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Commentary: The associations between height, cognition, and education and their relevance for health studies

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The study by Magnusson et al. very convincingly demonstrates a close association between height at 18 and achieved education among Swedish men. The taller a man is the more likely he is to go to university. The authors suggest that short people may be discriminated against in the school system. However, they have no empirical data concerning ‘discrimination’, consequently this conclusion is left hanging in the air.

Two questions emerge from this well-written paper:

(i) Why are achieved education and height linked to each other?

• Is it due to characteristics of the school system or peer relations that discriminate against short individuals? Other research has suggested that this is a possibility, for instance West or Nyström Peck.
• Or does this link arise from common social, psychological, or biological factors, which influence both height and educational achievement? Magnusson et al. control for many such factors, for instance parents’ education and family background, but they also conclude that this possibility cannot yet be ruled out.

(ii) What is the implication for health of the association between height and education?

With regard to the first question there is an analogy with sociological studies of how social class determines educational achievement. Two separate effects have been established here: first, a working-class child tends to have poorer school marks than a middle-class child—this is referred to as the primary effect of social class. Second, if one compares individuals with the same school marks, a working-class child is less likely than a middle-class child to continue to higher education—this is referred to as the secondary effect of social class. To draw an analogy with studies of social class, we could in the present case perhaps talk about a primary effect of height on cognition and a secondary effect of height on educational achievement when we compare individuals on the same cognitive level. We assume that discrimination against short individuals would play a greater role in the secondary case. A primary effect of height on cognition may, instead, suggest that there are common underlying social–psychological–biological factors.

We replicated the study by Magnusson et al. by using the Stockholm Birth Cohort Study. Thus we studied 5983 men born in 1953 living in Stockholm in 1963, for whom we have data on

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height and cognitive ability from military conscription at age 18 and educational achievement at adult age. Our data on height, cognitive skills, and education are drawn from the same sources and defined in the same way as the data in Magnusson’s study. In addition we analysed mortality for the 1980–2002 period, when the men were 27–49 years old (n = 6318). The purpose of this was to attempt to answer the two questions posed above. Our population is considerably more homogeneous than that of Magnusson’s study; all men were born in the same year and all lived in Stockholm during (part of) their childhood.  

Using the same cut-off points for height as Magnusson we replicated their finding that height is linked to cognitive ability, as measured by logical test score at the time of conscription (Pearson’s r = 0.14, P < 0.001), and to education (r = 0.10, P < 0.001). The figure below shows how the likelihood of going on to higher education increases steeply for each cognitive score. We divided the men into two groups, short (152–179 cm) and tall (180–205 cm), and give the proportions of university entrance for both groups (Figure 1). For any given score (except the top score) it is somewhat more likely for a tall person to enter university. This effect is not strong, however. A formal test estimates the chance of university entrance to be 1.10 (95% confidence interval 1.03–1.16) times higher for tall than for short individuals, adjusting for cognitive scores. In studies where social class has been in focus, a secondary effect of this kind has not only been interpreted as indicating discrimination but it has also been argued that this may reflect differences in values and resources, for instance in how much one can rely on parental support during university education. Thus, for a gifted working-class child not to choose university could be a rational choice. Similarly, the existence of a secondary effect of height on educational achievement is compatible with, but does not necessarily prove, discrimination of short people. 

An intriguing possibility is that height and cognitive skills are somehow determined by partly common factors. Magnusson et al. quote evidence that height and cognition may share a common genetic background, but height and education may not. Physical growth may influence cognitive growth and both may at the same time be influenced by a range of social factors, some of which are common to both outcomes. Height and cognitive skills may thus evolve together during the first two decades of life. Body height is known to be related to circulatory disease mortality and to all-cause mortality. Cognitive skills in childhood are also suggested to be linked to later mortality in young and middle-aged men. We combined height at 18 (divided into three groups) and cognitive ability at 18 (also divided into three groups) and then combined them into nine categories. Table 1 shows the results. The mortality risk of those who are in the lower third of both cognitive ability and body height can be estimated as 3–4 times that of the opposite extreme. However, cognitive ability rather than height seems to be the prime mover. 

We conclude that the evidence for a ‘discrimination hypothesis’ is not very strong. The net effect of height on education, given a certain level of cognitive ability, seems modest. Its net effect on mortality, at least in these relatively young men, seems to be even less. The cognitive effect on achieved education seems large, but cognitive scores at 18 are already influenced by educational experience, as demonstrated by Härnéqvist four decades ago. Height, cognition, and education are all associated with each other as well as with mortality, but the web of causation is poorly understood. The study by Magnusson et al. is helpful in sorting out some aspects. We will use the Stockholm Birth cohort to explore further the tangled web that is woven. 

References


