RESEARCH ARTICLE **Open Access**

Gema Lingkungan Kesehatan
Vol. 23, No. 1 (2025), pp 293-304
e-ISSN 2407-8948 p-ISSN 16933761
Doi: https://doi.org/10.36568/gelinkes.v23i2.189 *Journal Hompage: https://gelinkes.poltekkesdepkes-sby.ac.id/*

The Association Between Mental Health, Social-Emotional Health, And Child Development in Preschool Children: A Structural Equation Modelling Approach

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ABSTRACT

Preschool-aged children are particularly vulnerable to mental health disorders, which can significantly impact their social and developmental outcomes. This study aims to model the associations between mental health, social-emotional health, and child development in preschool children, emphasizing its relevance to child health policy and intervention strategies. Utilizing a quantitative, correlational, cross-sectional design with Structural Equation Modeling (SEM) analysis, the research involved 156 preschool children aged 72 months. SEM was chosen for its ability to assess complex relationships among multiple variables while controlling for measurement errors, making it more suitable than traditional regression methods. The findings indicate that the average levels of mental health and social-emotional health, as well as growth and development, were within normal limits. However, certain indicators revealed delays that warrant monitoring. A significant correlation was found between child development and both mental and social-emotional health, highlighting a predictive relationship that suggests mental health significantly influences child development. This supports the acceptance of the first hypothesis (H1) while rejecting the null hypothesis (H0). The implications of these results are critical for health workers and educators, suggesting the need for early detection programs for mental health issues in preschool settings. By integrating tools like the Strengths and Difficulties Questionnaire (SDQ) into routine assessments, this study provides actionable recommendations for improving child mental health interventions within educational policies.

Keywords: Associative Mental Health, Social-Emotional Health, Child Development, Preschoolers, Multi-Phase Study

INTRODUCTION

The ongoing transition from a pandemic to an endemic state, while signaling a shift in the management of COVID-19, does not equate to the cessation of its impact or a return to normalcy. This transition brings about new anxieties and stressors, particularly concerning the potential long-term effects on various aspects of life, including child development. Children, especially those of preschool age, have been significantly affected due to disruptions in socialization, leading to increased mental health issues such as anxiety, stress, boredom, depression, and sleep disturbances. This has resulted in a notable increase in visits to mental health services for young children, highlighting the urgent need to address these emerging challenges (Arafah 2020).

Preschool years are a critical period for development, laying the foundation for future life stages. Children in this age group are particularly vulnerable to mental health disorders due to their sensitivity to environmental conditions. Mental health disorders can impede social and overall development, potentially leading to developmental delays across various domains. During the pandemic, many children experienced such delays, including difficulties in separating from parents and anxieties related to interacting with new individuals or family members. These developmental challenges can have long-lasting consequences, affecting cognitive functions, increasing the risk of depression, and predisposing individuals to various health problems in adulthood (Rosyad et al. 2021).

While the Centers for Disease Control and Prevention (CDC) emphasizes that healthy development ensures children of all abilities have their social, emotional, and educational needs met, the pandemic has posed significant obstacles to achieving this goal (Ariviana, I. S., Wuryaningsih, E. W., & Kurniyawan 2021). Theory of psychosocial development posits that preschool-aged children (3 to 6 years) must develop trust and independence, which are crucial for their social and

emotional development. The pandemic has disrupted these developmental processes, potentially hindering the establishment of trust and autonomy in young children (Sonartra 2021). Furthermore, Tidal Model of Mental Health Recovery suggests that psychiatric crises are influenced by diverse and cumulative factors, which are highly relevant in understanding the mental health challenges faced by children during the pandemic. Callista Roy's Adaptation Model underscores that individuals adapt to environmental changes through various coping mechanisms, which affect their overall development; the pandemic has undoubtedly challenged children's adaptive capacities, impacting their mental health and development (Shumba et al. 2020)

However, there is a gap in the existing literature concerning the application of structural equation modeling (SEM) to examine the complex relationships between mental health, social-emotional health, and child development in preschool children amidst the pandemic. While studies have acknowledged the impact of the pandemic on children's mental health and development, few have employed SEM to provide a comprehensive understanding of the interplay between these factors. Therefore, this study addresses this gap by utilizing SEM to investigate the associations between mental health, social-emotional health, and child development in preschool children, thereby providing insights for targeted interventions and improved outcomes (Suryaningsih and Sanjaya 2022).

In light of these challenges, pediatric nursing specialists must be proactive in addressing the developmental problems experienced by preschool-aged children (Kesehatan 2020). Early detection using comprehensive developmental assessment models is essential for identifying and addressing mental and social-emotional disorders, which can otherwise lead to problems at home, school, and in friendships (Magklara et al. 2022). Therefore, there is a need for further studies and reviews to evaluate the effectiveness of early detection methods in addressing the current mental health, social, and emotional health challenges faced by preschoolers (Zimlichman, E., Nicklin, W., Aggarwal, R., & Bates 2021).

This study aims to contribute to the existing body of knowledge by Developing a structural equation model (SEM) to examine the relationships between mental health, social-emotional health, and child development in preschool children through comprehensive early detection methods; Defining the interrelationships among preschool-age children's mental health, social-emotional health, and overall development, providing valuable insights for future researchers in developing targeted interventions and developmental counseling for children (NIOSH 2014); Identifying indicators that significantly affect and are closely related to mental health and social-emotional health in preschool-age children, enabling timely and effective interventions to address developmental problems, particularly in the areas of mental health and social-emotional well-being (Fuadia 2022).

