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Identifying the Components of Preschool Curriculum Model based on Bronfenbrenner's Ecological Systems Theory

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ABSTRACT

Objective: This study aimed to identify the dimensions and components of the preschool curriculum based on Bronfenbrenner's Ecological Systems Theory.

Methods: The study utilized both qualitative and quantitative methods to evaluate the dimensions and components of the preschool curriculum model. The researchers investigated articles, books, and research papers conducted both domestically and internationally on reputable and authenticated online database networks, spanning from 2000 to 2023. The statistical population of the study was 371 principals of pre-schools located in Bushehr province in the academic year 2021-2022, and by using the Krejci-Morgan table, we selected 181 Principals as a sample. To validate the quantitative section of the study, the confirmatory factor analysis was conducted.

Results: The results of the study revealed that the preschool curriculum model had seven components, including: paying attention to educating and informing families; utilizing new and creative teaching methods in preschool; paying attention to the role and effects of communication and an appropriate educational environment; comprehensiveness and appropriateness of the educational content of preschool programs; educational facilities and resources, appropriateness of the preschool programs with society's culture; and the role of governance of macro-management in supporting preschool program.

Conclusions: Based on the findings, we conclude that the integration of Bronfenbrenner's Ecological Systems Theory into the design of a preschool curriculum holds great potential for creating a more comprehensive and effective educational experience for young children.

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Introduction

Early childhood refers to the period of human life from conception to age eight or nine, which is crucial for children's development and learning. A well-designed program during this period can provide a strong foundation for their future success in both school and life (Shahi et al., 2023). The official education system has always placed great importance on imparting life skills to children due to their crucial significance. This type of education encourages personal growth and development, improves adaptability, and facilitates effective communication (Janaabadi & Saadat, 2022). The curriculum should aim to cultivate children's understanding and respect for their local and global communities, while also encouraging their curiosity and responsibility towards the natural and social environments (Barton & Le, 2022). The main objective of an early childhood curriculum is to guide programs in providing experiences that enhance children's well-being, development, and learning. The curriculum should be centered around the children's developmental stages, needs, and interests (Rezaei Nasab et al., 2021). To ensure children's optimal growth and development, it's crucial to offer them attentive care and frequent opportunities to explore their interests. An effective curriculum should ignite their love for learning and enable them to acquire essential skills and knowledge in various areas, including social-emotional, physical, cognitive, language, literacy, math, social studies, science, technology, and the arts (Zarghami & Behrooz, 2021). Children mainly learn by interacting with the individuals and environment around them. Thus, it is essential to provide an early care and educational environment that meets their developmental requirements and guarantees their protection, enabling them to participate wholly in the learning experience (Kim, 2020). Psychologists believe that early childhood is crucial in shaping the psychological traits and characteristics of children, making it necessary to acquire various skills and training during this stage. Neglecting to utilize the opportunities and potential of the early childhood stage can result in severe harm to both the child and society. It is important to acknowledge that children are not passive during their early childhood, but rather active learners who require appropriate educational methods that align with their developmental needs (Likhar et al., 2022). Reynolds (2019) highlights the significant impact of early childhood education on a child's growth and development, emphasizing the importance of effective curricula and methods to prevent or reduce behavioral and developmental issues in later

years. Therefore, it is crucial to carefully consider the design and implementation of curricula, methods, and models for preschool education.

For centuries, child development and early childhood education have been closely intertwined. Understanding child development is crucial to providing effective early childhood education and care. By assessing a child's developmental stage, educators can make informed decisions about the best instructional approach for each child (Ghaisarzadeh et al., 2023). Several developmental theories have been established by psychologists are used to generate philosophies regarding children's development. These theories analyze the growth and behavior of children and provide interpretations. They also suggest how genetic makeup and environmental conditions influence development and behavior, and how these factors are interconnected (Saracho, 2023). Urie Bronfenbrenner (1979), an American psychologist, challenged previous theories of child development by highlighting the complex interplay of various aspects to a child's life. Rather than focusing solely on individual development, Bronfenbrenner's work emphasized the significance of wider contextual factors and proposed the “Ecological Systems Theory.” The ecological theory places emphasis on the environment's significance in the lives and development of children (El Zaatari & Malouf, 2022). According to this theory, environmental factors have an impact on every aspect of a child's development, and their surroundings vary in all circumstances. The effects of these environmental factors are intertwined with a child's regular developmental pattern, which can be challenging for them to comprehend. The ecological theory utilizes the understanding of a child's surroundings to elucidate, organize, and clarify their effects (Taube Dayan, 2022). This approach acknowledges the occurrences within the realm of ecological psychology. Bronfenbrenner's theory stands out from other psychological theories that focus solely on individuals in laboratory settings or in isolation from their environment, with little consideration given to the impact of context. In contrast, Bronfenbrenner's theory examines the development of individuals within their natural environment. His work played a pivotal role in sparking a renewed interest in the ecological approach (Hayes et al., 2017). Bronfenbrenner’s theory bears some similarities with Albert Bandura’s ‘social learning theory’ and Lev Vygotsky’s ‘sociocultural theory’ in that all consider the environment – now including the digital environment - a critical mechanism in child development, and pride of place is given to the contexts of children’s diverse

lives (Abugre & Subbey, 2022). Bronfenbrenner's ecological systems theory posits that child development is influenced by a series of nested systems, ranging from the immediate microsystem (e.g., family, school) to the broader macrosystem (e.g., cultural values, societal norms). This perspective aligns with Bandura's social learning theory, which suggests that children learn through observation, imitation, and modeling of others' behaviors. In this sense, the environment, including the social interactions and relationships within it, plays a central role in shaping children's behavior and development. Similarly, Vygotsky's sociocultural theory highlights the significance of social interactions and cultural influences in cognitive development. According to Vygotsky, children learn and develop through their interactions with more knowledgeable others, such as parents, teachers, and peers. The cultural context, including values, traditions, and societal norms, provides the framework within which children acquire knowledge and skills (Whiter et al., 2023).

