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Analysis of the influence of factors of children's health development in preschool education based on mathematical and statistical methods of study

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Abstract Healthy development is not only about children's physical health, but also involves mental health and social adaptability. In the preschool stage, the influence of multiple factors such as family, school and community has a profound impact on children's health. In this paper, we used PLS-SEM combined with Bayesian network modeling to explore the mechanism of influencing factors on children's health development in preschool education. The study first constructed a health influence mechanism model, taking into account the influence of multiple dimensions such as community environment, family support and school environment. The data of 600 preschool children were analyzed through a questionnaire survey and structural equation modeling was used to analyze the data. The results showed that four factors, namely, personal characteristics, community environment, family support and school environment, had a significant effect on children's health, in which the direct effect of school environment was the largest, with a path coefficient of 0.305, and the direct effect of family support was the second largest, with a path coefficient of 0.221.The inference and diagnostic analysis of Bayesian networks revealed that changes in the school environment had a more significant effect on children's health, especially when the children's mental health and social adjustment are more negatively affected when the school environment is poor. The study suggests that children's health development in preschool education is a complex system interwoven with multiple factors, in which the school environment plays a key role and requires special attention.

Index Terms Preschool education, child health, PLS-SEM, Bayesian network, community environment, family support

I. Introduction

The education of pre-school children belongs to the initial part of education and plays an important role in the molding of children's character and lifelong development [1]. The promotion of children's health and the protection of life must be prioritized in the work. Children's health is crucial to children's growth and development, which involves not only children's physical health, but also children's mental health, social skills and other aspects.

Children's physical health is the foundation of pre-school education. Children should maintain good living habits, undergo regular medical check-ups, and develop good dietary and exercise habits in order to strengthen their body's resistance and immunity. At the same time, children should stay away from diseases and pollution sources, avoid contact with harmful substances and the environment, and maintain good personal hygiene habits to prevent infectious diseases [2]-[5]. Children's mental health is equally important, and it directly affects children's emotions, behaviors, and social skills [6]. Children should maintain a good psychological state, avoid excessive anxiety and stress, and build positive and healthy self-esteem and self-confidence [7].

Children's social skills are also one of the important goals of preschool education. Children should learn to communicate and cooperate well with others and develop good interpersonal relationships [8]. In addition to physical, mental and social health, children's cognitive and intellectual development are also important aspects. Children should acquire basic cognitive and intellectual skills and develop the ability to observe, think and solve problems through learning and play [9], [10]. Only by safeguarding the health of preschool children can we lay a good foundation for their future development. As children grow up in different environments, there are certain differences in their personalities, and their healthy growth is simultaneously affected by the triple influence of family, school and society [11], [12]. According to statistics, there is an urban-rural gap, a family gap, a campus gap in children's development, and their physical health and mental health problems exceed 10% [13], [14]. Therefore, in-depth analysis of the factors influencing children's health in preschool education is of great significance to children's development.

The purpose of this study its to systematically analyze the multidimensional influences on preschool children's health by constructing an integrated model based on PLS-SEM and Bayesian networks. First, a theoretical framework for influencing children's health was developed in terms of multiple dimensions, including personal characteristics, family support, school environment and community environment. Second, the data were empirically analyzed using the PLS-SEM method to explore the extent and mechanism of the factors' influence on children's health. Finally, the inference and diagnosis of Bayesian network are used to further validate the paths and interrelationships of the factors, providing data support and theoretical basis for the intervention strategies of children's health in preschool education.

II. Research on the influence of factors in children's healthy development

This paper first constructs a health influence mechanism model to explore the factors of children's health development in preschool education, and then analyzes the strength of the influence of each influence factor based on the prediction and diagnosis method of PLS-SEM and Bayesian network.

II. A. ***Health impact mechanism modeling***

Based on the cultural adaptation stress theory, interpersonal relationship theory and ecosystem theory, this paper analyzes the relationship between the surrounding environment and independent individuals and their health at the micro level, focusing on the community environment, family support and school environment. At the same time, health behaviors are used as mediating factors to explore their mediating effects between the physical and mental health of children in the community, family, school and preschool education. The logical mechanism of the influence of children's health in specific preschool education is shown in Figure 1.