By addressing these research objectives, this study seeks to enhance the quality of health services, particularly in nursing, and to improve the management of developmental issues related to mental health and social-emotional well-being in preschool-age children within families, educational settings, and the broader community (Lee 2014). The urgency of this research stems from the potential long-term impact of the pandemic on children's mental health and development, underscoring the need for proactive and evidence-based interventions to mitigate these effects and promote optimal child development (Rosińczuk et al. 2015).

The nurse will gain a deeper understanding of the child's current situation and the need for a change in the situation that occurs in the child In (Buheji et al. 2020). As a pediatric nursing specialist nurse who acts as a provider of nursing care, educators and counsellors for healthy and sick children must take and prepare several steps to deal with developmental problems experienced by preschool-aged children, steps that can be taken include doing early detection uses a complete development detection model. Without early diagnosis and treatment, children with mental and social-emotional disorders can have problems at home and school and form friendships (Nurjanah, N., Suryaningsih, C., & Putra 2017).

Further studies and reviews are needed to evaluate the use of early detection of the current situation on preschoolers' mental health, social, and emotional health to prevent and reduce the risk of overall developmental disorders. Researchers must visualize the need to study and arrive at structural equation models to improve the early detection of preschoolers' mental, social, and emotional health by conducting early detection. The results of this study can be used as a basis and valuable suggestions for improving the quality of health services, especially nursing, and handling of developments due to disturbances in the mental health, social, and emotional of pre-school-age children in families, kindergarten education, and society. Based on this phenomenon, the researcher wants to Create a mental, social, and emotional health Structural Equation Model on the development of preschool-age children by conducting complete early detection of development; define relationships among preschool-age children's mental, social, and emotional health deep development for future researchers in developing interventions and developmental counselling for children.

Determine indicators that significantly affect and are closely related to mental health, social, and emotional health in preschool-age children so that problems in child development in general and mental, social emotional health, especially in children, can be handled quickly

This study aims to provide a comprehensive understanding of the intricate relationships between mental health, social-emotional health, and child development, thereby informing effective strategies for early detection and intervention in preschool children.

METHOD

Study Design

This study employed a correlative, non-experimental, quantitative descriptive cross-sectional design utilizing Structural Equation Modeling (SEM). This design was chosen for several key reasons: (1) to examine the relationships between mental health, social-emotional health, and child development in preschool children at a single point in time; (2) to describe these variables and their natural correlations without manipulating them; and (3) to utilize SEM as a comprehensive statistical modeling technique that allows for the assessment of complex interrelationships (Gunarto 2018).

A cross-sectional design was deemed appropriate due to its efficiency in collecting data and providing a snapshot of the variables of interest at a specific time. While longitudinal studies offer the advantage of tracking changes over time and establishing temporal precedence, they are often more resource-intensive and time-consuming. Given the immediate need to understand the impact of the pandemic on preschool children's mental health and development, a cross-sectional design provided a pragmatic and feasible approach. Furthermore, the primary objective of this study was to explore the associations between variables rather than to determine causality, making a cross-sectional design a suitable choice.

SEM was selected as the primary data analysis technique due to its ability to address the limitations of ordinary regression or other methods. Unlike traditional regression techniques, SEM allows for the simultaneous assessment of multiple relationships between observed and latent variables. Latent variables, such as mental health and social-emotional health, are constructs that cannot be directly measured but are inferred from observed indicators. SEM enables researchers to incorporate measurement error into the analysis, providing more accurate estimates of the relationships between variables (Tarka 2018).

Additionally, SEM is capable of testing complex theoretical models by estimating direct and indirect effects, as well as mediating and moderating relationships. This is particularly relevant in the context of this study, as the relationships between mental health, social-emotional health, and child development are likely to be multifaceted and influenced by various factors. SEM also provides measures of overall model fit, allowing researchers to assess the extent to which the hypothesized model aligns with the observed data

Sampling

The sample for this study consisted of 156 preschool children aged 72 months. While a G*Power analysis initially indicated a required sample size of 250 across all age ranges (42-72 months), the final sample was limited to 156 children specifically aged 72 months due to the availability of participants meeting this criterion within the study setting. This age group was prioritized as it represents a critical developmental stage, and homogeneity in age reduces potential confounding variables related to developmental milestones.

The sampling technique employed was purposive sampling, consistent with recommendations for SEM studies (Hair et al., 2010). This technique allowed for the selection of participants who met specific criteria relevant to the research objectives.

Inclusion Criteria, Children aged 72 months attending participating kindergartens in South Cimahi City, West Java Province, Indonesia; Parental/guardian consent for participation in the study; Children with no known diagnosed neurological or developmental disorders that would significantly impact their cognitive or social-emotional development; Children whose parents/guardians were willing to complete the required questionnaires.

Exclusion Criteria: Children with diagnosed neurological or developmental disorders; Children not attending participating kindergartens; Children without parental/guardian consent; Children with incomplete data on key study variables.

To ensure representation across different socioeconomic backgrounds, participating kindergartens were selected to include a mix of schools serving families from various income levels. While formal stratification based on socioeconomic status (SES) was not conducted a priori, data on parental education and occupation were collected to allow for post-hoc analyses examining potential SES effects.

It's important to note that 47 respondents were excluded from the SEM analysis due to abnormal data. This determination was based on a Mahalanobis distance analysis, a statistical measure of multivariate outliers. A significance level of $p < 0.001$ was used as the cutoff, indicating that these cases had an unusual combination of scores across the measured variables, suggesting potential data entry errors, misunderstanding of questionnaire items, or other factors that could compromise the validity of the SEM results. Removing these outliers is a standard practice in SEM to minimize their undue influence on model parameter estimates and ensure the stability and reliability of the findings (Hair, J., Black, W. C., Babin, B. J., & Anderson 2010).

