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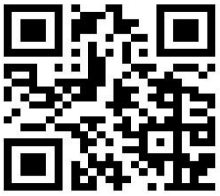
SPSS vs. AMOS: A Comparative Approach to Analyzing Moderators in Behavioral Research



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ABSTRACT: Many researchers face confusion in selecting appropriate software for quantitative data analysis due to the lack of comparative studies in this area (1). This study examines the moderator analysis results conducted using AMOS and SPSS software. Moderator analysis assesses the extent to which the independent variable influences the dependent variable through a moderator variable. The research utilized data from a questionnaire completed by 383 adolescents in Ahvaz, Iran. The independent variables included the impact of COVID-19, parental attachment, and peer attachment, while emotional intelligence served as the dependent variable, with online networking acting as the moderator.

Analysis using SPSS indicated that online networking moderated the relationship between all independent and dependent variables. Conversely, results obtained from AMOS revealed no significant moderating effect between the independent and dependent variables. Descriptive data indicated that students experienced low internet connectivity during the COVID-19 pandemic, suggesting that online networking may have had a limited capacity to moderate these relationships. Consequently, the findings derived from AMOS are regarded as more reliable than those from SPSS.

The novelty of this research lies in its comparative analysis of AMOS and SPSS, alongside its pioneering examination of moderation within developmental psychology studies using AMOS. The results underscore AMOS's superior accuracy and reliability, as demonstrated by its alignment with the descriptive data and ability to provide clearer visualizations of variable relationships. This study strongly advocates for the application of AMOS in psychological research, particularly for complex interaction effects.

KEYWORDS: Comparative Approach, Data Analysis, Amos, SPSS, Moderator.

INTRODUCTION

In the realm of quantitative research, the choice of statistical software plays a pivotal role in shaping the outcomes of analyses. Many different statistical software packages are available, each offering unique features for the user (1). Among the various tools available, SPSS and AMOS are frequently employed by researchers to perform complex data analyses. The choice of software depends on various factors, including research questions, statistical proficiency, and coding experience. Despite their widespread usage, there remains a significant lack of empirical studies directly comparing these software packages, particularly in the context of moderating effects within psychological research (1).

This research explores the impact of the COVID-19 pandemic and levels of parental and peer attachment as independent variables, while emotional intelligence serves as the dependent variable. Additionally, the role of online networking is examined as a potential moderator in these relationships. While advanced statistical software and expertise may facilitate cutting-edge data analysis, the quality of results ultimately hinges on the soundness of the study's conduct. The findings from this study not only highlight the differences in results yielded by the two software packages but also emphasize the importance of selecting the appropriate analytical tools to ensure the reliability and validity of research outcomes.

By comparing the results obtained through SPSS and AMOS, this study contributes to a deeper understanding of how software choice can influence the interpretation of complex psychological constructs, ultimately guiding future research and applications in the field. It is crucial to recognize that regardless of sophisticated tools, meaningful insights cannot be derived from poorly collected data (2). Data analysis, a critical research phase, occurs after obtaining all necessary data for problem- solving (3). The precision and efficacy in utilizing analytical tools directly influence the accuracy of conclusions, making data analysis indispensable in the research process (2). Misjudgments in selecting analytical tools can fatally undermine conclusions, impeding the usability and applicability of research findings

(1). Therefore, researchers must possess comprehensive knowledge and understanding of analytical techniques to ensure scientifically justifiable results that contribute meaningfully to problem-solving.

AMOS, developed by IBM, is custom to test hypotheses concerning variable relationships (1). It enables the assessment of

relationship strength between latent and manifest variables and the fit of hypothetical models to real data (Purwanto, 2021). AMOS offers a user-friendly interface, eliminating the need for complex syntax or programming language knowledge, which is advantageous for beginners or those unfamiliar with programming (4).

SPSS (Statistical Package for the Social Sciences) is a versatile application used for advanced statistical analysis, including machine learning algorithms, string analysis, and big data analysis (4). It is a comprehensive data analysis platform widely adopted in quantitative research. Proficiency in SPSS is essential for researchers to conduct thorough data analyses in accordance with established methodologies (1). With SPSS's continuous evolution, reaching its 25th version in 2019, it remains a cornerstone of educational research and beyond.

In conclusion, selecting statistical software should align with research needs and researchers' proficiency levels (3). Both AMOS and SPSS offer unique advantages, catering to different research contexts and user preferences. Researchers should prioritize acquiring proficiency in the chosen software to ensure robust data analysis and meaningful research outcomes.