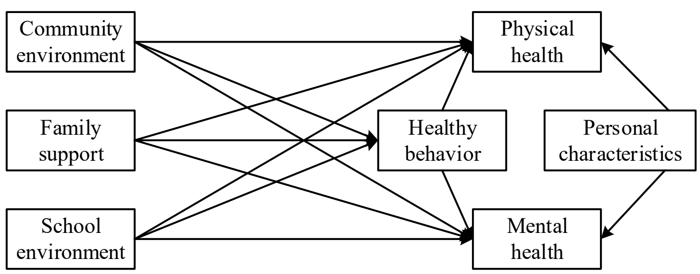

Figure 1: The health impact logic mechanism of children in the pre-education

II. A. 1) **Personal characteristics**

In terms of personal characteristics, they mainly include variables such as gender, whether or not they are an only child, and the type of household. As children's health in preschool education will involve various factors, it will inevitably be affected by children's own subjective characteristics in preschool education. According to the theory of cultural adaptation, girls are more sensitive psychologically, more prone to frustration, sadness and other emotions, and more susceptible to the influence of the external environment. Therefore, gender can affect the health of children in preschool education to a certain extent. Whether they are only children or not, from social experience, only children tend to get more emotional support from their parents, which can alleviate the psychological impact to a certain extent. The impact of different types of household registration on children's health varies significantly, with some studies showing that children of rural household registration are more likely to have emotional tendencies such as low self-esteem and sensitivity, and that the quality of children's physical health varies between urban and rural areas. Therefore, the type of household registration serves as an important factor influencing the health level of children in preschool education.

II. A. 2) **Community environment**

Changes in the living environment are the main difference between preschool children and local children, and the community environment, as the daily living place of preschool children, has a direct impact on their physical and mental health. The thesis mainly explores the impact of community environment on health from two aspects: hard environment and soft environment. The hard environment mainly refers to healthy drinking water, whether there are pollution sources in the neighborhood, air quality, and the degree of green plant coverage. Generally speaking, if there are obvious sources of air or water pollution around the community, it will produce more obvious “regional diseases”, which will have a direct impact on physiological health. The soft environment of the community mainly refers to the security management of the community where the children are located. A good security environment is the basis for all production and life, improves residents' sense of well-being and security, reduces dangerous crimes, and in turn improves children's mental health. On the other hand, if the basic security of the community is not guaranteed, it will deepen the anxiety and panic of the residents, thus lowering the level of children's mental health.

II. A. 3) Family support

Family support refers to the material and spiritual supplies that children in preschool receive from other family members. Studies have shown that higher family economic income ensures that children have access to richer resources, which not only improves their ability to protect their own health, but also develops self-confidence, does not feel inferiority, shame or jealousy due to lack of material goods, and reduces the frequency of mental illnesses. Children from poor families have significantly weaker initiative, motivation and ability to express themselves in the collective than children from economically well-off families, with an increased risk of depression and anxiety disorders diseases, affecting the level of mental health [15]. Parent-child relationship is the most primitive interpersonal relationship established by children, which will have an impact on future interpersonal interactions at all levels. Tense parent-child relationship has a negative effect on children's healthy physical and mental development. On the contrary, a warm and harmonious parent-child relationship can give children strong spiritual support, improve their psychological strength in the face of risks and difficulties, and have a higher sense of well-being and security, which in turn improves children's mental health. There is also the level of family education, different levels of education may affect the family's health concepts, psychological counseling, etc., the higher the level of parental education, on the one hand, pay more attention to prenatal health management, daily physical examination during the period of delivery and have more adequate knowledge of child care, pay attention to diet and nutritional balance, etc., which in turn can improve the children's physiological health level of quality. On the other hand, they pay more attention to the children's psychological state and give sufficient emotional support, thus improving the children's mental health.