Bronfenbrenner's model (1979) illustrates the nested arrangement of environmental structures, each with varying levels of impact on the child. According to Bronfenbrenner's ecological systems theory, child development is influenced by various levels of the environment, ranging from close family and school settings to broader cultural norms and legal frameworks. Therefore, to comprehensively study a child's development, we must analyze not just the child and their immediate surroundings but also the impact of the larger environment (O'Toole, 2019).

Bronfenbrenner's theory includes four interconnected systems: the microsystem, mesosystem, exosystem, and macrosystem (El Zaatari & Malouf, 2022). The development of a child is shaped by the relationships between these systems. The microsystem is the first level of the theory and includes individuals and groups that have direct contact with the child, such as parents, siblings, teachers, and peers. These relationships are bi-directional, meaning that the child can influence others and be influenced by them. The interactions within the microsystem are personal and crucial for the child's development. Positive relationships within the microsystem, such as a nurturing parent-child relationship, have a positive effect on the child's development. Conversely, negative relationships, such as distant or unaffectionate parents, can have a harmful effect (Crawford, 2020).

The mesosystem refers to the interconnected interactions between a child's microsystems, such as their parents, teachers, school peers, and siblings. Unlike microsystems, the mesosystem is not independent, as each system influences and affects the others (Tafazoli, 2021). For example, if a

child's parents communicate with their teachers, this interaction can impact the child's development. Essentially, a mesosystem is a system of microsystems that work together to shape a child's development. According to the ecological systems theory, a positive relationship between a child's parents and teachers can have a beneficial impact on their development, while a negative relationship can have adverse effects (Hayez et al., 2017).

The exosystem contains factors that influence the development of a child, but those factors may not directly involve the child. Some examples of the exosystem include the neighborhood a child lives in, their parents' work environment, friends of parents, the media, and the families of friends. If a child's parents are transferred to a new job in a new city, the child has to move. The child has no influence on the job of their parent, but the job influences the child's life. When the parent is transferred to a new job, the child has to move schools, neighborhoods, and likely loses contact with a lot of their peers, leaving a negative impact on the child (Ashiabi & O'Neal, 2015). Another example of the influence of the exosystem would be the parent getting promoted at their job. This promotion would allow the family to afford better living accommodations, leaving the child with a positive impact. The exosystem has the ability to have a negative or positive impact on a child, depending upon the things that happen within it (El Zaatari & Malouf, 2022).

Bronfenbrenner's ecological systems theory includes the macrosystem, which examines the influence of cultural factors on a child's development, such as socioeconomic status, poverty, wealth, and ethnicity (Zhang, 2018). Therefore, the culture in which individuals grow up can shape their beliefs and perceptions about life events (Guy-Evans, 2020). Unlike the previous ecosystems, the macrosystem does not focus on the child's specific environment but on the established society and culture in which the child is raised. This encompasses the culture's socioeconomic status, ethnicity, geographic location, and ideologies. For instance, a child growing up in a developing country will have a different developmental experience than one growing up in a more affluent country (Newman & Newman, 2020).

Bronfenbrenner's Ecological Systems Theory quickly gained popularity and became a valuable framework for psychologists, sociologists, and educators to investigate child development. This theory adopts a holistic perspective that considers all the systems in which children and their families participate, effectively capturing the fluidity of real-life family dynamics (Hayes &

O'Toole, 2017). According to Paat (2013) Bronfenbrenner's theory is particularly useful in understanding the development of immigrant children, whose experiences in different ecological systems are likely to be influenced by their cultural differences. By comprehending the ecology of these children, social workers can enhance their service delivery to better support these children.

In their study, Kelly and Coughlan (2019) employed constructivist grounded theory analysis to develop a theoretical framework for the recovery of youth mental health. Their research uncovered numerous correlations between their theory and Bronfenbrenner's ecological systems theory. Their theory posits that the components of mental health recovery are intertwined with the "ecological context of influential relationships." This corresponds with Bronfenbrenner's theory, which asserts that a young person's ecological systems, such as peers, family, and school, all have a significant impact on mental health growth. The Ecological Systems Theory has been utilized to connect psychological and educational theories to early educational curricula and practices. The theory revolves around the child's development, and all actions within and between the four ecological systems are aimed at benefiting the child in the classroom. To enhance the development of the ecological systems in educational practice, teachers and parents must maintain effective communication and collaborate to promote the child's well-being (Haleemunnissa et al., 2021).

It is important for teachers to empathize with the circumstances that their students' families may be going through, which can include social and economic challenges within different systems. The theory suggests that a positive relationship between parents and teachers can have a beneficial impact on a child's growth. Additionally, the child should take an active role in their education, participating both academically and socially. Collaborating with peers and engaging in meaningful learning opportunities can foster positive development (Barkhordari et al., 2020).

Numerous studies have explored how the school environment impacts students. For instance, Lippard et al. (2017) conducted a study to examine the impact of teacher-child relationships on children's academic performance and behavior in the classroom. The study employed classroom observations and teacher reports, and the results indicated that these relationships played a significant role in shaping children's growth and development. These findings provided further evidence for the Ecological Systems Theory and highlighted the crucial role of teacher-child relationships in fostering positive outcomes for children. Roffey (2012) found that establishing a welcoming school environment that values diversity positively influences students' interpersonal

connections in the educational setting. Such a school culture can significantly impact the individuals within a child's growing ecological systems. Additionally, Langford et al. (2014) discovered that incorporating comprehensive health education into the school curriculum can improve both academic performance and student welfare. Thus, the microsystems have a significant impact on the development of students.