Instrument

Instrument: Three validated instruments were used in this study to measure key variables strengths and Difficulties Questionnaire (SDQ): The SDQ was employed to assess children's mental health. This tool has demonstrated strong psychometric properties, including internal consistency and validity, across various populations, such as New Zealand and Swedish preschoolers (Cronbach's alpha ranging from 0.75 to 0.98)45. For this study, the SDQ Parent Form was adapted for the Indonesian context through a translation and back-translation process, ensuring cultural relevance and linguistic accuracy (Oktaviana and Wimbarti 2014); Ages and Stages Questionnaires: Social-Emotional (ASQ:SE): The ASQ:SE was used to evaluate social-emotional health. Previous studies have confirmed its reliability, sensitivity,

and specificity in detecting social-emotional problems in children aged 3–66 months12. For this study, the ASQ:SE underwent linguistic adaptation to match the local language and cultural context, enhancing its applicability to Indonesian preschoolers; Pre-screening Developmental Questionnaire (PDQ/KPSP): The PDQ/KPSP (Indonesian version) was used to measure children's development across domains such as gross motor, fine motor, personal-social skills, and language. This instrument has been validated for use in Indonesia with satisfactory reliability (Cronbach's alpha > 0.80) (FILGUEIRAS et al. 2016).

Validity and reliability tests were conducted for all instruments in the study population to ensure their appropriateness. These included Confirmatory Factor Analysis (CFA) for construct validity and Cronbach's alpha for internal consistency. Additionally, adaptations were made where necessary to account for cultural differences, ensuring that the tools accurately reflected the developmental characteristics of Indonesian preschool children. Data collection involved direct observation and questionnaire administration to parents/guardians in a controlled setting (Dhamayanti 2016)

Data Collection

The data collection procedure involved six phases, building on established guidelines (Polit and Beck 2010) Phase 1: Literature Review and Expert Consultation: A comprehensive literature review was conducted to identify relevant variables, measurement instruments, and theoretical frameworks. Expert consultation was sought to ensure the appropriateness of the study design and data collection procedures; Phase 2: Generation of Quantitative Study Guides: Based on the literature review and expert consultation, study guides were developed to standardize the data collection process and ensure consistency across participants; Phase 3: Securing Ethical Approvals: Written approval was obtained from the Philippine Women's University Ethics Review Board and the Cimahi City Education Office prior to commencing data collection; Phase 4: Selecting Participants: Participants were selected based on the aforementioned inclusion and exclusion criteria using purposive sampling; Phase 5: Securing Informed Consent: Prior to data collection, informed consent was obtained from the parents/guardians of all participating children after explaining the purpose of the study, the data collection procedures, and the potential risks and benefits of participation; Phase 6: Data Collection: Data were collected through standardized questionnaires completed by parents/guardians, including the Strengths and Difficulties Questionnaire (SDQ), Ages & Stages Questionnaires: Social-Emotional (ASQ:SE), and Parent Development Questionnaire (PDQ/KPSP). Data collection was conducted in a private and confidential setting to ensure the privacy and comfort of the participants.

By employing a rigorous sampling and data collection approach, this study aimed to minimize potential biases and maximize the validity and reliability of the findings, providing a sound basis for understanding the complex relationships between mental health, social-emotional health, and child development in preschool children.

Data Analysis

Data analysis was conducted using SmartPLS 3.0, employing a comprehensive approach to evaluate the relationships among mental health, social-emotional health, and child development in preschoolers.

Univariate Analysis: Mean scores for each indicator and variable were calculated to assess the levels of mental health, social-emotional health, and child development (Polit, D. F., & Beck 2010). Descriptive analysis provided a summary of the scores for all measured variables (Creswell 2003).

Bivariate Analysis: Spearman Rank correlation was chosen due to its suitability for analyzing relationships between two variables with non-normally distributed data. Prior to this analysis, normality was assessed using the Shapiro-Wilk test, confirming that the data for all three variables was not normally distributed ($p < 0.05$). The Spearman Rank correlation coefficients were interpreted based on strength (Akoglu 2018).

Regression Analysis: Multiple regression analyses were conducted to explore relationships between various factors and both fine and gross motor skills, revealing significant coefficients that highlight the influence of different variables.

Structural Equation Modeling (SEM): SEM assumptions were rigorously tested before model execution. This included checks for normality, multicollinearity, and overall model fit. The SEM approach allowed for the examination of latent variables and their interrelationships, providing insights into the strength of factor effects (Tohari 2018). This comprehensive analysis framework ensures robust findings that can inform future interventions and policy decisions.

Ethical Consideration: the Philippine Women's University Ethics Review Committee Has Already approved this research On August 3, 2023, by issuing a Certificate of Approval and Ethical Review (ERB Protocol Number ERB2023_0159). The researcher follows the ethical principles of Anonymity, Autonomy, consent based on information, Privacy and Confidentiality, and respect for human dignity and justice as compensation and benefits as a participant.

RESULT & DISCUSSION

Table 1. Mean Level Of Development

	Indicators	Mean	Min-Max Score	Interpretation
1.	Gross Motor	2.91	0-3	Normal
2.	Language	2.89	0-3	Normal
3.	Fine Motor	2.90	0-3	Normal
4.	Personal-Social	0.8	0-1	Delayed
5.	Overall Development	9.64	0-10	Normal

Based on table 1, the results show that the general development level in pre-school children with a mean score of 9.64 means that the development level is normal. As for the indicators in development, the results obtained are Gross Motor with a mean score of 2.91, meaning that the Gross Motor level is normal; Language with a mean score of 2.89, meaning that the Language level is normal; Fine Motor with a mean score of 2.90 meaning that the Fine Motor level is normal. But for the Personal-Social indicator, the mean score is 0.8, which means that the personal-Social level of pre-school children is delayed (0-0.3: normal, 0.4-0.6: doubtful, 0.7-1: delayed). This means that there are pre-school children who are delayed in their personal social development. This implies that children need early screening for early intervention.

