Journal of Family Sciences **E-ISSN: 2460-2329**
Special Edition from National Seminar on Family, Child, and Consumer Issue: Building a Quality Family to Create a Golden Indonesia, 2024, 86-98

The Role of Age and Imaginative Play as Predictors of Cognitive Flexibility in Preschool-Aged Children

Atika Rahma Putri[1]*), Efriyani Djuwita[1], Inge Uli Wiswanti[1]
[1]Faculty of Psychology, University of Indonesia, UI New Campus – Depok 16424, Indonesia

*) Corresponding author: tikarapu@gmail.com

Abstract

Cognitive flexibility is a part of executive function that helps individuals adjust to changing circumstances, which is important for children to adapt with surroundings. Alongside with rapid cognitive development during preschool-age, preschoolers also show maturity in symbolic functions that grow distinct characteristics in imaginative play. This research aimed to see the role of age and imaginative play in predicting preschool-aged children's cognitive flexibility. Sample was carried out using a convenience-sampling technique and this research subjects were 74 preschoolers (4–6 years) and their parents. Participants in this study are preschool-aged children who are enrolled at preschool in Jakarta, Bogor, and Depok areas, along with parents or guardians of the children who accompanied the children in their daily activities at home. This study used hierarchical linear regression analysis techniques in SPSS to analyze the role of age and imaginative play in predicting cognitive flexibility. The result showed both age and imaginative play significantly predict cognitive flexibility. Age has 9.4 percent of the role, whereas imaginative play accounted for 8.3 percent. These provide an illustration for parents and educators that imaginative play activities can facilitate the development of cognitive flexibility at preschool age.

Keywords: cognitive flexibility, imaginative play, preschool-aged, preschooler

Abstrak

Cognitive flexibility merupakan bagian fungsi eksekutif yang membantu individu melakukan penyesuaian terhadap perubahan, sehingga penting bagi anak untuk beradaptasi dengan lingkungan sekitar. Bersamaan dengan perkembangan pesat kognitif pada usia prasekolah, anak prasekolah juga menunjukkan kematangan fungsi simbolik yang menampilkan karakteristik khas dalam *imaginative play*. Penelitian dilakukan untuk melihat peran usia dan *imaginative play* dalam memprediksi *cognitive flexibility* pada anak prasekolah. Pengambilan sampel dilakukan dengan teknik convenience-sampling dan subjek penelitian merupakan 74 anak prasekolah (usia 4–6 tahun) beserta orang tuanya. Partisipan dalam penelitian ini adalah anak usia prasekolah yang bersekolah di PAUD di wilayah Jakarta, Bogor, dan Depok, serta orang tua atau wali anak yang mendampingi anak dalam beraktivitas sehari-hari di rumah. Penelitian ini menggunakan teknik analisis regresi linier hierarki di SPSS untuk menganalisis peran usia dan permainan imajinatif dalam memprediksi *cognitive flexibility*. Hasil analisis menunjukkan usia dan *imaginative play* memiliki peran yang signifikan dalam memprediksi *cognitive flexibility*. Dimana usia berperan sebesar 9.4 persen, sementara *imaginative play* berperan meningkatkan kekuatan prediksi sebesar 8.3 persen. Hasil tersebut memberikan gambaran bagi orang tua dan pendidik bahwa aktivitas *imaginative play* mampu memfasilitasi perkembangan *cognitive flexibility* di usia prasekolah.

Kata kunci: anak usia prasekolah, *cognitive flexibility, imaginative play*

Introduction

Playing is something that is loved by every child with various interactive processes, skills, exploration, motivation and problem solving in it. Early childhood is children aged 4-6 years where children have entered preschool level. Children at that age experience changes in previous phases of life. Early childhood is often called the "golden age" (Anzani & Insan, 2020). The progression is caused by rapid development in brain structure and cognitive function of preschool-aged children, especially in the prefrontal cortex which is related to emotions and behavior control (Quinones-Camacho, et.al., 2019). This helps preschool-aged children to have adequate abilities in anticipating, solving problems, imagining, communicating their needs, and showing empathy for others (Marotz & Kupzyk, 2018). No wonder if preschool-aged children often show unexpected things both in behavior and the questions given.