Nurani and Pratiwi (2020) conducted a study that revealed the inclusion of self-help and social skills in the curriculum for young children. The development of life skills is achieved through habits, modeling, and cultural activities that align with the local culture. The researchers suggest that the implementation of life skills should be tailored to the local wisdom of the region to enhance the formation of Indonesian children's identity and personality, thus contributing to the country's strength. Barbareev and Nikova- Cingulovska (2020) conducted research that revealed the preschool curriculum was designed to promote positive growth and development in all children in Sweden. The curriculum takes a comprehensive approach, focusing on enhancing children's social, physical, emotional, and intellectual abilities. It offers top-notch education and cares in a secure, respectful, and inclusive setting, establishing a solid basis for lifelong learning. Addisu et al (2020) found in their study that the current curriculum objectives are inadequate in addressing all aspects of children's development, which may hinder their preparation for future life and learning. Moreover, preschool education implementation in schools faces several obstacles, including the lack of crucial materials such as textbooks, teacher guides, policy documents, and guidelines, as well as inconsistencies in program implementation.

Aghdasi et al. (2021) revealed in their study that the ecological systems have enhanced our comprehension of the various levels of impact on an individual's growth, beyond just personal features or attributes. Bronfenbrenner's contribution to this theory has emphasized that parent-child relationships are not isolated, but rather influenced by broader structures. This theory has ultimately led to a more comprehensive understanding of human development and has influenced fields such as psychology, sociology, and education. According to Khaleghinezhad’s research (2019), Iranian children have less access to preschool education compared to their counterparts in both developed and developing countries. This is due to insufficient funding and a lack of support from the government for low-income families with young children. Additionally, the government's

policies lack transparency and accountability, and the variations in the quality of preschool centers between privileged and disadvantaged areas create obstacles to achieving social justice. Babli Bahmai et al. (2017) conducted a study that incorporated specific objectives such as fostering exploratory skills, reasoning, and individual independence into its models. The study encompassed various subjects, including life skills, culture, mathematics, science, social studies, and art. The study emphasized active teaching and learning methods, such as research, games, discovery, and self-learning, while also recognizing the importance of evaluation as a tool for ongoing learning guidance and program adaptation.

The application of Bronfenbrenner's ecological theory to designing preschool curricula has not been researched yet. Therefore, this study aims to fill this gap by exploring the design of the preschool curriculum model based on this theory for the first time. Given the importance of curriculum design during the preschool period, this study aims to investigate and identify the components of the preschool curriculum model based on Bronfenbrenner's Ecological Systems Theory.

Materials and Methods

The study employed a mixed-methods approach that combined qualitative and quantitative methods to conduct a descriptive content analysis. In qualitative section, the researchers investigated publications (articles, books and dissertations) conducted both domestically and internationally on reputable and authenticated online database networks such as Emerald, Science Direct, and Wiley Online Publications, spanning from 2000 to 2023. Furthermore, we analyzed articles from journals featured in the Scientific Information of Academic Jihad database and Iran publications database, which were domestic resources. Then, we used a quality appraisal strategy to fine-grain the identified publications (Theelen et al., 2019). Finally, we developed a coding scheme based on the work of Glaser and Strauss (Glaser, 1999). For screening identified publications, first, three primary inclusion criteria were applied: (1) only peer-reviewed publications in the English and Persian languages were included; (2) only publications from 2000 to 2023 were included; (3) only publications that offered new insights and avoided repetition and duplication were included. We also focused exclusively on studies undertaken in preschool and early childhood education contexts. Therefore, studies in the context of K-12 education were

excluded. To find relevant publications, the researchers conducted a search query on various websites using keywords such as: early childhood, preschool curriculum, Bronfenbrenner's ecological theory, and child development, in both Persian and Latin. The first screening led us to identify a total of 1324 publications. After an initial screening, 428 articles were removed because of duplications. Then, 396 publications did not meet the secondary inclusion criteria which left us with 491 papers for full-text screening. Full-text screening led 388 publications to be dropped because they were not conducted either in preschool education contexts or in early childhood settings. Finally, 112 publications (64 articles, 27 books and 21 dissertations) were identified to meet the conditions for entry into the study and quality appraisal. The statistical population of the study was 371 principals of pre-schools located in Bushehr province in the academic year 2021-2022 and by using the Krejci-Morgan table, we selected 181 Principals as a sample. To observe the ethical consideration in this research, it was tried to collect the data after obtaining the participants' consent. Moreover, the participants were assured of the confidentiality of their personal information and providing results without specifying the names and details of participants' birth certificates. In the quantitative section of the study, the researchers developed a questionnaire based on the results of qualitative phase and the status of the components of the study research. This questionnaire consisted of 67 items and distributed among 181 principals to collect the data. The questionnaire was tested for validity and reliability before being used to collect research data. To ensure validity, two tests were conducted: The Fornell-Larcker test for divergent validity and the Average Variance Extracted (AVE) test for convergent validity. The results of these tests are presented in the findings section with detailed explanations. In this study, the questionnaire's reliability was assessed using Cronbach's Alpha and Composite Reliability were calculated above (0.70) which were approved. The qualitative section systematically analyzed the theoretical foundations, while the quantitative section employed SPSS software to conduct reliability and validity analysis. Confirmatory factor analysis was performed using SMART PLS software to validate the research model.

Results

The qualitative part of the research

The study employed a qualitative research method, specifically utilizing the Grounded Theory based on Glaser's approach (1999). The goal of the research in Glaser's approach is to discover the main concern and behavioral patterns of the participants (Khanifar & Moslemi, 2018). The Glaser approach involves a systematic process of coding and analysis that is designed to allow theories to emerge from the data rather than being imposed on the data from the outset. This means that the researcher avoids preconceived notions or hypotheses about the phenomena under study.

The researchers utilized a three-stage coding process (open, central, and selective) to identify the key components of the paradigm model of the preschool curriculum based on Bronfenbrenner's ecological theory.