The decision between AMOS and SPSS should be made based on the specific requirements of the research and the nature of the data being analyzed. By understanding the strengths and limitations of each software, researchers can effectively utilize these tools to draw accurate conclusions and contribute valuable insights to their fields.

METHODS

The research method employed in this study is quantitative, utilizing a structured approach to data collection and analysis. The research data analysis incorporates both AMOS and SPSS software to compare the results of the analyses conducted. This dual-software approach facilitates a comprehensive examination of the data, allowing for effective hypothesis testing and moderator analysis.

In addition to the main analysis, a descriptive analysis was performed to summarize the characteristics of the collected data. This descriptive analysis provided insights into the demographic profiles of the respondents and highlighted trends related to the independent variables, such as the impact of COVID-19 on emotional health and the nature of parental and peer attachments. By showcasing these descriptive statistics, the study sets a contextual foundation for interpreting the results from the moderator analysis effectively. This step is essential for understanding the broader implications of the findings and ensures that the moderator effects are analyzed within an appropriate context.

The primary focus of the analysis is on moderator analysis, which measures the extent to which the moderator variable influences the direction and strength of the relationship between the independent and dependent variables. In this study, quantitative data were collected through a questionnaire administered to 383 respondents, providing a robust dataset for analysis.

aThe independent variables examined in this research include the impact of COVID-19, parental attachment, and peer attachment. Additionally, online networking is analyzed as a moderator in the relationships between these independent variables and emotional intelligence, which serves as the dependent variable. This methodological framework enables the investigation of the interplay between these variables and provides insights into the moderating effects identified within the context of the study

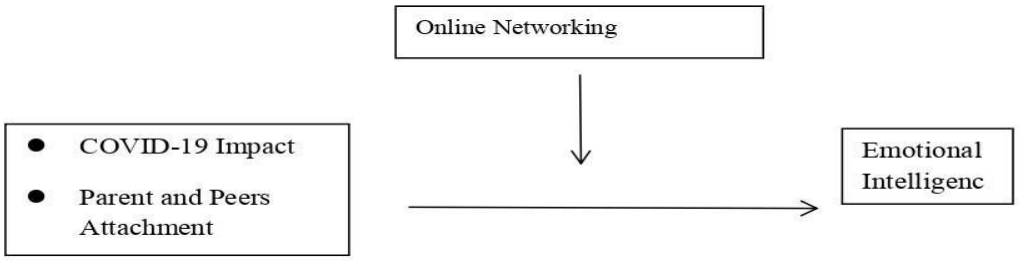

Figure 1: Conceptual Framework of the Study

RESULTS

CFI, or Comparative Fit Index, is a statistical measure used in structural equation modelling (SEM) to evaluate the goodness of fit of a model. It compares the fit of the specified model to a baseline model, typically a null model in which all variables are uncorrelated.

The CFI value ranges from 0 to 1, with values closer to 1 indicating a better fit. cfi here is.88 which shows good model fit according to theory.

Based on the data presented in the Path Diagram (Figure 2), the Goodness of Fit Index (GFI) is 0.48, with a probability level of 0.000, indicating that the model demonstrates an optimal fit. The exceedingly low probability of such a result occurring by chance reinforces the robustness of the model's fit to the data.

This alignment suggests that the observed data closely matches the expectations set forth by the model, reflecting a strong concordance between the theoretical framework and the empirical findings.(refer figure 2).