II. A. 4) School environment

According to the theory of acculturative stress and interpersonal relationships, the school is the place where preschool children live and learn directly, and where many people of their own age gather, so the handling of interpersonal relationships in the school will have an impact on the psychological health status of preschool children, including teacher-student relationships and peer relationships. The higher the teacher's concern, the more conscious the behavior of children in preschool education is, the more conscious they are to reduce health risky behaviors, and the stronger sense of belonging and security they will have psychologically, which in turn will improve the health status of children in preschool education. Similarly, good classmate relationships help to alleviate the tense and negative emotions brought about by unfamiliar environments, release psychological pressure, and gain a sense of security and trust, which in turn improves mental health. On the contrary, if negative and tense peer relationships are established, especially for children in preschool education, they may be isolated and bullied, increase psychological pressure, and be more prone to depression, autism and other emotions, which in turn reduces mental health.

II. B. Portfolio assessment modeling

II. B. 1) PLS-SEM

PLS-SEM is a novel method proposed on the basis of PLS regression, which consists of structural equations describing the relationship between exogenous and endogenous latent variables and measurement equations describing the relationship between endogenous and exogenous latent variables and observed variables [16].

(1) Structural modeling

The structural model describes the relationship between latent variables:

$$\eta = \beta\eta + \Gamma\xi + \zeta \tag{1}$$

where $\eta, \beta, \xi, \zeta \in R^n, \Gamma \in R^{n\times n}$. η is a $m\times 1$ vector of m endogenous latent variables (factors). ξ is a $n\times 1$ vector of n exogenous latent variables (factors). Γ is a matrix of $m\times n$ structural coefficients describing the effect of exogenous latent variables ξ on endogenous latent variables ζ in the structural model. The ζ is the $m\times 1$ residual vector of the structural model.

Since PLS denotes recurrence relations:

$$\eta_j = \sum_i \beta_{ji}\eta_i + \sum_j \gamma_{jb}\xi_b + \zeta_j \tag{2}$$

where β_{ji} and γ_{jb} are the coefficients connecting the predicted endogenous variables to the exogenous latent variables, and ζ_j is the endogenous residual variable.

(2) Measurement model

The measurement model describes the relationship between the observed variables and their latent variables:

$$X = \Lambda_\xi + \varepsilon_x Y = \Lambda_\eta + \varepsilon_y \tag{3}$$

where x, y denotes the observed variables of exogenous and endogenous latent variables ξ, η respectively, Λ_η is the $q \times n$ path coefficients matrix of X on ξ, and Λ_ξ is the $p \times m$ factor of Y on η loading matrix (path coefficient matrix) with the weighting relation:

$$\hat{\xi}_l = \sum_h \omega_{lh} x_{lh} \quad \hat{\eta}_i = \sum_k \omega_{ik} y_{ik} \tag{4}$$

where ω_{lh}, ω_{ik} are the h, k th weights used to estimate the latent variables ξ_l, η_i, respectively.

The PLS analysis method for SEM is to calculate the sample estimates $\hat{\xi}_l$ and $\hat{\eta}_i$ for each latent variable by iterating as follows:

Step 1: Given an arbitrary initial weight, e.g., $\omega_{lh} = 1$, the weights of the remaining variables are all 0.

Step 2: Calculate the new weight values for ω_{lh} and ω_{ik}.

Step 3: Determine if $|\omega' - \omega''| < 10^{-5}$ is satisfied, if it is valid, go to step 4, otherwise return to step 1 and reassign the values.

Step 4: Calculate the estimates of the potential variables ξ_l and η_i by using the formulae denoted as $\hat{\xi}_\iota$ and $\hat{\eta}_i$.

Step 5: After replacing $\hat{\xi}_l$ and $\hat{\eta}_i$ with ξ_l and η_i, the PLS method is applied to estimate the variable parameters in the structural model.

II. B. 2) **Bayesian networks**

Bayesian Networks (BN) are graphical models describing dependencies between data variables [17], and their basic principles are as follows:

Suppose a finite discrete set of random variables X_i is $U = \{X_1, X_2, \cdots, X_n\}$, where X_i can be selected for a finite number of values. In general, a Bayesian network is a binary $B = \langle G, \Theta \rangle$. G portrays a directed acyclic graph where i nodes correspond to X_i. The Θ inscribes the conditional probability that each value x_i of the parameters of the network's local conditional probability has a value x_i when its set of parent nodes y_i is in a particular configuration z_i. The joint probability distribution over the set U inscribed by B can be uniquely determined using Eq. (5), i.e:

$$P(X_1, X_2, \cdots, X_n) = \prod P(X_i \mid y_i) \tag{5}$$

The construction of BN can be carried out in three steps, and the calculation process does not need to strictly follow the following three steps, but can be crossed according to the actual needs.