During the coding stage, open coding was utilized to establish connections between the categories that were created. Open coding is an analytical process that involves identifying concepts, their features, and dimensions within the data. The grounded theory data processing approach shapes the initial categories of information about the phenomenon being studied through data segmentation (Creswell, 2017). The second stage of the process was the implementation of axial coding. Axial coding is a method that connects categories and establishes links between them based on their characteristics and dimensions. The term "axial coding" is used because it centers around a main category (Khanifar & Moslemi, 2018). During this stage, the categories, features, and dimensions obtained from the initial open coding phase are refined and organized in order to gain a deeper understanding of their relationships (Khanifar & Moslemi, 2018). In simpler terms, axial coding results in the creation of categories and subcategories. In this stage, all the final open codes were thoroughly reviewed and compared with existing research literature. Selective coding is a systematic process that involves the careful selection of main categories and establishing connections with other categories. This step is essential for theory development as it builds upon the findings of open coding and axial coding. It validates and refines the relationships between categories that need further development. Additionally, selective coding includes linking the central category to other categories, presenting these relationships in a narrative framework, and enhancing and developing the categories as needed (Khanifar & Moslemi, 2018). Based on Strauss and Corbin’s Grounded Theory, and according to the coding process, findings exposed 149

concepts in open coding, reduced into 67 categories by axial coding, and categorized into 7 main themes (components) after selective coding to support the final development of the model (Table 1 & Figure 1)

Table 1. Axial coding: combination of codes extracted from open coding and formation of categories

Categories (resulting from the combination of primary components)	Extractive primary components (Axial coding)	Codes
Paying attention to educating and informing families	Considering the family's role as the individual's closest environment + focusing on relationships between families + the family's key position as the most influential layer on child development + emphasizing the connections between parents and preschool centers + understanding the impact of preschool education on enhancing children's social skills + recognizing the effect of preschool on increasing children's academic motivation + acknowledging the influence of preschool on children's learning and growth + appreciating the impact of preschool on children's social successes + guiding families toward licensed preschool centers + striving to resolve ambiguities and misconceptions regarding preschool programs	A11, A7, A12, A56, A5, A91, A60, A61, A78, A107, A112, A122, A137, A141, A142
Utilizing new and creative teaching methods in preschool	Attention to the role of the family as the closest environment of the individua + attention to the relationships of families to each other + the key role of the family as the most effective layer on the child's development + attention to the relationship between parents and preschool centers +attention to the effect of preschool courses in improving social skills + paying attention to the effect of preschool courses on improving children's academic motivation +paying attention to the effect of preschool courses on children's learning and growth + paying attention to the effect of preschool courses on children's social success + guiding families to preschool centers with License + attempt to resolve ambiguities and Misunderstandings of preschool programs	A24, A30, A25, A33, A36, A37, A48, A76, A16, A87 A84, A32, A28, A106, A126
Monitoring and Evaluation	Guiding children's learning and improving educational programs + revising components of preschool curricula + evaluating and validating preschool programs + monitoring preschool centers + focusing on the quality of preschool centers + constant supervision of preschool centers' performance + emphasizing the quality of teacher-child relationships	A34, A35, A81, A68, A51, A82, A71, A85, A26, A55, A120, A130
Paying attention to the role and effects of communication and an appropriate educational environment	Considering providing a safe environment for educating children + focusing on interactions between the preschool curriculum or educational program and its implementation context + understanding the influence of the environment on child behavior + acknowledging the differential effects of the environment on different individuals + developing in a complex system of	A43, A100, A3, A1, A5, A2, A9, A6, A10, A4, A13, A19, A102, A103, A108, A113, A116, A124, A117, A138

	multilevel relationships + emphasizing the dynamism of the environment, the impact of the environment's multiple layers on child development + the reciprocal effects of individuals and the environment on each other	
Comprehensiveness and appropriateness of the educational content of preschool programs	Focusing on teaching life skills to children, emphasizing a comprehensive educational approach for children + focusing on developing children's social abilities, focusing on advancing children's emotional and intellectual capabilities + recognizing the informal nature of preschool curriculum content, ensuring preschool education is aligned with children's life needs + matching preschool curriculum content with children's diverse future experiences + underscoring the flexibility in designing preschool curricula + developing preschool education to prepare children for their future adult roles+ designing play-based and activity-based preschool curricula	A41, A42, A44, A45, A47, A63, A88, A65, A66, A72, A67, A83, A90, A93, A86, A92
Educational facilities and resources	Attention to innovative teaching and learning methods in the field of early childhood education + utilization of creative teaching methods in early childhood education + incorporation of active teaching methods for children + focus on innovation in teaching approaches for children + implementation of up-to-date teaching models in the field of children's education + design of appropriate approaches in the pre-primary curriculum + design of teaching methods suitable for children's development + consideration of a holistic and multidimensional approach in curriculum design for pre-primary education + attention to fostering exploratory and reasoning skills in children + providing opportunities for children to solve various problems	A31, A50, A22, A57, A39, A23, A75, A52, A27, A77, A38, A62, A64, A111, A115
Appropriateness of preschool programs with society's culture	Attention to adapting early childhood curricula to the context of each region + considering the impact of values and laws + traditions and societal culture on children's development	A73, A118, A14, A127, A129, A133
The role of governance macro- management in supporting preschool programs	Considering the importance of policymaking in the preschool domain + eliminating multiple decision-making bodies in the preschool sphere + focusing on macro planning in the preschool realm + emphasizing policymaking and planning regarding children + specifying the main authority regarding implementation and supervision and outsourcing in child matters + designing the necessary mechanism for making preschool compulsory + focusing on developing a decentralized preschool education system + having a strategic approach in designing the preschool curriculum + understanding the status and significance of preschool education + adopting a proper approach and model for the preschool curriculum + ensuring the continuity of the educational process in preschool + aligning preschool educational goals with children's mental and intellectual abilities + comprehending the position of preschool programs as an important part of education among top managers, substantially investing in preschool education + emphasizing transparency of information regarding preschool + considering educational justice in preschool	A17, A18, A40, A96, A49, A80, A79, A2, A15, A70, A69, A74, A89, A94, A95, A97, A101 A99, A114, A119, A121, A131, A135, A139, A140, A144, A145, A139, A134,

