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Modeling the Dynamics of Alcohol-Marijuana co-abuse in Virginia

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Each year 3,900 youth under 21 die from excessive drinking and 57,000 visit emergency departments with alcohol-related incidents from individuals ages 12-17. According to CDC, the economic cost of excessive alcohol-related accidents or incidences is approximately $249 billion breaking down as healthcare costs of $28 billion, loss in workplace productivity of $179 billion, auto collisions costs of $13 billion, and criminal justice costs of $25 billion. The recent de-criminalization of recreational marijuana use in Virginia adds a new layer to this public health crisis as many of young adults start using marijuana at an early age and become addicted. The use of marijuana is an entry level drug to heavier drugs and mixing alcohol with marijuana has different effects on the young brain of an adolescent and other unknown effects on their bodies is yet to be understood. In this work we present a compartmental model for the Co-abuse of Alcohol-Marijuana, we present the basic reproduction number, some stability results and numerical simulations with parameters gathered with data from Virginia.