Step 1: Determine the variables.

Step 2: Construct a conditionally independent directed acyclic graph, which can be obtained from the probability multiplication formula:

$$P(X) = \prod_{i=1}^{n} P(X_i \mid x_1, x_2, \cdots, x_{i-1}) \tag{6}$$

In order to determine the structure of the BN, the variables $X_1, X_2, \cdots, X_n$ need to be sorted according to some rule in order to determine the set of variables $Y_i (i = 1, 2, ..., n)$.

If Y_i is used to denote the set of parent nodes of the variable X_i, we can obtain $P(X_1, X_2, \cdots, X_n) = \prod_{i=1}^{n} P(X_i \mid Y_i)$.

Step 3: Assign the local probability distribution $P(X_i \mid Y_i)$.

II. B. 3) Combinatorial modeling steps

The BN model is a causal prediction and inference of the observed variables, while PLS-SEM is an empirical analysis of the latent variable layer path relationship. Therefore, the key to integrating PLS-SEM and BN models is to obtain the sample data needed for Bayesian network model inference and prediction through the observed variables, so as to deduce the mechanism of the role of factors influencing children's health development. In view of this, the idea of constructing the combined model in this paper is:

Step 1: Construct the PLS-SEM model of the influencing factors of children's healthy development according to the five steps of constructing the PLS-SEM model in the PLS-SEM foundation.

Step 2: Calculate the latent variable scores in the PLS-SEM model:

$$\min \sum_{i=1}^{N} (x_i - \Lambda_x \zeta_i)^T \theta_\delta^{-1} (x_i - \Lambda_x \zeta_i) \tag{7}$$

$$\text{s.t.}(1/N) \sum_{i=1}^{N} \zeta_i \zeta_i^T = \Phi \tag{8}$$

where N denotes the sample size, x_i denotes the i th observed variable, θ_δ denotes the covariance matrix of the residuals, T denotes the transpose of the matrix, and Φ denotes the covariance matrix of ζ.

From Eq. (7) Eq. (8), once the coefficients Λ_ξ are determined, the scores of the exogenous latent variables ξ can be found. Similarly, by determining Λ_η, the score of the endogenous latent variable η can be obtained.

Step 3: Take the path relationship between the latent variables empirically determined by the PLS-SEM model as the machine knot of the BN model, and construct the latent variable Bayesian network model with the scores of the latent variables as the sample data based on Step 2, with the help of the Netica 5.19 software, in accordance with the 3 steps in the basic principles of the BN.

Step 4: On the basis of step 3, Bayesian inference and diagnosis of factors influencing children's health development are carried out.

III. Research design

III. A. Subjects of study

A total of 600 students from three kindergartens in City D were selected to participate in this study, of which 550 were valid samples.

III. B. Research methodology

(1) Questionnaire. In this study, the relevant questionnaires applicable to the investigation of children's health development were firstly selected, and further modifications and adjustments were made to the questionnaires after the reliability and validity tests to form the measurement questionnaires in line with the needs of this study. The survey questionnaires are all Likert scales.

(2) Survey program. The questionnaires were divided into student interviews and parent questionnaires, and the student interviews were conducted in the classroom. The parent questionnaire was taken home by the students after school on the same day to ask their parents to fill it out and bring it back to school the next day for submission.

III. C. Statistical methods

All data were statistically analyzed using SPSS20.0 and AMOS21.0. The data were firstly organized and summarized, descriptive statistics, and then exploratory and validation factor analysis, correlation analysis, and structural equation modeling were performed for each factor.

IV. Model Validation

IV. A. Assessment of the external structure of the model

Measurement models are assessed for internal consistency reliability and validity, mainly internal consistency reliability, convergent validity, and discriminant validity.