Table 2. Selective coding: combination of codes extracted from axial coding and formation of model dimensions

	Dimensions	Categories (resulting from the combination of primary components)
Factors affecting the preschool curriculum based on Bronfen Brenner's theory	microsystem	Paying attention to educating and informing families
		Utilizing new and creative teaching methods in preschool
		Monitoring and Evaluation
	Mesosystem	Pay attention to the role and effects of communication, and an appropriat educational environment
		Paying attention to educating and informing families
		Monitoring and Evaluation
	Exosystem	Comprehensiveness and appropriateness of the educational content of preschool programs
		Utilizing new and creative teaching methods in preschool
		Educational facilities and resources
		Monitoring and Evaluation
		Pay attention to the role and effects of communication, and an appropriate educational environment
	Macrosystem	Monitoring and Evaluation
		Appropriateness of preschool programs with society's culture
		The role of governance macro-management in supporting preschool programs
		Educational facilities and resources
		Pay attention to the role and effects of communication, and an appropriate educational environment

The findings are displayed in Table (2) refer to selective coding stage. Selective coding involves a systematic and iterative process of analyzing qualitative data and identifying the core category. By identifying the core category and integrating other categories, researchers refine their understanding of the central phenomenon and develop a comprehensive theory.

The quantitative part of the research

To investigate the research questions in the quantitative section, the researchers developed a questionnaire consisting of 67 questions based on the results of qualitative phase and the status of the components of the study research. The questionnaire was tested for validity and reliability before being used to collect research data. We performed an exploratory factor analysis to identify and rank the various dimensions and components of our data. Prior to analyzing the data, we conducted both the Kaiser-Meyer-Elkin Measure of Sampling Adequacy and Bartlett's goodness-of-fit tests to ensure suitability. To determine the variables' adequacy, we utilized the KMO statistic, with a value above 0.70 being deemed appropriate for factor analysis. Additionally, we utilized Bartlett's test to assess the correlation between the variables, which is essential for a meaningful and useful factor analysis model. As a result, we formulated a statistical hypothesis with regard to Bartlett's test.

Table 3. KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy KMO		0.714
Bartlett's Test of Sphericity	Approx. Chi-Square	5936.697
	Df	1230
	Sig	0.0000

Table (3) shows that the KMO statistic was above 0.70 indicating sufficient correlation and data adequacy for exploratory factor analysis, with a 95% confidence level and a measurement error of α=5%. Moreover, Bartlett's test demonstrated a significant level of less than 0.05 (Sig < 0.05), rejecting the null hypothesis and supporting the research hypothesis. Consequently, the data was deemed suitable for further analysis.

Table 4. Cronbach's Alpha Values, Composite Reliability, and Average-Variance Extracted Index for Research Variables

Components	Cronbach's Alpha	Composite Reliability	AVE	Significance Level
Paying attention to educating and informing families	0.87	0.93	0.929	0.001
Utilizing new and creative teaching methods in preschool	0.80	0.86	0.904	0.001
Pay attention to the role and effects of communication and appropriate educational environment	0.86	0.84	0.857	0.001

Comprehensiveness and appropriateness of the educational content of preschool programs	0.84	0.75 0.912	0.001
Educational facilities and resources	0.77	0.82 0.904	0.001
Appropriateness of preschool programs with society's culture	0.85	0.76 0.817	0.001
The role of governance macro- management in supporting preschool programs	0.79	0.68 0.897	0.001

Cronbach's Alpha and Composite Reliability Indexes were used to assess the reliability of the internal consistency of measurement model variables. Composite reliability and Cronbach's Alpha Coefficient for all of the constructs were over the recommended threshold of 0.70, indicating the adequate internal consistency of multiple items for each construct (Khanifar & Moslemi, 2018). Therefore, the reliability and internal consistency of research variables were confirmed. The extracted average variance index was used to assess the convergent validity of the research measurement model. Convergent validity indicates whether a test that is designed to measure a particular construct correlates with other tests that assess the same or similar construct. The extracted average variance index estimates the explanation of the variance of the questions by the latent variable. The minimum accepted value for the extracted average variance index was determined to be 0.5 (Creswell, 2017). According to the values of the extracted average variance index in Table (4), the convergent validity is confirmed.

Table 5. The Furnell-Locker Index values to investigate the divergent validity of the measurement part of the research model

Components	1	2	3	4	5	6	7
Paying attention to educating and informing families	0.852						
Utilizingnew and creative teaching methods in preschool	0.782		0.718				
Pay attention to the role and effects of communication and appropriate educational environment	0.713		0.871	0.816			
Comprehensiveness and appropriateness of the educational content of preschool programs	0.725		0.832	0.764	0.712		
Educational facilities and resources	0.466		0.671	0.715	0.69 0.714		
Appropriateness of preschool programs with society's culture	0.727		0.822	0.718	0.730 0.667	0.729	
The role of governance macro-management in supporting preschool programs	0.70		0.825	0.727	0.843 0.767	0.749 0.757	

The Furnell-Locker Index was used to investigate the divergent validity of the research measurement model. According to The Furnell - Locker Index, a latent variable should have more dispersion among its questions than other latent variables. Divergent validity refers to the extent to which a test is not related to other tests that measure different constructs. In other words, the root mean of the extracted variance of each latent variable must be greater than the maximum correlation of that variable with other latent variables of the model (Khanifar & Moslemi, 2018). According to the values of The Furnell-Locker Index in Table (4), the divergent validity is confirmed.

