Statistical Literacy in Social Work

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Abstract

Formal quantitative analyses are ubiquitous across the biomedical (e.g., medicine, nursing biology) and social sciences (e.g., psychology, sociology). As such, it is essential that researchers be able to appropriately conduct, interpret, and report statistical tests. However, little research has been done to explore the level of comprehension of social workers who often both assume the role of consumers and producers of research statistics. To explore this further, we conducted a survey of social worker academics and practitioners - providing them with two case vignettes (one on p-values and one on confidence intervals) to assess for misinterpretation of reported findings. The results at this time are preliminary –having at this time collected data from 33 participants.

Methods

This observational study utilized a cross sectional design and was based on previous work *(Haller & Krauss, 2002; Hoekstra et al. 2014)* regarding the misinterpretation of p-values and confidence intervals in the field of psychology. The overall concept was to test whether those involved in social work, from those in graduate programs to seasoned professors and researchers, where proficient in understanding and interpreting these concepts.

This particular survey encompassed two main scenarios; scenario one being "The 95% confidence interval for the mean ranges from 0.1 to 0.4" the second being "Your result is significant (t = 2.7, d.f. = 38, p = 0.01)." The participants were then to answer a series of true or false questions regarding the statements as well as their confidence in their responses on a scale from 0-100. Before answering the scenario questions, they were also asked screening questions regarding their experience level (i.e., how many courses they had previously taken/taught) as well as how confident they are in their *overall* ability (0-100).

Results

At this time, data collection is ongoing. Preliminary results (n = 33) suggest that a good number of individuals seem to be misinterpreting the data despite a reported medium-high levels of confidence in their responses (mean confidence = 62.82, sd = 18.97). The average number of items misinterpreted on the confidence interval vignette was 4.00 (sd = 1.54). The average number of items misinterpreted on the p-values vignette was 2.61 (sd = 1.56). Out of the 12 total items, participants missed an average of 6.61 items (sd = 2.62). All this, despite high confidence, as noted above, and participants reporting have taken on average 5.06 – college-level statistical courses (sd = 2.94).
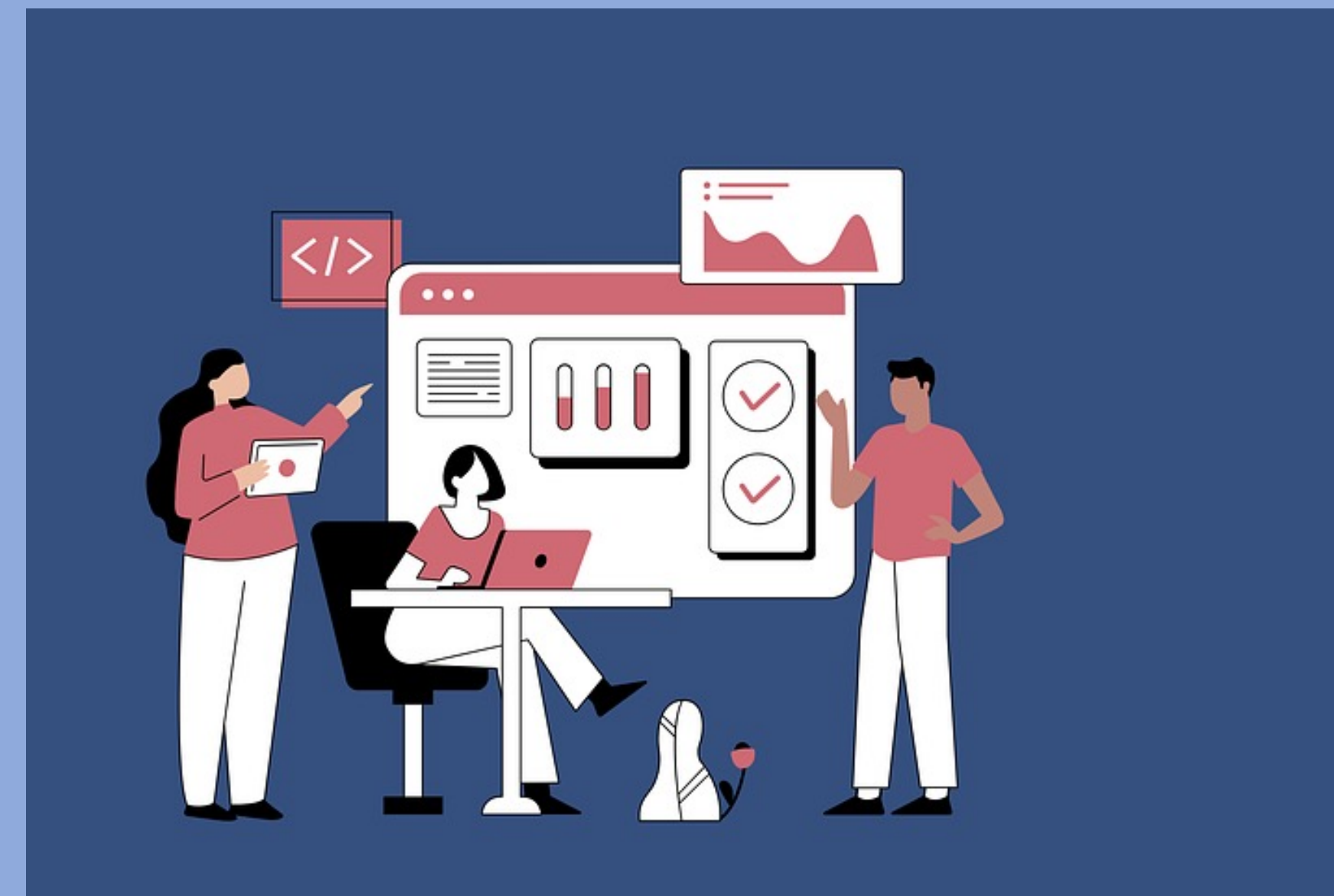
SCENARIO #1

