

Homework # 13 - Stat 202

2.136 Marriage and income. Data show that men who are married, and also divorced or widowed men, earn quite a bit more than men who have never been married. This does not mean that a man can raise his income by getting married. Suggest several lurking variables that you think are confounded with marital status and that help explain the association between marital status and income. Use a diagram like Figure 2.29(c) to illustrate your ideas.

2.137 Exercise and self-confidence. A college fitness center offers an exercise program for staff members who choose to participate. The program assesses each participant's fitness, using a treadmill test, and also administers a personality questionnaire. There is a moderately strong positive correlation between fitness score and score for self-confidence. Is this good evidence that improving fitness increases self-confidence? Explain why or why not.

2.138 Music and academic performance. The Kalamazoo (Michigan) Symphony once advertised a "Mozart for Minors" program with this statement: "Question: Which students scored 51 points higher in verbal skills and 39 points higher in math? Answer: Students who had experience in music."⁴⁰ In fact, good academic performance and early exposure to classical music are in part common responses to lurking variables.

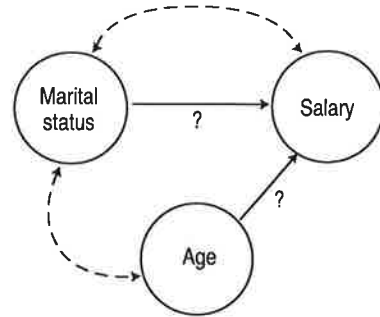
What background information about students could explain the association? Use a diagram like Figure 2.29(b) to show the situation.

2.139 Coaching for the SAT. A study finds that high school students who take the SAT, enroll in an SAT coaching course, and then take the SAT a second time raise their SAT Mathematics scores from a mean of 521 to a mean of 561.⁴¹ What factors other than "taking the course causes higher scores" might explain this improvement?

2.140 Computer chip manufacturing and miscarriages. A study showed that women who work in the production of computer chips have abnormally high numbers of miscarriages. The union claimed that exposure to chemicals used in production caused the miscarriages. Another possible explanation is that these workers spend most of their work time standing up. Illustrate these relationships in a diagram like those in Figure 2.29.

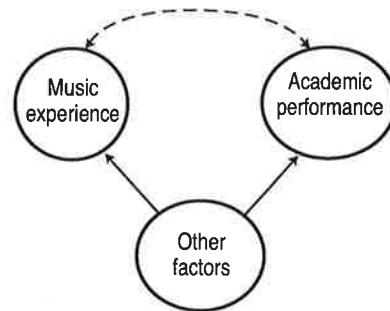
2.141 Hospital size and length of stay. A study shows that there is a positive correlation between the size of a hospital (measured by its number of beds x) and the median number of days y that patients remain in the hospital. Does this mean that you can shorten a hospital stay by choosing a small hospital? Use a diagram like one of those in Figure 2.29 to explain the association.

2.136. Age is one lurking variable: Married men would generally be older than single men, so they would have been in the work force longer and therefore had more time to advance in their careers. The diagram shown on the right shows this lurking variable; other variables could also be shown in place of “age.”



2.137. No; self-confidence and improving fitness could be a common response to some other personality trait, or high self-confidence could make a person more likely to join the exercise program.

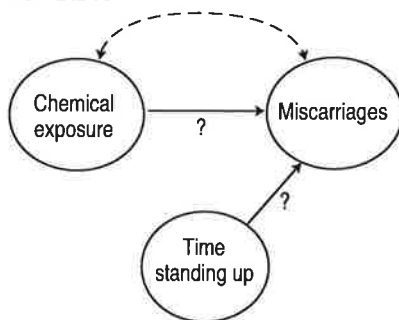
2.138. Students with music experience may have other advantages (wealthier parents, better school systems, and so forth). That is, experience with music may have been a “symptom” (common response) of some other factor that also tends to cause high grades.



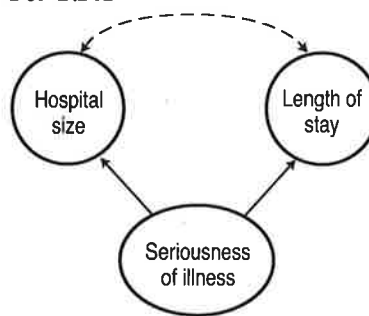
2.139. Two possibilities are that they might perform better simply because this is their second attempt or because they feel better prepared as a result of taking the course (whether or not they really *are* better prepared).

2.140. The diagram below illustrates the confounding between exposure to chemicals and standing up.

For 2.140



For 2.141



2.141. Patients suffering from more serious illnesses are more likely to go to larger hospitals (which may have more or better facilities) for treatment. They are also likely to require more time to recuperate afterwards.