

CIGARETTE/NICOTINE USE - A GATEWAY TO OTHER DRUG USE?



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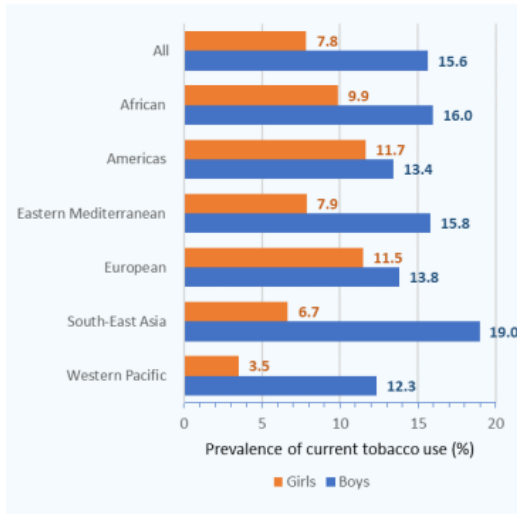
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OUTLINE

- Introduction
 - Tobacco/nicotine
 - Cannabis
- Development of the human brain and impact of nicotine
- Origin of the gateway theory (GWT)?
- Factors influencing the GW hypothesis
- Cigarettes/nicotine: gateway to other drugs?
- Conclusion



Figure 14. Prevalence of current tobacco use, adolescents aged 13-15 years, by region



WHY ARE WE WORRIED?

“Of the 5 countries globally experiencing rises in tobacco use, 3 are in the African region (Congo, Lesotho and Niger). The other two (Egypt and Oman) are in the Eastern Mediterranean region.” – WHO, 2019

INTRODUCTION: TOBACCO/NICOTINE

- Nicotine is the addictive drug found in tobacco products and nicotine products like electronic cigarettes and nicotine pouches
- Nicotine is a stimulant – occurs naturally in tobacco plant but there is also synthetic nicotine
- About 80% of those who currently smoke started smoking before they were 18 years
- The age at which smoking begins is a predictor of smoking behaviors in later life (WHO, 2019)
- However, smoking or nicotine use at an early age does not only affect smoking or nicotine use later in life but the use of other drugs (Ren & Loftipour, 2019)

TRADITIONAL TOBACCO PRODUCTS

- Usually categorized as combustible and non-combustible tobacco products
- **Combustible tobacco products:**
- Require burning of the product for consumption and include cigarettes, cigars, cigarillos, pipes, roll-your-own and hookah/shisha/waterpipe/ hubbly

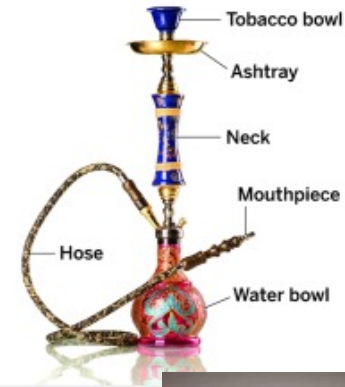


NON-COMBUSTIBLE TOBACCO PRODUCTS

- Also called smokeless tobacco products (SLT)
- They do not require burning for consumption
- These include snuff, snus, dissolvable tobacco, chew tobacco



NOVEL/EMERGING AND RE-EMERGING NICOTINE/TOBACCO PRODUCTS



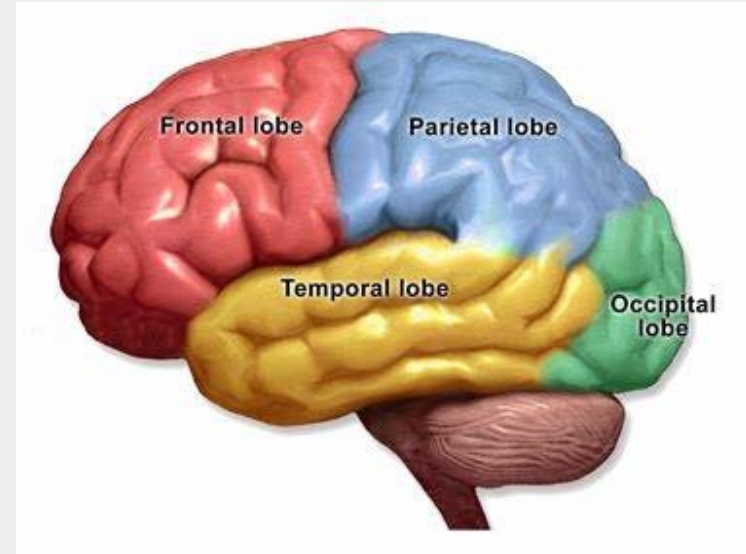
INTRODUCTION: CANNABIS/MARIJUANA

- Cannabis contains the psychoactive cannabinoid called THC (delta9 tetrahydrocannabinol) – over 480 types of compounds in this plant.
- There is also synthetic cannabis
- Known by various names: marijuana, pot, tea, grass, and weed, dagga, etc.