Table 6. The results of confirmatory factor analysis

Components	Significance level	T-value	Standard Deviation	Factor Load
Paying attention to educating and informing families	0.001	8.91	0.62	0.83
Utilizing new and creative teaching methods in preschool	0.001	9.46	0.57	0.78
Paying attention to the role and effects of communication and	0.001	8.69	0.67	0.71
Comprehensiveness and appropriateness of the educational	0.001	8.79	0.71	0.76
Educational facilities and resources	0.001	9.21	0.59	0.84
Appropriateness of preschool programs with society's culture	0.001	8.13	0.60	0.74
The role of governance macro- management in supporting preschool	0.001	9.52	0.68	0.81

The table (6) presents the results of the confirmatory factor analysis for the indicators of preschool curriculum components which are grounded in Bronfenbrenner's ecological theory. The study analyzed the factor load of each component of the preschool curriculum separately, and we reported the results in a standardized format. The indicators demonstrate a robust factor load, as indicated by the high values. Additionally, all of the indicators are statistically significant and acceptable with a T-Statistic value greater than 1.96, signifying a 95 percent confidence level.

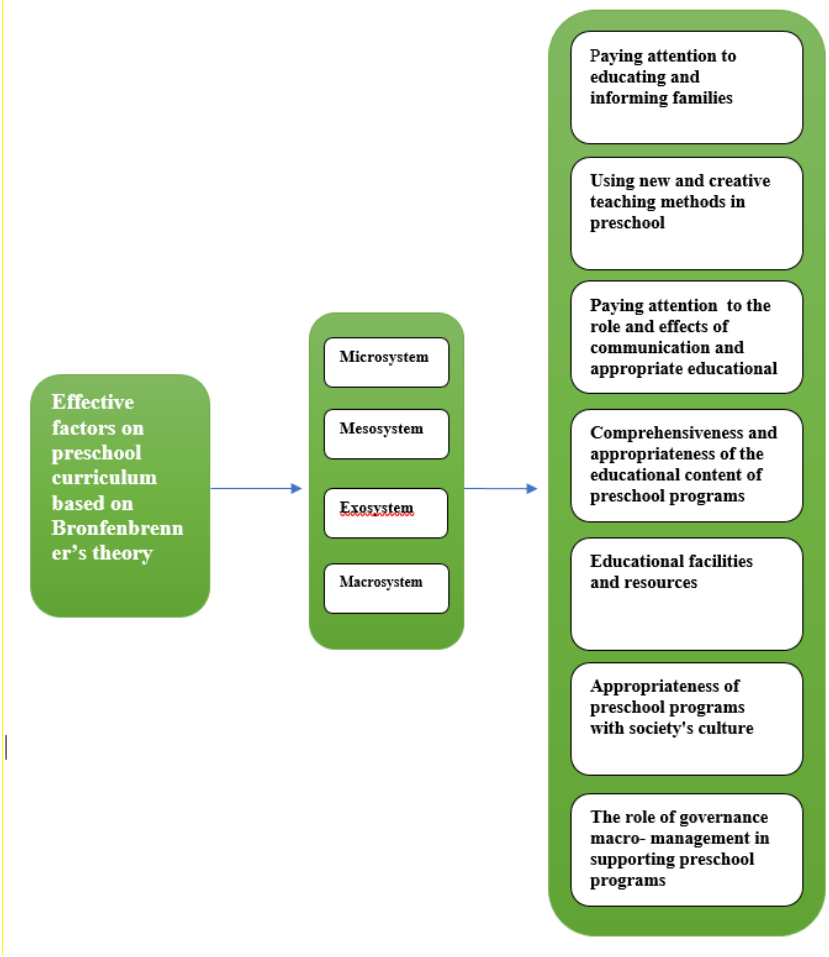

Figure 1. Conceptual model of Preschool Curriculum Model based on Bronfenbrenner's Ecological Systems Theory

Discussion

This study aimed to identify the components of preschool curriculum model based on Bronfenbrenner's ecological theory. To achieve this goal, the researchers adopted a mixed research approach and conducted a comparative content analysis of relevant sources. In the qualitative part, through the three stages of coding (open, central, and selective) of the grounded theory, the effective components of the proposed model were identified. The quantitative study was conducted to test the reliability of the research questionnaire. The results demonstrated that both the questionnaire and its dimensions were confirmed. Ultimately, this research provides a comprehensive framework for the preschool curriculum based on Bronfenbrenner's ecological

theory in Iran. The results of the research revealed that the preschool curriculum model has seven components. These components included: paying attention to educating and informing families, utilizing new and creative teaching methods in preschool, paying attention to the role and the effects of communication and an appropriate educational environment, comprehensiveness and appropriateness of the educational content of preschool programs, educational facilities and resources, appropriateness of preschool programs with society's culture, and the role of governance of macro-management in supporting preschool program. The results of this study are consistent with the research conducted by Nurani and Pratiwi (2020), Darling et al. (2020), Barbareev and Nikova- Cingulovska (2020), Usman (2016), Leggett (2017), Addisu et al (2020), Aghdasi et al. (2021), Khaleghinezhad's research (2019), Reinke et al. (2011), and Babli Bahmai et al (2017).

