Female height and union formation in the developing world

Christiaan Monden, Department of Sociology, Tilburg University
Jeroen Smits, Department of Economics, Radboud University Nijmegen

Abstract (149 words)
We study the role of female height in union formation among 350,000 women aged 16-49 living in 560 districts within 52 developing countries. Theories on union formation are usually tested on data for Western societies. The literature suggests that being taller increases success at the marriage market for men but not for women. We challenge the idea that the role of female height is universal. Theoretical arguments as well as empirical evidence suggest that the role of female height is conditioned by the level of development of societies. Female height is an important signal of health and reproductive potential in less developed societies. We develop a series of hypotheses on the role of female height on the likelihood to marry and to marry a partner with higher socio-economic status. These hypotheses are tested on a unique dataset with comparable measurements of societies that strongly vary in level of development.

Introduction

Studies on mate preferences and union formation usually assume, explicitly or implicitly, that physical preferences and mechanisms operating on the marriage market are universal. From an evolutionary perspective, it is expected that men look for women with a high reproductive perspective, whereas women look for partners with high status and strength. This perspective can explain why in Western countries height has been found to be a positive characteristic on the marriage market for men but not for women. In fact, being smaller seems to be more advantageous for women on the marriage market. In Western countries, being tall is also associated with reproductive success among men, whereas for women being below average is most advantageous in this respect. In the literature it is often implicitly assumed that these Western patterns are universal, however the sporadic evidence on developing countries indicates that this assumption is probably not correct.

In this study we challenge the idea that preferences for characteristics in partner selection are universal and stable over countries. We formulate alternative hypotheses about the role of height in union formation in the developing world and test these hypotheses using data on 350,000 women living in 52 developing countries. Compared to other factors used in research on union formation (like education, income, ethnicity or religion), height has several advantages. First, it can be reliably measured in large and diverse populations where real choices have been made (instead of experimental designs). Second, it is available for a large number of countries. Third, it is a salient feature. Fourth, it has been empirically well established (i.e. with large twin-studies) that height not only reflects genetic endowments but also childhood material circumstances.

Background

Little is known about union formation in developing countries. Almost all our knowledge is based on Western studies (often on students). But Western countries have unusual

demographic patterns compared to most other societies: mortality and fertility are extremely low, and rates of non-marriage relatively high. Is it really reasonable to assume that partner preferences are similar in other parts of the world? The idea of stable preferences stems from a evolutionary perspective: our preferences were formed during the time when humans where hunter-gatherers on the African plains, there has been no further evolution. This means our mating preferences will be universal across cultures. However, this hypothesis is hardly tested.

We do not dispute the idea that individuals look for partners with favorable socio-economic characteristics and a high likelihood of healthy and successful offspring. However, we argue that the signals of a successful and reproductively successful partner may differ over time and among societies. In societies with different levels of resources, different physical characteristics may be better markers for reproductive potential. Below we will formulate hypotheses based on this idea.

For modern Western countries the features that are found most attractive in female partners are small waists, symmetrical features and large breasts (Hume & Montgomerie, 2001; Singh & Young, 1995; Streeter & McBurney, 2003). Tall height is not studied because of the assumption that is not related to reproductive success. Is the rating of the features stable over time and societies? Those few studies that have looked at cross-cultural differences in preferences indicate that they are not. Results indicate that the preference for a healthy and reproductive successful partner might be universal but that the characteristics valued most in the West, such as hip-waist ratios and symmetry, are not constant across cultures (Wetsman & Marlowe, 1999; Yu & Shepard, 1998). Furnham and Buguma showed substantial differences between UK and Ugandian students in rating attractiveness of body shapes. Even within developed countries the beauty-ideal is not constant. Voracek and Fisher (BMJ 2002), for instance, showed substantial changes over the 1953-2001 in body measures of Playboy centerfold models.

Regarding the male-taller norm, evidence shows that Western men prefer a short partner, or at least a partner shorter than themselves. This preference is found both in experimental studies and in real couples (Gillis & Avis, 1980). But again, hardly any tests have been done to find out whether this is a universal pattern. Sear et al (2004) did not find evidence for the male-taller norm in Gambian couples. Baten and Murray (1998), in a study of Bavarian women in the nineteenth century, showed that shorter women are less likely to be married than tall women and women of average height. All this is in contrast to the idea of ideal forms and the role of height in union formation being stable over time and over societies.

Hypotheses
Why would height increase a woman's chances on the marriage market? And why would this be more so in less developed societies than in modern affluent societies?

It is well known that height has an important genetic component. However, it is also empirically established that there is a there is a strong environmental component influencing final adult height. This is true in modern Western societies (Silventoinen, 2003), but even more so in societies where food is not abundant, infectious disease is widespread, and medical care is not universal (Roberts et al., 1978). For instance, higher incidence of diarrhea episodes is associated with slower growth rates (Rowland et al., 1977). In developing countries height is a sign of strength, health potential, and of having experienced a more prosperous childhood, indicating more family resources. It also signals higher reproductive potential. These are

important features that people value in a potential partner.

