Suppose we wish to estimate the effect of marijuana usage on college grade point average. For the population of college seniors at a university, let *daysused* denote the number of days in the past month on which a student smoked marijuana and consider the structural equation

1. Let *percHS* denote the percentage of a student’s high school graduating class that reported regular use of marijuana. If this is an IV candidate for *daysused*, write the reduced form for *daysused*. Do you think the instrument relevance condition could be well satisfied?
2. Do you think *percHS* is truly exogenous in the structural equation? What problems might there be?

Answer:

1. For the instrument relevance condition to be satisfied, we require that high school peer group effects carry over to college. Namely, for a given SAT score, a student who went to a high school where smoking marijuana was more popular would smoke more marijuana in college. Even if this identification condition equation holds, the link might be weak.
2. We have to assume that percentage of students using marijuana at a student’s high school is not correlated with unobserved factors that affect college grade point average. Although we are somewhat controlling for high school quality by including SAT in the equation, this might not be enough. Perhaps high schools that did a better job of preparing students for college also had fewer students smoking marijuana. Or marijuana usage could be correlated with average income levels. These are, of course, empirical questions that we may or may not be able to answer.