Bronfenbrenner's ecological theory emphasizes the importance of understanding early childhood development within the context of multiple environments, from immediate settings like family and school to broader social and cultural contexts. This theory emphasizes the importance of the family as a primary system that significantly influences an individual's development. The results indicate that creating a preschool curriculum based on Bronfenbrenner's theory requires designers to consider all levels of the microsystem, mesosystem, exosystem, and macrosystem. According to the findings of the research and literature review, we discussed how to apply these components in preschool curriculum based on Bronfenbrenner's ecological theory in more details as follows. The first component "Education and information dissemination", recognizes the significant role of families in shaping children's development and highlights the need to pay attention to educating and informing families. The family forms the core of the microsystem, and its influence on a child's development is profound. According to Darling et al. (2020) educating and informing families in this context involves providing them with knowledge, skills, and resources to support their children's learning and well-being. This can be achieved through programs that promote positive parenting practices, early childhood education initiatives, and workshops on child development and effective communication strategies within the family. The mesosystem represents the interconnections between different microsystems in an individual's life. Effective education and information dissemination should focus on fostering collaboration and communication between families and other systems that influence a child's development, such as schools, healthcare

providers, and community organizations. Collaborative efforts can enhance the exchange of information, align goals, and create a supportive network for families (Reinke et al., 20101). The exosystem encompasses external systems that indirectly influence the child's development. Educating and informing families from an ecological perspective requires addressing the broader societal factors that impact family dynamics and parenting practices. This includes advocating for policies and programs that support work-life balance, affordable childcare, and accessible healthcare services. By addressing these systemic factors, families can have better resources and support to provide an optimal environment for their children's development. The macrosystem represents the broader sociocultural context in which families operate. Educating and informing families should consider cultural diversity, values, beliefs, and traditions that shape family dynamics and practices.

The second component" utilizing new and creative teaching methods in preschool" explores how innovative and creative approaches to teaching can enhance the learning experiences of young children. The microsystem represents the immediate environment in which a child directly interacts. In the context of preschool education, utilizing new and creative teaching methods involves creating a stimulating and engaging classroom environment. This includes employing innovative instructional strategies such as play-based learning, project-based learning, inquiry-based learning, and hands-on activities (Leggett, 2017). By incorporating these methods, teachers can promote active exploration, critical thinking, problem-solving, and creativity among children. The mesosystem refers to the connections and interactions between different microsystems. To effectively utilize new teaching methods, collaboration and professional development are essential. Collaboration among teachers, administrators, and support staff allows for the sharing of ideas, experiences, and resources. It enables educators to learn from one another, adapt innovative strategies to their specific contexts, and collectively improve teaching practices. The exosystem encompasses external systems that indirectly influence a child's development. Utilizing new teaching methods in preschool requires supportive policies and resources at the exosystem level. Education authorities, policymakers, and funding agencies play a crucial role in providing guidance and allocating resources to support the implementation of innovative teaching methods. The macrosystem represents the broader sociocultural context in which preschool education takes

place. Utilizing new and creative teaching methods requires an understanding of societal attitudes and expectations towards early childhood education.

The third component" paying attention to the role and effects of communication and appropriate educational environment" explores the significance of effective communication and creating a suitable educational environment within the context of Bronfenbrenner's theory. By considering the various ecological systems that influence a child's development, we can appreciate the impact of communication and the environment on children's learning, and social-emotional development. The mesosystem represents the interconnections between different microsystems in a child's life. In the context of preschool education, it is essential to establish strong connections between the preschool and families. By incorporating new and creative teaching methods, educators can encourage parent involvement in the learning process. This can include sharing innovative teaching strategies with parents, involving them in classroom activities, and providing resources and guidance to support learning at home. The exosystem encompasses external systems that indirectly influence a child's development. When implementing new and creative teaching methods in preschool, educators should consider the broader influences that impact the classroom environment. The macrosystem refers to the broader sociocultural context in which preschool education takes place. When utilizing new and creative teaching methods, educators should consider the cultural diversity, values, and beliefs of the children and families they serve. In the context of early childhood education, clear and consistent communication between teachers, parents, and children fosters a collaborative and supportive learning environment. Open lines of communication enable parents and teachers to share information, exchange feedback, and work together to meet the unique needs of each child. Positive and responsive communication also promotes a sense of security, trust, and emotional well-being among children (Darling et al. (2020)).

The fourth component" Comprehensiveness and appropriateness of the educational content of preschool programs" explores the importance of considering the appropriateness of educational content within the context of Bronfenbrenner's theory. By analyzing the various ecological systems that influence a child's development, we can gain insights into the factors that contribute to effective and developmentally appropriate preschool curricula. The microsystem refers to the immediate environment in which a child directly interacts. In the context of preschool education,

the educational content within the classroom plays a crucial role in shaping children's learning experiences. It is essential for preschool programs to provide developmentally appropriate content that aligns with the needs, interests, and abilities of young learners. A well-designed curriculum should encompass a range of domains, including cognitive, social-emotional, physical, and creative development. The mesosystem represents the connections and interactions between different microsystems. In the context of preschool education, it is important to ensure consistency and coherence in the educational content across various settings. This includes alignment between the preschool curriculum and the content covered at home or in other educational contexts. When there is coherence and continuity in the educational content, children can build upon their prior knowledge, make connections, and deepen their understanding. The exosystem encompasses external systems that indirectly influence a child's development. When evaluating the appropriateness of educational content in preschool programs, it is important to consider the influences from the broader educational context. This includes educational policies, guidelines, and standards set by educational authorities (Duncan et al., 2009). Preschool curricula should align with these guidelines to ensure that the content is age-appropriate, evidence-based, and meets the expectations of educational stakeholders and society at large. The macrosystem represents the broader sociocultural context in which preschool education takes place. When evaluating the appropriateness of educational content, it is crucial to consider sociocultural relevance and diversity. Preschool programs should reflect and respect the cultural, linguistic, and ethnic diversity of the children they serve.