You are conducting an experiment. After analyzing the data, you find that:

"The 95% confidence interval for the mean ranges from 0.1 to 0.4"

Instructions: Please mark each of the statements below as "true" or "false", in light of the scenario described above. False means that the statement does not follow logically from your result. As well, note that all, several, or none of the statements may be correct.

Additionally, for each answer choice, please enter into the textbox how certain you are, in your response, on a scale of 0 - 100 (where 0 means "completely uncertain" and 100 means "completely certain").

SCENARIO #2

You are conducting an experiment on a new treatment. You compare the means of your control and experimental groups (each with 20 subjects).

After analyzing the data using a simple independent means t-test, you find that:

Your result is significant (t = 2.7, d.f. = 38, p = 0.01).

Instructions: Please mark each of the statements below as "true" or "false", in light of the scenario described above. False means that the statement does not follow logically from your result. As well, note that all, several, or none of the statements may be correct.

Additionally, for each answer choice, please enter into the textbox how certain you are, in your response, on a scale of 0 - 100 (where 0 means "completely uncertain" and 100 means "completely certain").
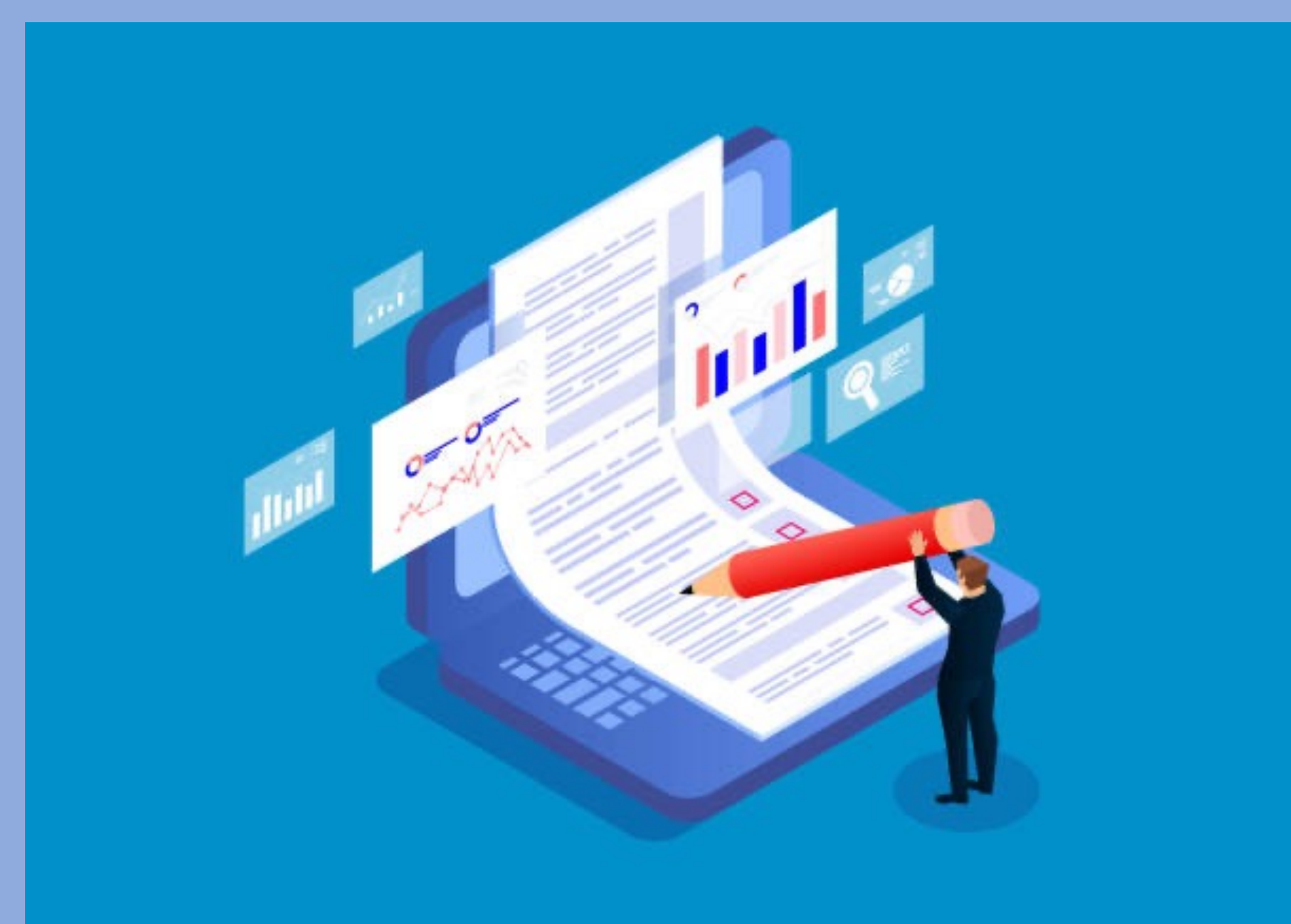
Conclusion

