ENG518

Statistical Analysis and Hypothesis Testing

1. **Null Hypothesis (H_0)** – A baseline assumption used in hypothesis testing to establish no effect or relationship.
2. **Alternative Hypothesis (H_1)** – Contrasts the null, indicating an observed effect or relationship.
3. **Statistical Procedures** – Methods like t-tests, ANOVA, regression analysis used to interpret numerical data.
4. **Parameters** – Quantities defining a population, unlike statistics derived from samples.
5. **Descriptive Statistics** – Measures such as mean, median, and mode summarizing data.
6. **Inferential Statistics –** Drawing conclusions from sample data about a population.
7. **p-value** – Probability that observed results occurred by chance.
8. **Sample vs. Population** – Subset studied versus entire group targeted by research.
9. **Correlation** – Measures the relationship between two variables.
10. **Chi-square Test** – A statistical method for testing relationships between categorical variables.

Research Design and Methods

11. **Quantitative Data** – Numerical data analyzed statistically.
12. **Qualitative Data** – Descriptive data analyzed thematically.
13. **Mixed Methods** – Combines qualitative and quantitative research.
14. **Action Research –** Investigative approach involving iterative problem-solving.
15. **Experimental Design** – Manipulating variables to establish causation.
16. **Case Study** – In-depth analysis of a single entity or case.
17. **Ethnographic Study** – Research focusing on cultural or social contexts.
18. **Cross-sectional Study** – Data collected at one point in time.
19. **Longitudinal Study –** Data collected over an extended period.

Data Collection Techniques

20. **Questionnaires –** Structured tools for data collection, including closed- and open-ended questions.
21. **Interviews** – Direct, conversational data collection.
22. **Observational Methods** – Monitoring and recording behavior or events.
23. **Instruments** – Tools used for data measurement, e.g., surveys, tests.
24. **Sampling Methods –** Techniques for selecting participants (random, stratified).
25. **Pilot Testing** – Pre-testing methods or tools for feasibility.

Literature Review

26. **Research Literature Review** – Critical evaluation of existing research.
27. **Annotated Bibliography** – Summary and evaluation of sources.
28. **Primary Sources –** Original research documents or evidence.
29. **Secondary Sources** – Summaries or interpretations of primary sources.
30. **Critical Review** – Analytical approach to literature evaluation.

Documentation and Citation

31. **APA Style** – Formatting and citation style by the American Psychological Association.
32. **MLA Style** – Modern Language Association guidelines for humanities.
33. **Chicago Manual of Style (CMS)** – Used primarily in publishing and history.
34. **In-text Citations –** Brief references within the text pointing to detailed sources.
35. **Plagiarism Avoidance** – Ethical use and acknowledgment of sources.

Writing and Presentation

36. **Abstract** – A concise summary of research objectives, methods, results, and conclusions.
37. **Introduction** – Section explaining research purpose and background.
38. **Methodology –** Detailed description of research methods.
39. **Results Section** – Presentation of data analysis findings.
40. **Discussion and Conclusion** – Interpretation and significance of findings.

Variables and Measurement

41. **Independent Variable (IV)** – Factor manipulated in an experiment.
42. **Dependent Variable (DV)** – Outcome measured in response to IV.
43. **Moderator Variable** – Affects the strength or direction of the IV-DV relationship.
44. **Control Variable –** Held constant to isolate relationships between IV and DV.
45. **Intervening Variable** – Hypothetical constructs linking IV and DV.

Research Ethics

46. **Informed Consent** – Participant agreement based on full understanding.
47. **Confidentiality** – Ensuring data privacy.
48. **Bias** – Systematic errors affecting validity.
49. **Validity** – Degree to which an instrument measures what it claims.
50. **Reliability** – Consistency of measurement over time.

Advanced Concepts

51. **Factorial Design** – Examines effects of multiple IVs simultaneously.
52. **Randomization** – Ensures unbiased sample allocation.
53. **Operational Definitions** – Specific explanations of terms and concepts.
54. **Error Analysis –** Identifying sources of measurement error.

55. **SEM (Standard Error of Measurement) –** Quantifying error in measurements.

Statistical Tools and Terms

56. **Regression Analysis –** Predicting the value of a dependent variable.
57. **Standard Deviation –** Measure of data dispersion.
58. **Cronbach's Alpha –** Reliability coefficient for internal consistency.
59. **Effect Size –** Magnitude of observed phenomena.
60. **Confidence Interval –** Range within which a population parameter likely falls.

Proposal and Synopsis Writing

61. **Research Proposal –** Plan outlining research objectives, methods, and significance.
62. **Research Synopsis –** Summary providing a snapshot of proposed research.
63. **Research Objectives –** Goals that guide the study.
64. **Feasibility Study –** Assessment of research practicality.

Critical Approaches

65. **Moral Criticism –** Evaluating literature based on moral implications.
66. **Historical Criticism –** Interpreting texts within historical context.
67. **Neo-humanism –** Literature evaluation focusing on philosophical ideals.

Research Strategy

68. **Conceptual Framework –** Theoretical structure guiding research.
69. **Research Questions –** Specific queries research aims to answer.
70. **Hypothesis Development –** Creating testable statements.

Research Validation and Interpretation

71. **Triangulation –** Using multiple methods or data sources to validate findings.
72. **Validity Threats –** Factors compromising the validity of results, such as confounding variables.
73. **Internal Validity –** Ensures changes in the DV are solely due to the IV.
74. **External Validity –** Extent to which findings can be generalized to other contexts.
75. **Construct Validity –** Ensures measures represent the intended construct.
76. **Face Validity –** The degree to which a test appears effective at face value.

Advanced Sampling Techniques

77. **Cluster Sampling –** Dividing the population into groups and sampling entire groups.
78. **Stratified Sampling –** Dividing the population into strata and sampling within each.
79. **Convenience Sampling –** Using readily available participants.
80. **Snowball Sampling –** Participants recruit additional participants.

Data Analysis Techniques

81. **Content Analysis** – Identifying patterns in textual or visual data.
82. **Thematic Analysis** – Extracting themes from qualitative data.
83. **ANOVA (Analysis of Variance) –** Comparing means among multiple groups.
84. **Factor Analysis** – Reducing data into underlying dimensions.
85. **Structural Equation Modeling (SEM)** – Examining relationships among multiple variables.

Data Presentation

86. **Tables and Graphs** – Tools for summarizing and presenting data.
87. **Histograms** – Representing frequency distributions.
88. **Pie Charts –** Visualizing proportions within a dataset.
89. **Line Graphs** – Tracking changes over time.
90. **Bar Charts** – Comparing categories visually.

Evaluation and Feedback

91. **Peer Review** – Evaluation by experts to ensure quality and accuracy.
92. **Blind Review –** Reviewer anonymity to eliminate bias.
93. **Rubrics** – Standardized criteria for evaluating research or academic work.
94. **Critical Appraisal** – Systematic assessment of research quality.

Emerging Topics and Technologies

95. **Artificial Intelligence (AI) in Research** – Use of machine learning for data analysis.
96. **Big Data Analytics** – Handling and interpreting vast datasets.
97. **Cloud-based Research Tools** – Online platforms for collaboration and storage.
98. **Open Access Journals –** Free, publicly accessible research publications.
99. **Systematic Reviews** – Comprehensive synthesis of research studies.

Miscellaneous Concepts

100. **Pilot Study** – A smaller-scale version of the main study to test feasibility.