LA Nurse BP

Case Study 1*

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Executive Summary

Here is what I did.

1 Introduction

Certain traits such as family history and mood are expected to increase one's ambulatory blood pressure (BP). Goldstein and Shapiro (2000) studied potential factors that contribute to hypertension. They collected information about the participants' BP, activity levels, work status, and mood ratings throughout the day, as well as relevant family history and information about their menstrual phases, to establish links that lead to elevated BP. Towards the end, they sought to uncover preventative measures for individuals who may be at a higher risks of developing hypertension. The objectives of this project is much simpler. I am interested in exactly what traits are *associated* with elevating one's BP, given the longitudinal structure and various time-dependent metrics in the dataset (given by Goldstein & Shapiro, 2000; cited by Roback & Legler, 2021).

1.1 Methods

The dataset includes repeated measures over the course of two work and off-work days on 203 registered nurses between the ages of 24 and 50 years working in Los Angeles, in the year 2000. Of those 203 nurses, 172 has complete data on all of the variables recorded.[1] BP of the participants were measured 30 minutes before their normal start of work, and measured measured repeatedly every 20 minutes for the rest of the day. This led to around 40-60 observations per nurse (9573 total observations). Each time the BP was taken, participants were asked to give several mood ratings including happiness, stress, and tiredness. In addition, participants wore an actigraph on their waist to record frequency of movements in one-minute intervals; the researchers obtained an activity measure for the ten-minute periods before each BP reading.

*Code used for this project is available at this GitHub Repository.

[1]In the original paper by Goldstein and Shapiro (pp. 228–29), they reported 171 nurses who completed all sessions. It is likely that this is due to Roback and Legler (2021) or Weiss (2005) excluding other personality variables used in the original study. Because I am not investigating personality traits in this project, 172 suffices being my total subject counts. Additionally, Goldstein and Shapiro mention that "[s]imilar patterns of findings were obtained in the sample of 171 as in the total sample" (p. 229).

2 Exploratory Data Analysis

The variables (original and re-parameterized) used in this project are given in Table 1.

Variable Name	Variable Descrption
ID (Cluster)	Unique identification number for each participant
BP (Response)	Systolic blood pressure (in mmHg)
Act	Activity level (frequency of movements in 1-minute intervals, over a 10-minute period)
Phase	Menstrual phase (follicular or luteal)
Day	Workday or non-workday
Posture	Position during BP measurement (sitting, standing, or reclining)
HAP	Self-ratings of happiness by each nurse at the time of each BP measurement on a 5-point scale (5 strongest and 1 weakest)
STR	Self-ratings of stress by each nurse at the time of each BP measurement on a 5-point scale (5 strongest and 1 weakest)
TIR	Self-ratings of tiredness by each nurse at the time of each BP measurement on a 5-point scale (5 strongest and 1 weakest)
Age	Age (in years)
Full FH	Family history, coded as either NO (no family history of hypertension), YES (1 hypertensive parent), or YESYES (both parents hypertensive)
Stand	Indicator variable for standing, where it equals 0 if Posture is either sitting or reclining and 1 when Posture is standing
Mood	Combined mood ratings: HAP - (STR + TIR)/2
FH	Indicator variable for having family history of hypertension (1 for YES and YESYES, 0 for NO)

Note: *emphasis* added to re-parameterized variables; colors represent levels.

Table 1: Variable Descrptions

Because of the longitudinal nature of our data, it is worth noting our levels of analysis and to which our variables belong. I will call time-dependent measurements *Level 1* data (variables) and the rest of the subject-level measurements *Level 2* data (variables).

2.1

3 Model Selection

4 Results

References

Goldstein, I. B., & Shapiro, D. (2000). Ambulatory blood pressure in women: Family history of hypertension and personality [Publisher: Taylor & Francis _eprint: https://doi.org/10.1080/713690197]. *Psychology, Health & Medicine*, *5*(3), 227–240. https://doi.org/10.1080/713690197

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