Identifying Levels of Measurement: Nominal, Ordinal, Interval, and Ratio

EXERCISE 1

The questions are in bold followed by answers.

1. **In Table 1.2 of the Ha et al. (2018) study, identify the level of measurement for the current therapy variable. Provide a rationale for your answer and discuss if the categories of current therapy were exclusive and exhaustive.**
   Answer: The current therapy variable was measured at the nominal level. These drug categories were probably developed to be exhaustive for this study and included the categories of drugs the study participants were receiving. However, the categories were not developed to be exclusive because many of the patients were taking more than one of these drugs to manage their health problems. The current drug therapies are measured at the nominal level because the categories cannot be ranked with one category being considered more or less beneficial than another category (see Fig. 1.1; Grove & Gray, 2023).

2. **Identify the mode for the current therapy variable. What is the meaning of these results?**
   Answer: The mode for current therapy was beta (β) blocker. The mode is the most frequently occurring category of a variable (Grove & Gray, 2023). A total of 100 (94%) of the cardiac patients were receiving this category of drug, which was the most commonly prescribed drug for this sample.

3. **What is the level of measurement for the demographic variable duration of HF? Provide a rationale for your answer.**
   Answer: The duration of HF in this sample was measured in years, resulting in ratio-level data. Each year includes the same equal intervals of 12 months or 365 days. Duration of HF has an absolute zero, because zero indicates the absence of HF for a person. Duration of HF might also be called a continuous variable because it has a continuum of values (see Table 1.1; Gray & Grove, 2021).

4. **What statistics were conducted to describe the body mass index (BMI) of the cardiac patients in this sample? Discuss whether these analysis techniques were appropriate or inappropriate.**
   Answer: BMI was described with a mean and standard deviation (*SD*). BMI measurement resulted in ratio-level data with continuous values and an absolute zero (Stone & Frazier, 2017). Ratio-level data should be analyzed with parametric statistics, such as mean and *SD* to describe BMI (Grove & Gray, 2023; Knapp, 2017).

5. **How many cardiac patients participated in the Ha et al. (2018) study? Determine the frequency and percentage of those patients who did not have a pacemaker. Round your answer to the nearest whole percent (%).**
   Answer: A total of 106 cardiac patients participated in this study. The sample included 16 patients with a pacemaker (see Table 1.2). The number of cardiac patients without a pacemaker was 90 (106 − 16 = 90). The group percent is calculated by the following formula: (group frequency ÷ total sample size) × 100%. For this study, (90 patients ÷ 106 sample size) × 100% = 0.849 × 100% = 84.9% = 85%. The final answer is rounded to the nearest whole percent as directed in the question. You could have also subtracted the 15% of patients with pacemakers from 100% and identified that 85% did not have pacemakers.

6. **What is the level of measurement for the NYHA class variable? Provide a rationale for your answer.**
   Answer: The level of measurement for the NYHA class variable was ordinal. The NYHA class was measured with categories that are exclusive, exhaustive, and can be rank ordered (see Fig. 1.1). The categories were exhaustive, because most of the cardiac patients (n = 104) fit into NYHA classes of I, II, or III and the two other patients fit into the open category "not specified." The categories were exclusive because each patient with HF fits into only one category. The NYHA classes can be ranked because class I includes cardiac patients with the least severe heart disease and class III includes those with the most severe heart disease (Gray & Grove, 2021; Waltz et al., 2017).

7. **What level of measurement is the Cardiac Depression Scale (CDS) score? Provide a rationale for your answer.**
   Answer: The CDS score is at the interval level of measurement. The CDS is a 26-item Likert scale developed to measure depression in cardiac patients. Study participants rated their symptoms on a scale of 1 to 7, with higher numbers indicating increased severity in the depression symptoms. The total score for each participant obtained from this multi-item scale is considered to be at the interval level of measurement (Gray & Grove, 2021; Waltz et al., 2017).

8. **Is the prevalence of depression linked to the NYHA class? Discuss the clinical importance of this result.**
   Answer: The study narrative indicated that the prevalence of depression increased with the greater NYHA class. In NYHA class III, 64% of the study participants were depressed, whereas 11% were depressed in NYHA class I. Thus as the NYHA class increased, the number of participants with depression increased. This is an expected finding because as the NYHA class increases, cardiac patients have more severe physical symptoms, which usually result in emotional distress, such as depression. Nurses need to actively assess cardiac patients for depression, especially those in higher NYHA classes, so they might be diagnosed and adequately treated.

9. **What frequency and percentage of cardiac patients in the Ha et al. (2018) study were not being treated with an antidepressant? Show your calculations and round your answer to the nearest whole percent (%).**
   Answer: A total of 106 cardiac patients participated in this study. The sample included 15 patients who were receiving an antidepressant (see Table 1.2). The number of cardiac patients not treated for depression was 91 (106 −15 = 91). The group percent is calculated by the following formula: (group frequency ÷ total sample size) × 100%. For this study, (91 patients ÷ 106 sample size) × 100% = 0.858 × 100% = 85.8% = 86%. The final answer is rounded to the nearest whole percent as directed in the question. You could have also subtracted the 14% of patients treated with antidepressants from 100% and obtained the 86% who were not treated with an antidepressant.

10. **Jafri and colleagues (2022) conducted a study to examine the cardiovascular outcomes of patients who were referred to a home-based cardiac rehabilitation program. Depression was measured with the Patient Health Questionnaire (PHQ-9) with the pre-rehabilitation score being 6 and the postscore was 5 ($p < 0.01$). What implications do these results have for clinical practice?**
   Answer: Participants in the cardiac rehabilitation program experienced a significant improvement in their depression scores. The positive outcomes from this study support cardiac patients completing a rehabilitation program. In addition, nurses need to assess and manage depression in cardiovascular patients.