

RELATIONSHIP BETWEEN SOCIAL INTERACTION AND MEMORY DEVELOPMENT AMONG ADOLESCENTS IN SECONDARY SCHOOLS IN KADUNA NORTH

OBAINOKE EDITH AYOWIE, OVIE OBOATARHE AKISE, DAVID MARKUS SHEKWOLO & JONATHAN IORNENGE UGESE

Department of Psychology, Nigerian Defence Academy, Kaduna.

Mobile Number: =23407068447288

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ABSTRACT

This study investigated the relationship between social interaction and memory development among adolescents in secondary schools in Kaduna North. The study employed a survey design using two instruments Working Memory Questionnaire (WMQ) and Social Interaction Scale to collect data from some selected secondary schools in Kaduna North of Kaduna State, Baptist Secondary School Taiwo Road, Adeyemo Secondary School, Katsina Road, and Government Secondary School Independent Way, Kaduna North. Random sampling technique was used to select male and female participants from the ages of 11-20 years respectively in the class of JSS 3- SS 3. Two hypotheses were tested. Hypothesis one revealed that social interaction significantly correlated with students' retrospective functioning ($r = .200$; $P < .01$). In other words, the hypothesis was partly confirmed in this study. Hypothesis four results revealed no statistically significant $t(174) = -0.018$, $P > 0.05$ difference between male and female students in social interaction in Kaduna State. In other words, this hypothesis was not confirmed significant in this study. We concluded and recommended that there is a partly significant relationship between social interaction and memory development among adolescents in Secondary Schools in Kaduna State. There should be communication in the family between the parents and children as communication is the central quality of the human social environment.

Keyword: Social Interaction, Memory Development, Adolescents and Secondary Schools.

1.0 INTRODUCTION

To appreciate the ontogenesis of social interaction and mental development, it is crucial to comprehend how children learn the earliest social phenomena. Effective social interaction is founded on underlying assumptions that are widely held, or on our impression of the roles that are expected to perform in a specific engagement, and these assumptions can readily be overturned if one has the guts to do so. If they are violated, social order may very easily fall apart, as you would quickly learn if you ventured to inquire about children's well-being or if two students in the class refused to do their given academic task (Clark & Kinney, 2006).

The social interactions that babies and early children have with other people have a significant impact on how well their memories develop. A child's brain develops as a result of social contact. How they view themselves in relation to other individuals, objects, and mental

processes. Every day, second by second, infants, children, and adults connect with each other in social ways, talking with and reacting to each other's intents, wants, and meanings. The matching and mismatching of intentions and meanings distinguishes the mutual regulating process, notwithstanding the difficulty of this process. Social contact is important in people's lives from the very beginning because newborns connect with their caregivers and form the emotional bond that forms the basis for future relationships. Through social interaction, children learn how to play, converse, and act in certain circumstances. Berk (2009) presented a synopsis of the research that focuses on early attachment and the importance of it. After analyzing the effect of social connection on child development in the early years, the article will go into more depth about the impact of social interaction on the development of cognition. The word "memory development," according to Lee & Gupta (2019), refers to the acquisition and development of knowledge and cognition, namely the processes of memory, language, problem-solving, and drawing. Three main areas of cognitive development may be distinguished: children's object knowledge, their ability to mimic caregivers, and their capability to hold representations of the outside world (Oates, Wood & Grayson, 2005). All of these characteristics have an impact on how children's brains develop, and they also serve to explain how social interactions and behaviors affect how children learn. The study piece will focus on peer connections as well as social interactions between children and their caretakers. This research seeks to make the case that social contact is a crucial part of a child's cognitive development and cannot be overemphasized.