In their daily activities, preschool-aged children face various challenges when interacting with their surroundings. As in their activities at preschool, playing with friends and teachers, as well as daily routines at home with family members. Therefore, children need to learn that there are people's thoughts that may be different from their own, how to cooperate while playing together with other children, and also to understand certain boundaries or rules that apply in every condition (Marotz & Kupzyk, 2018). Frequently, those activities are coming up with new situations that may be different from what the child has understood before. To face those challenges, preschool-aged children need to be able to direct their minds flexibly. This ability is referred to as cognitive flexibility.

Cognitive flexibility, also known as shifting or switching abilities (Vitiello, Munis, & George, 2011), is an important aspect of child development. At preschool age, cognitive flexibility helps children to adjust their behavior so that it is in line with any demanded goals (Rahman, et al., 2022). Which then provides benefits for children in socializing with people around them, and making it easier for children to be able to think about different ways in handling challenges (Podjarny, Kamawar, & Andrews, 2022).

Children with high cognitive flexibility abilities have a better ability in adapting to changes and new things they encounter. For example, children with high cognitive flexibility will find it easier when they have to move from one task that uses certain mental processes, such as drawing, to another task with different mental processes, such as telling stories. However, the ability of cognitive flexibility in preschool-aged children is still limited. They often find difficulties to be able to focus on several tasks that must be carried out simultaneously (Marotz & Kupzyk, 2018). For this reason, it is necessary to provide stimulations that can spur the development of preschool-aged children's cognitive flexibility skills through various activities.

Activities of play, which are one of the main characteristics in the development of symbolic functions in preschool-aged children (Papalia & Martorell, 2021), are an important and potential part to boost the cognitive development of preschool-aged children. Especially in play activities related to imagination or pretend, such as imaginative play. Thompson and Goldstein (2019) define imaginative play as behaviors in play which includes using object substitution, making attributions in pretending, displaying social interactions in pretend play, becoming certain roles, and performing meta-communication related to the pretend roles.

Here, researchers believe that the process of playing also involves cognitive functions similar to those needed by children to display cognitive flexibility. According to the theory put forward by Bruner (1972, in Johnson et al., 1999), when doing play activities children get the opportunity to try many kinds of new and unusual behaviors that may have never been done before, which behavior then can be used to solve real life problems.

The role of play in supporting children's development process has been proven by several previous studies. Sheridan (2011) explains that children who are in a playful condition, or having a free feeling to play, can display flexible behavior. The results of experimental study regarding the conditions given to children when working on a task, found that children who were given tasks in a playful condition showed a higher level of performance than children in mainstream studying conditions, and in the process, children in a playful condition also willing to tried more new ways and display a more structured problem-solving method (Howard & McInnes, 2013).

Previous study conducted by Carlson, White, and Davis-Unger (2014) stated that there is a correlation between imaginative play with cognitive flexibility and other executive functions abilities in children aged 3-5 years. This is supported by study showing that a play-based approach is related to the development of cognitive function in preschool and has the potential for future success in school (Walker et al., 2020). Then, a study conducted by Bauer et al. (2021) on children aged 3–6 years in the southeastern part of the United States shows that there is a relationship between imaginative play and executive function, including cognitive flexibility. This study is also in line with the results of a study by Thibodeau-Nelsen et al. (2020) which showed that children with high levels of imaginative play tend to have good cognitive flexibility skills.

Besides, research conducted on kindergarten students in Moscow shows that the relationship between imagination and cognitive flexibility can only be seen when age is controlled (Veraksa et al., 2022). The role of age in the development of cognitive flexibility is evidenced by differences in accuracy and time needed to respond to cognitive flexibility tasks in different age ranges of children (Buttelman & Karbach, 2017). In his longitudinal study of preschool children in the Netherlands, Yeniad et al. (2014) also found an increase in ability in terms of accuracy in cognitive flexibility tasks given when children were 5 years old and 6 years old.

This is in line with the theoretical explanation that age has a role in the development of cognitive flexibility due to the development of brain structure (Quinones-Camacho et al., 2019). In preschool-aged children, there is also an increase in children's ability to understand changes and sort out attention to certain stimuli needed to display cognitive flexibility. This ability only develops after the child shows expertise to shift or change their response given to a task (Diamond, 2013).