Nettle (2002) showed that smaller than average women in the UK have more reproductive success. However, Sears found that, contrary to the UK, taller women in Gambia have higher reproductive success than shorter women. Of course, the both extremes are least successful. There are a number of reasons why height in developing countries might be associated with successful reproduction. First of all, reproductive success has a different meaning because of the low fertility and mortality in the West. Tall women have wider pelves than shorter women, which allows them to have easier births and higher birth-weight babies, and hence less maternal and infant mortality. In Western countries, with extremely low infant and maternal mortality, this hardly affects the association between reproductive success and height. In countries with high mortality, on the other hand, is it very likely that reproductive success and height are positively related (we will test this relationship empirically as well).

Obviously, the relationship between height and success on the marriage market will not be completely linear. Extremely tall women will face serious problems at the marriage market. Extreme height may no longer signal good health, but rather potential health problems and lower reproductive success. Extreme height may be socially less accepted. And, although these women could be ideal partners for extremely tall men, such a match is difficult to make because of limited meeting opportunities, especially in countries with a less well-developed infrastructure.

Taking into account the above we expect that: *In developing countries, taller women are more successful at the marriage market than shorter women, ceteris paribus. This does not hold for women in the highest percentiles of the height distribution* (Hypothesis 1)

Success at the marriage market is indicated by higher likelihood of finding a partner (being married), and of finding a partner with a higher socio-economic status and better health. Marriage market theories assume that an individual with more positive traits will not only be more successful in finding a partner, but will also be able to marry a partner with more favorable characteristics. Thus, our hypotheses concern the chance to (a) finding a partner, and (b) finding a partner with a higher educational level, occupational status, income and a better health.

We expect the importance of height to be conditional on the developmental level of the region. Thus, we expect a positive relationship between female height and marital success in developing countries, but also variations within the developing world. First, in less developed countries female height will be a stronger signal about health potential and reproductive success. Second, in a less developed economic environment, individuals need more personal resources to increase their overall well-being, especially their material well-being. In a richer environment that provides for many basic needs such a clean water and shelter, job opportunities, health care and old-age benefits, people can be less selective on the marriage market with regard to health potential and reproductive success. For individuals in a poor environment it is more important to obtain a partner with as many resources as possible. In such circumstances, fertility potential is more important too, because offspring is an asset for the household. Thus, our conditions hypothesis reads: *The positive effect of height on women's union formation is stronger in less developed countries/regions*.

In a similar line of reasoning we could expect that height is less important in more recent marriage cohorts. Marriages in more recent marriage cohorts took place in a more affluent environment than those in older marriage cohorts.

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Data and methods
The data we use to test our hypotheses are derived from the Demographic and Health Surveys (DHS), which are large representative household surveys in which, besides general household information, detailed information on all women aged 16-49 in the households is collected. The most recent (1998+) surveys are used for 52 developing countries (6 in Latin America, 29 in Sub-Saharan Africa, 7 in the MENA region, 6 in Middle and South Asia, and 4 in South-East Asia). We use the data from the women's surveys, from which we derive besides height (in cm) a number of background characteristics, including age and education of the woman and age, education and occupation of the husband. Widowhood is used as an indicator of husband's poor health. To study trends we compare marriage cohorts. These cohorts are centered around 1995, 1985 and 1975.

We use the geographical information available in the data sets to distinguish sub-national regions within the countries (called districts here). We assume that the marriage market is mainly restricted to the district in which the woman lives. As distance is generally more a problem in developing than in developed countries, this assumption does not seem unreasonable. Level of development of the districts is measured by an index constructed on the basis of six variables aggregated from our household data sets: the percentages of households in the district owning a fridge, a car, a telephone, or a television, and the percentages of households with electricity or running water. At the national level, GDP per capita is used.

We use four dependent variables: (1) whether the respondent ever married (2) educational level of the husband, (3) occupational class of the husband, and (4) whether the husband is still alive. Our main independent variable is height in centimeters. DHS contains a good height measure. Preliminary analyses show no evidence of heaping. We will estimate three-level (household, district, country) multilevel models in Stata10 and perform cross-level interactions.

Results
In addition to descriptive tables and figures about the distribution of height and marital status we will construct the following tables and figures to test our hypotheses:
Table 1   Percentage of married, never married, divorced and widowed women by height in deciles;
Table 2   Three-level binary multilevel regression of height and own education on being married with and without cross-level interactions between regional developmental index and height
Table 3   Three-level multilevel regression of height and own education on husband's educational level with and without cross-level interactions between regional developmental index and height
Table 4   Three-level multinomial multilevel regression of height and own education on husband's occupational class with and without cross-level interactions between regional developmental index and height
Table 5   Three-level binary multinomial multilevel regression of height and own education on widowhood for ever married women class with and without cross-level interactions between regional developmental index and height
Figure 1   Line diagram showing average years of education of the husband (y-axis) by standardized height of the wife adjusted for age and education (x-axis)