DEVELOPMENT OF THE HUMAN BRAIN ACROSS THE LIFESPAN

- The development of the brain is determined by both genetic and environmental factors
- The human brain develops right from the uterus to about 25 years.
 - Continues to grow afterwards but not as fast
- Studies suggest that adolescents have heightened reward-sensitivity.



Why is nicotine unsafe for young brains?

The brain keeps developing until about age 25. Using nicotine in adolescence can harm the parts of the brain that control **attention**, **learning**, **mood** and **impulse control**.

Each time a new memory is created or a new skill is learned, stronger connections – or **synapses** – are built between brain cells. Young people's brains build synapses faster than adult brains. Nicotine changes the way these synapses are formed.

Using nicotine in adolescence may also **increase risk** for future **addiction** to other drugs.



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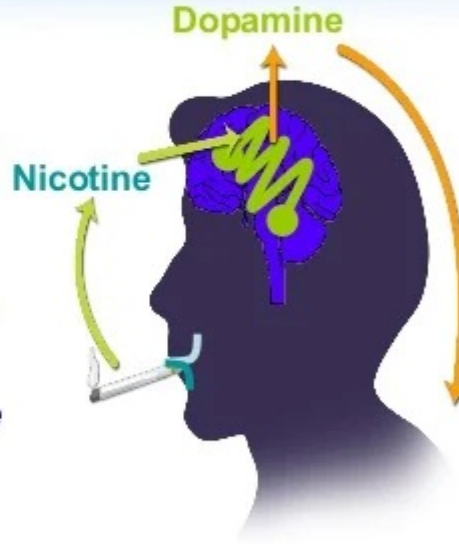
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Source: National Institute on Drug Abuse;
National Institutes of Health; U.S. Department
of Health and Human Services.



The Cycle of Nicotine Addiction

- ◆ **Nicotine binding causes an increase in dopamine release**¹
- ◆ **Dopamine gives feelings of pleasure and calmness**²
- ◆ **The dopamine decrease between cigarettes leads to withdrawal symptoms of irritability and stress**^{3,4}
- ◆ **A smoker craves nicotine to release more dopamine to restore pleasure and calmness**^{2,3}



- Causes increase in the neurotransmitter dopamine → affects the brain pathways controlling reward and pleasure
- Nicotine addiction can also be a learned behaviour or by the influence of the individual's environment

<https://www.mayoclinic.org/diseases-conditions/nicotine-dependence/symptoms-causes/syc-20351584>

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2. Fagerstrom K. *Drugs* 2002;62(Suppl2):1-9.
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IMPORTANT TO NOTE

- Vulnerability of the human brain (especially during adolescence)
- Vulnerability affected by age
- Importance of the developmental period of drug exposure
 - Being exposed to drugs at adolescence increases the sensitivity to that substance at adulthood (Spear, 2016)



ORIGIN OF THE GATEWAY THEORY

- Stemmed from the “stepping-stones” theory
- First appeared in a pamphlet of the U.S. Bureau of Narcotics (1965) -
 - “drug users who begin with cannabis are more likely to progress to using LSD (Lysergic acid diethylamide), cocaine and heroin”
- GW drug theory credited to Denise Kandel (1975)
 - describes how tobacco or alcohol use precedes marijuana and other illicit drug use.