However, only a few similar studies have been conducted on preschool-aged children in Indonesia. In addition, previous studies have not shown how much age and imaginative play can have a role in predicting the development of cognitive flexibility. On the other hand, the research conducted by Bauer et al. (2021) is also considered to still have limitations because the data collection method uses only one assessment, namely giving a questionnaire to teachers, which has the potential to produce common method variance.

Based on the discussion of previous studies and its limitations, this study aimed to see how much the role of age and imaginative play is in predicting cognitive flexibility

development in preschool-aged children. In this study, imaginative play data will be collected by involving parents as the main data source. This is done by considering that in assessing imaginative play, parents are able to give more focused attention to one child so as to minimize bias caused by the similarity of judgments on children.

Methods

Participants

Participants in this study are preschool-aged children who are enrolled at preschool (Taman Kanak-kanak, Raudhatul Athfal, or any other early childhood education institutions) in Jakarta, Bogor, and Depok areas, along with parents or guardians of the children who accompanied the children in their daily activities at home. Child participants are in the age range of 4 years–6 years 11 months (48–83 months), participate daily at early childhood education institution, have a typical developmental history which is confirmed through the questionnaire regarding the child's development history attached in the parental consent form, and use Indonesian language (Bahasa Indonesia) as daily conversation language.

Sample was carried out using a convenience-sampling technique, in which participants were selected based on their willingness to participate in the study (Gravetter & Forzano, 2012) by disseminating research information through the school administrator to parents at three preschools. The principal and teachers of those preschools have agreed to support and permitted this research to be conducted at their school. The participants in this study were obtained from parents who filled out informed consent and allowed their children to participate in the research, and the children also agreed to play with the researchers when asked on the day of research.

Measurement

Cognitive flexibility is the human ability to adapt the cognitive processing strategies to face new and unexpected conditions in the environment (Cañas et al., 2003). Measurement of cognitive flexibility was carried out using the Dimensional Change Card Sorting (DCCS) procedure, which was developed by Zelazo (2006) and has been adapted for use in Indonesian by Hendrawan et al. (2015). The DCCS measuring instrument is intended for children aged 2.5 to 7 years. In this test, measurements are taken by giving two boxes, each attached with a blue house and a red star card, and a number of cards with a house or a star in blue and red variations. Each child is given three stages of the game with one trial phase.

In the first stage, or called pre-switch test, each child is given instruction to play color games and then asked to sort 6 cards into the boxes according to its color (red or blue). In the second stage or post-switch test, the game rules are changed where the child is asked to sort 6 other cards according to its shape (house or star). If the child manages to sort at least 5 of the 6 cards correctly, the child can continue the game to the third stage, namely the border test.

In the border test, children are asked to sort cards based on two different dimensions (color or shape) according to the marks printed on the cards. If the cards have lines around the image, they must be sorted by color and if there are no lines around the image, the card must be sorted by shape. The DCCS game rules, such as "if red goes here, if blue goes here" are always stated while pointing to the appropriate box

before showing each card (Zelazo, 2006). DCCS score range is 0 to 3, calculated based on the stage along the trial that was successfully completed.

Imaginative play is defined as "a form of symbolic play where children use objects, actions or ideas to represent other objects, actions, or ideas using their imaginations to assign roles to inanimate objects or people" (Vasantha et al., 2020). The imaginative play variable was measured using the Childhood Imagination Questionnaire (CIQ) developed by Gilpin (2017). The CIQ consists of 14 items, with 5 items in the sociodramatic play subscale, 5 items in the imaginary companion subscale, and 4 items in the fantasy play subscale (Thompson, 2020; Blanchard, 2020). Answer options were given on a Likert-type scale of 1 to 5, with 1= never, 2= rarely, 3= sometimes, 4= often, and 5= almost every day. The CIQ has concurrent validity with 4 other measuring tools which also measure constructs related to imagination and pretend play (Thibodeau-Nelsen et al., 2020), and is reliable (α= .95) in the Indonesian translation. Final score is done by calculating the average score of all items.

This measure was chosen because the items in CIQ were considered sufficient to cover the description of behaviors in Thompson and Goldstein (2019) five components of imaginative play, even though they were not fully able to describe the actual situation because the data was taken from adult's view of observation (Thompson, 2020). In this research, CIQ was given to parents to minimize bias compared to teacher assessments, where teachers in each class needs to observe a group of students at the same time.