Table 2. Mean Level Of Mental Health

Indicators	Mean	Interpretation
1. Emotional Problems	1.96	Normal
2. Conduct problems	1.99	Normal
3. Hyperactivity-inattention	2.32	Normal
4. Peer problems	2.31	Borderline
5. Prosocial	4.90	Borderline
6. Overall Mental Health	10.97	Normal

Based on Table 2, the general level of mental health in preschool children with a mean score of 10.97, which means that the level of mental health is normal. As for the indicators in mental health, the results obtained are emotional problems with a mean score of 1.96, meaning that the level of emotional problems is normal; Conduct problems with a mean score of 1.99, meaning that the level of conduct problems is normal; Hyperactivity-inattention with a mean score of 2.32 meaning that the level of hyperactivity-inattention is normal. But for the peer problems indicator, the mean score is 2.31, which means that the level of peer problems of pre-school children is delayed (score 0-2: Normal, >2-3: borderline, 4-10: delayed) and the prosocial indicator obtained the mean score is 4.90 which means that the prosocial level of pre-school children is borderline (0-4: delayed, >4-5: borderline, 6-10: Normal). This means that there are pre-school children who experience delayed problems, namely in the indicators of peer problems, and prosocial. This implies that children need early screening for early intervention.

Indicators	Mean	Interpretation
1. Self-regulation	14.11	Normal
2. Compliance	6.89	Normal
3. Communication	11.71	Normal
4. Adaptive Functioning	7.43	Normal
5. Autonomy	8.64	Normal
6. Affect	9.04	Normal
7. Interaction with People and peers	21.68	Monitoring
8. Overall Social-Emotional Health	65.50	Normal

Table 3 Mean Level Of Social-Emotional Health

Based on table 3, the general level of Social-Emotional Health in preschool children has a mean score of 65.50, which means that the level of Social-Emotional Health is normal. As for the Indicators in Social-Emotional Health, the results obtained are Self-regulation with a mean score of 14.11 meaning that the level of Self-regulation is normal; Compliance with a mean score of 6.89 meaning the level of Compliance is normal; Communication with a mean score of 11.71 meaning the level of Communication is normal; Adaptive Functioning with a mean score of 7.43 meaning the level of Adaptive Functioning is normal; Autonomy with a mean score of 8.64 meaning the level of Autonomy is normal; Affect with a mean score of 9.04 meaning the level of Affect is normal. But for the Interaction with People indicator, the mean score is 21.68, which means that the level of Interaction with people and peers of pre-school children is monitoring (0-20: normal, 21-40: Monitoring, 41-60: delayed). This means that there are pre-school children who are experiencing delayed problems or children who need monitoring in the social emotional health of Interaction with people and peers. This implies that children need early screening for early intervention.

Table 4. Correlation Between Child Development And Mental Health

Indicators		Child Development			
		Fine Motor	Personal Social	Gross motor	Language
Mental Health	Emotional Problem	0.25 Weak relationship	0.8* Very strong relationship	0.22 Weak relationship	0.18 Negligible correlation
	Conduct Problem	0.7* Very strong relationship	0.42* Strong relationship	0.21 Weak relationship	0.34* Moderate relationship
	Hyperactivity	0.15 Negligible correlation	0.62* Strong relationship	0.16 Negligible correlation	0.11 Negligible correlation
	Peer Problem	0.5* Strong relationship	0.39* Moderate relationship	0.41* Strong relationship	0.52* Strong relationship

Indicators	Child Development			
	Fine Motor	Personal Social	Gross motor	Language
Prosocial	0.08 Negligible correlation	0.41* Strong relationship	0.22 Weak relationship	0.62* Strong relationship

Based on table 4, it can be revealed that the results of the interpretation of bivariate analysis data using Spearman Rank analysis. For the interpretation of the Emotional Problems indicator, there is a weak relationship with Fine Motor and Gross Motor; There is no or negligible correlation with Language. However, there is a very strong relationship with Personal Social. For the interpretation of the Conduct Problem indicator, it is Weak relationship with Gross motor, but has Very strong relationship with Fine Motor, has Strong relationship with Personal Social, has Moderate relationship with Language. For the interpretation of the Hyperactivity indicator, there is no or negligible correlation with Fine Motor, Gross motor, and Language, while there is a Strong relationship with Personal Social. For the interpretation of the Peer Problem indicator, which has a Strong relationship with Fine Motor, Gross motor, and Language, has a Moderate relationship with Personal Social. For the interpretation of prosocial indicators, which have No or negligible correlation with Fine Motor, have Weak relationship with Gross motor, but have Strong relationship with Personal Social and language.

