

2016 #3

Jean Linner, Lassiter High School, AP Statistics Table Leader

Purpose: determine if students can identify the variables in a study, differentiate an experiment from an observational study, and explain the effects of confounding variables.

(a) The explanatory variable is the *level of smoking*. This could be simplified to *smoking or not*, but sampling stating only *smoking* was not recognized as a variable because it did not imply levels.

The response variable, likewise, was *getting Alzheimer's or not*. Simply stating *Alzheimer's* was not a complete answer.

Neglecting to indicate the levels of these variables, but associating smoking with the explanatory role and Alzheimer's in the response role was sufficient for partial credit. Also, a complete response for one of the two variables, but incomplete or missing response for the other was scored as a partial.

Reversing the positions of the variables was scored as incorrect.

(b) The study is observational, because no level of smoking was assigned to the participants.

Partial credit could be earned by stating that no treatment was imposed without a reference to the level of smoking as the proposed treatment or by saying that smoking was observed. If the student enhanced the statement by saying that the researchers ONLY OBSERVED the smoking, readers will take that to mean that they did not apply treatments, and is scored as complete. Without the modifier, the statement is partially complete at best.

Incorrect statements related to the response knock the score down by one-half point (like "a control group was not present"). Statements not related to the response may be ignored. Swapping the response and explanatory variables is scored as an incomplete unless it is consistent with the response in part (a).

(c) We can reasonably believe that non-smokers are more likely to exercise than smokers, so there may be an association between smoking status and exercise activity level. If low exercise activity level is an actual cause of Alzheimer's, it would appear that any of the common characteristics of low-exercise people might be the cause of the disease. The expectation that frequent exercisers would be non-smokers makes it more difficult to isolate the effect of each of these factors to determine which of the paired factors is actually the cause of Alzheimer's.

Mentioning only that exercise and not smoking might combine to ward off Alzheimer's was only considered partially correct, because it did not address the possible linkage of exercise alone on the disease.

Inexact language cost students on this problem. Please encourage your students to minimize the word "it" as the subject of a sentence, give specific answers in context, and re-read their responses before moving to the next section.