Executive Functioning Skills in School Children

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ABSTRACT

Background: Executive functioning skills are of critical importance for establishing and maintaining organizational skills, behavioural control, and meta-cognitive skills that are needed to function within the school environment, both behaviorally and academically (Dawson & Guare, 2004; Rose & Rose, 2007). It had been proposed by researchers that the identification of needs and appropriately implemented interventions for executive function would ultimately result in better academic achievement, fewer behavioural and organizational problems and fewer educational referrals (Meltzer et al, 2007).

Aim: To study teacher's perception of executive functioning skills in students.

Methodology: The study was a school based cross sectional study which comprised of 90 students. Tools used for the study were Socio-demographic data sheet, General Health Questionnaire- 12, Wisconsin Card Sorting Test (WCST) and Behaviour Rating Inventory of Executive Functioning Skills (BRIEF), Teacher's Rated Form. Statistical analysis of quantitative data was done using Statistical Package of Social Sciences (SPSS for Windows version 16.0).

Result: It had been found that students rated to have better planning/organization and monitoring showed better performance on WCST. Students who were observed to have poor inhibition of behaviour and emotion, poor initiation of task had poor performance on WCST.

Conclusion: Thus, students if helped with executive functioning skills at early ages could have good academic and behavioural achievements.

Keywords: Executive function, teacher, student

INTRODUCTION

In this study, executive functioning is defined as a collection of cognitive processes that are responsible for guiding, directing and managing behaviour toward the pursuit of a goal-directed task as measured by the teacher's perception on the (BRIEF) Behavior Rating Inventory of Executive Function (Gioia, et al; 2000). Executive functioning skills are of critical importance for establishing and maintaining organizational skills, behavioural control, and meta-cognitive skills that are needed to function within the school environment, both behaviourally and academically (Dawson & Guare, 2004; Rose & Rose, 2007).

Executive function is an important factor to consider in school functioning. Early emphasis on executive function is important, because executive functions and theory of mind that can be taught to pre-schoolers (Kloo & Perner, 2008). There is some indication that programs that address executive functions can make a difference in education at the 3-4years old level, even though developmental functions have not matured (Jacobson, 2008). Recent research continues to suggest the need for a developmentally appropriate program with a strong emphasis on play, which enhances learning and development to improve both social and academic success of young children (Jacobson, 2008). Support for executive functions, and not just content support, may increase academic functioning for the students. Many if not most interventions should be directed at executive functioning instead of exclusive content based tutoring. It is predicted that supportive executive function interventions would ultimately result in better academic functioning, use of appropriate strategies and skills for problem solving, better organization, increased feelings of school satisfaction and esteem, less behavioural and emotional concerns, and reduced underachievement including dropout for all students.

METHODOLOGY

Aim: To study teacher's perception of executive functioning skills in children.

Objectives of the study

➢ To study the correlation between the executive functioning skills rated by the teachers with the objective measures.

Hypothesis

➢ There will be no significant correlation between the executive functioning skills rated by the teachers with the objective measures.

Place of the study: The study was conducted in St. Xavier's school Hazaribagh.

Study Design: The study was a school based cross sectional study. The subjects were recruited for the study by randomized sampling technique.

Sampling: The study comprised of 90 students selected randomly from the class. Thirty students from class III, VI & IX were selected. Ten students from each section were selected.

Inclusion Criteria: (For sample from schools)

➢ Students attending school regularly.

➢ Students aged between 8years to <16years.

➢ Students of average intelligence.

➢ Both boys and girls.

➢ Studying in standard III, VI, & IX

➢ GHQ-12 Score ≤ 3

Exclusion Criteria: (For sample from school)

➢ Any psychiatric disorder and physical illness.
➢ GHQ-12 Score >3
➢ Below average intelligence

Tools used in the collection of data:

I.   Socio Demographic and Clinical Data Sheet

II.   General Health Qutionnaire-12 (Goldberg & Williams, 1991)

III. Wisconsin Card Sorting Test (Heaton et al, 1993)

IV.   Behavior Rating Inventory of Executive Functioning Skills (Gioia et al, 2000)

Procedure: Thirty samples each, of students studying in classes three, six and nine were randomly selected from the school and after fulfilling the inclusion criteria but not the exclusion criteria were taken up for the study, after establishing rapport, a clinical interview was held. The school authority and teachers were presented with informed consent and were made to agree to participate in this study. Children were carefully screened for neurological dysfunction, learning disability, emotional disturbance, and attention deficits through an interview prior to testing. At first consent was taken from the parents of each who was investigated for present study. Necessary socio-demographic details were collected and then the General Health Questionnaire-12 was administered to rule out the presence of any mental health problem. Then Wisconsin Card Sorting Test (WCST) was administered on the students, followed by BRIEF teachers' form given to teachers for them to fill it accordingly. The students were instructed beforehand regarding the testing.