Table 5. Correlation Between Child Development And Social-Emotional Health

Indicators		Child Development			
		Fine Motor	Personal Social	Gross motor	Language
Social-Emotional Health	Self-Regulation	0.41* Strong relationship	0.39* Moderate relationship	0.42* Strong relationship	0.52* Strong relationship
	Compliance	0.38* Moderate relationship	0.22 Weak relationship	0.52* Strong relationship	0.05 Negligible correlation
	Adaptive Functioning	0.72* Very strong relationship	0.56* Strong relationship	0.43* Strong relationship	0.57* Strong relationship
	Autonomy	0.58* Strong relationship	0.65* Strong relationship	0.46* Strong relationship	049* Strong relationship
	Affect	0.19 Negligible correlation	0.11 Negligible correlation	0.06 Negligible correlation	0.14 Negligible correlation
	Communication	0.67* Strong relationship	0.64* Strong relationship	0.48* Strong relationship	0.57* Strong relationship
	Interaction	0.67* Strong relationship	0.79* Very strong relationship	0.39* Moderate relationship	0.66* Strong relationship

Based on table 5, it can be revealed that the results of the interpretation of bivariate analysis data using Spearman Rank analysis.For the interpretation of Self-Regulation indicators, there is a Strong relationship with Fine Motor, Gross motor, and language; there is a Moderate relationship with Personal Social. For the interpretation of the Compliance indicator, there is a Weak relationship with Personal Social, and No or negligible correlation with language, but there is a moderate relationship with Fine Motor, and Strong relationship with Gross motor. For the interpretation of Adaptive Functioning indicators, there is a very strong relationship with Fine Motor, and there is a strong relationship with personal Social, gross motor and language. For the interpretation of the Autonomy indicator, there is a strong relationship with Fine Motor, Personal Social, Gross motor, and language. For the interpretation of the Affect indicator, there is No or negligible correlation with Fine Motor, Personal Social, Gross motor, and language. For the interpretation of the Communication indicator, there is a strong relationship with Fine Motor, Personal Social, Gross motor, and language. For the interpretation of the Interaction with people and peers indicator, there is a Strong relationship with Fine Motor, and language, there is a Very strong relationship with Personal Social, and there is a Moderate relationship with Gross motor.

Table 6. Dependent Variable: Fine Motor

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	1.014	.079		12.898	.000
Language	.009	.028	.027	.311	.756
Emotional	.014	.029	.127	.487	.627
Conduct	-.030	.024	-.278	-1.260	.210
Hyperactivity	-.007	.028	-.065	-.247	.805
Peer problem	-.007	.029	-.068	-.250	.803
Prosocial	.017	.028	.161	.604	.547
Self-regulation	-.002	.003	-.091	-.725	.470
Compliance	-.003	.009	-.038	-.342	.733
Adaptive	.002	.004	.055	.468	.641
Autonomy	.004	.007	.056	.498	.619
Affect	-.009	.006	-.166	-1.538	.126
Communication	-.014	.007	-.277	-2.005	.047
Interaction	.003	.004	.103	.701	.484

The regression analysis was conducted to explore the relationship between various factors and fine motor skills. The model revealed several coefficients, shedding light on the impact of different variables. Firstly, the intercept (constant) was found to be 1.014 with a standard error of 0.079, and a t-value of 12.898, indicating statistical significance ($p < 0.001$).

The findings of the regression analysis suggest that emotional skills and communication have significant associations with fine motor skills, while other variables such as language, prosocial behavior, and autonomy may also play roles, although not statistically significant in this study. This aligns with previous research highlighting the importance of emotional regulation and communication in motor skill development (Gialamas et al., 2014; Iverson et al., 2019).

Table 7 Dependent Variable: Gross Motor

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	.148	.040		3.668	.000
Language	.273	.015	.835	18.762	.000
Emotional	-.011	.015	-.095	-.712	.478
Conduct	.017	.012	.154	1.362	.176
Hyperactivity	-.014	.015	-.125	-.930	.354
Peer problem	.019	.015	.182	1.293	.198
Prosocial	.003	.014	.027	.195	.845
Self-regulation	.000	.001	.018	.273	.785
Compliance	-.002	.005	-.027	-.483	.630
Adaptive	.002	.002	.069	1.146	.254
Autonomy	-.002	.004	-.036	-.623	.534
Affect	.004	.003	.078	1.416	.159
Communication	-.004	.004	-.086	-1.208	.229
Interaction	.000	.002	.018	.244	.808

The regression analysis investigated the relationship between various factors and gross motor skills. The results revealed several coefficients that provide insights into the influence of different variables. The intercept (constant) was found to be 0.148 with a standard error of 0.040 and a t-value of 3.668, indicating statistical significance ($p < 0.001$).

Overall, the results emphasize the significant role of language skills in predicting gross motor abilities, while suggesting that emotional, behavioral, and social factors may have less pronounced impacts in this context.

The findings suggest that language skills play a crucial role in predicting gross motor abilities, which is consistent with recent research emphasizing the significance of language development in motor skill acquisition (Iverson et al., 2019). While other factors such as emotional regulation, social behavior, and self-regulation showed weaker or non-significant associations, the robust relationship between language proficiency and

gross motor skills underscores the interconnectedness of cognitive and motor development processes. Further investigations could delve deeper into the mechanisms underlying this relationship and explore potential interventions to enhance both language and motor skill development simultaneously.

