

Original Research

Patterns Of Relationships Between Verbal Memory, Language, And Verbal Intelligence In Preschoolers

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ABSTRACT

Background: *This study aims to identify whether language can be the mediator of the relation between verbal memory and verbal intelligence*

Methods: *The participants that involved in this study are 51 preschool-age children in Pekanbaru, consisting of males (n=24) and females (n=27), ages four to six years. Cluster sampling technique was used to collect the sample. The abilities of verbal memory, language and verbal intelligence were assessed towards each participant individually. Wechsler Preschool and Primary Scale of Intelligence, Test of Auditory Processing Skill 3 and Developmental Profile 3 were assigned as the instrument of the test conducted in this study. Data analysis in this study uses mediator analysis.*

Results: *This study found a positive correlation between verbal memory and verbal intelligence ($r = 0.53$; $p < .05$), language and verbal intelligence ($r = 0.71$; $p < .05$), language and verbal memory ($r = 0.64$; $p < .05$).*

Conclusion: *According to the result of the analysis, it is evident that language can be the mediator of the relation between verbal memory and verbal intelligence.*

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INTRODUCTION

Verbal intelligence is a subset of intelligence defined as the ability to recall information obtained (Lombardino, 2011). This ability is very important for academic achievement and has been considered to be used as a predictor of academic ability because of the positive correlation between verbal intelligence and academic ability (Flanagan & Kaufman, 2009).

Based on the literature review, this ability can be influenced by verbal short-term memory and language skills. Baddeley (2000) in the model of working memory explains that verbal information stored in long-term memory is a representation of verbal intelligence. In line with Martin & Brownell (2005) in their study of a typical child population which showed that verbal memory had a positive correlation with verbal intelligence. The higher the verbal memory ability, the higher the verbal intelligence. Furthermore, research by Flanagan and Kaufman (2009) on a typical child

population explains that there is a positive relationship between language ability and verbal intelligence.

The relationship pattern of verbal memory and verbal intelligence in the typical child population is different when referring to the atypical child population. Children with dyslexia have verbal memory deficits but do not have verbal intelligence deficits (De Clercq-Quaegebeur et al., 2010; Taruna & Syaf, 2018). However, children with language deficits always have verbal intelligence deficits (Pennington, 2009), considering that verbal intelligence is an ability that depends on language skills (McGrew, 2009).

The relationship between verbal memory and verbal intelligence is an indirect relationship. That is, the relationship between verbal memory and verbal intelligence is mediated by other factors that also have a positive correlation with verbal intelligence, one of which is language skills (Flanagan & Kaufman, 2009).

This study will provide a specific description of the direct and indirect correlation patterns between verbal memory, language, and verbal intelligence. Previous studies have only described a direct relationship between verbal memory, language, and verbal intelligence, like research Flanagan and Kaufman, (2009).

MATERIALS AND METHOD

This research is a descriptive quantitative research. This research was conducted from August 2021 to September 2021. The research process and data collection were approved by four preschool educational institutions in Pekanbaru, Riau (Indonesia). Participants in this study amounted to 51 preschool children. All participants attend Kindergarten in Pekanbaru City.

The sample selection technique in this study used cluster sampling. Verbal memory ability, language, and verbal intelligence in each child are individually assessed using the Wechsler Preschool and Primary Scale of Intelligence, Test of Auditory Processing Skill, and Developmental Profile 3. Wechsler Preschool and Primary Scale of Intelligence reliability in measuring intelligence ability verbal ranges from 0.86 to 0.96 (Strauss, Sherman, & Spreen, 2006). Furthermore, the reliability of the Test of Auditory Processing Skill in measuring verbal memory ability ranges from 0.82 to 0.87 (Martin & Brownell, 2005). Lastly, the reliability of Developmental Profile 3 in measuring language skills is 0.83 (Alpern, 2007).

Data analysis in this study used mediator analysis techniques with JASP. JASP is a free and open-source program for statistical analysis supported by the University of Amsterdam. The data analyzed is standard score type data. Verbal memory and spoken language assessment data were interpreted by speech therapists. Meanwhile, interpretation of verbal intelligence assessment data was carried out by experienced psychologists.

RESULTS

Fifty-one subjects were involved in the study, 24 males (47.1%) and 27 females (52.9%) (Table 1). One subject with the age of four years (2%), the age of five years as many as 24 children (47.1%), and the age of six years as many as 26 children (51%) (Table 2). Based on descriptive analysis, verbal memory, language, and verbal intelligence were on average performance based on the bell curve (Table 3).

Based on Table 4, it can be seen that verbal memory is correlated with verbal intelligence ($r = 0.53$; $p < .05$), language is correlated with verbal intelligence ($r = 0.71$;

$p < .05$), and language is correlated with verbal memory ($r = 0.64$; $p < .05$). Furthermore, based on Table 5 it can be seen that language mediates the correlation between verbal memory and verbal intelligence (indirect effect = 0.456; $p < .05$). Then, in Table 6 it can also be seen the significance value of the direct effect (direct effect = 0.156; $p > .05$). Referring to this, language becomes a perfect mediator variable on the correlation between verbal memory and verbal intelligence (Figure 1).