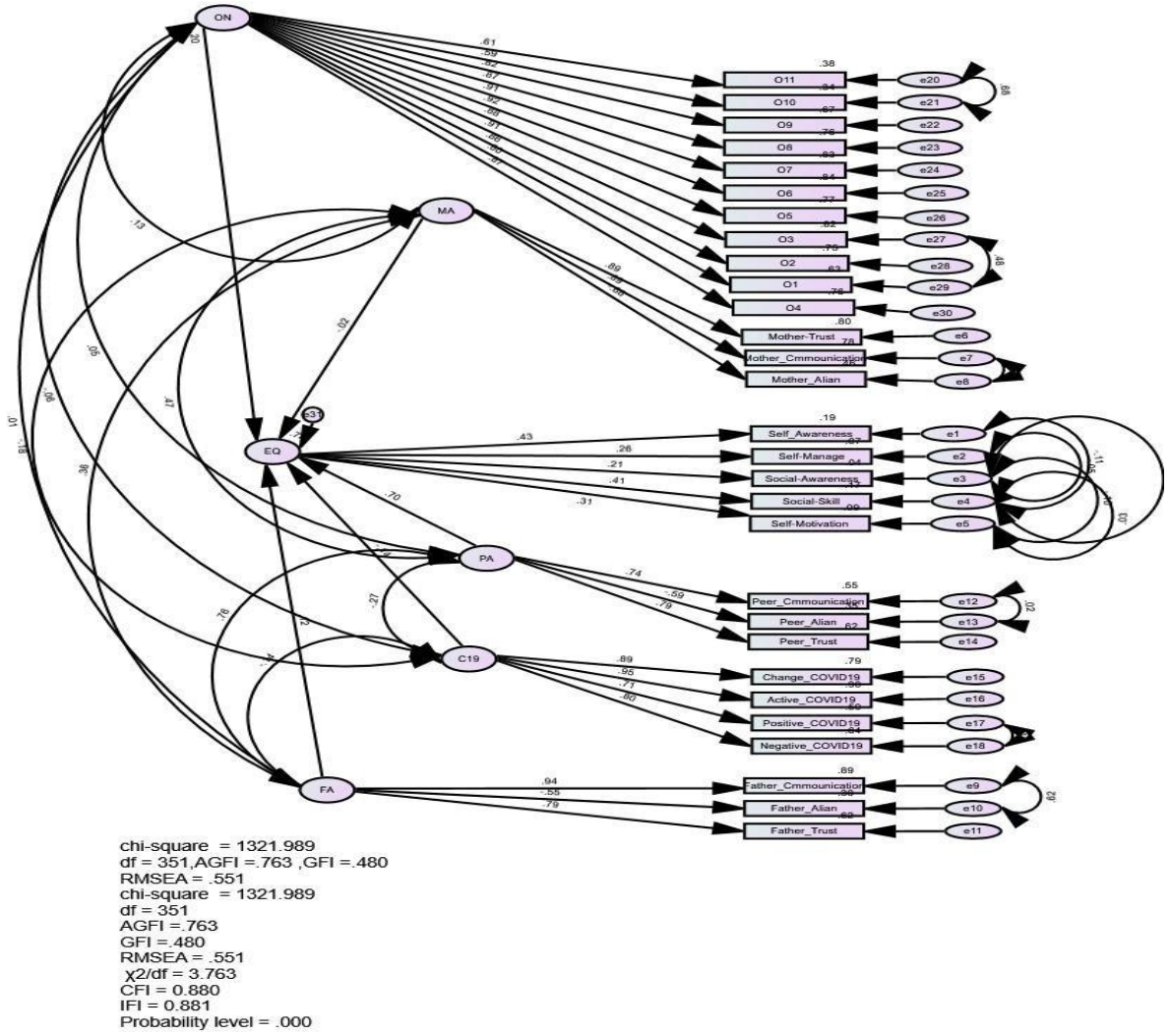

Figure 2: Comparative Fit Index (CFI)

Descriptive study

The data from Tables 1 reveals that a notable subset of individuals within the surveyed population with relatively low activity levels or engagement in online networking activities. Identifying individuals with low engagement in online networking provides valuable insights into Internet usage patterns in Ahvaz, Iran.

Table 1: Online Networking

Variable	***Mean***	***S.D***	***N***	***%***
Online Networking Low ≤ 41	41.34	9.20		
			157	41.0
Mediom 42- 49			145	37.9
High ≥ 50			81	21.1

Note: Cut off Point is according to (Mean SD)

Objective: To determine the moderating role of online networking and gender in the relationship of COVID-19 impact, parents' attachment, peers' attachment with emotional intelligence among adolescents in Ahvaz, Iran.

Research Question: To what extent does online networking and gender moderate the relationship of COVID-19 impact, parents' attachment, and peers attachment with emotional intelligence among adolescents in Ahvaz, Iran?

