

# Teen smoking could lead to adult depression, study says

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Teenagers who smoke could be setting themselves up for depression later in life, according to a groundbreaking new Florida State University study.

Psychology Professor Carlos Bolanos and a team of researchers found that nicotine given to adolescent rats induced a depression-like state characterized by a lack of pleasure and heightened sensitivity to stress in their adult lives. The findings, published online in the journal *Neuropsychopharmacology*, suggest that the same may be true for humans.

"This study is unique because it is the first one to show that nicotine exposure early in life can have long-term neurobiological consequences evidenced in mood disorders," Bolanos said. "In addition, the study indicates that even brief exposure to nicotine increases risk for mood disorders later in life."

The Florida State researchers injected adolescent rats twice daily with either nicotine or saline for 15 days. After the treatment period ended, they subjected the rats to several experiments designed to find out how they would react to stressful situations as well as how they would respond to the offering of rewards.

They found that behavioral changes symptomatic of depression can emerge after one week of nicotine cessation and -- most surprising -- that even a single day of nicotine exposure during adolescence can have

long-lasting effects.

"Some of the animals in our study were exposed to nicotine once and never saw the drug again," Bolanos said. "It was surprising to us to discover that a single day of nicotine exposure could potentially have such long-term negative consequences."

The rats that were exposed to nicotine engaged in behaviors symptomatic of depression and anxiety, including repetitive grooming, decreased consumption of rewards offered in the form of sugary drinks and becoming immobile in stressful situations instead of engaging in typical escape-like behaviors. The researchers were able to alleviate the rats' symptoms with antidepressant drugs or, ironically, more nicotine.

Interestingly, adult rodents that were exposed to the same nicotine regimen as the adolescents did not display depression-like traits. It is not known exactly how nicotine works on the brain and nervous system to induce these effects, but exposure has toxic effects in several brain regions and neurotransmitter systems at distinct periods of development, Bolanos said.

Because various neurotransmitter systems in the brain continue to develop throughout adolescence, the researchers theorize that nicotine may negatively influence these systems resulting in altered functionality later in life. The study's findings underscore the need for further research into how this process occurs.

Scientists have long known there is a connection between smoking and mood disorders, but they have not been able to say for sure that one causes the other because there are so many factors influencing human behavior. This study provides support for the idea that smoking can induce symptoms of depression, and paradoxically, can also be a way of managing those same symptoms and enhancing the risk for addiction.

"The message to young people of course is don't smoke and don't even try it," Bolanos said. "If they do smoke, they need to be aware of the potentially long-term effects that recreational or even occasional cigarette smoking can have on their systems."

Publication: Bolanos' doctoral students Sergio Iniguez and Brandon Warren are the study's lead authors. Undergraduate and graduate research assistants Eric Parise, Lyonna Alcantara, Brittney Schuh, Melissa Maffeo and Zarko Manojlovic are co-authors in addition to Bolanos. To view the article, "Nicotine Exposure During Adolescence Induces a Depression-Like State in Adulthood," visit [www.nature.com/npp/journal/vao ... ull/npp2008220a.html](http://www.nature.com/npp/journal/vao...ull/npp2008220a.html) .

Source: Florida State University

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