IV. A. 1) Reliability analysis

In order to ensure the authenticity of the model results, the reliability and validity of the sample data must be analyzed and tested, and the data need to be tested for reliability and validity. Reliability generally refers to the credibility of the sample data, i.e., the same question is tested several times on the same respondent, and if the results are generally consistent, it means that the data has passed the reliability test. Reliability is generally verified by consistency and correlation tests on survey data.

Cronbach′s α coefficient can clearly show the consistency between the sample data investigated, Cronbach′s α coefficient is suitable for the data consistency analysis of opinion or attitude questionnaires, so it is applicable to this study.The value of Cronbach′s α coefficient is generally between 0 and 1, and the closer it is to 1, it means that the survey results are more reliable. Generally, coefficient values around 0.65 indicate reliability.

Combination reliability is an assessment of the consistency between the variables in the scale; the higher the combination reliability, the higher the correlation between the variables. The lower the combined reliability, the lower the correlation between the variables. A combination reliability of 0.70 or more indicates a satisfactory correlation of the variables. As can be seen from the table, the values of the combination reliability of all variables are more than 0.7, which indicates a high level of reliability of the variable indicators, i.e., a strong intrinsic correlation.

The variable reliabilities are shown in Table 1. It can be seen that the Cronbach′s α coefficients of the latent variables are all around 0.7 and all the combined reliability coefficients are over 0.8. This indicates that the internal consistency of the sample data is high and the questionnaire has a high level of reliability.

Table 1: Variable Reliability

	Cronbach's Alpha	Composite reliability
Personal characteristics	0.731	0.841
Social environment	0.696	0.829
Family support	0.725	0.827
School environment	0.776	0.833

IV. A. 2) Validity analysis

(1) Convergent validity

Convergent validity is the degree to which a measure is positively correlated with an alternative measure of the same construct. Convergent validity was assessed using two criteria, including negative external loadings and average variance extraction (AVE). First, the criterion for the external loading factor should be greater than 0.70, and second, the AVE is used as a measure of the covariance in a structure, which needs to be greater than 0.5. The results of the convergent validity are shown in Table 2. All model load factors were around 0.7 and all AVE values ranged from 0.582 to 0.749, which meets the requirements.

Table 2: Convergence validity results

Path	External load coefficient	AVE
Personal characteristics	-	0.711
Gender ← Personal characteristics	0.565	-
To be an only child ← Personal characteristics	0.835	-
Hukou type ← Personal characteristics	0.888	-
Social environment	-	0.582
Community environmental pollution ← Personal characteristics	0.67	-
Community security ← Personal characteristics	0.533	-
Family support	-	0.736
Economic situation ← Personal characteristics	0.743	-
Parent-child relationship ← Personal characteristics	0.744	-
Parents' education level ← Personal characteristics	0.548	-
School environment	-	0.749
Teacher-student relationship ← Personal characteristics	0.751	-
Classmate relationship ← Personal characteristics	0.9	-

(2) Discriminant validity

Discriminant validity refers to “the degree to which a variable differs from other variables”. Discriminant validity is evaluated by examining the cross loadings of the indicators and comparing the square root of the AVE value with the construct correlation. The Fornell-Larker criterion was used for this assessment, where the square root of the AVE of each latent variable should be greater than its highest correlation with the other variables. The results of the discriminant validity are shown in Table 3. All constructs had adequate discriminant validity. In summary, the measurement model has high internal reliability and sufficient validity.

Table 3: Convergence validity results

	AVE	Personal characteristics	Social environment	Family support	School environment
Personal characteristics	0.764	0.842	-	-	-
Social environment	0.742	-0.126	0.846	-	-
Family support	0.634	0.245	-0.245	0.891	-
School environment	0.645	0.625	-0.257	-0.452	0.859

IV. B. Assessment of the internal structure of the model

IV. B. 1) Model fit assessment

The model fitting criteria for PLS-SEM in this study were standardized root mean square residual (SRMR), squared Euclidean distance (d-ULS) and geodesic distance (d-G), standardized fit index (NFI) and root mean square residual covariance matrix (RMS_theta). The results showed that the fit statistics were all acceptable (SRMR = 0.068, d-

ULS = 1.052, d-G = 0.769, and NFI = 0.882), and for the factorial model, SRMR below the threshold value of 0.5, d-ULS values greater than 0.8, and NFI values greater than 0.8 were considered acceptable. All values met the requirements of the fitting criteria, indicating a good fitted model.