Moderator Analysis for Online Networking

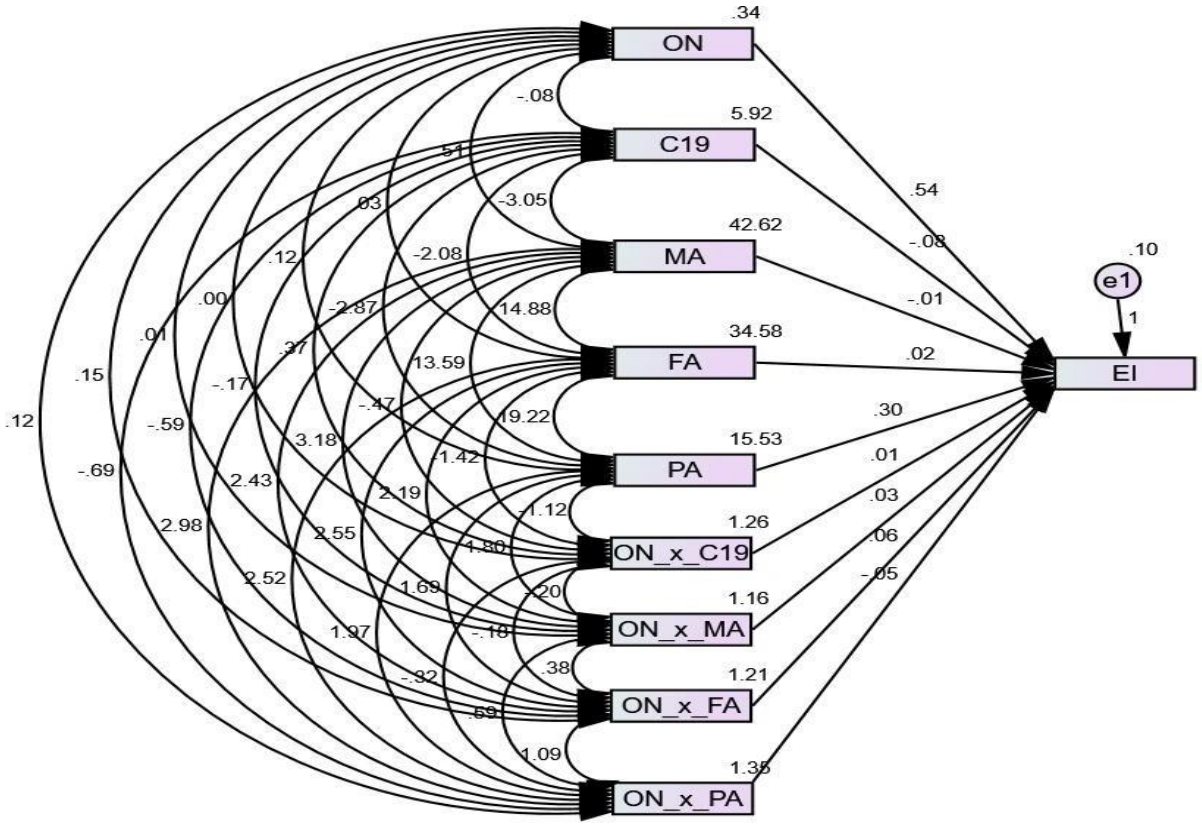

Figure 3: Path Diagram for Moderator of Online Networking

Table 2: Moderating Effects of Online Networking on COVID-19 Impact, Parent and Peers Attachments, and Emotional Intelligence

Path	*Estimate*	*p*
ON_x_C19	.012	.426
ON_x_MA	.031	.105
ON_x_FA	.057	.059
ON_x_PA	-.051	.095

(C19 =COVID-19 Impact, MA = Mother Attachment, FA=Father Attachment, PA =Peer Attachment, CR = Critical Ratio, *** P <0.00, ** P <0.01, * P <0.1), (Esti)Estimate

Ha1: There is a significant moderating role of online networking on the relationship between COVID-19 impact and emotional intelligence among adolescents in Ahvaz, Iran.

The interaction between Online Networking (ON) and COVID-19 Impact (C19) does not demonstrate a statistically significant relationship with emotional intelligence (EQ) (B = .012 ,p <.001). Ha1 is not supported. (refer to Table 5 and Figure 3).

While, according to results gained via Hayes' Process Macro by (SPSS) online networking was able to moderate the relationship between COVID_19 impacts and emotional intelligence (B= -.0090, p=.0035) . Ha1 is supported

Table 3: Moderator of Online Networking and Covid_19 Impacts with Emotional Intelligence

R	*R-sq*	*B*	*F*	*df1*	*df2*	*p*
.34	.11	-.0090	16.62	3	379	.0035

Ha2: There is a significant moderating role of online networking on the relationship between mother attachment and emotional intelligence among adolescents in Ahvaz, Iran.

The interaction between Online Networking (ON) and Mother Attachment (MA) does not demonstrate a statistically significant relationship with emotional intelligence (EQ) (B = .031, p <.001). Ha2 is not supported. (refer to Table 5 and Figure 3).

On the other hand, the results confirmed Hayes' Process Macro by (SPSS) revealed that online networking was able to moderate the relationship between mother attachments and emotional intelligence (B= .0094, p=.0099) .

