Analysis on Income Gap Based on Appearance Discrimination in Chinese Labor Market

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ABSTRACT

This paper uses the CGSS2017 database and mainly uses regression analysis to study the appearance discrimination in the Chinese labor market in terms of BMI, an representative appearance characteristic, and attempts to analyze the differences that arise between groups of different incomes and ages to confirm the existence of appearance discrimination against labors in the Chinese labor market. According to the findings of this paper on average, women with lower BMI receive higher wages among women under 40 years old and at low and middle income levels; however, this appearance discrimination is not significant among men, as this variability is caused by the potential gender discrimination in the Chinese labor market.

Keywords: *Obesity Discrimination, Appearance Discrimination, Gender Discrimination, Chinese Labor Market, CGSS*

1. INTRODUCTION

Brunner, Chandola, and Marmot have mentioned in their study on obesity that the prevalence of overweight and obesity is particularly prominent in countries with rapid economic growth.[1] Also, Puhl and Brownell's paper also pointed out that obese people suffer from mood disorders and anxiety disorders such as depression more than 25% more than normal weight people.[2]

As a country with a very fast growing economy and a population of over 1.4 billion people, there have always been numerous employers and employees in the Chinese labor market. The causes and subsequent effects in Chinese labor market have actually been a controversial and great topic to research. At this stage, in the reality of China's imperfect labor market and various regulations, overweight and obesity among workers may generate a series of social problems in terms of discrimination in employment, schooling, and low-income compensation. There are a number of studies in China based on obesity discrimination or appearance discrimination, yet studies that grouped samples by different characteristics and link their findings to other potential discrimination possibilities discussed are scarce. This paper focuses on the impact of obesity on income level in Chinese labor market and analyzes the causes and consequences of potential discrimination phenomena.

According to modern human capital theory, health is the most basic human capital, and many economists, including Schultz, believe that health has a significant impact on raising income.[3] In this case, overweight may become unhealthy phenotypes, and at the same time fat may lead to physical, mental health in the quality and productivity of the population's workforce decreases, thus generating discrimination against overweight and obese employees in the market and affecting their wage levels. Therefore, this paper will analyze the CGSS2017(Chinese General Social Survey) data to test whether overweight and obese Chinese workers have a significant effect on their wage earnings.

Appearance discrimination is a widespread social discrimination phenomenon, and this paper examines obesity discrimination in the Chinese labor market to explore whether this social discrimination phenomenon is accompanied by economic effects that have deeper negative implications for society.

2. VARIABLES AND DATA

In this Chapter, the paper will present the explanatory variable, response variable, control variables, the hypothesis, and the basic statistical analysis related.

2.1. Variables

2.1.1. Explanatory variable: BMI.

BMI is a reliable indicator when it comes to comparative analysis of the health effects of individual weight on people of different heights, so this paper uses BMI to define weight. According to international standards, an adult with a BMI of 25-30 is considered overweight; 30-35 is considered obese; and above 35 is considered very obese. In this paper, no distinction is made between overweight, obesity, and overweight, which are collectively referred to as overweight.

2.1.2. Response variable: Income.

In case of income, it particularly refers to the income of the position or the remuneration received for performing labor.

2.1.3. Control variable:

Meanwhile, due to the complex composition of factors affecting income, namely gender, education, and age, are chosen as control variables.

Table 1 Variables

	Name	Type	Definition
Explanatory Variable	Income(inc)	Continuous	Intra-occupational income
Response Variable	Overweight (Owei)	Dummy	Body weight divided by height squared
	Education (edu)	Dummy	Highest degree of education
Control Variables	Gender	Dummy	Physiological sex
	Age	Continuous	Age at 2017

All variables are shown in Table 1. The data used in this paper come from the Chinese General Social Survey (CGSS), which started in 2003 and is the earliest national, comprehensive, and continuous academic survey project in China. Nowadays, CGSS data has become the most important data source for studying Chinese society and is widely used in various aspects. The latest data, CGSS2017, is used. Thia was released in 2020 and is available for free and download on the official website.[4]

2.2. Hypothesizes

This paper hypothesizes that:

1). Higher BMI presents a negative effect on income;

2). This effect is more significantly shown in female group.