Preliminary results point to a general misunderstanding of statistical tests by social workers. This begs the question as to how much emphasis (i.e., teaching, training, mentorship) is being placed on the statistical skills of those within the field. Given the importance of having the ability to analyze and understand statistical results, it not too far off to conclude that learning how to deal with statistics, specifically research based, is detrimental and vital to working more effectively in social work both in practice and in research.

References

- Hoekstra, Rink & Morey, Richard & Rouder, Jeffrey & Wagenmakers, Eric-Jan. (2014). Robust misinterpretation of confidence intervals. Psychonomic bulletin & review. 21. 10.3758/s13423-013-0572-3.

- Anderson, Britta L et al. "Statistical literacy in obstetricians and gynecologists." Journal for healthcare quality : official publication of the National Association for Healthcare Quality vol. 36,1 (2014): 5-17. doi:10.1111/j.1945-1474.2011.00194.x

- Lyu, Xiao-Kang, et al. "Beyond Psychology: Prevalence of p Value and Confidence Interval Misinterpretation across Different Fields." Journal of Pacific Rim Psychology, Jan. 2020, doi:10.1017/prp.2019.28

- Schmidt, Robert L., et al. "Statistical Literacy Among Academic Pathologists: A Survey Study to Gauge Knowledge of Frequently Used Statistical Tests Among Trainees and Faculty." Archives of Pathology & Laboratory Medicine, vol. 141, no. 2, Feb. 2017, p. 279. Gale Academic OneFile, link.gale.com/apps/doc/A510296539/AONE?u=tall85761&sid=bookmark-AONE&xid=4927f930. Accessed 31 Jan. 2022.