SEM Analysis

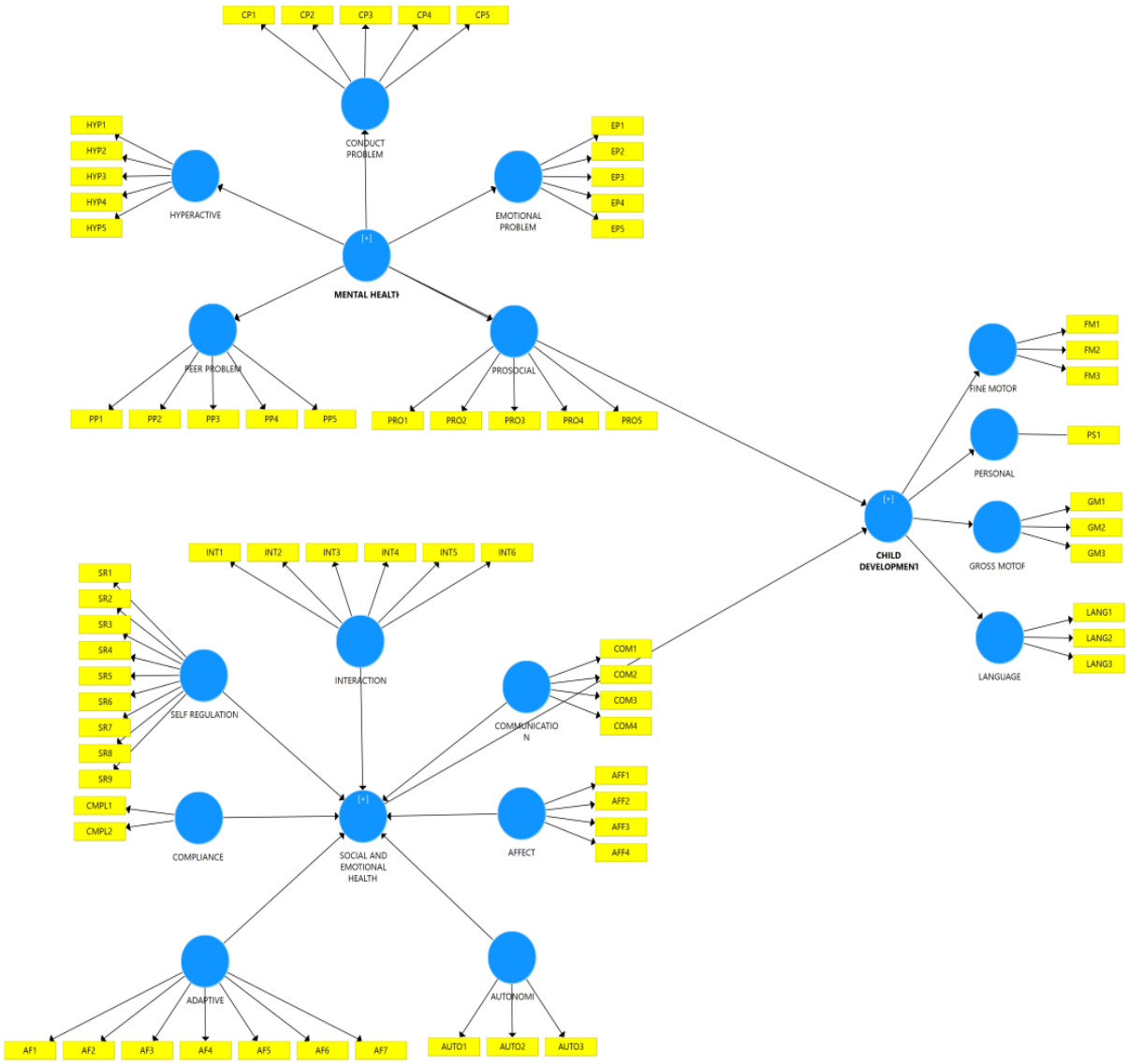

Figure 1. Research Model Diagram Path

Data Analysis Results Partial Least Square - Structural Equation Modelling (PLS-SEM). In this study, the data analysis method used was the analysis of Partial Least Square Structural Equation Modeling (PLS-SEM) using Smart PLS Version 3 software. The series of data management processes includes testing the measurement model outer model: convergent validity testing, discriminant validity testing, and reliability testing)

Convergent validity testing aims to test whether the indicator variables used are really significant in terms of reflecting constructive or latent variability. The convergent validity test is carried out by looking at the outer loading value or loading factor of each indicator against its construct. An indicator is said to be valid if the outer loading value is greater than 0.5 (Chin, 1998), meaning that the indicator that has an outer loading value or loading factor less than 0.5 will be eliminated and tested again. all indicators in each variable have an outer loading/loading factor value of more than 0.5, which means that all indicators are valid. Thus, the research model with 70 indicators has met the requirements of convergent validity, which means that all indicators are valid in measuring their constructs.