This research was conducted in 8 weeks from January–March 2023. 83 subjects who are students in Playgroup, Kindergarten A, or Kindergarten B classes from three preschools participated. The entire part of research was carried inside each school. Research time is adjusted to each school's daily schedule and special agenda. Some data collection on children is carried out during learning hours, while others are carried out during free play time, according to agreement with the homeroom teacher.

The research was carried out in two stages data collection on parents and data collection on children. For parents, data collection was carried out by distributing questionnaires regarding personal data, child development history, and CIQ questionnaires through the school which were sent together with informed consent. Questionnaires were given on paper sheets to schools A and B, while questionnaires in school C were given online via Google form according to the provisions of the school. The results of data obtained from the parent's questionnaire and informed consent, were used as the basis to determine which children would become research participants.

Next, the researcher provided a list of children names who had been permitted by the parents based on the informed consent form to the school and confirmed this with the homeroom teacher of each child. Children who have received approval from their parents are then called in turn to one of the rooms in the school which has been set up as a playroom. Before playing, the researcher ensured child's willingness by giving child-assent through a verbal question "I want to invite you to play in the three stations in this room, do you want to come play?" If the child states that they are willing, the child will be given a 'play ticket' which will be filled with stickers every time the child successfully completes the game at one station. The DCCS procedure is given in turn with two other executive function game procedures which are also used as a big data for Imaginative Play and Executive Function Research Laboratory. After the procedures, each child was then given rewards of a sticker set and a puzzle.

Analysis

Researchers used hierarchical linear regression analysis techniques in IBM SPSS version 20 to see the role of age and imaginative play in predicting cognitive flexibility. Then, the classical assumption test is also used as a requirement that must be met so that the regression results are marked valid and can be generalized (Field, 2013). The classical assumption test is carried out using Kolmogorov-Smirnov to calculate normality, the Glejser test to see whether there is heteroscedasticity or not, Durbin-Watson to review autocorrelation in the regression model, and the multicollinearity test.

This study also tests classical assumptions, to ensure that the regression model used can be generalized to the population, and to state that the test results are significant, it is necessary to test the classical assumptions on the residuals from the regression model (Field, 2013). Classic assumption tests include normality, heteroscedasticity, autocorrelation and multi-collinearity tests (Table 1).

Table 1. Classic assumption test result

Classic assumption test	Result	Description
Normality Test (Kolmogorov-Smirnov)	p> 0.05	Normally distributed residue
Heteroscedasticity Test (Glejser)	p< 0.05	No heteroscedasticity
Autocorrelation Test (Durbin-Watson)	1.690 (k=2; n=74)	No Autocorrelation
Multicollinearity Test (VIF)	VIF=1.000; ≤ 10	No Multicollinearity

Findings

Respondent Characteristics

Table 2 show that data were collected on 83 subjects consisting of preschool children and their parents. After filtering the data, nine data were eliminated because 4 subjects did not meet the completeness of the data and the other 5 subjects did not meet the age criteria. The final data that can be processed is 74 subjects with a range of children aged 4–6 years (M= 5.32, SD= 0.74).

Participants came from three preschools in Pesanggrahan and Cilandak areas, South Jakarta and North Bogor area, Bogor. There were 18 subjects from school A (24.3%), 17 subjects from school B (22.9%), and 39 subjects from school C (52.7%). All child participants have a typical developmental history and use bahasa Indonesia as their daily language. Most of the child participants were boys. In Table 1 below, the results of descriptive analysis of the demographic data of child participants, which include gender and age group, are displayed.

Then for parent participants (shown in table 2), mothers mostly had a last education at the 4 Years Diploma (D4)/Bachelor (S1) level (62%) and the least at the Master's level (10.8%). Meanwhile, most fathers had a last education of 4 Years Diploma (D4)/Bachelor (S1) level (55.4%) and the least are 1-3 Years Diploma (D1/D2/D3) level (6.7%).