Table 1. Description by gender

Gender	Total	Percentage
Male	24	47.1%
Female	27	52.9%
Total	51	100%

Table 2. Description by age

Age	Total	Percentage
4 years	1	2%
5 years	24	47%
6 years	26	51%
Total	51	100%

Table 3. Variable description

Variable	Mean (SD)
Verbal memory	92,05 (8,84)
Language	95,23 (5,77)
Verbal intelligence	89,98 (10,03)

Table 4. Correlation Analysis

Correlation Analysis	Verbal intelligence	Verbal memory	Language
Verbal intelligence	-		
Verbal memory	$r 0.53 (p < .001)$	-	
Language	$r 0.71 (p < .001)$	$r 0.64 (p < .001)$	-

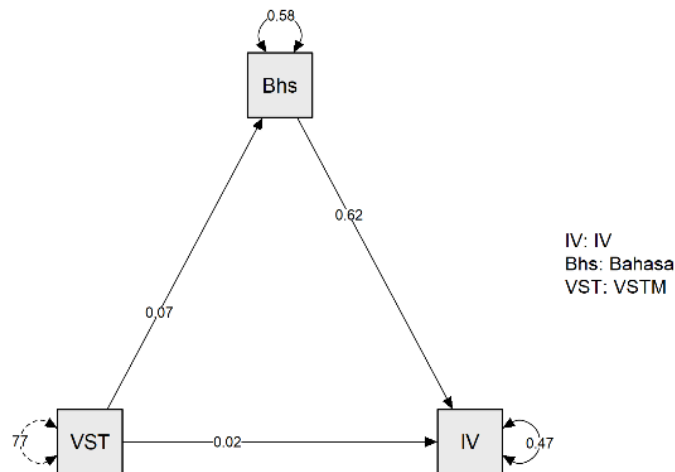
Table 5. Indirect Effects

Indirect Effects	Estimate	p
Verbal memory > language > verbal intelligence	0.456	<.001

Table 6. Direct Effects

Direct Effects	Estimate	p
Verbal memory > verbal intelligence	0.156	0.277

Figure 1. Path analysis



DISCUSSION

This study aims to determine the relationship pattern of verbal memory, language, and verbal intelligence. By knowing the pattern of the relationship between the three variables, the phenomenon of the difference in the pattern of the relationship between verbal memory and verbal intelligence in typical and atypical populations can be explained.

In the first finding, this study found that there is a positive correlation between verbal memory and language. This finding can be explained using memory theory which has explained that verbal memory is related to language ability (Baddeley, 2003). Another study on the topic of memory also found that verbal memory is a very important memory skill for language skills (Jordan et al., 2013; Bosman & Janssen, 2017; Linck et al., 2014; Morales et al., 2013; Pascale & de Abreu, 2011).

The second finding, this study found that language significantly affects verbal intelligence abilities. The higher the language ability, the higher the verbal intelligence ability. In harmony with Jordan et al. (2013) who in their research found that language skills also have a significant effect on verbal intelligence, such as comprehension, vocabulary, and similarities. Another study also explains that language skills are important in verbal intelligence performance (Ehman et al., 2017; Goldin-Meadow et al., 2014).

Schipolowski et al. (2014) in his research explains that language is the main factor that constructs verbal intelligence abilities. In addition, it is also known in neuroscience that language skills and verbal intelligence are controlled by the same hemisphere, namely the left hemisphere (Schoenberg & Scott, 2011; Willerman et al., 1992; Nagel et al., 2013; Raja Beharelle et al., 2010; Riès, S. K., Dronkers, N. F., & Knight, 2016).

The third finding in this study is the relationship between verbal memory and verbal intelligence. In line with the results of research by Schneider and Niklas (2017), there is a significant relationship between verbal memory and verbal intelligence. The higher the verbal memory ability, the higher the verbal intelligence ability (Castles, 2011; Schneider et al., 2017).

The last finding, this study explains that in order to understand the relationship between verbal memory and verbal intelligence comprehensively, researchers and practitioners should always consider language ability as a mediator of the relationship between the two variables. Research by Schneider and Niklas (2017) and Martin and

Brownell (2005) in assessing the relationship between verbal memory and verbal intelligence does not include language variables. Thus, the findings found that the direct relationship between verbal memory and verbal intelligence was significant.

The results of previous studies related to the relationship between verbal memory and verbal intelligence basically cannot be used to explain the phenomenon of children who have verbal memory deficits but do not have verbal intelligence deficits (Giofrè et al., 2016). However, if researchers and practitioners include language variables as a mediator of the relationship between verbal memory and verbal intelligence, then the nature of the direct relationship between verbal memory and verbal intelligence becomes insignificant, because the second relationship is mediated by language ability.

CONCLUSION

This study specifically finds that the relationship between verbal memory and verbal intelligence is indirect, because it must be mediated by other variables, namely language skills. Based on this research, it can be concluded that language is empirically proven to be a perfect mediator on the relationship between verbal memory and verbal intelligence. Further research with a large sample is needed in this study for generalization purposes.

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