-bbox="821 755 852 787">-9</p>	 <p data-bbox="1272 755 1304 787">-7</p>	 <p data-bbox="1703 755 1734 787">-4</p>
 <p data-bbox="157 1079 596 1112">Obesity difference in callback: 0</p>	 <p data-bbox="821 1079 852 1112">-6</p>	 <p data-bbox="1272 1079 1304 1112">-10</p>	

*Note:* The photo-pair specific difference in callback of being obese is the interaction effect from a regression of callback on photo-pair fixed effects and an interaction of being obese with these photo-pair fixed effects. Since photo-pairs are added randomly to each application these estimated differences in callbacks across photos are not affected by the inclusion of occupation fixed effects.

**APPENDIX B:**

Table B1. Aggregated results for the correspondence testing. Men and women separately..

	Jobs No.	Neither Invited No.	At least one invited No.	Equal Treatment No.	Only normal weighted invited No.	Only obese invited No.	Callback rates		Relative callback rate (7)/(8)	$\chi^2$
							Normal Weighted (7)	Obese (8)		
<b>Men:</b>										1.3
Computer professionals	36	23	13	6	5	2	0.31	0.22	1.38	
Business sales assistants	80	37	43	28	13	2	0.51	0.38	1.37	8.1**
Preschool teachers	75	27	48	35	9	4	0.59	0.52	1.13	1.9
Accountants	53	47	6	1	3	2	0.08	0.06	1.33	0.2
Nurses	79	24	55	42	6	7	0.61	0.62	0.98	0.1
Restaurant workers	93	66	27	9	13	5	0.24	0.15	1.57	3.6
Shop sales assistant	111	93	18	9	7	2	0.14	0.10	1.45	2.8
<b>Men total:</b>	<b>527</b>	<b>317</b>	<b>210</b>	<b>130</b>	<b>56</b>	<b>24</b>	<b>0.35</b>	<b>0.29</b>	<b>1.21</b>	<b>12.8**</b>
<b>Women:</b>										
Computer professionals	37	24	13	6	2	5	0.22	0.30	0.73	1.3
Business sales assistants	113	57	56	27	18	11	0.40	0.34	1.18	1.7
Preschool teachers	109	42	67	46	15	6	0.56	0.48	1.17	3.9*
Accountants	50	34	16	7	8	1	0.30	0.16	1.88	5.4*
Nurses	45	20	25	19	2	4	0.47	0.51	0.91	0.7
Restaurant workers	71	42	29	11	17	1	0.39	0.17	2.33	14.2**
Shop sales assistant	33	30	3	2	1	0	0.09	0.06	1.50	1.0
<b>Women total:</b>	<b>458</b>	<b>249</b>	<b>209</b>	<b>118</b>	<b>63</b>	<b>28</b>	<b>0.40</b>	<b>0.32</b>	<b>1.24</b>	<b>13.5**</b>

Notes: The null hypothesis is “Both individuals are treated unfavorable equally often”, that is, (5) = (6). The critical value of the  $\chi^2$  at the one percent level of significance is 6.63 (\*\*) and at the five percent level of significance is 3.84 (\*). (a) Upper level of compulsory school.

Table B2. Obesity net discrimination, ethnic net discrimination, female share and skill requirements on occupational level

	Obese: relative callback rates	Ethnic: relative callback rates	Fraction Females (%)	Skill requirement
Computer professionals	1.00	1.10	24	3
Business sales assistants	1.26	1.28	38	2
Preschool teachers	1.73	1.41	75	3
Accountants	1.15	1.33	92	3
Nurses	0.96	1.43	91	3
Restaurant workers	1.92	2.75	68	1
Shop sales assistant	1.46	3.22	66	2
Total	1.22	1.51	52	-

*Note:* Obesity relative callback rates are taken from Table 1. Information on the fraction females and on skill requirement in each occupational category is taken from Statistics Sweden (2003). The required skill/level of education in each occupation is defined as 3=higher education, 2=secondary education and 1=primary education.