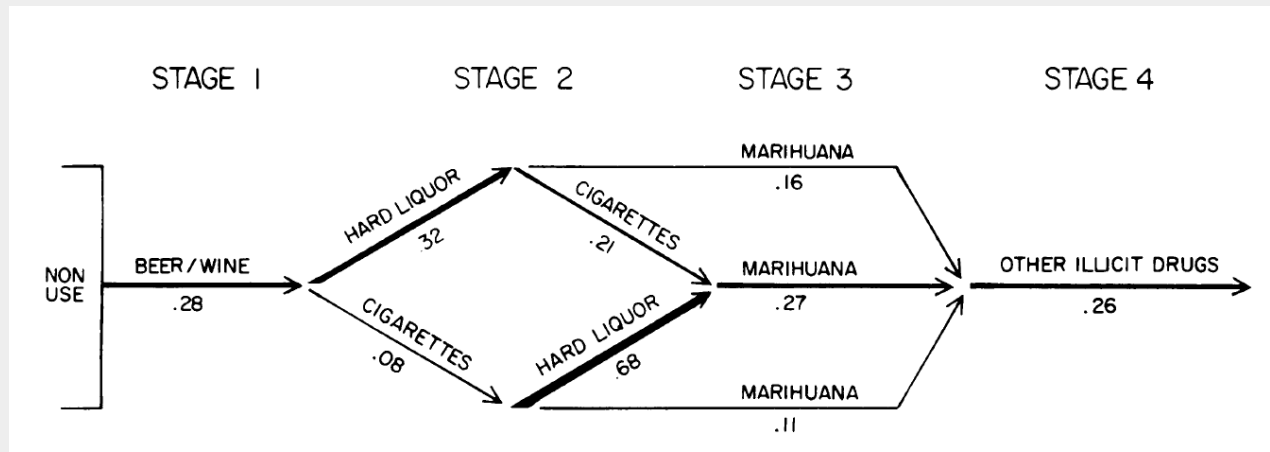
THE GATEWAY THEORY

- Kandell first looked at the sequence and stages and not the causes – (used epi studies)
- GWT involves two elements:
 - 1) sequencing of initiation of use between drug classes,
 - 2) association in the use of drugs, such that use of a drug lower in the sequence increases the risk of using drugs higher up the chain (Bell & Keane, 2014)
- Further research have used animal studies to explore causality, but no consensus reached, e.g.,
 - pretreatment of mice with nicotine increased their brain's response to cocaine (not the reverse) (Levine et al, 2011)



THE GATEWAY THEORY

“The gateway drug hypothesis refers to the pattern of substance use during adolescence whereby legal substances, such as nicotine and alcohol, precede the progressive use of illicit substances like [marijuana], cocaine and heroin.” – Miller & Hurd (2017)



Regardless of whether they started with cigarettes or alcohol, most of them transitioned to marijuana before other hard drugs

Kandel, D (1975)

DRUG-DRUG SPECIFICITY

- The gateway relationship is also specific to some patterns depending on the drugs involved
 - Early exposure to alcohol → future alcohol consumption
 - Early tobacco smoking initiation → future smoking tobacco smoking
 - Tobacco smoking → marijuana (the reverse have not been found to be the case)
 - Nicotine → cocaine (the reverse have not been found to be the case)
 - Marijuana → opioid but not cocaine
- Mostly based on the direct effect of the drugs on the biological and developmental processes of the nervous system (the brain and spinal cord and nerves)
- Also impacted by other factors, for example, sex, genetic background, and other environmental influences

FACTORS INFLUENCING THE GW HYPOTHESIS

- **Sex:** Human investigations show males are more at risk for substance use disorders even though females show longer term influence of drug use. (data still limited)
- **Genetics:** Parental use of drugs can lead to more susceptibility to other drug use (impact have been found on other drug use behaviour and not necessarily the specific drug used by the parents)
- **Environment:** Neighborhood - Environmental influences, acceptability , risk perception, accessibility and availability, peer pressure etc. impact on the use of substances



FACTORS INFLUENCING THE GW HYPOTHESIS (II)

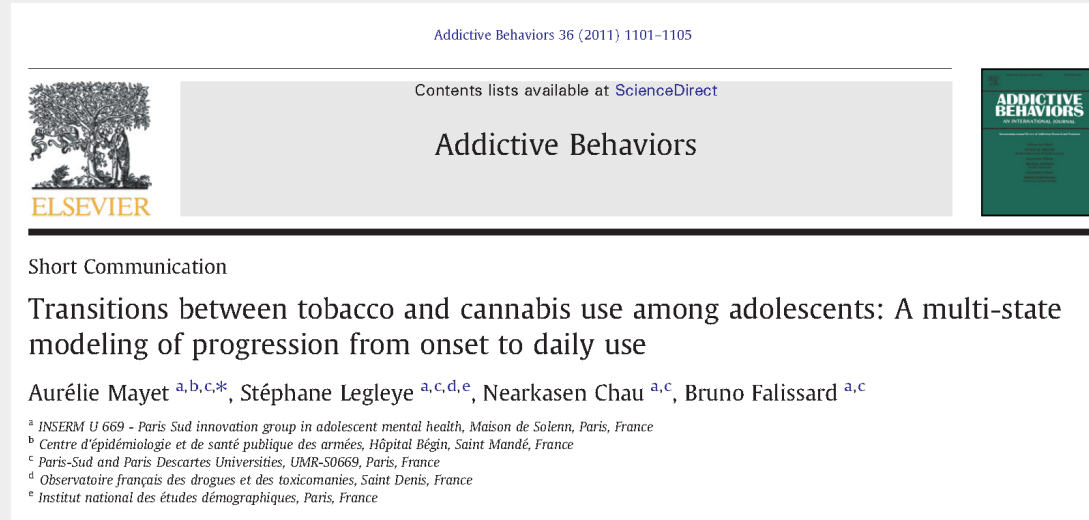
- **Age:** The earlier the age of initiation, the higher the risk of progression
- **Intensity of use:** The more frequent an individual uses a particular drug, the more likely s/he would transition to the next drug
- **Drug-drug specificity:** E.g., tobacco use → alcohol but not the reverse