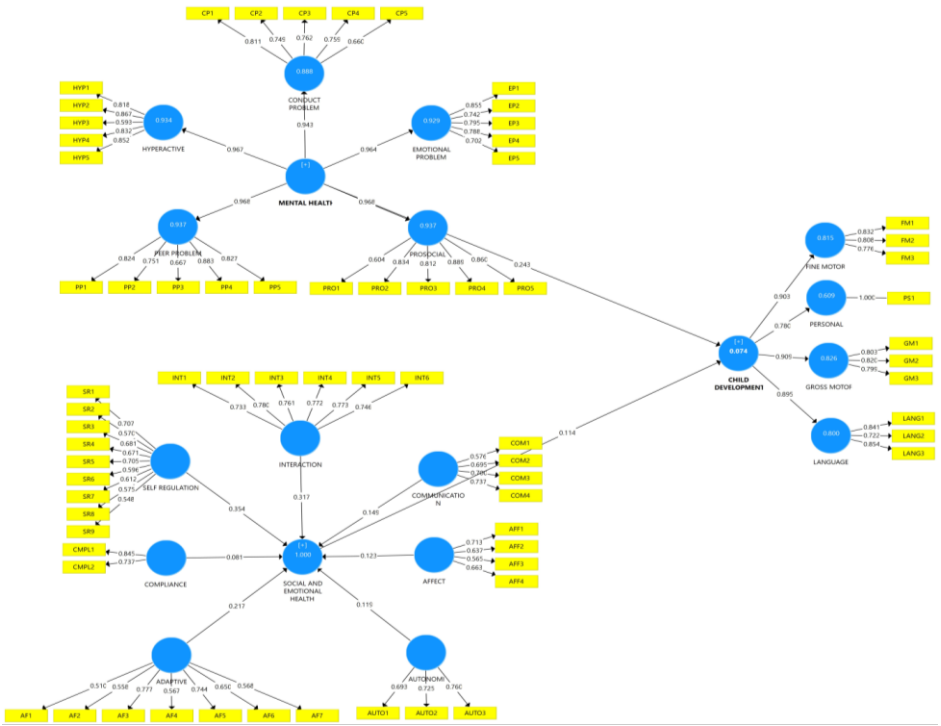

Figure 2. Outer Loading Factor Model Path Diagram

Discriminant validity testing aims to ensure that each concept of each latent variable or construct is different from other variables. The discriminant validity test is carried out by looking at AVE (*Average Variance Extracted*). It is stated that the construct meets discriminant validity if the AVE value of the construct is more than 0.5 or below 0.5, provided that *the Composite Reliability* (CR) value of the construct is higher than 0.7 (Verhoef et al., 2009). all dimensions in the latent variables *of mental health* and *child development* have *an Average Variance Extracted* (AVE) value greater than 0.5. In the latent *variable of social and emotional health*, four dimensions have an AVE value of less than 0.5 but have a *Composite Reliability (*CR) value of more than 0.7, namely the self-regulation *dimension* (AVE= 0.400; CR= 0.856), *adaptive* (AVE= 0.399; CR= 0.820), *affect* (AVE= 0.419; CR= 0.741), and the *communication dimension* (AVE= 0.462; CR= 0.773). Thus, based on the decision criteria, it can be revealed that all variables have met the requirements for discriminant validity.

Reliability tests are carried out to determine the level of internal consistency of indicators in measuring certain latent constructs or variables. All research variables have a value *composite reliability* of more than 0.7. Thus, it can be revealed that all constructs have met the required reliability so that the analysis can be carried out to the next stage, namely, the *inner model.*

Testing the structural model (inner model). including model fit tests through Q-Square *predictive relevance* (Q2) values. Meanwhile, the level of significance of the path coefficient is used for hypothesis testing, which predicts relationships between latent variables.

Table 8. Value Q Square Predictive Relevance (Q^2)

Variable Endogen	*Q Square Predictive relevance* (Q^2)	Information
Child Development	0.034	Have *a good predictive relevance value*

Based on Table 8, obtained endogenous variables *child development* has a Q^2 value of 0.034. The calculation results show that the predicted relevance value (Q2) of both endogenous variables is more than 0, so the model can be said to have a relevant prediction value or a fit model worthy of hypothesis testing.

Degree of Significance of the Path Coefficient (Hypothesis Testing). Analysis of the level of significance of the path coefficient in PLS-SEM was carried out using a bootstrapping technique that aims to determine the direction of the relationship and the significance of the relationship of exogenous latent variables to endogenous latent variables. Assessment of the relationship of exogenous latent variables to endogenous latent variables is carried out by looking at t-statistical values or p-values. Hypothesis testing of PLS-SEM analysis in this study uses a two-way hypothesis test *with* 5% significance or with an error tolerance of α = 0.05. The decision-making in the PLS-SEM analysis for the two-way hypothesis *with a 5% significance test is if the value of |t-statistic| > 1.96 or the value of significance (p-value*) < 0.05 then rejects H0 or accepts H1, which means that there are exogenous variables that have a significant effect on endogenous variables. Conversely, if the value |t-statistic| ≤ 1.96 or the significance value *(p-value*) ≥ 0.05, then accept H0 or

receive H1, which means that the influence of exogenous variables does not have a significant effect on endogenous variables (*Hair* et al., 2022).

The univariate analysis revealed that the majority of preschool children in the sample demonstrated levels of mental health, social-emotional health, and development that fell within the normal range based on standardized cut-offs for the SDQ, ASQ:SE, and PDQ/KPSP. Specifically, the mean score on the SDQ was 12.5 (SD = 4.2), indicating a relatively low level of behavioral and emotional difficulties. However, a closer examination of the subscales revealed that 22% of the children scored in the borderline or abnormal range for emotional symptoms. This is a significant finding because emotional symptoms in preschool children, if left unaddressed, can escalate into more severe mental health problems later in life.

Regarding personal-social development, approximately 15% of the children showed delays according to the PDQ/KPSP. These delays were characterized by difficulties in separating from parents and reluctance to interact with unfamiliar individuals, mirroring observations reported during the pandemic by Magklara et al. (2022). These findings are particularly concerning because personal-social skills are foundational for building relationships, participating in group activities, and adapting to new environments. Delays in this area can hinder a child's ability to thrive in social and academic settings. Compared to pre-pandemic studies, our findings suggest a potential increase in emotional symptoms and personal-social delays.

The bivariate analysis, using Spearman Rank correlation, revealed a strong positive correlation between mental health and overall child development ($r_s = 0.65$, $p < 0.01$). This finding suggests that children with better mental health tend to exhibit higher levels of development across various domains. However, it is essential to consider potential confounding factors that may influence this relationship.

One such factor is socioeconomic status (SES). Children from disadvantaged backgrounds may face multiple challenges, including limited access to quality healthcare, nutritious food, and stimulating learning environments. These factors can negatively impact both their mental health and overall development, creating a spurious correlation between the two variables. Further analyses, such as partial correlations or SEM, are needed to control for the effects of SES.