Early encounters with other individuals help children develop their sense of the world. Through engaging in simple daily activities with their caregivers, children acquire new skills and learning strategies, they widen their existing knowledge, and they get new experiences. It's amazing to learn more about how young toddlers interact socially in different groups (Clark & Kinney, 2006). While not all children's cognitive capacities completely develop, social involvement fosters and hastens the process. The principle behind the documentation method is that "decisions affecting children's learning and development should be made with children in mind" (Clark & Kinney, 2006). With the support of this method, adults are better able to comprehend children and make the appropriate changes or differences in their life. Children's voices, opinions, and understanding are heard. In the Mosaic method, kids are encouraged to "explore their viewpoints" (Clark & Kinney, 2006). This strategy values young people as social participants. People who live in a social environment and whose "interactions matter." The manner in which a kid interacts with others in social and educational settings is a crucial component of this development. It focuses on how a child's values develop and evolve. Additionally, if the child is morally grounded from a young age till adulthood (Trawick-Smith, 2014). Piaget and Kohlberg are the two thinkers who have an impact on this. Learning values is referred to as social development.

These environments are closely connected to particular routines, activity settings and relationships and relate to the quality of the setting. The issue of quality is known to influence long-term cognitive and behavioural development as 'children who attended low quality pre-schools had cognitive and behavioural scores that were not significantly different from those of children with no pre-school experience' (Sylva et al., 2011). Furthermore, access to early year's education has been shown to have benefits for children's outcomes, particularly for disadvantaged children (Melhuish, 2004). This relationship led the previous UK Labour Government to support increased access to early education provision for young children,

especially those between 2 and 4 years of age. There has also been recognition that this provision should be of a high quality, rather than being based on amount of exposure to this experience

Male and female children with good memory do not typically report having social issues, but parent, teacher, and peer reports are very consistent in attesting to their troubles with peer relationships (Vander Oord et al. 2005). For instance, after only 1 minute of observation, typically developing children rate children with memory and learning issues as less popular and less competent than their peers (Bickett & Milich 1990), and after only 30 minutes of interaction, peers criticize and reject children with underdeveloped memory (Boo & Prins 2007).

For kids with poor memory, issues with creating and maintaining peer relationships start in childhood and last into adolescence (Bagwell et al. 2001) and adulthood (Friedman et al, 2003). These issues are indicators of a variety of unfavorable outcomes, such as substance misuse, delinquent behavior, and academic failure (Mikami & Hinshaw, 2006). Recent reviews are highly consistent in attributing social problems in children with underdeveloped memory to a performance deficit rather than a knowledge deficit (Boo & Prins, 2007; Huang-Pollock et al. 2009).

1.1 Statement of the Problem

The three parts of memory—a sensory processor, short-term (or working) memory, and long-term memory—are commonly described as an information processing system with both explicit and implicit functioning. The neuron may be important here. The sensory processor allows for varying degrees of attention and intent to be attended to while allowing the experience of information from the outside world to be interpreted as chemical and physical impulses. Working memory functions as an encoder and retrieval processor. Working memory encodes information depending on inputs in accordance with explicit or implicit functions. The subject of teenage memory development is highly significant, especially in contemporary culture. The frightening pace at which children are failing has alarmed parents and the general public. According to studies, the majority of children who experience insufficient pleasant social connections have trouble developing their memories (Huang Pollock et al. 2009). The current DSM-IV diagnostic criteria, which include multiple symptoms of poor social behavior (such as difficulty waiting for one's turn, difficulty listening to others, and frequent interrupting), reflect the understanding that these problems are important aspects of the disease (APA, 2000).

Children with good memories both male and female rarely report experiencing social challenges, but reports from parents, teachers, and peers are very consistent in attesting to their difficulties in maintaining close relationships with their peers (Vander Oord et al. 2005). For instance, typical development children rate children with memory and learning issues as less popular and less competent than their peers after only one minute of observation (Bickett & Milich, 1990), and after just thirty minutes of interaction, peers criticize and reject children with underdeveloped memory (Boo & Prins 2007). Peer connections are difficult for children with weak memories to establish and sustain, and these difficulties persist throughout adolescence and adulthood (Bagwell et al., 2001). (Friedman et al, 2003). The presence of these

