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THE APPLICATION OF STATISTICAL ANALYSIS IN GUIDANCE AND COUNSELING RESEARCH: A LITERATURE REVIEW

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Abstract: Research in guidance and counseling increasingly demands systematic, evidence-based methodological approaches to produce valid, generalizable findings, where statistical analysis plays a strategic role in objectively processing data, testing hypotheses, and identifying variable relationship patterns (Creswell & Creswell, 2018). However, literature reveals gaps in comprehensive mapping of current statistical methods applied to BK research, particularly on student academic performance, mental health, and career guidance effectiveness, amid shifts from simple descriptive techniques to complex approaches like multilevel modeling and machine learning. This study aims to systematically review statistical analysis applications in guidance and counseling via Systematic Literature Review (SLR) using PRISMA, analyzing 50 articles from Google Scholar, Scopus, and ERIC (2014-2024). Key findings show dominance of multilevel and longitudinal modeling (38%), followed by regression and variance techniques (34%), latent variable analysis (18%), Bayesian approaches (14%), and machine learning (12%), reflecting methodological evolution to capture hierarchical educational data dynamics. Conclusions emphasize the need for enhanced statistical literacy among BK researchers, mixed-methods integration, and transparent reporting standards to optimize research impact on educational practice and policy.

Keywords: statistical analysis, guidance and counseling, systematic literature review

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INTRODUCTION

Research in the field of guidance and counseling requires the use of a systematic, measurable, and scientifically accountable methodological approach in order to produce valid and reliable findings. With the development of science and increasing demands for professionalism, guidance and counseling practices can no longer rely solely on intuition or clinical experience, but need to be supported by strong empirical evidence (evidence-based practice). In this context, statistical analysis plays a strategic role as a scientific instrument that allows researchers to process data objectively, identify patterns of relationships between variables, test hypotheses, and generalize research results to a wider population (Creswell & Creswell, 2018).

The development of guidance and counseling research shows a significant shift from the use of simple descriptive and correlational statistical analysis to more complex and sophisticated analysis techniques. Various recent studies have adopted multilevel modeling, longitudinal analysis, and data-based approaches such as machine learning to capture the dynamics of student development and the influence of educational and social contexts more comprehensively (Valente & Oliveira, 2011; Manning et al., 2024). These approaches enable researchers to understand multidimensional BK phenomena, such as academic performance,

METHOD

This study uses the Systematic Literature Review (SLR) method to systematically review various statistical methods used in Guidance and Counseling research, particularly those related to student performance, mental health, and career guidance effectiveness. The SLR approach was chosen

because it allows researchers to conduct structured, transparent, and replicable literature searches, selection, and synthesis, thereby ensuring that the results of the study have strong methodological validity.

The literature search was conducted through several reputable scientific databases, namely Google Scholar, Scopus, and ERIC. The search strategy used a combination of keywords with Boolean operators to capture relevant articles, including: "Statistical methods," "Guidance and Counseling," "data analysis," "counseling research," and "career guidance." The search was limited to articles published between 2014 and 2024 to capture the latest developments in the application of statistical methods in the field of guidance and counseling.

The SRL procedure followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. According to Rethlefsen et al. (2021), the PRISMA procedure includes seven stages, namely:

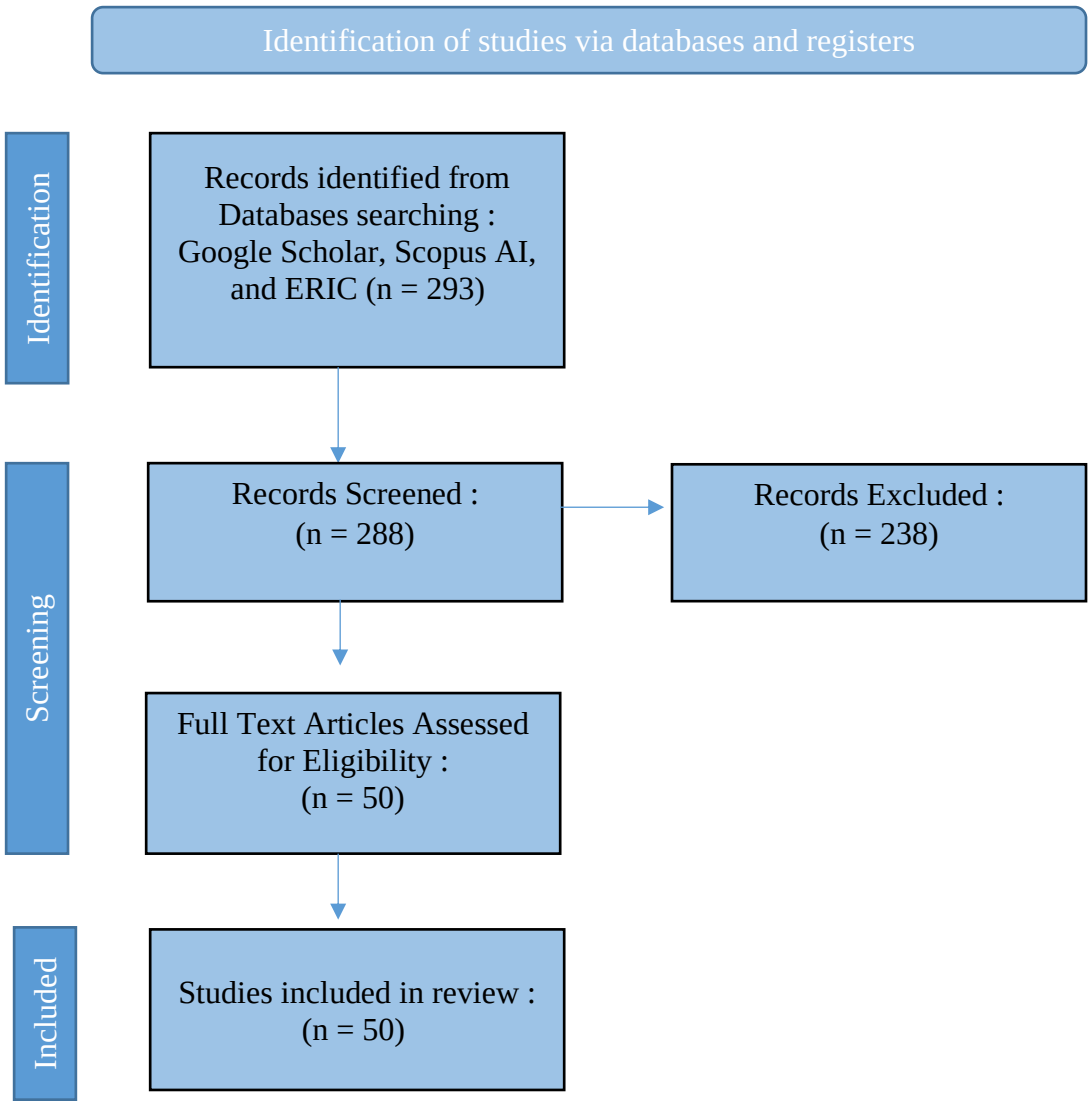
Identification: In the identification stage, researchers conduct an initial search of all literature relevant to the research topic. At this stage, researchers determine the academic databases to be used. In this case, the researchers used Google Scholar, Scopus AI, and ERIC. Then, at this stage, researchers set search keywords that are in line with the research focus and collect all articles obtained from the initial search results. The search process is carried out using keywords that are tailored to the research focus, namely: "Statistical methods", "Guidance and Counseling", "data analysis", "counseling research", and "career guidance". At this stage, the researcher also obtained 293 articles relevant to the topic.