Since the purpose of this study is to examine the relationship between income and being overweight in the labor market, individuals who do not work or have no formal wage income were excluded, and since height and weight as well as income were the main variables, samples with missing values for these variables were excluded. The differences between national legal working age, retirement, pension income and wage income, and possible hunchback and short stature due to bone changes in the elderly were taken into account, thus excluding samples younger than 16 and older than 70 years for the male sample and younger than 16 and older than 65 years for the female sample. 7713 samples have remained, and the frequencies of the samples are shown in Table 2; results of the descriptive statistical analysis are shown in Table 3.

Table 2 Frequency and Ratio

Variables		Frequency	Ratio
	Male	4145	53.7%
	Female	3567	46.3%
Gender	Middle school and lower	4469	57.9%
	High school	1426	18.4%
	College and higher	1817	23.5%
BMI	Non-overweight	5807	75.2%
	Overweight	1905	24.8%
	Lower than 10,000	1569	20.3%
Income	10,000 to 100,000	5313	68.8%
	100,000 to 500,000	770	9.9%
	500,000 to 1,000,000	37	0.4%

	Higher than 1,000,000	23	0.29%
	Under 25	359	4.65%
Age	25 to 40	2132	27.6%
	40 and above	5062	65.6%

Table 3 Statistical analysis

	Variable	Obs	Mean	Std. Dev.	Min	Max
Male	Income	4,145	56591.76	236407.3	100	1000000
	BMI	4,145	23.52587	8.197568	0.75	194.92
	Education	4,145	5.698914	3.208724	1	13
	Age	4,145	47.92593	14.93262	18	103
Female	Income	3,567	45628.19	285010.8	100	9930000
	BMI	3,567	23.00533	11.42327	0.48	221.78
	Education	3,567	5.45164	3.488761	1	13
	Age	3,567	47.13148	14.65283	18	65

Since income is usually log-normally distributed and to facilitate the interpretation of statistical results, log income is used as the corresponding variables In addition, because the effect of overweight on income may be different for different genders, the male and female samples are analyzed separately (Table 4).

Table 4 Primarily Regression Analysis By Gender

	Male	Female
	lnInc	lnInc
BMI	0.0852	0.0381*
	-4.27	-2.4
Age	-0.0174*	-0.0742
	(-14.53)	(-5.31)
Education	0.174*	0.208
	-31.28	-35.45
_cons	9.810	8.956
	-108.94	-96.31
N	4145	3567

***p < 0. 01, **p < 0. 05, * p < 0. 1

3. ANALYSIS

To better perceive the factors influencing individual wage income clearly, the effects of BMI, education, and age factors on wages are explored by using multiple linear regression equations, which is shown in Table 4.

3.1. Primarily Analysis According to Gender Variability

The fitted values of each regression model were significant overall (p =0.000). From the regression model, it appears that overweight does not have a significant effect on wage income. However, the regression coefficient of income (lninc) is relatively stable, 0.0083 among males and -0.038 among females. That is to say, being overweight leads to a 0.83% increase in income for males and a 3.8% decrease in income for females. If calculated based on the average annual income of the sample workers of $56,591.76 (males), and $45,628.19 (females), male workers who are overweight earn $452 more than those who are not overweight, and female workers who are overweight earn $1733.8 less than those who are not overweight. Also, as shown in the table, there are effects of age and education on income and the coefficients are as

expected, which also shows the difference among the two gender groups. An increase in age leads to a 1.7% decrease in income levels for men and a 7.4% decrease for women; an increase in education levels leads to a 17.4% increase in income levels for men and a 20.8% increase in income levels for women.

