



EVALUATION OF THE RELEVANCE OF PIAGET'S COGNITIVE PRINCIPLES AMONG PARENTED, ORPHAN AND DEAF AND DUMB CHILDREN IN TAMIL NADU, INDIA: A COMPARATIVE STUDY

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ABSTRACT

Cognitive development refers to mental development, which not only includes intelligence but also perception, recognition, recall and interpretation of information along all forms of reasoning. Therefore, for efficient communication with a child, it is necessary to understand his/her intellectual level. Total number of 520 children were screened among which 180 children were included in the study. The children from each category were divided into 4 including Group I (Deaf and dumb children), Group II (Orphaned children), Group III (Single parented children), Group IV (Parented children) Two experiments were carried out in the children to assess the classical characteristics of Piaget's Cognitive development and the third experiment was that of Vygotsky's Zone of Proximal Development in cognitive development. This study has emphasized more on the influence of attachment patterns and communication on cognitive development of children. It can be concluded that Parented Children observed a greater number of responses related to Piaget's and Lev Vygotsky's principal among age group of 4 to 7 years and there was no overall association present between both the Piaget's and lev Vygotsky's experiments.

KEYWORDS

Cognitive Development, Vygotsky's Theory, Attachment Patterns.

INTRODUCTION

Child psychology helps in understanding the normal and abnormal psychological patterns of a child and can help parents understand how to communicate and connect with their child, teach their child coping mechanisms for managing emotions, and help the child progress and thrive in each new developmental stage. Cognitive development refers to mental development, which not only includes intelligence but also perception, recognition, recall and interpretation of information along all forms of reasoning. Therefore, for efficient communication with a child, it is necessary to understand his/her intellectual level.¹

Children attachment patterns are highly influenced by those of their parents. The attachments of both child and parents affect children's physical, developmental, psychological, and behavioral well-being. It also plays an important role in the developmental cognition of a child.² Piaget viewed the child as a little scientist actively exploring his/her world and the driving force for this behavior was curiosity. Piaget termed real curiosity as "intelligent experimentation." Children transform from one stage to another when they reach the appropriate maturation level and have been exposed to certain relevant experiences.³ In the dental office, the child constructs his/her knowledge about dentistry by observing, touching, handling and working with dental instruments and equipment's. Behavior prediction, oral health education and motivation are some of the most common challenges faced by a pediatric dentist. These characteristic cognitive principles have not been assessed in a dental setting. Research on the cognitive development of the child and its application to dental health care can enable pediatric dentists to better understand, approach and deliver improved quality of care to children.⁴

MATERIALS AND METHOD

The observational study was carried out after obtaining IRC approval (IRC-0506112020/T/9) Total number of 520 children were screened, among which 180 children were included in the study. The children from each category were divided into 4 groups between the age 4 to 7 years.

Group 1: Deaf and Dumb Children

- Group 1a: 4 to 5 years (N=15)
- Group 1b: 5 to 6 years (N=15)
- Group 1 c: 6 to 7 years (N=15)

Group 2: Orphan Children

- Group 2a: 4 to 5 years (N=15)
- Group 2b: 5 to 6 years (N=15)
- Group 2c: 6 to 7 years (N=15)

Group 3: Single Parented Children

- Group 3a: 4 to 5 years (N=15)
- Group 3b: 5 to 6 years (N=15)
- Group 3c: 6 to 7 years (N=15)

Group 4: Parented Children

- Group 4a: 4 to 5 years (N=15)

- Group 4b: 5 to 6 years (N=15)
- Group 4c: 6 to 7 years (N=15)

Inclusion Criteria

- Children between the 4 – 7 years of age
- Child residing with both parents
- An orphaned child
- Child with a single parent residing in orphanage

Exclusion Criteria

- Specially abled children
- Children and parents not willing to give consent for participation in the study.

Two experiments were carried out in the children to assess the classical characteristics of Piaget's Cognitive development and the third experiment was that of Vygotsky's Zone of Proximal Development in cognitive development

It included:

- Cognitive Egocentrism
- Concept of Conservation
- Zone of Proximal Development

All the experiments were observed among children according to the groups and their sub categories related to the children age.

