



AP[®] Statistics 2003 Sample Student Responses

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4. Because of concerns about employee stress, a large company is conducting a study to compare two programs (tai chi or yoga) that may help employees reduce their stress levels. Tai chi is a 1,200-year-old practice, originating in China, that consists of slow, fluid movements. Yoga is a practice, originating in India, that consists of breathing exercises and movements designed to stretch and relax muscles. The company has assembled a group of volunteer employees to participate in the study during the first half of their lunch hour each day for a 10-week period. Each volunteer will be assigned at random to one of the two programs. Volunteers will have their stress levels measured just before beginning the program and 10 weeks later at the completion of it.

- (a) A group of volunteers who work together ask to be assigned to the same program so that they can participate in that program together. Give an example of a problem that might arise if this is permitted. Explain to this volunteer group why random assignment to the two programs will address this problem.

They might all be members of a massage therapy club
So we won't know whether it is the Tai Chi or Yoga which lowers their stress or the massage - and that would cast doubt upon our experiments. Random assignment would stop this problem because the people with lower stress levels would be more or less evenly distributed between the groups so that variable, massage, we didn't think to block for would not influence one group over the other.

- (b) Someone proposes that a control group be included in the design as well. The stress level would be measured for each volunteer assigned to the control group at the start of the study and again 10 weeks later. What additional information, if any, would this provide about the effectiveness of the two programs?

Because we wish to compare the programs to each other the control group would not help us in that sense. However, it would allow us to compare the effectiveness of those programs to doing nothing which would let us determine whether they are helping employees reduce stress or if it is another variable, but again it would not help us compare the two which is what we are interested in doing.

- (c) Is it reasonable to generalize the findings of this study to all employees of this company? Explain.

No it's not, for this experiment we took volunteers but the problem with that is the people who volunteered are very likely the ones who needed the stress reduction the most so just because we may find Tai Chi reduces stress more, it may just be true for people who are really stressed, not for an average office worker who has less stress to begin with. Therefore it's not reasonable to generalize because most likely these people are not a representation of the office population.

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The fact that these people like each other could effect their stress levels and throw off the data. Because they are friends they might reduce eachother's stress and the yoga or tai chi would have nothing to do with it. Tell them "Random assignment is crucial so there is as little bias and as few confounding variables as possible. We want to have all sorts of people so our sample represents everyone. I bet you are friends because you share something in common, which means it would be better if we randomly split you up so we could get all types of people."

(b) Someone proposes that a control group be included in the design as well. The stress level would be measured for each volunteer assigned to the control group at the start of the study and again 10 weeks later. What additional information, if any, would this provide about the effectiveness of the two programs?

It would test whether the fact that they think they should be less stressed actually makes them less stressed. It could be that both of them work equally but only because the people are mentally expecting less stress. It would also help those using the data to take in the time. Perhaps the end of the 10 weeks was when taxes are due, so everyone is more stressed. This way you could tell how much the program helps reduce stress not only compared to the other program, but to no program as well.

(c) Is it reasonable to generalize the findings of this study to all employees of this company? Explain.

No, you can not generalize at all since this was a voluntary experiment. Perhaps those who volunteered were less stressed or just don't represent some of the people in the company. If all the volunteers had been male, you certainly couldn't have said your findings would be true to women as well. The women could easily be totally different. You definitely can't generalize.

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