CIGARETTE/NICOTINE PRODUCTS USE - A GATEWAY TO OTHER DRUG USE?

Findings:

- The likelihood of first initiating tobacco appeared 17.6 times greater than the likelihood of initiating cannabis
- Once a subject has experimented with one substance, the risk of another substance experiment was much greater
- Transition intensity from tobacco initiation to daily use was 4.8 times higher than that from cannabis.



Factors associated with the onset of cannabis use: a systematic review of cohort studies

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(Factores asociados al inicio del consumo de cannabis:
una revisión sistemática de estudios de cohortes)

Results: A total of 32 relevant studies were identified, of which 13 were of higher quality. Selection bias for the inclusion of consumers at the baseline measurement and lack or insufficient adjustment for confounders were the causes of exclusion. The factors of great evidence related to the onset of cannabis use were masculine sex, consumption of tobacco or alcohol, having a problematic relationship with parents, and cannabis consumption by friends.

GWT FOR TOBACCO/NICOTINE PRODUCTS USE

Review Paper

Tobacco Induced Diseases

Association between waterpipe use and susceptibility to cigarette smoking among adolescents and young adults who never smoked: A systematic review and meta-analysis

Zhu Yu^{1*}, Meng Wang^{2**}, Junfen Fu¹

ABSTRACT

INTRODUCTION Several factors associated with susceptibility to cigarette smoking have been identified, yet there is little evidence on the possible effects of waterpipe use. With this systematic review and meta-analysis, we aimed to investigate the relationship between waterpipe use and cigarette smoking susceptibility among adolescents and young adults who never smoked.

METHODS Eligible studies were searched in PubMed, Springer Link, ScienceDirect and Cochrane Library up to August 2022. The pooled odds ratio (OR) and 95% confidence intervals (CI) of cigarette smoking susceptibility with waterpipe use were estimated using a random-effects model. Publication bias was assessed by

AFFILIATION

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- GW theory has also been applied to various sequence of use for various tobacco products
 - Use of e-cigarettes → smoking traditional cigarettes
 - Smoking traditional cigs → e-cig use
 - Waterpipe tobacco smoking → smoking traditional cigarettes

ADDICTION

SSA SOCIETY FOR THE STUDY OF ADDICTION

Research Report

Adolescent electronic cigarette use and tobacco smoking in the Millennium Cohort Study

Jeremy Staff , Brian C. Kelly, Jennifer L. Maggs, Mike Vuolo

First published: 19 July 2021 | <https://doi.org/10.1111/add.15645> | Citations: 10



CONCLUSION (I)

- GW drug theory has not provided sufficient information about causation
- Complex social, biological and environmental interactions not thoroughly assessed
- Therefore, some researchers believe that there are important knowledge gaps needed to be filled before it can be fully accepted or refuted
- However, the GW theory gives more reasons for smoking cessation but most importantly prevention of smoking or nicotine use by adolescents

Are Gateway Drugs Real?

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LEADING THE WAY TO RECOVERY

WHAT IS A "GATEWAY DRUG?"

Gateway drugs are mildly addictive substances that are said to cause a user to consume harder, more potent, addictive drugs.

Top three substances labeled as gateway drugs:

- 1 Marijuana
- 2 Alcohol
- 3 Cigarettes

CONCLUSION (II)

- GWT provides an opportunity to understand drug use and possible points of intervention that may be more effective in preventing drug use
- The knowledge of GWT, limited as it may be, have not be fully harnessed
- Drug rehabilitation centers may benefit from helping those who use drugs to also quit tobacco/nicotine use



Thank you!

QUESTIONS

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