

Title: BMI in early adulthood is associated with descendants' epigenetic pace of aging in three generation especially in the maternal line

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Abstract

Studies based on harvest records indicate that grandparental nutrition status in youth is associated with grandchildren's health traits, with associations showing unilineal inheritance. We investigated the association between male early adulthood BMI (18-22y.) and the general well-being of their descendants measured with epigenetic pace of aging.

We had the BMI at drafting available from 1244 soldiers participating the World War II (WWII) and DNA methylation data based DunedinPace, measuring the pace of biological aging, from their children (59-93y., n=409), grandchildren (34-49y., n=473) and great grandchildren (6-36y., n=342). Regression analyses were adjusted with soldier's age at drafting, education, East/West Finland origins and the age, sex, smoking and BMI of the descendant and repeated stratified by sex. We also analyzed the association between parental BMI at 18 with their children's DunedinPace (16-38y. n=905) in the descendants of the soldier.

Soldiers BMI at drafting had an inverse association with the DunedinPace of their daughters ($p=0.01$, $\beta=-0.01$, $n=196$), daughter's daughters ($p=0.03$, $\beta=-0.09$, $n=154$) and all great grandchildren ($p=0.01$, $\beta=-0.07$, $n=342$). Similarly maternal BMI at 18 associated with offsprings DunedinPace ($p=0.001$, $\beta=-0.132$, $n=501$).

Soldiers BMI at drafting was inversely associated with biological aging of their descendants, especially in the ancestral line of females. However, BMI at drafting during WWII is not simply demonstrating food availability, as those with higher socioeconomic status had grown taller and had lower BMI. Further investigation is needed to understand whether we are observing transgenerational effect of ancestor's BMI or for example repeated intergenerational social inheritance in maternal line.