Three Mountain Task¹:

This experiment was carried out to evaluate the Egocentric nature of a child at different age category between all the three group. The child was made to sit on one side of the table with a doll placed on the other side of the table on which three mountains of different heights were placed. The child was asked to point out the biggest mountain out of the three. The child was also asked to select one photograph from a series indicating the tallest mountain from the dolls view. If a child picked a picture reflecting their own view rather than the doll's view, then it was noted as he/she was unable to understand another person's point of view and was thus egocentric. The responses included:

1. Childs Point of View
2. Childs Viewing From the Dolls Point of View

Beaker Experiment⁴: Conservation tasks test a child's ability to see that some properties are conserved or invariant after an object undergoes physical transformation. The concept of conservation was assessed by the beaker experiment. The child was presented with the same amount of liquid in two identical beakers. The liquid was poured from one beaker into a third thinner and taller beaker. Then the child was asked to identify the beaker that contained more amount of liquid. If the child pointed out the taller beaker as the one containing more liquid, then he/she was considered to lack the concept of conservation. The responses included:

1. Tallest beaker will have more water
2. Both have equal water

Puzzle Experiment⁴:

The experiment was based on the principle of Lev Vygotsky's on the zone of proximal development (1962). In this experiment three puzzle games including Shape block puzzles, Picture puzzles and Cross-word puzzles game were given to all the groups. All the children were taught to play with the puzzles and after the task they were asked to do by themselves, it was checked whether they were able to complete the task by themselves after proper assistance and encouragement. Their responses included:

1. Correct answer
2. Wrong answer

The three experiment was carried in Parented, Orphaned, Single parented children and Deaf and dumb children's groups among the three categorised age of 4-5 years, 5-6 years and 6-7 years children.

Data regarding responses to various experiments and puzzles were entered into Microsoft Excel and analysed using IBM SPSS Statistics for Windows, Version 20 (IBM Corp., Armonk, N.Y., USA). Data was investigated for normality using the Shapiro-Wilk test and assessed a normal distribution and a data deviated from the normal distribution ($p \leq 0.05$).

DISCUSSION

Children learn to use language to convey ideas to others and their representational skills advance during the preoperational stage. Children spend the majority of the pre-school years in the preoperational stage. These years mark a significant shift in a child's cognitive development because their capacity for reasoning has significantly increased. These intuitively developing children presents a challenge to dentists since they may have behavior control issues⁵

The Main Characteristic Features Seen During This Phase Include:

- Cognitive egocentrism is the inability to understand the perspective of another person.
- Concept of centration is the tendency to focus, only on one aspect of a situation and other aspects of the situation are ignored.
- Concept of conservation explains that as long as nothing is added or subtracted two equal physical quantities remain equal even if the appearance is changed.⁶

Table 1 Prevalence of Egocentrism Based on Mountain Experiment in Children of Different Age Groups

Groups	Mountain experiment		Total	Chi-square test value	p-value
	Wrong Answer	Right Answer			
Group I					
Deaf & Dumb Children					
4-5 years	15(100%)	0(0%)	15	8.870	0.000*
5-6 Years	15(100%)	0(0%)	15		
6-7 Years	11(73.3%)	4(26.7%)	15		
Group II					
Orphan Children					
4-5 years	15(100%)	0(0%)	15	4.615	0.099
5-6 Years	13(86.7)	2(13.3)	15		
6-7 Years	11(73.3%)	4(26.7%)	15		
Group III					
Single Parent Children					
4-5 years	15(100%)	0(0%)	15	5.777	0.056
5-6 Years	12(80%)	3(20%)	15		
6-7 Years	10(66.7%)	5(33.3%)	15		
Group IV					
Parented Children (Control)					
4-5 years	15(100%)	0(0%)	15	8.514	0.014*
5-6 Years	13(86.7%)	2(13.3%)	15		
6-7 Years	9(60%)	6(40%)	15		

Table 2 Prevalence of Lack of Conservation Based on Beaker Experiment in Children of Different Age Groups

Groups	Beaker Experiment		Total	Chi-square test value	p-value
	Wrong Answer (Lack of conservation)	Right Answer			
Group I					
Deaf & Dumb Children					
4-5 years	15(100%)	0(0%)	15		

5-6 Years	15(100%)	0(0%)	15		
6-7 Years	15(100%)	0(0%)	15		
Group II					
Orphan Children					
4-5 years	15(100%)	0(0%)		2.045	0.360
5-6 Years	15(100%)	0(0%)			
6-7 Years	14(93.3%)	1(6.7%)			
Group III					
Single Parent Children					
4-5 years	15(100%)	0(0%)	15	1.047	0.593
5-6 Years	14(93.3%)	1(6.7%)	15		
6-7 Years	14(93.3%)	1(6.7%)	15		
Group IV					
Parented Children (Control)					
4-5 years	15(100%)	0(0%)	15	8.780	0.012*
5-6 Years	15(100%)	0(0%)	15		
6-7 Years	11(73.3%)	4(26.7%)	15		