Statistical Analysis: Statistical analyses of the quantitative scores were done using Statistical Package for Social Sciences (SPSS for Windows version 16.0). The χ^2 test and Correlation were used for comparison of categorical data.

RESULT

Table-1: Correlation between the scores of WCST and BRIEF for Children of Standard IIIrd

Variables	TA	TC	TE	%E	PR	%PR	PE	%PE	NPE	%NPE	CLR	%CLR	CC	TCC	FMS	LL
In	-	-0.184	0.184	0.149	0.416*	0.411*	0.414*	0.409*	-0.339	-0.366*	-0.060	-0.086	0.054	-0.014	-0.237	0.280
Sh	-	0.078	-0.078	-0.116	-0.139	-0.143	-0.127	-0.126	0.078	0.046	0.175	0.158	-0.065	0.165	0.379*	0.335
EC	-	-0.089	0.089	0.066	-0.006	-0.016	-0.018	-0.35	0.130	0.101	-0.031	-0.051	-0.151	0.214	0.112	-0.033
Inta	-	-0.290	0.290	0.367*	-0.038	-0.026	-0.016	-0.001	0.363*	0.401*	-0.398*	0.377*	-0.288	0.128	-0.303	-0.367
WM	-	0.129	-0.129	-0.143	0.097	0.097	0.069	0.070	-0.244	-0.239	0.070	0.075	0.139	-0.083	-0.160	0.278
P/O	-	0.202	-0.202	-0.227	0.067	0.064	0.038	0.044	-0.290	-0.300	0.212	0.215	0.259	-0.157	-0.087	0.410
Org	-	0.030	-0.030	-0.069	0.127	0.121	0.120	0.109	-0.197	-0.207	0.170	0.161	0.069	0.047	0.179	0.212
M	-	0.187	-0.187	-0.199	0.058	0.056	0.049	0.044	-0.287	-0.290	0.126	0.123	0.151	-0.170	0.082	0.006
BR	-	-0.229	0.299	0.267	0.243	0.234	0.249	0.246	0.018	-0.022	-0.192	-0.230	-0.191	0.249	-0.142	0.203
Mc	-	0.040	-0.040	-0.034	0.153	0.156	0.134	0.141	-0.227	-0.214	-0.013	-0.003	0.093	-0.072	-0.230	0.207
GEC	-	-0.111	0.111	0.099	0.256	0.254	0.243	0.247	-0.195	-0.204	-0.102	-0.114	-0.005	0.054	-0.261	0.255

*p≤0.05, **p≤0.01, ***p≤0.001

WSCT Domains - TA- Total Administered, TC- Total Correct, TE- Total Error, %E- Percentage Error, PR- Perseverative Responses, %PR- Percentage Perseverative Responses, PE- Perseverative Errors, %PE- Percentage Perseverative Errors, NPE- Nonperseverative Errors, %NPE- Percentage Nonperseverative Errors, CLR- Conceptual Response, %CLR- Percentage Conceptual Response, CC- Category Completed, TCC- Trials to Complete First Category, FMS- Failure to Maintain Set, LL- Learning to Learn.

BRIEF Domain - In- Inhibit, Sh- Shift, EC- Emotional Control, Inta- Initiate, WM- Working Memory, P/O Plan/Organize, Org - Organization of Materials, M- Monitor, BR- behavior Regulation, Mc- Metacognition, GEC- Global Executive Composite.

Table no.1 shows that among students of standard IIIrd there are significant positive correlations between BRIEF Domain In and WSCT Domains PR (0.416), %PR (0.411), PE (0.414), %PE (0.409). But there is significant negative correlation between BRIEF Domain In and WSCT Domains %NPE (-0.366). Further, there are significant positive correlations between WSCT Domains %E (0.367), NPE (0.363), %NPE (0.401), %CLR (0.377) and Inta. There is significant negative correlation between WCST domain CLR (-0.398) and BRIEF domain Inta. The correlation is on 0.05 level. Thus, results show a significant relationship between inhibition and perseverative responses and initiation and conceptual responses, among the students of standard IIIrd.