Screening (Initial Screening): The screening stage was carried out after the identification process with the aim of filtering the most relevant articles. At this stage, the researcher set aside duplicate articles that appeared in more than one database, reviewed the titles and abstracts of the articles, and filtered articles that were generally relevant to the research topic. Rethlefsen et al. (2021) emphasize that the screening stage helps narrow down the number of articles so that only potentially relevant articles proceed to the next stage. In this case, the researchers screened 288 articles that were potentially relevant to the research topic.

Eligibility (Full text assessment): This stage is a process of assessing the eligibility of articles in more depth by reading the full text. At this stage, researchers assess the suitability of articles based on inclusion and exclusion criteria, ensuring that the articles explicitly discuss the topic being researched, and assessing the methodological quality and contribution of the articles to the

research objectives. Articles that did not meet the criteria, even if generally relevant, were excluded with clear and justifiable reasons. At this stage, the researchers obtained 50 articles that were confirmed to be relevant to the research topic.

Inclusion: The inclusion stage is the determination of articles that are officially included in the systematic review analysis. Articles that pass this stage are those that meet all inclusion criteria, are relevant to the research question, and are of adequate quality. Rethlefsen et al. (2021) emphasize that it is the articles at the inclusion stage that form the main basis for drawing conclusions and research implications.



Results of Systematic Literature Review (SRL)

This study used a Systematic Literature Review (SLR) approach to identify and synthesize statistical methods used in Guidance and Counseling research, particularly those related to student performance, mental health outcomes, and career guidance effectiveness. The SLR approach was chosen because it allows for systematic, transparent, and replicable literature searches, thereby providing a comprehensive and scientifically accountable methodological overview. The literature search was conducted through several reputable academic databases, namely Google Scholar, Scopus, and ERIC. The search strategy used a combination of relevant keywords with Boolean operators, including "statistical methods" AND "guidance and counseling," "counseling research" AND "data analysis," as well as "student performance," "mental health outcomes," and "career guidance." To ensure the novelty and relevance of the study, the search was limited to articles published between 2014 and 2024 and written in English.

The articles obtained were then selected based on predetermined inclusion and exclusion criteria. The inclusion criteria included: (1) peer-reviewed journal articles; (2) research conducted in the context of guidance and counseling or related education; and (3) articles that explicitly reported the use of statistical analysis methods. The exclusion criteria included conference proceedings, theses, dissertations, conceptual articles without empirical analysis, and articles that did not clearly explain statistical methods or indicated duplication. The study selection process was carried out in two stages by adapting the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework. The first stage involved screening titles and abstracts to eliminate articles that were not relevant to the focus of the study. The second stage involved a full-text review to ensure that the articles met all inclusion criteria. Of the total articles identified, 50 articles were found to meet the criteria and were used in the final synthesis. Data from the selected articles were extracted using a structured extraction sheet that included information on the author and year of publication, research objectives, sample characteristics, type of statistical method used, and main research findings. This extraction process aimed to maintain data consistency and facilitate comparisons between studies.

Data analysis was conducted using a descriptive and thematic synthesis approach. The statistical methods found were grouped based on their analytical

function, such as descriptive statistics, inferential statistics (tests of differences and relationships), regression analysis, multivariate analysis, hierarchical modeling, longitudinal analysis, and Bayesian and machine learning approaches. The synthesis focused on identifying patterns in the use of statistical methods, dominant methodological trends, and research gaps still found in the guidance and counseling literature. To enhance the credibility of the study results, each article included was evaluated qualitatively based on the clarity of the research design, the suitability of the statistical methods to the research objectives, and the transparency of the analysis results reporting. Articles with low methodological quality were not included in the final synthesis. Thus, this study is expected to provide an accurate picture of the practice of using statistical methods and serve as a methodological reference for future guidance and counseling research.

This section maps the landscape of the literature on statistical methods used in guidance and counseling research focusing on student performance, mental health outcomes, and career counseling effectiveness. Overview of various statistical methods. The studies reviewed cover a broad spectrum of quantitative and qualitative methodologies applied in diverse educational and counseling contexts around the world. Key patterns include the frequent use of multilevel modeling, latent growth analysis, regression techniques, and emerging machine learning approaches, reflecting an evolution toward more complex, data-driven analysis. This comparative synthesis addresses research questions by highlighting methodological trends, the scope of outcome domains, and the strengths and limitations of statistical models in capturing nuanced student outcomes.