The fifth component" Educational facilities and resources" explores the role of educational facilities and resources within the context of Bronfenbrenner's theory. The microsystem represents the immediate environment in which a child directly interacts. In the context of education, the physical learning environment plays a crucial role in facilitating learning and supporting children's development. Educational facilities, such as classrooms, libraries, science laboratories, and playgrounds should be designed to be safe, accessible, and conducive to learning. Adequate space, proper lighting, comfortable seating, and age-appropriate materials and equipment are essential for creating an engaging and stimulating learning environment. A well-designed physical environment promotes exploration, creativity, collaboration, and active participation among

students. The mesosystem refers to the connections and interactions between different microsystems. In the context of education, it is important to ensure the integration of resources within educational settings. This includes aligning curriculum materials, teaching aids, and technological tools to create a cohesive and comprehensive learning experience. Resources such as textbooks, digital content, educational software, and manipulatives should be selected and utilized based on their relevance, quality, and appropriateness for the specific educational goals and the developmental needs of children. The exosystem encompasses external systems that indirectly influence a child's development. In the context of educational facilities and resources, the exosystem includes community support and external resources. Collaboration with parents, community organizations, and local businesses can provide additional resources, expertise, and opportunities for educational enrichment. The macrosystem represents the broader sociocultural context in which education takes place. The availability and quality of educational facilities and resources are influenced by societal investment in education. Adequate funding, policies, and public support are essential for ensuring equitable access to high-quality educational resources (Usman, 2016).

The sixth component" Appropriateness of preschool programs with society's culture" explores the importance of considering cultural relevance in designing and implementing preschool programs. The microsystem refers to the immediate environment in which a child directly interacts. Preschool programs should reflect and respect the cultural, linguistic, and ethnic diversity of the children they serve. This includes incorporating culturally relevant materials, practices, and perspectives into the curriculum. By valuing and integrating children's cultural backgrounds, traditions, and languages, preschool programs create an inclusive and supportive learning environment (Michael-Luna et al., 2016). The mesosystem represents the connections and interactions between different microsystems. Engaging families as partners in the educational process allows educators to gain insights into children's cultural backgrounds, values, and beliefs. By involving families in curriculum planning, decision-making, and sharing culturally specific resources, preschool programs can create a bridge between home and school. The exosystem encompasses external systems that indirectly influence a child's development. When evaluating the appropriateness of preschool programs, it is important to consider societal and community cultural influences. Preschool curricula should align with societal norms, values, and expectations. This includes

considering cultural practices, celebrations, and events that are important within the broader community. The macrosystem represents the broader sociocultural context in which preschool education takes place. Preschool curricula should be free from stereotypes, discrimination, and cultural biases. Educators should strive to provide materials and activities that reflect diverse cultures, challenge stereotypes, and promote positive cultural representations.

The seventh component" The role of governance of macro-management in supporting preschool program" explores how effective governance at the macro level contributes to the success and quality of early childhood education. The microsystem represents the immediate environment in which a child directly interacts. Effective governance at the macro level plays a crucial role in setting standards, regulations, and policies that guide the operation and quality of preschool programs. This includes establishing licensing requirements, curriculum guidelines, teacher qualifications, and health and safety standards. By providing clear guidelines and expectations, macro-management governance ensures that preschool programs are well-structured, safe, and developmentally appropriate. The mesosystem refers to the connections and interactions between different microsystems. It includes coordination between government agencies, policymakers, early childhood professionals, and community organizations. By fostering collaboration, macro-management governance promotes the sharing of resources, knowledge, and expertise. This collaboration enhances the quality and effectiveness of preschool programs, supports professional development for educators, and facilitates the alignment of services across different sectors. The exosystem encompasses external systems that indirectly influence a child's development. Effective macro-management governance plays a critical role in resource allocation and support for preschool programs. This includes the allocation of funding, infrastructure development, and access to essential resources such as teaching materials, professional development opportunities, and research-based practices. Adequate and equitable resource allocation ensures that preschool programs have the necessary tools and support to provide high-quality education to all children, regardless of their background or socioeconomic status (Nurani and Pratiwi, 2020). The macrosystem represents the broader sociocultural context in which preschool programs operate. Macro-management governance shapes policy development and advocacy efforts that influence the overall quality and accessibility of early childhood education. Policies related to funding,

universal access, inclusion, and quality standards are crucial in ensuring that preschool programs are responsive to the needs of children and families.

The obtained findings indicate that preschool education is gaining more recognition. Leading countries have acknowledged its significance and worth, and scholars concur that preschool education lays the basic foundation for elementary school. Researchers emphasize the importance of designing and implementing a curriculum for this stage and determining the appropriate methods to use. This category holds significant value and should not be overlooked. This study aimed to investigate the various factors that influence the creation and structure of preschool curricula. To encourage creativity among students, it is necessary to adopt new teaching methods and modify educational content accordingly. Families also play a crucial role in ensuring the success of these programs, and they must prepare themselves adequately to participate effectively.

The proposed research needs to be investigated to increase its relevance on a larger scope. It is suggested to analyze and compare the findings of this study with other research conducted on preschool curriculum development to identify their similarities and differences. This will assist in understanding the possible obstacles and challenges in implementing the preschool curriculum, and devising strategies to overcome them. Future research in this area should focus on the practical implementation and evaluation of preschool curriculum models informed by Bronfenbrenner's Ecological Systems Theory. Longitudinal studies can provide valuable insights into the long-term impacts of such curriculum approaches on children's development and educational outcomes.

In conclusion, the integration of Bronfenbrenner's Ecological Systems Theory into the design of a preschool curriculum holds great potential for creating a more comprehensive and effective educational experience for young children. By considering the various ecological levels and their interactions, educators can provide a nurturing and stimulating environment that supports children's holistic development and lays a strong foundation for their future educational journey.

There are several limitations to this study that should be acknowledged. Firstly, this research only included empirical studies to ensure the reporting of authentic findings, which may have excluded some noteworthy reviews and conceptual papers. Secondly, our research only investigated studies undertaken in preschool settings and early childhood education contexts and did not examine its use and impact in K-12 educational contexts. Thus, our findings may not be generalizable to all

modes of educational contexts. Finally, this study only included publications published between 2000 and 2023, which may have excluded relevant studies published before 2000.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by ethics committee of Islamic Azad University.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection and analysis. The author contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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