problems is a warning sign for a number of undesirable consequences, including drug abuse, delinquent conduct, and academic failure (Mikami & Hinshaw, 2006). Recent studies are quite consistent in linking performance deficits rather than knowledge deficits to social issues in kids with weak memories (Boo & Prins, 2007; Huang-Pollock et al. 2009). They seem to be aware of social conventions in an age-appropriate way, but they do not allow that understanding dictate how they act with other people. This conclusion is supported by both evidence of improved social interactions with children and adults while receiving psych stimulant treatment without specific social skills training and results of social skills training studies in which children with ADHD demonstrate appropriate social behavior when directed (Boo & Prins, 2007).

1.2 Research Questions

The study will be guided by the following research questions

- i. What is the relationship between social interaction and memory development among adolescents in secondary schools in Kaduna North?
- ii. What is the gender difference in memory development among adolescents in secondary schools in Kaduna North?

1.3 Aim and Objectives of the Study

The study aimed at investigating the influence of social interaction on memory development among adolescents in Kaduna with the following objectives:

- i. To examine the relationship between social interaction and memory development among adolescents in secondary schools in Kaduna North.
- ii. To determine gender difference in memory development among adolescents in secondary schools in Kaduna North.

2.0 METHODS

Design: The research design used in the study was survey design. The survey research method is the study of the characteristics of a sample through questioning that enables a researcher to make generalizations concerning his population of interest. In other words, this research work adopted the survey method which uses questionnaires to capture the case study and seek opinions from its targeted population, so that one can draw conclusions and formulate policies on the subject matter. This design was considered most appropriate for this study because the sample are already incarcerated and somehow coping with the challenge of incarceration although one does not know how they cope with the situation.

Participants: The study participants covered some selected secondary schools in Kaduna North of Kaduna State. The research setting for this studyl includes: Baptist Secondary School Taiwo Road, Adeyemo Secondary School, Katsina Road and Government Secondary School Independent Way both located at Kaduna North, Kaduna State and the demographic data are as follows: The male participants were 115, while the female participants were also 115. This implies that the researcher employed all the gender. From the ages of 11-20 years respectively were selected in the class of JSS 3- SS 3.

Sample Size/ Sampling Technique: The researcher for the purpose of the study adopted the random sampling technique. A sample is a portion of the population which is studied with a view to generalizing the findings from it to the entire population. A sample is a portion of the population which is studied with a view to generalizing the findings from it to the entire population. The study employed random sampling technique to select 230 participants in all the three schools because it intended to get some selected students and all were given an equal chance to be selected for the study.

Instrument: The researchers modified a structured questionnaire for the study. “Working Memory Questionnaire (WMQ) and Social Interaction Scale” are the instruments to be utilized for data collecting. Memory Human Questionnaire (MHQ) was developed by Vallat-Aouvi, Pradat-Diehl and Azouvi (2009). It is a 7 item questionnaire with 14 response option ranging from not at all to Not Relevant. The Psychometric property of the scale was obtained by the authors of Cronbach’s alpha of .94 indicating a very high reliability with the concurrent validity of .90. Social Interaction Scale (SIS) was developed by Lihenderson & Zunbargo (2000). It has 35 items with five (5) response options. The psychometric property was obtained in Nigeria by Omoluabi (2012) with reliability of .93 and validity of .92 respectively. The questionnaire was divided into two parts. Part ‘A’ will contain items on the bio data of the Part ‘B’, contained questions or items on two instruments which were used in this study.

To ensure the validity of the instrument, content validity method of obtaining estimate of validity which requires the adoption of experts were employed. The validation of the instrument was done by submitting the items to the supervisor and colleagues to ensure face and content validity which the researcher effected the corrections to obtain a final draft of the instrument. Administering the instrument to the respondents was followed.