Table B3. Description of variables included in the statistical analysis

Variable	Description
<i>Recruiter information</i>	
Male responsible	Equals 1 if a male is responsible for recruitment at workplace, else zero
<i>Composition of employees</i>	
Males	Share of males at the firm
<i>Workplace characteristics</i>	
Employees : 0-19	Equals 1 if the number of employees at workplace is between 0 and 19, else zero
Public sector	Equals 1 if workplace operates in the public sector, else zero
<i>Occupational fixed effects</i>	Dummy variables assigned to 1 if the belongs to the particular occupation, else zero
<i>Firm size fixed effects</i>	Dummy variables assigned to 1 if firm has only one workplace, else zero, and dummy variables controlling for whether the firm has 0-9, 10-99 or more than 100 employees

Table B4. Descriptive statistics

Variable	Only normal weight invited (1)	Only obese invited (2)	Both invited (3)	None invited (4)	Total (5)
<i>Recruiter information</i>					
Male responsible	0.47	0.42	0.34	0.50	0.45
<i>Work place composition of employees</i>					
Fraction males†	0.48	0.44	0.36	0.49	0.45
<i>Work place characteristics</i>					
Employees : 0-19	0.62	0.49	0.44	0.56	0.54
Public sector	0.18	0.33	0.35	0.15	0.21
<i>Occupational distribution</i>					
Computer professionals	0.05	0.12	0.05	0.07	0.07
Business sales assistants	0.24	0.26	0.19	0.16	0.18
Preschool teachers	0.09	0.05	0.03	0.15	0.11
Accountants	0.20	0.19	0.35	0.13	0.20
Nurses	0.07	0.23	0.25	0.08	0.13
Restaurant workers	0.26	0.14	0.09	0.18	0.17
Shop sales assistant	0.08	0.02	0.04	0.22	0.15
<i>Firm size</i>					
Employees : 0-9†	0.30	0.18	0.22	0.35	0.30
Employees : 10-99†	0.38	0.40	0.26	0.33	0.32
Employees : 100-†	0.32	0.42	0.52	0.32	0.38
Number of work places equals one†	0.63	0.49	0.50	0.48	0.59
No of observations	99	43	209	471	822

*Notes:* This table reports the mean characteristics. All variables are measured at the work place level except variables marked with (†) which are measured at the firm level.

## Appendix C: The IAT procedure

In the computer IAT the two keyboard keys, “d” and “k”, are mapped to categories appearing on the left and right side of the screen, respectively. Using these keys the participants classify the stimuli (images of obese and non-obese individuals, the *target* stimuli) appearing in the middle of the screen according to the category which they belong to. Category labels on top of the screen help the subject to remember which key is mapped to which category. In the next part of the IAT the participant now instead classifies the *attribute* stimuli which in this case are words that are found being associated with (signalling) high and low work productivity. These include words such as “lazy”, “slow”, “effective” and “hard-working”.

Then follows the critical part of the IAT, where there are now four categories but still only two keys for the user to respond with. Consequently, two categories will now share a response key. For each and every response made by the subject to a presented stimulus the computer will measure the latency in milliseconds. When two categories that are “easily” associated in terms of their nominal features (obese + low work productivity and non-obese + high work productivity) share the same response key, the subject classifies the stimuli much faster and with fewer errors than when they are not associated, as is the case when obese + high work productivity share a response key and non-obese + low work productivity share the other. The key mapping that is thought to be easier is called the *compatible* part and the other the *incompatible* part.

Later in the test the participant performs this critical part with the key mapping of the target category but now in a reversed order. Since the critical parts are done with both normal and reversed key mapping, it is possible to calculate difference in response times between these two critical parts of the test. This difference represents the relative association of the target and attribute concepts. In this case, if the part of the test with non-obese + high work productivity/obese + low work productivity generally has lower response times than obese + high work productivity/ non-obese + low work productivity, it suggests that there is an automatic preferences of non-obese over obese individuals. This difference in response latencies, or rather a recalculation of this difference, between the two critical parts is known as the IAT-effect or the IAT-score.