

Study links heart rate to gender gap in criminal offending

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In the field of criminology, it is well established that men engage in more crime than women. Now, a new study from the University of Pennsylvania published in the journal *Criminology*, addresses the incomplete understanding of why males are more criminal than females by examining gender differences in biological functioning and behavior. It is the first study to demonstrate that men's lower resting heart rate partly explains the higher rate of criminal offending.

Olivia Choy, who graduated this month with a Ph.D. from Penn's Department of Criminology in the School of Arts & Sciences and is joining Nanyang Technological University as an assistant professor in July, conducted the research in Penn Integrates Knowledge Professor Adrian Raine's lab.

The study, "Explaining the Gender Gap in Crime: The Role of Heart Rate," complements traditional theoretical accounts of the [gender gap](#) and has implications for the advancement of integrative criminological theory in public health and law enforcement.

Researchers examined data from a longitudinal study that measured the [heart rate](#) of participants at age 11 and found that heart rate partly explains [gender differences](#) in both violent and nonviolent crime assessed at age 23.

Prior studies have shown that people with low [resting heart rates](#) seek stimulation to raise their level of arousal to a more optimal one. This

stimulation-seeking theory converges with a fearlessness theory arguing that these people have a low level of fear and may be more likely to engage in antisocial behavior, which requires a degree of fearlessness.

"We think cardiovascular functioning partly explains sex difference in crime," Raine said, "because low heart rate is a marker for other mechanisms like lack of fear and stimulation-seeking."

Raine holds appointments in Penn's School of Arts & Sciences and Perelman School of Medicine.

"One way to get that stimulation is by engaging in antisocial behavior," said Choy. "Obviously, you can engage in prosocial behavior, say, for example, like skydiving, but another major theory connects low levels of arousal to low heart rate, reflecting a low level of fear in individuals. To commit a crime, you do need a level of fearlessness, so these are two major explanations for why we see this relationship between low heart rate and [antisocial behavior](#)."

To test their hypothesis that a low resting heart rate partly mediates the relationship between gender and crime, the researchers examined data from a [longitudinal study](#) of 894 participants. Resting heart rate at 11 years of age was examined alongside self-reported and official conviction records for overall criminal offending, violence, serious violence and drug-related crime at 23 years of age.

A low resting heart rate partially mediated, or explained, the relationship between gender and all types of adult criminal offending, including violent and nonviolent crime. The mediation effects were significant after controlling for body mass index, race, social adversity and activity level. Resting heart rate accounted for 5 to 17 percent of the gender difference in crime.

Building on the limited number of studies that have been conducted to test theories of the gender gap empirically, the researchers examined the mediation effects on different types of crime in addition to overall criminal offending.

Data were obtained from a subsample of participants involved in the Mauritius Child Health Project. The original sample consisted of 1,795 children born in 1969-1970 who were recruited into the study from the island of Mauritius when they were 3 years old. When they were 11 years old, the children were given a major psychophysiological test. When they were 23 years old, assessments on their level of adult criminal offending in the past five years were made.

"We assessed criminal offending through self-reports," Choy said, "and looked at criminal conviction records obtained through district courts. This allowed us to look at gender, whether that predicts heart rates at age 11 and whether heart rate is associated with crime at age 23".

Choy added that the [gender](#) gap in [crime](#) is seen across time and across cultures. Differences in heart rates among male and female children are seen as early as 17 months of age: "You see it from 1 to 79 years, and even in newborn males who have lower resting [heart](#) rates than females."

More information: Olivia Choy et al. Explaining the gender gap in crime: the role of heart rate, *Criminology* (2017). [DOI: 10.1111/1745-9125.12138](#)

Provided by University of Pennsylvania

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