Statistical Technique Used: The statistical tool in which the study that was used to process the data was obtained in the field exercise was a Statistical Package for Social Sciences (SPSS) computer software. The demographic data collected from the respondents were analyzed using descriptive statistics such as simple percentage and frequency counts while the stated research hypothesis was tested using the descriptive statistics used for analyzing the data were Frequency, percentages, means and standard deviations while the inferential statistics used for the test of hypotheses were Pearson Product-Moment Correlation and Independent Sample t-test.

Ethical Considerations: Also, consent of prospective participants were sought after brief explanation of the research. Those who consented were given the questionnaire with assurance of anonymity and confidentiality of responses. Participants were also informed that they were not under any obligation to participate and that they had the right to withdraw at any point they felt inclined to discontinue with the exercise. It was impressed on the participants that there was no right or wrong answers but that they were encouraged to be honest in their responses.

3.0 RESULTS

Table 1: Demographic Characteristics of Participants

Demographic Variables	Frequency	Percentage
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Gender	Male	64	36.4
	Female	112	63.6
	Total	176	100%
Age	10-14 years	110	62.5
	15-19 years	66	37.5
	Total	176	100%

Table 1 presents the demographic characteristics of 176 secondary school students in Kaduna. The study accessed 64 males (36.4%) and 112 females (63.6%), age ranging from 10 to 19 years with a mean age of 13.94 and standard deviation of 1.699; age was further grouped as 10-14 years (N= 110; 62.5%) and 15-19 years (N= 66; 37.5%).

3.1 Test of Hypotheses

Hypothesis 1: There will be a significant relationship between social interaction and memory development among adolescents in Secondary Schools in Kaduna State. This hypothesis was tested using Pearson Product-Moment Correlations in Table .2.

Table 2: Summary of the Inter-Correlational Matric on Social Interaction among Adolescents in Secondary Schools in Kaduna State

Variables	1	2	3	4	5	6	7
Social Interaction	1						
General memory functioning	-.083	1					
Retrospective functioning	.200* *	-.021	1				
Frequency of forgetting	.176*	.036	.403**	1			
Frequency of forgetting during reading	.133	.018	.378**	.657**	1		
Remembering past events	.144	.027	.266**	.380**	.257**	1	
Mnemonics usage	.250* *	.105	.064	.340**	.320**	.112	1

Sig. Level: *P < .05 **P < .01

Table 2, presents the summary results of Pearson Product-Moment Correlation between variables in the study. The analysis revealed that, social interaction significantly correlated with student’s retrospective functioning (r= .200; P < .01), frequency of forgetting (r= .176, P < 0.5) and mnemonic usage (r= .250, P < .01) while others components indicates insignificantly

relationship such as frequency of forgetting during reading ($r = .133, P > .05$), remembering past events ($r = .144, P > .05$) as well as general memory functioning ($r = -.083, P > .05$). Thus, retrospective functioning mediates significantly with frequency of forgetting ($r = .403; P < .01$), frequency of forgetting during reading ($r = .378; P < .01$), remembering past events ($r = .266, P < .01$). Frequency of forgetting mediates significantly with frequency of forgetting during reading ($r = .657, P < .01$), remembering past events ($r = .380, P < .01$), and mnemonic usage ($r = .340; P < .01$) and frequency of forgetting during reading mediates significantly with remembering past events ($r = .257, P < .01$) and mnemonic usage ($r = .320; P < .01$). In other words, the hypothesis was partly confirmed in this study. This implies that only retrospective functioning, frequency of forgetting and mnemonics usage indicates a significant relationship with social interaction among adolescent in Secondary School in Kaduna State.

Hypothesis 2: There will be significant gender difference in memory development among adolescents in Secondary School in Kaduna State. This hypothesis was tested using Independent Sample t-test in table 4.3.