Table 3 Responses Based on the Shape Puzzle in Children of Different Age Groups

Groups	Puzzle 1 – Shape Puzzle		Total	Chi-square test value	p-value
	Right answer	Wrong answer			
Group I					
Deaf & Dumb Children					
4-5 years	13(86.7%)	2(13.3%)	15	4.186	0.123
5-6 Years	15(100%)	0(0%)	15		
6-7 Years	15(100%)	0(0%)	15		
Group II					
Orphan Children					
4-5 years	14(93.3%)	1(6.7%)	15	2.045	0.360
5-6 Years	15(100%)	0(0%)	15		
6-7 Years	15(100%)	0(0%)	15		
Group III					
Single Parent Children					
4-5 years	14(93.3%)	1(6.7%)	15	2.045	0.360
5-6 Years	15(100%)	0(0%)	15		
6-7 Years	15(100%)	0(0%)	15		
Group IV					
Parented Children (Control)					
4-5 years	15(100%)	0(0%)	15	-	-
5-6 Years	15(100%)	0(0%)	15		
6-7 Years	15(100%)	0(0%)	15		

Table 4 Responses Based on the Picture Block in Children of Different Age Groups

Groups	Puzzle 2 – Picture Block		Total	Chi-square test value	p-value
	Right answer	Wrong answer			
Group I					
Deaf & Dumb Children					
4-5 years	5(33.3%)	10(66.7%)	15	12.206	0.002*
5-6 Years	7(46.7%)	8(53.3%)	15		
6-7 Years	14(93.3)	1(6.7%)	15		
Group II					
Orphan Children					
4-5 years	7(46.7%)	8(53.3%)	15	5.431	0.066
5-6 Years	9(60%)	6(40%)	15		
6-7 Years	13(86.7%)	2(13.3%)	15		
Group III					
Single Parent Children					
4-5 years	5(33.3%)	10(66.7%)	15	11.534	0.003*
5-6 Years	9(60%)	6(40%)	15		
6-7 Years	14(93.3%)	1(6.7%)	15		
Group IV					
Parented Children (Control)					
4-5 years	7(46.7%)	8(53.3%)	15	7.800	0.020*
5-6 Years	9(60%)	6(40%)	15		
6-7 Years	14(93.3%)	1(6.7%)	15		

In the current study the children aged 4-7 years were included as they belong to intuitive stage of the preoperational period in the second period of Piaget's conceptual intelligence. This is supported by Asokan S, Surendran S, Asokan S, Nuvvula S (2014) study that evaluated the applicability of Piaget's cognitive principles in children between the ages of 4 and 7 years and reported that the majority of children between these two age ranges exhibited the Piaget-explained distinctive qualities of egocentrism and lack of conservation.²

Table 5 Responses Based on the Cross-Words in Children of Different Age Groups

Groups	Puzzle 3 – Cross words		Total	Chi-square test value	p-value
	Right answer	Wrong answer			
Group I					
Deaf & Dumb Children					
4-5 years	0(0%)	15(100%)	15	23.036	0.000*
5-6 Years	8(53.3%)	7(46.7%)	15		
6-7 Years	13(86.7%)	2(13.3%)	15		
Group II					
Orphan Children					
4-5 years	0(0%)	15(100%)	15	20.893	0.000*
5-6 Years	9(60%)	6(40%)	15		
6-7 Years	12(80%)	3(20%)	15		
Group III					
Single Parent Children					
4-5 years	1(6.7%)	14(93.3%)	15	9.921	0.000*
5-6 Years	9(60%)	6(40%)	15		
6-7 Years	13(86.7%)	2(13.3%)	15		
Group IV					
Parented Children (Control)					
4-5 years	1(6.7%)	14(93.3%)	15	23.940	0.000*
5-6 Years	10(66.7%)	5(33.3%)	15		
6-7 Years	14(93.3%)	1(6.7%)	15		

Table 6 Association Between Piaget's (Mountain and Beaker Experiment to Lev Vygotsky's (Shape Puzzle, Picture Block and Crosswords experiments).