3.2. The Endogeneity Problem

There may be an endogeneity problem in the effect of overweight workers on income, which leads to insignificant estimation results. Therefore, estimating the income effects of overweight individuals requires considering the endogeneity issues of the estimated model. First, being overweight may be related to certain characteristics of overweight individuals themselves and their families and the socioeconomic status of their upbringing, and overweight individuals may have higher earnings because of their family. Second, nutritious workers with high income are prone to be overweight (in China, vegetables are cheap yet meat is relatively much more expensive. According to the study of Yulan Lin, in China, the price index of high-calorie foods such as meat can reach several times that of vegetables.[5] Hence the likelihood of calorie acquisition is higher for those with high incomes). Thus, not only does being overweight affect wage income, but wage income in turn affects weight. Thus, there is an endogeneity problem with the wage effect of overweight. The exogeneity of the equation would be ensured if a set of .

instrumental variables could be found that are assumed to be orthogonal to the error term, but a set of instrumental variables related to the overweight index but not to wage income could not be found in the course of this paper. Also, to solve this endogeneity problem, if the wage income of an overweight person in the absence of overweight, could be estimated, then subtracting the wage income of an overweight person in the absence of overweight from the wage income of an overweight person would be the causal effect of overweight on wage income. However, it is not possible to observe both overweight and non-overweight income for the same group of people, so an accurate estimate of the relationship between the overweight person and his or her difference in income if they would have been earned in the absence of overweight is difficult.

3.3. The Effect of Age and Gender

To try to solve this problem, another multiple regression analysis by reversing the variables is done in Table 5, and the aim was to analyze the effects brought by other variables on BMI. The results of this regression echo the previously mentioned hypothesis that wages do have an impact on BMI at the same time. Among men, BMI tends to increase by 0.06 for every $1,000 increase in current year earnings, while among women, BMI tends to increase by 0.5% for every $1,000 increase in current year earnings

Table 5 Regression Analysis By Gender

	Male	Female
	BMI	BMI
Income	0.000000619	0.00000512*
	-1.14	-7.67
Age	0.00492	0.0586**
	-0.53	-4.01
Education	0.0715	-0.0602
	-1.64	(-0.98)
_cons	22.85*	20.34
	-37.79	-22.25
N	4145	3567

***p < 0.01, **p < 0.05, * p < 0.1

Age also has a significant effect on BMI, with an increase in age leading to an average increase in BMI of 0.49 in men and an increase in age leading to an average increase in BMI of 5.8 in women. It was previously mentioned that it was difficult to find other instrumental

variables eligible, and considering that age also had a significant effect on BMI, another multiple regression of BMI on lninc was done, controlling for the two variables of age and gender, which is shown in Table 6 and Table 7, for male and female.

Table 6 Regression Analysis By Age - Male

	Under 25	25 to 40	40 and above
	lninc	lninc	lninc
BMI	0.00445	0.00198	0.0104*
	-0.77	-0.57	-4.08
Education	0.0177	0.131*	0.246*
	-1	-18.01	-31.65
_cons	10.15*	9.779*	8.474*
	-50.74	-96.74	-117.04
N	770	1132	2319

***p < 0.01, **p < 0.05, * p < 0.1

Table 7 Regression Analysis By Age - Female

	Under 25	25 to 40	40 and above
	lninc	lninc	lninc
BMI	-0.0470*	-0.00531*	0.0246
	(-2.23)	-2.12	-1.28
Education	0.029	0.162***	0.270**
	-1.36	-21.67	-33.66
_cons	10.79**	9.117*	8.315*
	-21.73	-108.84	-134.67
N	719	1000	1899

***p < 0.01, **p < 0.05, * p < 0.1

The results of regression with controlling the age variable are a bit more clear compared to the previous ones. In the male group, the regression coefficients for the three age intervals are 0.00445, 0.00198, and 0.0104, which means that an increase in BMI leads to a 0.4%, 0.1%, and 1% increase in income, which also proves that in the male group, BMI produces a positive effect on the incme. Menwhile, in the female group, the regression coefficients for the three age intervals are -0.0470, -0.0531 and 0.0246, which means that an increase in BMI leads to a 4.7%, 0.53% decrease for females under 40 and a 2% increase for females older than 40. In this way, the previous regression results without controlling for age can be explained - the insignificance of the results is caused by the different effects at different ages, and this insignificance subsides somewhat after controlling for age. At the same time, the previous hypothesis was proven, that is, BMI produces more negative effects in women than in men, at least in the age group of less than age of 40.