Table 2. Respondent characteristics

Variable	n	%
Gender		
Male	42	56.8
Female	32	43.2
Age		
4 years (48–59 months)	10	13.5
5 years (60–71 months)	30	40.5
6 years (72–83 months)	34	45.9
Mother's Education		
Senior high school	10	13.5
Diploma (D1/D2/D3)	10	13.5
Diploma (D4) / Bachelor (S1)	46	62.1
Master education (S2)	8	10.8
Father's Education		
Diploma (D1/D2/D3)	18	24.3
Diploma (D4) / Bachelor (S1)	5	6.7
Master education (S2)	41	55.4
Diploma (D1/D2/D3)	10	13.5

Distribution of Age, Imaginative Play, and Cognitive Flexibility Variables

Table 3 below shows that the description of the minimum, maximum, mean and standard deviation for the age (in months), imaginative play and cognitive flexibility variables. The cognitive flexibility score of 74 participants had an average of 1.88 (SD = 0.548). The minimum score obtained by participants on cognitive flexibility was 1, and the maximum score obtained was 3. On imaginative play, participants obtained an average score of 2.72 (SD = 0.765) with a range of scores obtained by participants between 1.21 to 4.64. Meanwhile, the average age of the participants was 69.18 months (SD = 7.62) with a range of ages from 50 to 83 months.

Table 3. Distribution of age, imaginative play, and cognitive flexibility variables

Variable	Min	Max	Mean	SD
Age	50	83	69.18	7.62
Imaginative play	1.21	4.64	2.72	0.765
Cognitive flexibility	1	3	1.88	0.584

The Influence of Age on Imaginative Play

Table 4 show that in this study, hierarchical linear regression was carried out to test whether age and imaginative play significantly predicted cognitive flexibility through two blocks of variables. In the first block, age (M = 69.18, SD = 7.62) was entered as a predictor variable, with cognitive flexibility (M = 1.88, SD = 0.548) as the dependent variable. Then in the second block, the imaginative play score (M= 2.72, SD = 0.765) was also included as a predictor variable with cognitive flexibility as the dependent variable.

The results of the analysis on 74 subjects showed that the first model was significant, R2 = 0.094, F (1,73) = 7.486, $p < 0.05$. Where age significantly predicts cognitive flexibility (β= 0.022, $p < 0.05$). In the second model R2 = 0.178, F (2.72) = 7.662, $p < .05$, it shows a significant increase from the first model ΔR2 = 0.083, ΔF (1.72) = 7.194, $p < 0.05$, with the addition of imaginative play in predicting cognitive flexibility (β= 0.207, $p < 0.05$).

Thus, the hypothesis of this research is accepted, namely that there is a significant role of age and imaginative play in predicting cognitive flexibility. In this case, age has a role of 9.4 percent in predicting cognitive flexibility. Meanwhile, imaginative play has been proven to play a role in increasing predictive power by 8.3 percent in the development of cognitive flexibility in preschool children (4-6 years).

Table 4. Analysis of the influence of age on imaginative play

Model		B	SE	t	p
1	Constant	0.353			
	Age	0.022	0.008	2.736	0.009
2	Constant	-0.229			
	Age	0.022	0.008	2.889	0.005
	Imaginative Play	0.207	0.077	2.682	0.009

a. Dependent variable: cognitive flexibility

Discussion

This study proves that age and imaginative play each have a significant role in predicting cognitive flexibility. The results of this research are in line with the results found by Bauer et al. (2021) in examining the relationship between imaginative play and cognitive flexibility and other executive functions in preschool children. That research found that there is a significant relationship where a high imaginative play tendency can predict cognitive flexibility and other executive function abilities. The findings in this research also support previous research conducted by Veraksa et al. (2022) regarding the role of imaginative play on cognitive flexibility in preschool students which states that age, when seen together with imaginative play, can also be a predictor of cognitive flexibility.

The findings regarding the extent of the role of age and imaginative play in predicting cognitive flexibility in this study can also be explained based on the processes carried out by children while undergoing imaginative play. In imaginative

play, children play roles and behaviors that are different from what they do in everyday life, so children need to sort out what role is currently happening. The main components included in imaginative play activities, referring to research from Thompson and Goldstein (2019), are giving children the experience of using objects in different functions, giving new attributes to certain objects, pretending to be someone or something else, and planning to run a particular narrative. Consciously, in imaginative play activities, children can also explore things outside reality to experience unusual roles or places (Gleason & White, 2023).