Spearman's Rho			Vygotsky's Puzzle Experiments		
			Puzzle 1 Shape puzzle	Puzzle 2 Picture block	Puzzle 3 Cross word puzzle
Piaget's Experiment	Mountain experiment	Correlation Coefficient	0.062	-0.076	-0.063
		p-value (2-tailed)	0.409	0.311	0.399
	Beaker experiment	Correlation Coefficient	0.030	-0.083	-0.029
		p-value (2-tailed)	0.686	0.269	0.702

Almomani F et al (2021)⁷ in the study stated that the main crucial domains associated with cognitive deficits was hearing loss. Orphaned children are the individuals who face many challenges and fail to obtain social cognition from the environment. The influence of culture and social variables on cognitive development was given by Lev Vygotsky (1978). The earliest learning is influenced by a number of social and psychological factors around the child which modifies the child's intellectual thinking.⁷

In the present study it was noted that the presence of egocentrism was more prevalent in 4-5 years old children in all the groups. There was a gradual and uniform reduction in the prevalence of the characters which is similar to the study given by Taylor J (1996) in his study also stated that prevalence of egocentrism in children was more in younger children and as the age increases there was a decrease in the egocentric characteristic.⁸

In the present study a significance difference was observed in the Parented children group, followed by deaf and dumb group, single parented and orphaned children. Hence in this study the parental presence showed a higher influence on the cognitive development. This was observed in the study by M Badakar C, J Thakkar P, M Hugar S, Kukreja P, G Assudani H, Gokhale N (2017)⁹.

Lev Vygotsky in the zone of proximal development describes how the cognitive growth occurs in children. Vygotsky felt that a developmental measure was needed to better assess children's educational potential than considering a child's potential by static measure such as obtaining an IQ score. He stated that adults' guidance plays an important role in the cognitive development of a child which is obtained from the zone of proximal development.¹⁰

In the present study three puzzle games including Shape block puzzles, Picture puzzles and Cross-word puzzles game were given to Parented, Orphaned, Single parented children and Deaf and dumb children's groups. It is similar to the study by Freund LS (1990) who also conducted the same experiment on the puzzle game. He concluded that

guided learning within the zone of proximal development led to greater understanding and improving performance than working alone. Playing with shapes and picture blocks helps children in developing their vocabularies, it improves math skills, and it also teaches them about gravity, balance, and geometry. These puzzle games improve children on the mental ability to correlate with colours, shapes, and sizes which improves their Zone of Proximal development.¹⁰ YK Sari, W Sukartiningsih, and M Jannah (2018) stated that puzzle games help in developing memory skills, it also provides an ability to plan, to test various ideas and solve problems. While completing a puzzle game, children need to remember different shapes, colours, positions and strategies to complete them. These experience in completing a puzzle will help children to learn on accepting challenges and overcoming problems.¹¹ Similar study by Saul Mcleod (2022)¹² stated that assisted learning in the zone of proximal growth was superior to working alone in terms of understanding and performance which increases as the age increases. It was stated that social interaction also plays an important role in cognitive development. An interesting observation from the present study was that Zone of proximal development was higher in Parental presence (Parented, Deaf and dumb children) when compared to single parented and orphaned children it was found that at 4-5 years all groups showed egocentrism and lack of conservation and the children responded rightly for the puzzle experiments were more in Parented children group. Vygotsky LS (1978)¹⁴ stated that the Zone of proximal development refers to the help or guidance received from an adult or more competent peer. In the present study there was a significant increase in the children responding to the puzzle experiment after a proper training given to solve the puzzle which was based on the Lev Vygotsky's zone of proximal development. It was found that in all the puzzle experiment, parented children showed higher right responses when compared to other groups. There was no overall association present between Piaget's principles and Lev Vygotsky's principles. The relevance between Piaget's and Lev children among all the groups cannot not be compared with any other studies as limited literature is available on the studies related to the experiments by Piaget's and Lev Vygotsky's cognitive principles.

CONCLUSION

The conclusions drawn from the study are that, with the increase in age:

- The egocentric characteristics decreased in Mountain experiment.
- Lack of conservation decreased in Beaker experiments.
- Children responded with right answers in puzzle experiments
- Piaget's cognitive principles was appreciated in most of the children across the age groups.
- Lev Vygotsky's Zone of proximal development was observed in parented group, followed by Deaf and Dumb, Single Parented and Orphaned children.

In the limitations of the current study, overall relevance was not observed and further studies are required on a larger sample size to provide a confirmatory relation on the relevance of cognitive principles between Piaget's theory and Lev Vygotsky's theory.

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