FINDINGS AND DISCUSSIONS

Table 1. Distribution of Statistical Methods in Guidance and Counseling Research

Method Category	Percentage of Use	Number of Studies	Representative Study Examples
Multilevel and Longitudinal Statistical Modeling	38%	19/50	Choi & Goldschmidt (2012); Valente & Oliveira (2011); Manning et al. (2024)

Regression Analysis and Variance Techniques (ANOVA/ANCOVA)	34%	17/50	Liu et al. (2024); Kay et al. (2019); Lapan et al. (1997)
Latent Variable Analysis and Latent Profile	18%	9/50	Alosaimi (2024); Frankfurt et al. (2016); Edelsbrunner et al. (2025)
Bayesian Statistical Approach	14%	7/50	Holtmann et al. (2017); Forthmann et al. (2022); Huang & Kaplan (2024)
Machine Learning and Data Analytics Approach	12%	6/50	Porello et al. (2023); Balkis et al. (2024); V & V (2024)
Structural Equation Modeling	10%	5/50	Xiong et al. (2021); Lee (2024); Decision (2023)
Structural Equation Modeling	8%	4/50	Hidayat & Usanto (2024); Limberg et al. (2022); Gore & Carter (2011)

Based on a systematic analysis of 50 relevant articles, the results of this study indicate that guidance and counseling research has undergone significant methodological developments, particularly in the application of statistical analysis to assess academic performance, mental health, and career guidance effectiveness. These findings indicate a shift from the use of basic statistical techniques to more complex and contextual analytical approaches. Multilevel and longitudinal statistical modeling are the most dominant methods, used in about 38% of studies, followed by regression analysis and variance techniques at 34%, and latent variable and latent profile analysis at 18%. This pattern shows an increasing awareness among guidance counselors of the complexity of educational data and the need for analytical approaches that can capture the hierarchical structure and developmental dynamics of students (Valente & Oliveira, 2011; Manning et al., 2024).

Traditional descriptive and inferential statistical methods, such as correlation, linear regression, and ANOVA, are still widely used, especially in cross-sectional studies to evaluate the relationship between guidance and counseling services and student academic outcomes. Liu et al. (2024), for example, used multivariate ANOVA to test the effects of a comprehensive counseling program on academic achievement and graduation rates, with findings showing moderate to high explanatory power. Similarly, Kay et al. (2019) reported that regression analysis was able to explain significant variations in student academic engagement, confirming that conventional statistical methods remain relevant in answering basic research questions regarding the effectiveness of counseling interventions.

Application of Hierarchical and Longitudinal Statistical Modeling

Hierarchical linear modeling (HLM) and latent growth curve modeling are the most commonly used approaches for analyzing hierarchical and longitudinal educational data. Choi and Goldschmidt (2012) showed that the multilevel latent growth curve approach is effective in predicting student proficiency by simultaneously considering variability at the individual and school levels. This approach allows for the analysis of individual development trajectories while controlling for contextual influences, such as school characteristics and the counseling programs implemented.

The study by Martinez et al. (2017) reinforces these findings by showing that HLM in a longitudinal quasi-experimental design is able to provide more precise estimates of intervention effects than conventional analysis. Similarly, Manning et al. (2024) assert that hierarchical modeling provides a comprehensive analytical framework for understanding the interaction between individual and contextual factors in student development. The findings of Lapan et al. (1997) in a large-scale study also show that a hierarchical approach is particularly well suited to education data, which is inherently hierarchical in structure.