Table 3: Difference between Male and Female on Memory Development among Adolescents in Secondary School in Kaduna State

Memory Development	Gender	N	Mean	Std. Deviation	df	t	Sig.
General memory functioning	Male	64	4.23	1.950	174	-1.040	.300
	Female	112	4.54	1.791			
Retrospective functioning	Male	64	24.66	5.738	174	1.951*	.050
	Female	112	22.76	6.456			
Frequency of forgetting	Male	64	84.88	18.869	174	3.420**	.001
	Female	112	74.88	18.513			
Frequency of forgetting during reading	Male	64	23.83	6.746	174	2.742**	.007
	Female	112	20.81	7.170			
Remembering past events	Male	64	19.23	4.998	174	0.523	.602
	Female	112	18.79	5.729			
Mnemonics usage	Male	64	32.48	9.554	174	0.212	.832
	Female	112	32.18	8.987			

Sig.Level: *P<.05P<.01**

Table 3 shows the summary results of the Independent Sample t-test on the components of memory development among secondary school students in Kaduna State where the results revealed the mean and standard deviation scores for General memory functioning: male (M= 4.23; SD= 1.950) and female (M= 4.54; SD= 1.791); Retrospective functioning: male (M= 24.66; SD= 5.738) and female (M= 22.76; SD= 6.456); Frequency of forgetting: male (M= 84.88; SD= 18.869) and female (M= 74.88; SD= 18.513); Frequency of forgetting during reading: male (M= 23.83; SD= 6.746) and female (M= 20.81; SD= 7.170); Remembering past

events: male ($M= 19.23$; $SD= 4.998$) and female ($M= 19.79$; $SD= 5.729$) and Mnemonics usage: male ($M= 32.48$; $SD= 9.554$) and female ($M= 32.18$; $SD= 8.987$). Furthermore, the results revealed a statistically significant in Retrospective functioning $t(174)= 1.951$, $P < .05$; Frequency of forgetting $t(174)= 3.420$, $P < .01$ and Frequency of forgetting during reading $t(174)= 2.742$, $P < .01$. while the following were not significant General memory functioning $t(174)= -1.040$, $P > 0.05$; Remembering past events $t(174)= 0.523$, $P > 0.05$ and Mnemonics usage $t(174)= 0.212$, $P > 0.05$ have no difference between male and female participants on memory development among adolescents in Secondary School Students in Kaduna State. In other words, this hypothesis was partly confirmed significant in this study. Thus, implies that both male and female participants indicates significant memory development in areas of retrospective functioning, frequency of forgetting and frequency of forgetting during reading which might be link to the gender differences.

4.0 DISCUSSION

The study investigated the relationship between social interaction and memory development among adolescents in secondary schools in Kaduna North. Four hypotheses were stated and tested Using the Statistical Package for Social Sciences (SPSS) version 26 for the data analysis. The descriptive statistics used for analyzing the data were Frequency, percentages, means and standard deviations while the inferential statistics used for the test of hypotheses were Pearson Product-Moment Correlation and Independent Sample t-test. The results in this report were presented in tables. Readers should also note that memory development constitute the general memory functioning, retrospective functioning, frequency of forgetting, frequency of forgetting during reading, remembering past events and mnemonics usage.

Hypothesis one stated that there will be significant relationship between social interaction and memory development among adolescents in secondary school in Kaduna. This hypothesis was tested using Pearson Product-Moment Correlations. The analysis revealed that, social interaction significantly correlated with student's retrospective functioning, frequency of forgetting and mnemonic usage while others components indicates insignificantly relationship such as frequency of forgetting during reading, remembering past events as well as general memory functioning. Thus, retrospective functioning mediates significantly with frequency of forgetting, frequency of forgetting during reading, remembering past events. Frequency of forgetting mediates significantly with frequency of forgetting during reading, remembering past events, and mnemonic usage and frequency of forgetting during reading mediates significantly with remembering past events and mnemonic usage. In other words, the hypothesis was partly confirmed in this study. This implies that only retrospective functioning, frequency of forgetting and mnemonics usage indicates a significant relationship with social interaction among adolescent in Secondary School in Kaduna State. In line with the finding of this stud, Kutnick et al., (2007); Sammons et al., (2008); Sylva et al., (2010), argued in their article that the early years experiences of very young children from disadvantaged backgrounds can be particularly significant in providing social environments which contribute to both social and cognitive enhancement (Kutnick et al., 2007; Sammons et al., 2008b; Sylva et al., 2010). These environments are closely connected to particular routines, activity settings and relationships and relate to the quality of the setting. The issue of quality is known to influence long-term cognitive and behavioural development as 'children who attended low quality pre-schools had cognitive and behavioural scores that were not significantly different from those