IV. B. 2) Assessment of pathway relationships

According to the effect analysis of the PLS-SEM model, there are two ways of influencing between latent variables: one is the direct effect, which is the effect produced when the cause variable directly affects the outcome variable. The second is the indirect effect, which is the effect produced when the cause variable indirectly affects the outcome variable through other variables, and the sum of the two is the total effect. The size of the total effect reflects the degree of influence. The path relationship between the structures in the proposed model was examined through the regression coefficient (β), and the significance of the β value was assessed based on the t-value, and only if t>1.96, the confidence level a>0.05 was considered to indicate that the significance test was passed. The model utility analysis is shown in Table 4, where the absolute value of the t-statistic for all path coefficients is greater than 1.96, indicating that all paths in the model are valid and meet the original hypothesis. The path coefficients of personal characteristics, social environment, family support and school environment and children's health in the table are 0.328, 0.149, 0.221, 0.305 respectively, indicating that they all have different degrees of positive and direct effects on children's health.

Table 4: Model utility analysis

Path	Effect	Path coefficient	T value
Personal characteristics → Child health	Direct effect	0.165	5.345
	Indirect effect	0.163	5.132
	Total effect	0.328	5.641
Social environment → Child health	Direct effect	0.149	4.614
	Indirect effect	-	4.631
	Total effect	0.149	4.364
Family support → Child health	Direct effect	0.082	7.615
	Indirect effect	0.139	7.641
	Total effect	0.221	7.016
School environment → Child health	Direct effect	0.199	8.631
	Indirect effect	0.106	8.641
	Total effect	0.305	8.461

V. Empirical analysis

V. A. A priori probability estimation

The latent variable score is the key factor connecting the structural equation model and Bayesian network, and the prior probability is estimated by the latent variable score. Firstly, the latent variable scores were calculated by Smartpls 2.0 and used as the sample data, and then the sample data were clustered and analyzed by SPSS 2.0, and each variable was discretized into three states (named as low, medium, and high), which means that the data ranges were divided into three parts corresponding to different states. By calculating the frequency of each part of the data, the a priori probabilities of the latent variables were finally obtained as shown in Table 5. The prior probabilities of the latent variables were imported into the netica software to obtain the Bayesian network of children's health, on the basis of which the subsequent Bayesian inference and diagnostic operations can be carried out.

Table 5: The prior probability table of the latent variable

State	Variable			
	Personal characteristics	Social environment	Family support	School environment
Height	30.6%	23.6%	38.9%	41.5%
Medium	38.6%	30.7%	33.2%	30.1%
Low	30.8%	45.7%	27.9%	28.4%

V. B. Bayesian Reasoning

When the variables are nodes of evidence and the inference process is from cause to effect, the inference process is called prediction or forward inference. Where the prior probability of a latent variable is known, the conditional probability, or posterior probability, can be obtained through Bayesian inference, and the prior and posterior probabilities are inextricably linked. If the probabilities of the three states of children's health quality in preschool, “high”, “medium” and “low”, are known, this information can be provided as evidence to the Bayesian network, and the conditional probabilities of the subsequent nodes in the network can be calculated. Then the conditional probabilities of the subsequent nodes in the network are calculated, resulting in a conditional probability table, according to which the changes in the data in the table can be used to make predictive analysis of the changes in other variables in the model.

The Bayesian inference for the family support occurrence condition is shown in Table 6. When family support changes from high to low, the other latent variables in the model are affected by it with different degrees of changes. Firstly, we observe the probability of the other latent variables in the “high” state, and find that they all show different magnitudes of decrease, among which the school environment has the greatest magnitude of change: when family support is high, the probability of school environment is high is 69.6%, while when family support is low, the probability of school environment is high is only 15.8%. This indicates that family support has a greater impact on children's health than the other variables. Secondly, we observe the changes in the probability of the “medium” status of each latent variable, and find that when family support is high→medium→low, the probability of the other latent variables “medium” does not change significantly, indicating that it is difficult to change children's health due to the change of other factors. Finally, the change in the probability of the “low” status of each latent variable was observed and found to be increasing in different magnitudes, indicating that when the family support provided for children's health decreases, children's health will deteriorate.

