

Chocolate Consumption, Traffic Accidents and Serial Killers

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Messerli¹ suggests that, because chocolate contains flavonoids shown to improve cognitive function, we might expect to see a correlation between a country's chocolate consumption per capita and the number of Nobel laureates that countries produce. Indeed, Messerli revels in the strength of the correlation between these two variables. However, the study seems flakey to us, since the use of large-scale correlations with cultural data is a rocky road, and it can too easy to fudge the difference between cause and correlation. We present some data that mars the previous inference.

Our present study aimed to show how Messerli's study is problematic on several fronts. First, there are no controls for why certain countries might have differential levels of chocolate consumption. For instance, patterns of chocolate consumption are higher in winter than in other seasons², suggesting that countries with colder climates will consume more chocolate. Second, by looking at IQ instead of Nobel laureates, we offer a more suitable proxy for investigating possible population-level effects. This is especially true considering that Nobel laureates constitute an extreme outlier and will likely introduce a large amount of systematic error. Third, the correlations we find here might be artefacts of the degree of industrialisation and levels of spending in education. We therefore also controlled for GDP – a general indicator of a country's wealth and a coarse proxy for the amount of money invested in education.

Methods

We take five variables from Wikipedia: the number of Nobel prizes awarded by country of recipient (and the population of that country) (http://en.wikipedia.org/wiki/List_of_countries_by_Nobel_laureates_per_capita). The nominal gross domestic product (GDP) per capita (http://en.wikipedia.org/wiki/List_of_countries_by_GDP_%28nominal%29_per_capit_a), the number of road fatalities per 10,000 population (http://en.wikipedia.org/wiki/List_of_countries_by_traffic-related_death_rate), the number of serial killers since 1900 (http://en.wikipedia.org/wiki/List_of_serial_killers_by_number_of_victims) and the number of rampage killers since 1900 (http://en.wikipedia.org/wiki/List_of_rampage_killers). We also obtained the average annual temperature³ and the average IQ of different countries⁴.

Results

After eight variables were acquired, we replicated Messerli's findings that chocolate consumption per capita correlates with the number of Nobel laureates per capita ($r = 0.73$, $p = 0.00007$). However, the average IQ of a country did not correlate with chocolate consumption ($r = 0.27$, $p = 0.21$). Additionally, for 18 countries where data was available, the level of chocolate consumption per capita is significantly correlated with the (log) number of serial killers and rampage killers per capita ($r = 0.52$, $p=0.02$, see fig.1). Also, the number of the number of Noble laureates per capita correlates with the number of road fatalities per 100,000 inhabitants per year ($r = -0.55$, $p = 0.0066$). However, a linear regression controlling for per-capita GDP and mean temperature found that chocolate consumption was not a significant predictor of the number of Nobel laureates ($F(1,19) = 3.6$, $p = 0.07$). Countries with higher GDP and lower mean temperatures correlate with higher Nobel laureates per capita ($r=0.7$, $p=0.0002,0.0016$).

Discussion

Unlike Messerli claims, economic and climactic indicators do affect the correlation between chocolate consumption and Nobel laureates. However, we also found similarly strong statistical links between variables that intuitively have no causal effect (traffic accidents) and ones that suggest that chocolate consumption has a negative affect on society (serial killers). If these results were to be validated, then it could have widespread implications for social policy, with bans being implemented to limit chocolate doping before exams and in high stress situations (especially when there is a gun to hand). We were also intrigued by the negative correlation between the number of road traffic fatalities and the number of Nobel laureates. Could it be the case that potential laureates spend more time thinking than focusing on crossing the road?

However, as first noted by Sir Francis Galton⁵, the nature of how cultural phenomena diffuse over space and time can lead to spurious correlations between independent variables⁶. So, even though we do not specifically question the links between flavonoids and cognition, there is little evidence to suggest there is a one-to-one (isomorphic) link between individual-level benefits and widespread population-level effects.

We suggest, alongside Messerli, that further investigation, such as controlled experiments is warranted. For instance we left the issue of change over time out of this analysis. The original work may have elicited some snickers, but it is also being picked up in the media. If researchers declare large-scale cross-cultural correlation to be a robust approach, then it's a slippery slope to a world of pure imagination.

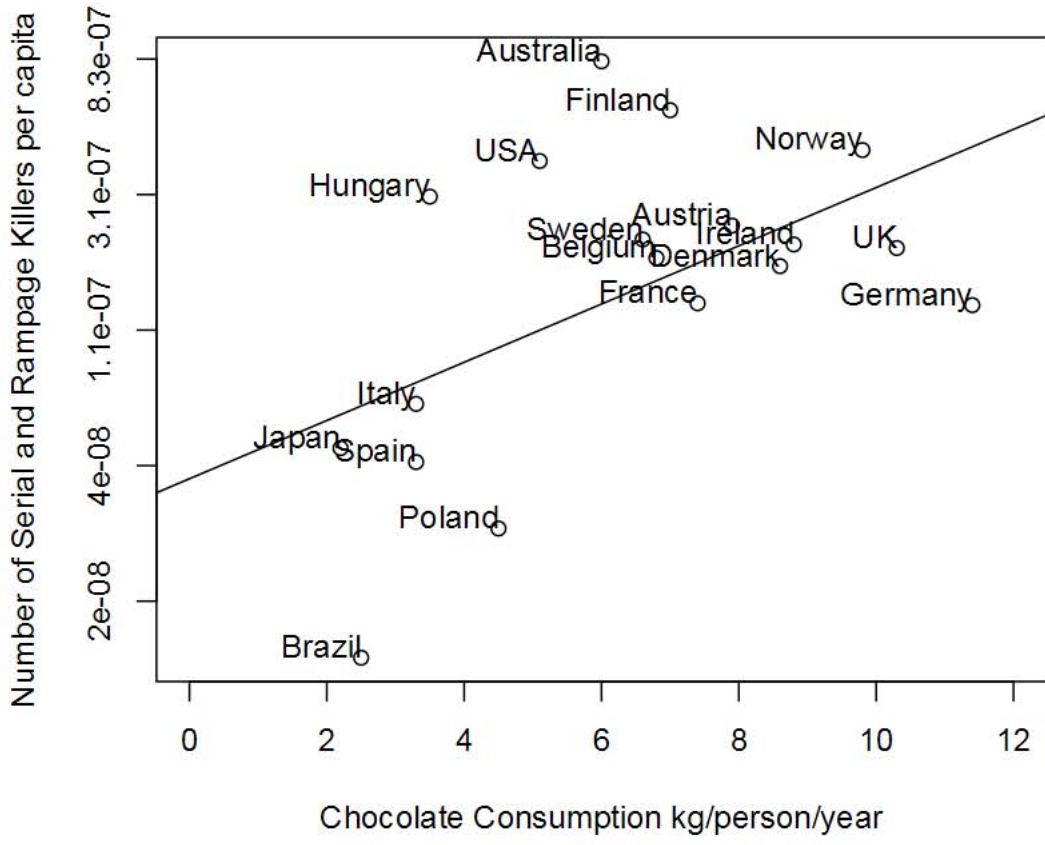


Figure 1: Correlation between countries' annual per capita chocolate consumption and the serial and rampage killers per capita since 1900.

References

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