Thus, the experiences and cognitive processes that children gain when involved in imaginative play have implications for cognitive flexibility. In displaying cognitive flexibility, children need the ability to overcome possible changes by providing flexible responses to find various new ways and ideas (Filippetti & Krumm, 2020). Children also need to be open to change their behavior in order to adapt from a known rule to another new rule (Caroll et al., 2016). Cognitive flexibility shows an important role in enabling children to learn to understand, adopt, and rearrange their response scheme to something (Deak & Wiseheart, 2015).

Children who have a high tendency towards imaginative play, or are more involved in imaginative play, get more exposure to activities such as changing roles, changing the function of objects, and facing different storylines. So according to Blanchard (2020), imaginative play activities have a big role in providing benefits to improving children's cognitive abilities, because through imaginative play, children learn to handle the difficulties of the changes that occur. Apart from that, imaginative play activities also give children the opportunity to practice weighing situations between fictional narratives and real world situations, so that they can hone children's abilities in finding various alternatives to everyday choices (White & Carlson, 2021). Furthermore, White and Carlson (2021) stated that when children are fully involved in imaginative play, children should be able to first store their perspective on the real world so that they can adapt to the storyline that is being played.

Even so, the results of this study are different from the findings in a study conducted by Thibodeau-Nielsen et al. (2020) which shows that imaginative play does not have a significant role on cognitive flexibility. Researchers see that different findings may occur due to differences in measurement methods, especially in the imaginative play variable. In this case the measurement of imaginative play still needs to be reviewed further in order to provide the necessary picture of imaginative play. This is because imaginative play itself has a wide range of definitions and behavioral patterns, which according to Thompson (2020), it is necessary to elaborate a definition and measurement method that is able to cover and describe the entire characteristics of this construct. The various sources of imaginative play data collection currently available, such as questionnaires filled by teachers, questionnaires filled by parents, naturalistic observation, structured observation, and interviews with children (Thompson & Goldstein, 2019) may provide different descriptions and richness of information regarding what children do in an imaginative play session.

This research has several limitations, including the terms of methods. Imaginative play data that is only collected through questionnaires is one of the limitations because it is only able to provide an overview of children's frequency and tendencies towards imaginative play, but does not show the quality of children's imaginative play (Thibodeau-Nelsen & Gilpin, 2020). Then, another limitation of this study is the small number of samples, namely 74 subjects. This is because the data collection process

needs to be carried out directly to each child, but on the other hand researchers also have limitations in terms of resources and time for collecting research data (8 weeks). The agenda of ongoing activities at the preschool where the research was carried out, as well as the mood of the children, also influenced the number of children who were able to participate in the data collection process during that time period.

The next limitation is related to the data collection process. It does not rule out the possibility that the data obtained in the research was influenced by the conditions when the data collection procedures were carried out on children. In this case, data collection is carried out in one of the rooms in the school at different times, depending on the activities of each class and agreement with the homeroom teacher. It made the conduciveness of the room during the data collection process also varies. Some situations may become a distraction and reduce the child's focus and influence the response given. Such as when a child turn is in a free play schedule so there are lots of other children in front of the room, when the child has been promised by the teacher to do certain activities in class so the child becomes in a hurry because they are afraid of being left behind, or when the child gets their turn near dismissal time.

Conclusion and Recommendation

Conclusion

The average age of respondents in this study was 6 years. Family characteristics also show that the education of the mother (62.1%) and father (55.4%) is mostly a bachelor's degree. Based on the results of the analysis, this study proves that there is a significant role of age and imaginative play in predicting cognitive flexibility in preschool-aged children. In this case, imaginative play is able to increase the predictive power of the development of cognitive flexibility in preschool children.

Recommendation

Based on the limitations of this study, there are several suggestions that the researchers propose to improve the quality of future research about the role of age and imaginative play on cognitive flexibility. First, researchers can use additional imaginative play measurement methods besides questionnaires. This is expected to provide a more comprehensive picture of the quality of imaginative play and might be able to explain which aspects of imaginative play related to cognitive flexibility.