Table 6: Bayesian reasoning under the condition of family support

Family support	Personal characteristics			Social environment			School environment		
	Height	Medium	Low	Height	Medium	Low	Height	Medium	Low
Height	0.372	0.473	0.155	0.304	0.354	0.342	0.696	0.353	0.251
Medium	0.216	0.38	0.404	0.54	0.326	0.134	0.285	0.34	0.375
Low	0.371	0.302	0.327	0.261	0.392	0.347	0.158	0.375	0.167

The Bayesian inference for the school environment occurrence condition is shown in Table 7. From the table, it can be seen that the school environment has a greater impact on children's health than the impact of the social environment. Among the changes in children's health, the probability of children's health being in the “medium” state is the most stable.

Table 7: The bayesian reasoning under the conditions of the school environment

School environment	Personal characteristics			Social environment		
	Height	Medium	Low	Height	Medium	Low
Height	0.304	0.354	0.342	0.396	0.353	0.251
Medium	0.54	0.326	0.134	0.285	0.34	0.375
Low	0.261	0.392	0.347	0.458	0.375	0.167

V. C. Bayesian diagnosis

When variables are nodes of evidence and the inference process allows to go from effect to cause, the inference process is called diagnostic or reverse inference. For example, if the probability that an individual characteristic has a “high”, “medium”, or “low” effect on a child's health is known, this information can be provided to the network as evidence. The conditional probabilities of the other variables in the model are then calculated by the Bayesian network, resulting in the conditional probabilities shown in Table 8.

Table 8: The bayesian diagnosis of personal characteristics changes

Personal characteristics	Social environment			Family support			School environment		
	Height	Medium	Low	Height	Medium	Low	Height	Medium	Low
Height	0.245	0.354	0.401	0.33	0.45	0.22	0.45	0.241	0.309
Medium	0.363	0.231	0.406	0.503	0.192	0.305	0.242	0.351	0.407
Low	0.256	0.302	0.442	0.445	0.228	0.327	0.368	0.389	0.243

The Bayesian diagnosis of the change in the state of the school environment is shown in Table 9. By setting the probability that the school environment is "high" to 1, at which point we can assume that the school environment has a high impact on children's health close to 100 percent, feeding this evidence into the Bayesian network reveals that: personal characteristics, social environment, and family support all have a probability of about half of being in the "high" state. As the status of the school environment goes from high to low, there are different levels of changes in personal characteristics, social environment, and family support. The results of the Bayesian diagnosis confirm that as the school environment decreases, children's health also decreases, suggesting that in order to ensure children's health, it is important to focus on teacher-student and peer relationships.

Table 9: The bayesian diagnosis of the changing school environment

School environment	Social environment			Family support			Personal characteristics		
	Height	Medium	Low	Height	Medium	Low	Height	Medium	Low
Height	0.245	0.354	0.401	0.33	0.45	0.22	0.45	0.241	0.309
Medium	0.363	0.231	0.406	0.503	0.192	0.305	0.242	0.351	0.407
Low	0.256	0.302	0.442	0.445	0.228	0.327	0.368	0.389	0.243

VI. Conclusion

The results of the study show that children's health in preschool education is affected by a combination of factors, of which the school environment has the most significant influence. Specifically, the total effect of school environment on children's health was 0.305, which was much higher than the effects of other factors. In addition, family support is also an important factor influencing children's health, with a total effect of 0.221, and in particular, good family economic status and parent-child relationships have a positive effect on children's health. The Bayesian inference analysis concluded that the improvement of school environment can significantly enhance children's physical and mental health, especially when the school environment is poor, children's health is significantly reduced. Therefore, in order to promote the healthy development of children in preschool education, the focus should be on improving the school environment and strengthening family support.

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