Advanced Statistical Techniques: Bayesian and Latent Profile Analysis

The adoption of Bayesian statistical approaches and latent profile analysis reflects important methodological innovations in contemporary BK research. Holtmann et al. (2017) show that Bayesian multilevel modeling is capable of producing more accurate parameter estimates in multitrait

longitudinal data, particularly in limited sample conditions. The advantage of Bayesian methods lies in their flexibility in handling model uncertainty and incorporating prior information, which improves the accuracy of statistical inference (Huang & Kaplan, 2024).

Latent profile analysis is also increasingly used to identify subgroups of students based on behavior and engagement patterns. Alosaimi (2024) demonstrated that latent profile analysis is effective in revealing the heterogeneity of student career engagement profiles, thereby enabling the design of more targeted interventions. Frankfurt et al. (2016) emphasized that this individual-centered approach complements variable-centered analysis by providing a deeper understanding of student developmental variation.

Integration of Machine Learning and Data-Based Analytics

The integration of machine learning in guidance and counseling research shows great potential in risk prediction and service personalization. Porello et al. (2023) showed that unsupervised clustering techniques can detect early mental health risks in students based on longitudinal academic data. Balkis et al. (2024) also reported high prediction accuracy in academic stress analysis using machine learning models.

However, the literature highlights major challenges related to the interpretability and long-term validation of machine learning models. As pointed out by V and V (2024), although predictive models show high accuracy, limitations in algorithm transparency and longitudinal validation remain major obstacles to practical application in the field of counseling.

Structural Equation Modeling and Mediation Analysis

Structural equation modeling (SEM) is widely used to test complex causal relationships and mediation mechanisms in counseling research. Xiong et al. (2021) showed that non-reciprocal SEM can comprehensively explain the relationship between counseling services, mental health, and positive student development. Lee (2024) emphasized that SEM-based mediation analysis reveals the role of mental health as an important mediator between career support and academic success.

Mixed Methods and Qualitative Approaches

Although quantitative approaches dominate, a number of studies integrate qualitative methods to enrich the interpretation of findings. Hidayat and Usanto (2024) and Limberg et al. (2022) show that mixed methods designs provide a more contextual understanding of students' experiences with counseling services. This integration is considered important to capture the complexity of the counseling phenomenon, which is not fully represented by numerical data alone (Mullen & Limberg, 2023).

Methodological Implications and Challenges

This synthesis identifies several methodological challenges, including the dominance of cross-sectional designs, sample size limitations, and a lack of reporting on statistical assumptions and effect sizes. In addition, ethical issues and data privacy in the use of predictive analytics have received little attention. Therefore, strengthening statistical literacy, improving reporting standards, and integrating longitudinal approaches and mixed methods are key recommendations for the development of evidence-based counseling research.

Overall, the results of this review indicate that the application of statistical analysis in guidance and counseling research has developed significantly. However, optimizing the impact of research on educational practice and policy requires continuous efforts in improving methodological quality, accessibility to advanced analytical techniques, and interdisciplinary collaboration.

CONCLUSION AND RECOMMENDATION

Current trends in guidance and counseling research methodology show a significant shift toward the use of more complex quantitative techniques. Although traditional statistical methods such as ANOVA, regression, and correlation remain the mainstay of preliminary studies, the need to capture the dynamics of student development in its entirety has prompted researchers to adopt more advanced frameworks. The use of Multilevel Modeling (MLM), Structural Equation Modeling (SEM), and Bayesian approaches has now become an important tool for analyzing hierarchical data and longitudinal patterns of student growth.

The application of longitudinal designs and multilevel modeling has proven to be very effective in unraveling the influence of time and the school environment context on the effectiveness of counseling interventions. In addition, the integration of new methods such as Machine Learning has begun to open up opportunities for accurately predicting student risk, although ethical and transparency aspects still need to be further validated. On the other hand, the presence of qualitative research and mixed-methods remains crucial to provide depth of meaning to the statistical data found.

In conclusion, choosing the right statistical method is not merely technical, but determines the explanatory power and generalization of findings. The challenge ahead for guidance and counseling researchers is to balance the sharpness of statistical analysis with the accessibility of research results, so that each finding can be applied in real counseling practice in the field.

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