of children with no pre-school experience' (Sylva et al., 2011). Furthermore, access to early year's education has been shown to have benefits for children's outcomes, particularly for disadvantaged children (Melhuish, 2004). This relationship led the previous UK Labour Government to support increased access to early education provision for young children, especially those between 2 and 4 years of age. There has also been recognition that this provision should be of a high quality, rather than being based on amount of exposure to this experience

Hypothesis two stated that there will be significant gender difference in memory development among adolescents in Secondary School in Kaduna State. This hypothesis was tested using Independent Sample t-test. The results revealed a statistically significant in Retrospective functioning; Frequency of forgetting and frequency of forgetting during reading. While the following were not significant; General memory functioning; Remembering past events and Mnemonics usage have no difference between male and female participants on memory development among adolescents in Secondary School Students in Kaduna State. In other words, this hypothesis was partly confirmed significant in this study. Thus, implies that both male and female participants indicates significant memory development in areas of retrospective functioning, frequency of forgetting and frequency of forgetting during reading which might be link to the gender differences. Supporting the finding of this study, Male and female children with good memory do not typically report having social issues, but parent, teacher, and peer reports are very consistent in attesting to their troubles with peer relationships (Vander Oord et al. 2005). For instance, after only 1 minute of observation, typically developing children rate children with memory and learning issues as less popular and less competent than their peers (Bickett & Milich 1990), and after only 30 minutes of interaction, peers criticize and reject children with underdeveloped memory (Boo & Prins 2007).

For kids with poor memory, issues with creating and maintaining peer relationships start in childhood and last into adolescence (Bagwell et al. 2001) and adulthood (Friedman et al, 2003). These issues are indicators of a variety of unfavorable outcomes, such as substance misuse, delinquent behavior, and academic failure (Mikami & Hinshaw, 2006). Recent reviews are highly consistent in attributing social problems in children with underdeveloped memory to a performance deficit rather than a knowledge deficit (Boo & Prins, 2007; Huang-Pollock et al. 2009).

5.0 CONCLUSION

According the findings of this study we concluded that social interaction significantly correlate with introspective functioning, frequency of forgetting and mnemonics usage (memory development). Also that there is a partly significant relationship between social interaction and memory development among adolescents in Secondary School in Kaduna State. More so, it was found that there is a partly significant gender difference in memory development among adolescents in Secondary School in Kaduna State.

6.0 RECOMMENDATIONS

At the end of the study we recommend that:

- i. There should be communication in the family between the parents and children as communication is the central quality of the human social environment. Social interaction depends on communication.
- ii. Additionally, these issues make it more challenging for the individual to conform to other rules which he or she had no intention of violating. The individual is placed in an increasingly untenable position in which it becomes increasingly likely they will need to resort to deceit and rule violation.
- iii. Treating a person as though he or she were generally rather than specifically deviant produces a self-fulfilling prophecy, as such there should be equality in the treatment of people in our families, and societies.