Then, in collecting data at school, it is necessary to ensure that the room conditions are conducive and control is given at the time of data collection so it would not cause distraction to children. In selecting samples, researchers can also consider the variety of learning methods implemented in preschools. So that it can provide research results that are generalizable to the entire population of preschool children.

Furthermore, results of this study provide an overview and illustration for parents and educators that imaginative play activities can be one of the factors that can facilitate the development of cognitive flexibility in preschool-aged children. It is supposed to be a consideration in organizing educational programs or activitiy options to optimize the preschool-aged children cognitive development.

References

Anzani, R. W., & Insan, I. K. (2020). Perkembangan sosial emosi pada anak usia prasekolah. *PANDAWA, 2*(2), 180-193. Retrieved from https://ejournal.stitpn.ac.id/index.php/pandawa/article/view/595

Arán Filippetti, V., & Krumm, G. (2020). A hierarchical model of cognitive flexibility in children: Extending the relationship between flexibility, creativity and academic achievement. *Child Neuropsychology, 26*(6), 770-800. https://doi.org/10.1080/09297049.2019.1711034

Bauer, R. H., Gilpin, A. T., & Thibodeau-Nielsen, R. B. (2021). Executive functions and imaginative play: Exploring relations with prosocial behaviors using structural equation modeling. *Trends in Neuroscience and Education, 25*, 100165. https://doi.org/10.1016/j.tine.2021.100165

Blanchard de Assis, R. (2020). *Religious identity and imagination in early childhood* (Doctoral dissertation).

Buttelmann, F., & Karbach, J. (2017). Development and plasticity of cognitive flexibility in early and middle childhood. *Frontiers in Psychology*, *8*, 1040. https://doi.org/10.3389/fpsyg.2017.01040

Carlson, S. M., White, R. E., & Davis-Unger, A. C. (2014). Evidence for a relation between executive function and pretense representation in preschool children. *Cognitive Development, 29*, 1-16. https://doi.org/10.1016/j.cogdev.2013.09.001

Deák, G. O., & Wiseheart, M. (2015). Cognitive flexibility in young children: General or task-specific capacity?. *Journal of Experimental Child Psychology, 138*, 31-53. https://doi.org/10.1016/j.jecp.2015.04.003

Diamond, A. (2013). Executive functions. *Annual Review of Psychology*, *64*, 135-168. https://doi.org/10.1146/annurev-psych-113011-143750

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. Sage Publication.

Gleason, T. R., & White, R. E. (2023). Pretend Play as Abstraction: Implications for Early Development and Beyond. *Neuroscience & Biobehavioral Reviews*, 105090. https://doi.org/10.1016/j.neubiorev.2023.105090

Göncü, A., & Vadeboncoeur, J. A. (2017). Expanding the definitional criteria for imaginative play: Contributions of sociocultural perspectives. *Learning & Behavior*, *45*, 422-431. https://doi.org/10.3758/s13420-017-0292-z

Gravetter, F. J., & Forzano, L. B. (2012). *Research methods for the behavioral sciences*. Stanford: Cengage Learning.

Hendrawan, D., Fauzani, F., Carolina, C., Fatimah, H. N., Wijaya, F. P., & Kurniawati, F. (2015, November). The construction of executive function instruments for early child ages in Indonesia: A pilot study. In *Proceedings International Conference on Child and Adolescent Mental Health. Tangerang Selatan, Banten: Faculty of Psychology State Islamic University Syarif Hidayatullah Jakarta* (pp. 17-28).

Howard, J., & McInnes, K. (2013). *The essence of play: A practice companion for professionals working with children and young people*. Routledge. https://doi.org/10.4324/9780203075104

Johnson, J. E., Christie, J. F., Yawkey, T. D. (1999). *Play and early childhood development* (2nd ed.). Longman.

Marotz, L. R., & Kupzyk, S. (2018). *Parenting today's children: A developmental perspective*. Cengage Learning.

Papalia, D. E., Martorell, G. (2021). *Experience human development* (14th ed.). McGraw Hill.

Podjarny, G., Kamawar, D., & Andrews, K. (2022). Two birds in the hand: Concurrent and switching cognitive flexibility in preschoolers. *Journal of Experimental Child Psychology, 220*, 105418. https://doi.org/10.1016/j.jecp.2022.105418

Quiñones-Camacho, L. E., Fishburn, F. A., Camacho, M. C., Wakschlag, L. S., & Perlman, S. B. (2019). Cognitive flexibility-related prefrontal activation in preschoolers: A biological approach to temperamental effortful control. *Developmental Cognitive Neuroscience*, *38*, 100651.