Table 4: Moderator of Online Networking and Mother Attachment with emotional intelligence

R	*R-sq*	*B*	*F*	*df1*	*df2*	*p*
.36	.13	.0094	19.22	3	379	.00

Ha3: There is a significant moderating role of online networking on the relationship between father attachment and emotional intelligence among adolescents in Ahvaz, Iran.

According to the data from (AMOS) the interaction between Online Networking (ON) and Father Attachment (FA) does not demonstrate a statistically significant relationship with emotional intelligence (EQ).(B = .057 ,p <.001). Ha3 is not supported. (refer to Table 5 and Figure 3).

Also, data gained from Hayes' Process Macro by (SPSS) revealed that , the interaction term was not statistically significant (B= .0136, p=.0005). And Ha3 is not supported. (Refer to Table 8).

Table 5: Moderator of Online Networking and Father Attachment with Emotional Intelligence

R	*R-sq*	*B*	*F*	*df1*	*df2*	*p*
.04	.0023	.04	.29	3	379	.36

Ha4: There is a significant moderating role of online networking on the relationship between peer attachment and emotional intelligence among adolescents in Ahvaz, Iran.

According to the data from (AMOS) the interaction between Online Networking (ON) and Father Attachment (FA) does not demonstrate a statistically significant relationship with emotional intelligence (EQ). (B = -.051, p <.001). Ha4 is not supported. (refer to Table 5 and Figure 3).

As explained in the description section, adolescents in Ahvaz had insecure attachments to their peers, and around half of reported low levels of online networking. As a result, online networking can not moderate the relationship between peer attachment and emotional intelligence

Also, data gained from Hayes' Process Macro by (SPSS) showed that the online networking was able to moderate the relationship between peer attachments and emotional intelligence (B= .0124, p=.0004) .

Table 6: Moderator of Online Networking and Peer Attachment with Emotional Intelligence

R	*R-sq*	*B*	*F*	*df1*	*df2*	*p*
.49	.24	.01	. 41.65	3	379	.0004

DISCUSSION

The findings of this study highlight significant differences between the results obtained from AMOS and SPSS, particularly concerning the moderating role of online networking on emotional intelligence among adolescents.

While the initial hypothesis suggested that online networking would serve as an effective moderator in the relationships involving COVID-19 impact, parent and peer attachment, and emotional intelligence, the results revealed a contrasting picture. AMOS indicated that online networking did not indeed moderate these relationships effectively, producing results that aligned more closely with theoretical and descriptive results. Conversely, SPSS yielded limited evidence supporting the same moderation effect, raising questions about the robustness of its analysis in this context.

Interestingly, descriptive statistics pointed out that adolescents in Ahvaz had limited access to online social media during the COVID-19 pandemic. This finding is crucial because it suggests that while online networking could potentially serve as a strong moderator, the actual circumstances of limited access may have hindered its effectiveness. Thus, despite the theoretical framework suggesting a strong moderating role, the practical implications of the data from SPSS show a discrepancy that cannot be ignored.

The more reliable results obtained from AMOS emphasize its superiority in modeling complex relationships involving latent constructs, making it a preferable choice for analyses requiring nuanced interpretations (5). Therefore, the findings imply that researchers should consider using AMOS for studies related to emotional intelligence and social networking, particularly when examining the moderating effects of contextual variables.

In summary, this research underlines the importance of choosing appropriate statistical tools for analysis and the necessity of considering contextual factors that could influence outcomes. The integration of both quantitative results and descriptive insights forms a comprehensive understanding that can guide future research on emotional intelligence in the digital age.

CONCLUSIONS

The findings from this study provide valuable insights into the fundamental differences between AMOS and SPSS, which are critical for understanding these relationships. These unique features of AMOS allow researchers to analyze more complex

relationships between variables, and this study revealed that the results obtained from AMOS indicated lower effects of online networking on emotional intelligence compared to those from SPSS, which is in line with the descriptive results that show most students did not have online networking. However, it is important to consider the limitations of this study. The reliance on self-reported data may introduce biases that could affect the accuracy of the findings. Despite these limitations, the implications of this research are significant. Researchers should recognize the divergent capabilities of AMOS and SPSS, especially when dealing with complex data structures and moderating variables. This understanding can guide the choice of appropriate software for future studies, ultimately leading to more accurate interpretations of data in psychological research.

ACKNOWLEDGMENT

I hereby declare that the information provided above and in the attached documents is true to the best of my knowledge and belief and that no details have been omitted. I understand that if any information I have provided is found to be false or misleading, I will face legal consequences as per the applicable laws.

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