

MA6131 Statistics Report: Why am I single? Am I too short? (Public Version)

Tan Jun Wei^{1,*} and (Redacted)

¹NUS High School of Mathematics and Science, 20 Clementi Ave 1, Singapore 129957

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The rising rate of singlehood presents one of the most grave threats to mankind. However, current research into this dire circumstance focuses on national or international scale socioeconomic driving factors, rather than on small scale influencing factors more relevant to the general population. In addition, there have been little such studies conducted in a local (Singapore) context. In this work, we gather a data set describing one's marital status and height, before exploiting celebrated statistical methods such as the t-test and conducting detailed analysis on said data. We come to statistically significant results for both males and females that people in a romantic relationship are generally taller than their compatriots, with the result being much less significant in females.

I. INTRODUCTION

Singlehood presents one of the most crucial existential threats to humankind since the Cold War[1]. Such a threat has been brought into the spotlight in countries with rapidly ageing populations like Japan[2] recently. However, it is equally big a threat in Singapore, where the population statistics on marriage have been characterised by an increasing age of marriage across all demographics[3, 4]. Such trends have attracted great concern, with our Prime Minister Lee expressing his hope of an increased birth rate[5]. Possible explanations include an "increasing emphasis on freedom, independence and self-actualization"[6], increasing value being placed on a partner's income-earning capacity[7] and increasing levels of intelligence[8]. While these studies are indeed of importance to the governing body and should guide policy in this area, they do not answer the simple question important to many - why am I single?

It has been observed[9] that in NUS High School, tall people tend to be more likely to be in a romantic relationship than short people. This finding is very much in agreement with literature[10]. In the local context, a survey conducted by Today Online suggested that Singaporean women would be less likely to date men shorter or with a lower income than them[11]. In fact, the question of height, or in general *size*, has been brought up by then Senior Minister of State Josephine Teo before[12]. This has motivated the present study, in which a thorough investigation has been carried out with the objective being to determine whether there is indeed a preference with respect to height.

II. METHODS & DATA COLLECTION

Data collection was done by the use of a survey. The following data was collected: age, gender, genders that the respondent is romantically interested in, as well as

whether the respondent has been in a romantic relationship within the last 12 months. The cutoff of 12 months in the last condition was chosen to allow for people that might have been involved in a romantic relationship until recently, and to whom the survey remains equally meaningful, but also to exclude people who had been involved in a romantic relationship a long time ago, whose current height measurements are no longer indicative of the height when they were not single.

It should be noted that some of the questions request for highly personal and sensitive information, and that some may feel too uncomfortable to put the true answer. To prevent this, we fully anonymized the survey, opting to collect *no* data that could possibly be identifying, in the hopes that this would prevent such biases from changing the survey results.

III. STATISTICAL ANALYSIS

Survey respondents were blocked based on gender. Within each gender, we have identified two distributions of height, one belonging to respondents who have not been in a relationship in the past 12 months (singles) and the other belonging to those who have (non-singles). We have also blocked respondents by age to prevent confounding factors. Unfortunately, due to survey limitations, we were unable to get sufficiently many responses outside of the age range of 16 to 24 years old, and thus we only present the results for this age range. Other age ranges remain a possible future extension of this study. We hypothesise that the mean height of singles μ_1 is significantly less than that of non-singles μ_2 for both genders. In other words,

$$H_0 : \mu_1 = \mu_2$$

$$H_a : \mu_1 < \mu_2$$

Though the data was collected by means of a survey and not an SRS, we have spread the survey across multiple levels, schools and age groups. It is hence reasonable to assume that the data is similar to an SRS. There are