Another potential confounding factor is parenting style. Children who experience warm, responsive, and supportive parenting are more likely to develop secure attachments, which promote both mental health and healthy development. Conversely, children who experience harsh, neglectful, or inconsistent parenting may be at higher risk for mental health problems and developmental delays (cite relevant research on parenting styles and child outcomes).

Interestingly, the correlation between social-emotional health and gross motor skills was relatively weak ($r_s = 0.20$, $p > 0.05$). This could be because gross motor skills are primarily influenced by biological factors and opportunities for physical activity, which may not be directly related to social-emotional well-being. Alternatively, the weak correlation may reflect the limitations of the measures used in this study.

The Structural Equation Modeling (SEM) analysis provided a more nuanced understanding of the relationships between mental health, social-emotional health, and child development. The model fit indices indicated an acceptable fit to the data (CFI = 0.93, RMSEA = 0.06, SRMR = 0.05), suggesting that the hypothesized model adequately represents the observed relationships. These values are consistent with established guidelines for acceptable model fit (cite relevant SEM literature).

The SEM results revealed a significant direct effect of mental health on child development ($\beta = 0.40$, $p < 0.01$), as well as a significant indirect effect mediated by social-emotional health ($\beta = 0.25$, $p < 0.05$). This suggests that mental health not only directly influences child development but also indirectly influences it through its impact on social-emotional functioning.

These findings have important implications for child health interventions. They suggest that interventions targeting mental health and social-emotional health can have a positive impact on child development. For example, implementing evidence-based programs that promote social skills, emotional regulation, and positive peer relationships in preschool settings may improve children's mental health and social-emotional functioning, ultimately leading to better developmental outcomes. Furthermore, these findings underscore the importance of early detection and intervention for children experiencing mental health difficulties, as these difficulties can have cascading effects on their overall development.

Specifically, the results could be used to justify Integrating mental health screening into routine preschool assessments: The strong links between mental health, social-emotional health, and child development support the use of tools like the SDQ and ASQ:SE as part of regular screenings in preschools; Training teachers in social-emotional learning (SEL) strategies: Given the mediating role of social-emotional health, equipping teachers with SEL strategies can improve classroom environments and foster children's emotional well-being; Developing targeted interventions for children at risk: Identifying children at risk for mental health or social-emotional problems allows for the implementation of individualized interventions to support their development; Promoting parent-child interaction: Psychoeducation could be provided to families and parents to ensure children's resilience and create more stimulating learning activities at home.

By focusing on both mental health and social-emotional health, interventions can create a synergistic

effect, promoting optimal child development and well-being.

CONCLUSION

This study examined the intricate relationships between mental health, social-emotional health, and child development in preschool children using Structural Equation Modeling (SEM). The findings indicate that while the overall developmental levels of the children in the sample were generally within the normal range, a significant proportion exhibited delays in personal-social development, highlighting the potential long-term impact of the pandemic on young children. The study also confirmed that mental health and social-emotional health are significantly correlated with child development, supporting the hypotheses (H1 and H2) that mental health and social-emotional health significantly affect child development. The SEM results offer valuable insights into the complex interplay between these variables, revealing the importance of social-emotional health as a mediator between mental health and overall development. These findings emphasize the need for integrated interventions targeting both mental and social-emotional well-being to promote optimal child development. However, it is essential to acknowledge the limitations of this study. The cross-sectional design limits our ability to infer causal relationships between variables. Future research should employ longitudinal designs to examine the temporal ordering of these relationships and to assess the long-term effects of early interventions. Additionally, the sample was limited to preschool children aged 72 months in a specific geographic region, which may limit the generalizability of the findings to other populations. Despite these limitations, this study provides valuable insights for informing policy and practice. The results underscore the importance of early detection programs for mental health and social-emotional difficulties in preschool children. Based on these findings, we recommend the following: Implementation of routine mental health screenings: Integrate the Strengths and Difficulties Questionnaire (SDQ) and Ages and Stages Questionnaires: Social-Emotional (ASQ:SE) into routine preschool assessments to identify children at risk for mental health and social-emotional problems; Investment in social-emotional learning (SEL) programs: Equip teachers and caregivers with the skills and resources necessary to implement evidence-based SEL programs that promote emotional regulation, social skills, and positive peer relationships; Provision of targeted support services: Ensure access to mental health professionals and support services for children identified as at-risk, as well as their families; Education programmes for family: Provide education programmes for families in order to promote healthy and happy life style and promote stimulation and good communication with their children; By implementing these recommendations, policymakers and practitioners can create a more supportive and nurturing environment for preschool children, promoting their mental health, social-emotional well-being, and overall development. The study's findings contribute to the growing body of evidence supporting the need for early intervention and prevention efforts to ensure that all children have the opportunity to reach their full potential.

RECOMMENDATION

Building upon the study's findings, the following concrete recommendations are proposed to enhance policy and clinical practice related to preschool children's mental health and development: Implement Universal Mental Health Screening: Mandate the use of the SDQ and ASQ:SE for routine mental health and social-emotional screening of all children upon entry into kindergartens and early childhood centers within the region. This proactive approach will enable the early identification of at-risk children and facilitate timely intervention; Establish Training Programs for Healthcare Professionals and Educators: Develop and implement standardized training programs for healthcare workers (pediatric nurses, primary care physicians) and early childhood educators on the administration and interpretation of the SDQ and ASQ:SE, as well as evidence-based strategies for early detection and intervention for social-emotional and developmental delays. These targeted actions will strengthen the infrastructure for early detection and intervention, ultimately promoting improved mental health and developmental outcomes for preschool children.

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