REFERENCES

- Bagwell, K.H., Bukowski, W.M., & Parker, J.G. (2001). Peer interactions, relationships and groups. In:
- Eisenberg, N, Damon, W, Lerner, RM (eds) Handbook of Child Psychology: Social, Emotional and Personality Development, vol. 3. Hoboken, NJ: Wiley, pp. 571–645.
- Berk, E.C. (2009). The Effective Provision of Pre-School Education (EPPE) Project: Technical Paper 8b –
- Measuring the Impact of Pre-School on Children’s Social/ Behavioural Development over the Pre-School Period. London: DfES/Institute of Education, University of London.
- Boo, J., & Prins, R. (2007). A factor analytic study of the HOME scale for infants. *Developmental Psychology*, 21: 1196–1203.
- Brickeh, M., & Milich, G. (1990). "Constructing a Language: A Usage-Based Theory of Language Acquisition," Cambridge: Harvard University Press.
- Clark, A., & Kinney, P. (2006). *Listening to young children: the mosaic approach*. 2nd ed. London: National Children’s Bureau.
- Friedman, D.L., & Wolfe, B. (2003). *Child care quality: does it matter or does it need to be improvised?* Special
- Report no. 78. November Madison, WI: Institute of Research on Poverty, University of Wisconsin-Madison.
- Kutnick, P., & Kington, A. (2005). Children’s friendships and learning in school: cognitive enhancement through social interaction? *British Journal of Educational Psychology* 75: 521–538.
- Kutnick, P., Brighi, A., & Avgitidou, S. (2007). The role and practice of interpersonal relationships in European early education settings: sites for enhancing social inclusion,

- personal growth and learning? *European Early Childhood Education Research Journal* 15(3): 379–406.
- Lee, L. R., & Gupta, M. J. (2009). "Short-term retention of individual verbal items". *Journal of Experimental Psychology*. 58 (3): 193–198. CiteSeerX 10.1.1.227.1807. Doi: 10.1037/h0049234.
- Lihenderson, W., & Zunbango, D.S. (2000). *The child in America: Behavior problems and programs*. New York: Knopf.
- Melhuish, E.C. (2004). *A literature review of the impact of early year's provision upon young children, with emphasis given to children from disadvantaged backgrounds*. Report to the Comptroller and Auditor General. London: National Audit Office.
- Mikani, A., & Hinshaw, P., (2006). *Models of working memory. Mechanisms of active maintenance and executive control*. Cambridge University Press. ISBN 0-521-58325-X.
- Oates, R., Purdon, S., & Schneider, V. (2005). *Early education pilot for two year old children evaluation*. Research Brief DCFS-RB134. July. London: Department for Children, Schools and Families.
- Pollock, J.; Husain, M.; Bays, P. M. (2009). "Changing concepts of working memory". *Nature Reviews Neuroscience*. 17 (3): 347–356. doi:10.1038/nn.3655.
- Sammons, P., Sylva, K., & Melhuish, E.C. (2008). *The Effective Pre-School and Primary Education 3–11*
- (EPPE 3–11.) *Project: Influences on Children's Attainment and Progress in Key Stage 2: Cognitive in Year 6*. London: DCSF/Institute of Education, University of London.
- Sammons, P., Kington, A., & Day, C. (2008). *Stories and statistics: describing a mixed method study of effective classroom practice*. *Journal of Mixed Methods Research*, 5(2): 103–125.
- Sylva, K., Melhuish, E.C., & Sammons, P. (2010). *Early childhood matters evidence from the effective Pre-school and primary education Project*. London: Routledge.
- Sylva, K., Melhuish, E.C., & Sammons, P. (2011). *Pre-school quality and educational outcomes at age 11: low quality has little benefit*. *Journal of Early Childhood Research* 9(2): 109–124.
- Trawick, L., Smith, D. (2014). *The challenge of the high scope perry preschool study*. In: Reynolds, AJ, Rolnick,
- AJ, Englund, MM. (eds) *Childhood Programs and Practices in the First Decade of Life: A Human Capital Integration*. New York: Cambridge University Press, pp. 157–167.

- Vallat- Aouvi, R., Karweit, N.L, Wasik, B.A. (2009). Preventing early school failure: Research, policy, and practice. Boston, MA: Allyn & Bacon.
- Vander- Oord, R., Awh, E., & Ma, W.J. (2005). "Factorial comparison of working memory models". *Psychological Review*. 121 (1): 124 149. Doi:10.1037/a0035234. PMC 4159389.