* tanjunwei03@gmail.com

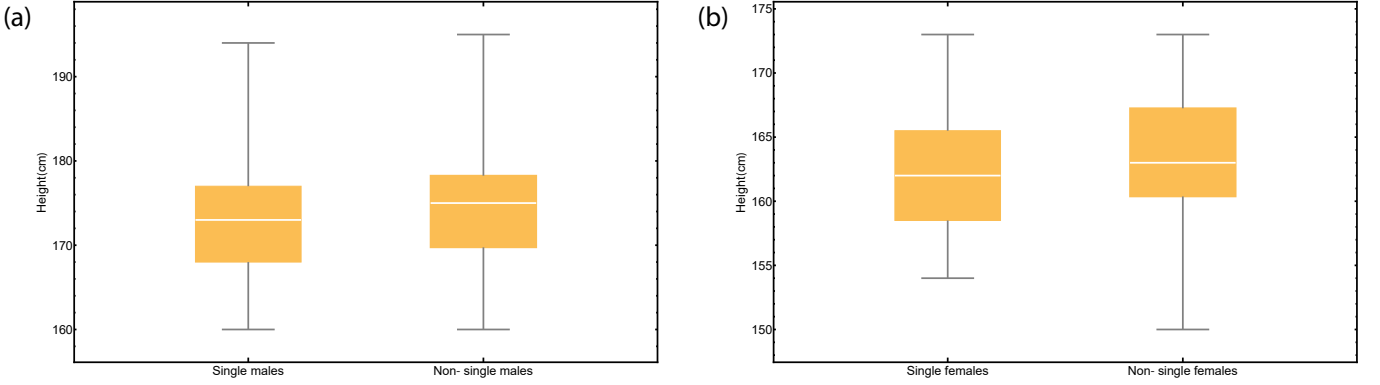


FIG. 1. Box plots of the heights of (a) males and (b) females

	Males	Females
n	$n_1 = 50$ $n_2 = 29$	$n_1 = 12$ $n_2 = 21$
\bar{x}	$\bar{x}_1 = 173.350$ $\bar{x}_2 = 175.103$	$\bar{x}_1 = 162.042$ $\bar{x}_2 = 163.548$
s_x	$s_{x1} = 7.02782$ $s_{x2} = 6.64989$	$s_{x1} = 5.42074$ $s_{x2} = 5.79635$
df	61.322	24.352
P-value	0.137	0.231

TABLE I. Sample statistics

more than 1170 people aged 16-24, so the independence condition is satisfied.

The box plots of the heights of both males and females are shown in Figure 1. The two box plots for both single and non-single males are skewed to the right. In addition, the box plot for non-single females is skewed to the left, with only that of single females being approximately symmetric. However, as all the sample sizes are greater than 5 and $n_1 + n_2 > 30$ for both genders, the 2-sample t-test can be performed anyway.

Table I summarises the parameters and results of the 2-sample t-test done on each gender. As the P-value for males is less than 0.15, we can conclude at 15% significance level that the mean height of non-single males is higher than that of single males. However, as the P-value for females is greater than 0.15, we can conclude at 15% significance level that there is insufficient evidence to conclude that the mean height of non-single females is higher than that of single females.

IV. DISCUSSION

The results of our study shows that a greater height is correlated with a greater likelihood of being in a romantic relationship. This concurs with the general agreement

that physical attractiveness is a major factor in choosing a partner for both males and females[13].

One of the most unexpected results presented in this work is that the result is statistically significant for males, but not so for females. Current literature has established that physical attractiveness is more significant a factor when choosing a partner for males than it is for females[13]. Considering that the majority of respondents were attracted to the opposite gender, this result would suggest that females should experience a greater difference in the likelihood of being single with height.

This is most likely a reflection of different criteria by which the different genders determine physical attraction. While there is little research on what makes a male attractive, literature shows that one of the most important characteristics governing whether a female is considered attractive or not is the waist to hip ratio[14].

At this point it is necessary to address an alternative explanation for the trends observed - since adolescent women generally date older men[15], it is natural to suggest that the result obtained is due to age as a lurking variable. However, as natural as it is, this is likely not the reason for our results - the pubertal growth spurt for males ends at the age of around 17.1 years old on average, with the peak height velocity achieved at the age of around 14.1 years old[16]. Thus, it is believed that there is little variation in height due to age within our sample of people aged 16 to 24 years old.

V. CONSEQUENCES & SOLUTIONS

The prospect of imminent and permanent singlehood is a terrifying concept to most, and this work has likely done nothing to allay those fears in vertically challenged people. However, there are some solutions for such unfortunate souls. Clinical interventions shown to result in an increase in height include vertebroplasties[17], inhibition of oestrogen[18, 19] and use of a gonadotropin-releasing hormone to delay puberty[20]. However, it should be noted that all of these were originally developed for other purposes - they are *not* treatments purely to make one

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FIG. 2. (Redacted) (not his real name) does push ups to decrease his BMI in a futile attempt to grow taller

taller.

It may also be of interest that an increased BMI in childhood does not result in a greater final height after puberty[21] - as such, exercising before puberty with the sole goal being to decrease the BMI (an example being shown in Figure 2) does not increase the final height.

VI. CONCLUSION & FUTURE WORK

In this work, we have provided a comprehensive study of people in Singapore aged 16-24, arriving at a statistically significant result that the mean height of males that are not single is higher than that of single males, while being unable to come to any statistically significant conclusion for females.

Possible future extensions include, as mentioned in section III, an extension of this study to include different age ranges. Other physical parameters such as various dimensions of the body, as well as socioeconomic factors can also be investigated.

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