MA684 Class 10 Homework

Principal Components Factor Analysis

Links to 2 on-line chapters covering principal components and factor analysis are given under the External Links button on our Blackboard site. Both resources give an introduction to the topic, but may not be very helpful in terms of details around performing the analyses.

The following ‘drinking motives’ questionnaire was used as part of a study examining drinking behavior. Adult respondents under age 40 were asked to think back to the year when they first began drinking, and each question was scored on a 1 to 5 scale: 1 almost never or never; 2 some of the time; 3 half of the time; 4 most of the time; 5 almost always or always.

**Thinking back to the first year you when you began drinking, how often would you say you drank for the following reasons:**

|  |  |
| --- | --- |
|  | (never) (always) |
| D1. To forget your worries | 1 2 3 4 5 |
| D2. Because your friends pressured you to drink | 1 2 3 4 5 |
| D3. Because it helped you enjoy a party | 1 2 3 4 5 |
| D4. Because it helped you when you felt depressed or  nervous | 1 2 3 4 5 |
| D5. To be sociable | 1 2 3 4 5 |
| D6. To cheer up when you were in a bad mood | 1 2 3 4 5 |
| D7. Because you liked the feeling | 1 2 3 4 5 |
| D8. So that others wouldn’t kid you about not drinking | 1 2 3 4 5 |
| D9. Because it was exciting | 1 2 3 4 5 |
| D10. To get drunk | 1 2 3 4 5 |
| D11. Because it made social gatherings more fun | 1 2 3 4 5 |
| D12. To fit in with a group you liked | 1 2 3 4 5 |
| D13. Because it gave you a pleasant feeling | 1 2 3 4 5 |
| D14. Because it improved parties and celebrations | 1 2 3 4 5 |
| D15. Because it would make you feel more confident  and sure of yourself | 1 2 3 4 5 |
| D16. To celebrate on special occasions with friends | 1 2 3 4 5 |
| D17. To forget about your problems | 1 2 3 4 5 |
| D18. Because it was fun | 1 2 3 4 5 |
| D19. To be liked by others | 1 2 3 4 5 |
| D20. So you would not feel left out | 1 2 3 4 5 |

Our research question is whether those who began drinking at an early age have different drinking motives than those who began drinking at later ages. But first, we need to determine how to summarize the information from the above questionnaire.

Data on 201 respondents are saved as ‘drinkingmotives2007’ Excel and text files and posted with this homework. Variables in the data set are 1) an id variable, ranging from 1 to 201; 2) age of first drink, not counting small sips and tastes, ranging from 11 years to 21 years for those in this sample; 3) through 22) the 20 items from the above drinking motives questionnaire, coded from 1 to 5. There are no missing data in this data set.

1. As a first step in summarizing the information from the above questionnaire, perform a principal components analysis with a varimax (orthogonal) rotation.

1A. How many components do you think are needed to summarize these 20

questions? Explain.

1B. How well do these components capture the information in these 20 questions?

Explain.

1C. Are there any questions that are not captured by the set of components? Explain.

2. From the principal components analysis, using the rotated solution, define the components - which items are related to which components? What do these components measure (suggest a name for the components)?

3. We will use the principal components analysis as a guide in creating sub-scales by summing sets of items. Based on your findings above, calculate (have the computer calculate) sub-scales for the respondents by summing the responses to the appropriate items from the questionnaire.

3A. Report the mean, standard deviation, and range for each of the sub-scales.

3B. Run a set of simple regressions, predicting each of your sub-scales from age of first drink. Based on these analyses, are there associations between drinking motives and age of first drink? Describe these associations.