Based on this, this paper proposes a new hypothesis here - that in the female group, this effect of weight on work may also originate from different wage levels themselves, and that the existence of appearance discrimination may be more pronounced for women whose wages are located at the middle income level. The regression model is shown in Table 8.

Table 8 - Regression Analysis By Income Level - Female

	Less than 10K	10K to 50K	50K to 100K	100K and above
	lninc	lninc	lninc	
BMI	-0.00303	-0.0648	0.0128	0.0108*
	(-0.81)	-0.82	-1.35	-3.81
Education	0.0549***	0.0591***	0.0114***	0.00173
	-4.01	-15.87	-4.95	-0.15

_cons	7.849***	9.701***	10.88***	11.68*
	-79.56	-334.55	-359.61	-88.08
N	86	1862	556	287

***p < 0.01, **p < 0.05, * p < 0.1

For women with different income levels, the regression coefficients are -0.00303, -0.0648, 0.0128, and 0.0108, respectively; that is, among women with low to moderate income, BMI tends to have a negative effect, with wages decreasing by 0.3% and 6% as BMI increases, while among women with high income, BMI tends to have a positive effect, with wages will market value increase by 1.2% and 1%, which happens to test the hypothesis. The coefficient is most pronounced among women in the middle income bracket (earning 10K to 50K), showing a clear discrimination phenomenon. However, for women whose salaries are located at low or high income levels, the coefficient is lower in comparison.

A possible explanation for this result is that BMI, when it plays a role, is related to the type of occupation and occupational status of the individual. For high-income people, the jobs they hold usually require a high level of personal intelligence and cognitive ability, or they need to have strong social capital, or they need to accumulate for a long time to enter the relevant positions, so the role of other factors may outweigh the role of appearence[6]; for low-income people, the jobs corresponding to low wage levels are often labor-intensive industries such as manual labor, and so on. Usually more attention is paid to the physical conditions and purely technical level of people, and the role of appearance is more limited.[7]

However, for middle-income women, their occupations are usually general office workers, which require relatively moderate professional skills and intelligence, and the labor market is well supplied with relatively fierce competition[8], so the figure factor has a more significant impact on the recruitment of employees and wage distribution in addition to work ability.

4. CONCLUSION

This paper examines the issue of appearance discrimination in the Chinese labor market in terms of BMI, an appearance characteristic, and attempts to analyze the differences that arise among groups of different incomes and ages, confirming the existence of appearance discrimination against women in the Chinese labor market: on average, among women under 40 years old and in the middle and lower income level, women with lower BMI receive higher wages; however, this appearance discrimination is not significant among men. The appearance discrimination in Chinese labor market mentioned is not only about the appearance discrimination itself, but also the potential gender discrimination. Therefore, in order to improve the quality of workers and labor productivity, it would be a good solution to formulate and improve the related public health management and human resource development policies. In order to guarantee social equity, relevant labor market regulations should be formulated and improved to prohibit overweight and obese people from being treated unfairly and discriminatorily in labor market recruitment, career promotion, labor compensation payment, also to prohibit women from being treated unequally and discriminatorily in labor market and occupation in order to guarantee gender equity.

The paper is not an experimental study and cannot yet provide an adequate causal account of the relationship between appearance and income; in terms of statistical methodology, there may be a better and comprehensive way due to the exclusion of many cases without income and other ineligible cases, the use of a sharply reduced valid sample, and the use of regression only for statistical judgment. At the same time, the endogeneity problem of the regression model is not well addressed when a set of instrumental variables related to the overweight index but not to wage income are not found and the counterfactual is not applicable. Also, the analysis of education level was omitted.

Moreover, due to the limitations of the data itself, the author only used height and weight-generated BMI as variable that does not provide a comprehensive and sufficient measure of appearance; also, the effect of appearance on income may be reflected in bonuses or other forms of income, and CGSS2017 does not capture these implied other labor earnings.

In future studies, it is better to further focus on thedata, selecting more representative variables to measure appearence, considering other other factors that may have an impact on the results of the data analysis, and refining the data process of analysis, thus drawing more valid conclusions.

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