Quiñones-Camacho, L. E., Fishburn, F. A., Camacho, M. C., Wakschlag, L. S., & Perlman, S. B. (2019). Cognitive flexibility-related prefrontal activation in preschoolers: A biological approach to temperamental effortful control. *Developmental Cognitive Neuroscience*, *38*, 100651. https://doi.org/10.1016/j.dcn.2019.100651

Rahman, A. A., Tan, H. K., Loo, S. T., Malik, A. B. A., Tan, K. H., Gluckman, P. D., ... & Rifkin-Graboi, A. (2022). Cognitive flexibility in preschoolers: A role for the late frontal negativity (LFN). *Cognitive Development, 63*, 101200. https://doi.org/10.1016/j.cogdev.2022.101200

Sheridan, M. D. (2011). *Play in early childhood: From birth to six years old* (3rd ed.). Routledge.

Šimleša, S., & Cepanec, M. (2015). Development of executive functions during childhood. *International Encyclopedia of the Social & Behavioral Sciences*, 489-496. https://doi.org/10.1016/B978-0-08-097086-8.23083-3

Thibodeau-Nielsen, R. B., & Gilpin, A. T. (2020). The role of emotion regulation in the relationship between pretense and executive function in early childhood: For whom is the relationship strongest?. *Infant and Child Development*, *29*(5), e2193. https://doi.org/10.1002/icd.2193

Thibodeau-Nielsen, R. B., Gilpin, A. T., Nancarrow, A. F., Pierucci, J. M., & Brown, M. M. (2020). Fantastical pretense's effects on executive function in a diverse sample of preschoolers. *Journal of Applied Developmental Psychology*, *68*, 101137. https://doi.org/10.1016/j.appdev.2020.101137

Thompson, B. (2020). *Pretend play across the preschool years: Defining and observing its developmental progression* (Doctoral dissertation, George Mason University).

Thompson, B. N., & Goldstein, T. R. (2019). Disentangling pretend play measurement: Defining the essential elements and developmental progression of pretense. *Developmental Review, 52*, 24-41. https://doi.org/10.1016/j.dr.2019.100867

Vasantha, W. B., Kandasamy, I., Smarandache, F., Devvrat, V., & Ghildiyal, S. (2020). Study of imaginative play in children using single-valued refined neutrosophic sets. *Symmetry*, *12*(3), 402. https://doi.org/10.3390/sym12030402

Veraksa, N., Gavrilova, M., & Veraksa, A. (2022). "Complete the drawing!": The relationship between imagination and executive functions in children. *Education Sciences*, *12*(2), 103. https://doi.org/10.3390/educsci12020103

Vitiello, V. E., Greenfield, D. B., Munis, P., & George, J. L. (2011). Cognitive flexibility, approaches to learning, and academic school readiness in Head Start preschool children. *Early Education & Development*, *22*(3), 388-410. https://doi.org/10.1080/10409289.2011.538366

Walker, S., Fleer, M., Veresov, N., & Duhn, I. (2020). Enhancing executive function through imaginary play: A promising new practice principle. *Australasian Journal of Early Childhood, 45*(2), 114-126. https://doi.org/10.1177/1836939120918502

White, R. E., & Carlson, S. M. (2021). Pretending with realistic and fantastical stories facilitates executive function in 3-year-old children. *Journal of Experimental Child Psychology, 207*, 105090. https://doi.org/10.1016/j.jecp.2021.105090

Yeniad, N., Malda, M., Mesman, J., van IJzendoorn, M. H., Emmen, R. A., & Prevoo, M. J. (2014). Cognitive flexibility children across the transition to school: A longitudinal study. *Cognitive Development*, *31*, 35-47. https://doi.org/10.1016/j.cogdev.2014.02.004

Zelazo, P. D. (2006). The dimensional change card sort (DCCS): A method of assessing executive function in children. *Nature protocols*, *1*(1), 297-301. https://doi.org/10.1038/nprot.2006.46