Table-2: Correlation between the scores of WCST and BRIEF for Children of Standard VIth

Variables	TA	TC	TE	%E	PR	%PR	PE	%PE	NPE	%NPE	CLR	%CLR	CC	TCC	FMS	LL
In	-	-0.306	0.300	0.344	0.123	0.132	0.186	0.197	0.262	0.295	-0.351	-0.293	-0.134	0.188	0.161	-0.142
Sh	-	-0.011	0.004	0.054	-0.158	-0.136	-0.097	-0.080	0.125	0.176	-0.115	-0.059	0.194	0.027	-0.220	0.098
EC	-	0.179	-0.166	-0.167	-0.092	-0.081	-0.126	-0.121	-0.115	-0.131	0.091	0.100	-0.042	-0.128	-0.026	-0.022

Variables																
Inta	-	-0.238	0.264	0.247	0.181	0.177	0.185	0.178	0.203	0.176	-0.184	-0.212	-0.278	0.011	0.212	-0.255
WM	-	-0.165	0.166	0.161	-0.015	-0.033	0.003	-0.026	0.265	0.249	-0.091	-0.135	-0.144	0.252	-0.134	0.118
P/O	-	0.141	-0.129	-0.130	-0.225	-0.227	-0.188	-0.201	0.020	0.021	0.087	0.094	-0.103	0.180	-0.117	-0.106
Org	-	0.087	-0.102	-0.130	-0.201	-0.230	-0.253	-0.289	0.141	0.102	0.098	0.068	0.205	0.005	-0.244	0.140
M	-	0.165	-0.148	-0.163	-0.135	-0.150	-0.069	-0.056	-0.156	-0.162	0.116	0.104	0.034	-0.136	-0.010	-0.242
BR	-	-0.015	0.019	0.064	-0.019	-0.067	0.057	-0.039	0.099	0.128	-0.156	-0.093	0.000	0.005	-0.207	-0.036
Mc	-	-0.122	0.114	0.107	-0.020	-0.032	-0.003	-0.014	0.188	0.165	-0.088	-0.101	-0.221	0.102	0.024	-0.211
GEC	-	-0.101	0.095	0.115	-0.069	-0.064	-0.037	-0.035	0.199	0.195	-0.152	-0.127	-0.164	0.082	-0.102	-0.185

*p≤0.05, **p≤0.01, ***p≤0.001

WSCT Domains- TA- Total Administered, TC- Total Correct, TE- Total Error, %E- Percentage Error, PR- Perseverative Responses, %PR- Percentage Perseverative Responses, PE- Perseverative Errors, %PE- Percentage Perseverative Errors, NPE- Nonperseverative Errors, %NPE- Percentage Nonperseverative Errors, CLR- Conceptual Response, %CLR- Percentage Conceptual Response, CC- Category Completed, TCC- Trials to Complete First Category, FMS- Failure to Maintain Set, LL- Learning to Learn

BRIEF Domain- In- Inhibit, Sh- Shift, EC- Emotional Control, Inta- Initiate, WM- Working Memory, P/O Plan/Organize, Org- Organization of Materials, M- Monitor, BR- behavior Regulation, Mc- Metacognition, GEC- Global Executive Composite

Table no.2 shows that there is no correlation between the obtained scores of the children of standard VIth for all domains of WCST and BRIEF.

Table-3: Correlation between the scores of WCST and BRIEF for Children of Standard IXth

Variables	TA	TC	TE	%E	PR	%PR	PE	%PE	NPE	%NPE	CLR	%CLR	CC	TCC	FMS	LL
In	-	0.071	-0.071	-0.025	-0.022	0.031	-0.022	0.067	-0.223	-0.156	-0.184	0.042	-0.015	0.160	-0.224	0.186
Sh	-	0.200	-0.200	-0.160	0.004	0.004	-0.080	-0.051	-0.284	-0.263	0.009	0.051	-0.202	-0.011	0.227	0.058
EC	-	0.025	-0.025	-0.021	0.025	0.034	-0.029	-0.009	-0.104	-0.115	-0.111	-0.103	-0.069	0.092	0.000	0.253
Inta	-	0.003	-0.003	0.035	-0.006	-0.015	-0.041	-0.020	-0.004	0.064	0.033	0.018	-0.166	0.255	0.355	0.229
WM	-	0.088	-0.088	-0.91	-0.158	-0.196	-0.132	-0.159	0.089	0.128	0.250	0.168	0.123	-0.253	0.030	-0.285
P/O	-	-0.362*	0.362*	0.353	0.265	0.222	0.273	0.230	0.313	0.288	-0.199	-0.327	-0.398*	0.118	0.133	-0.254
Org	-	-0.087	0.087	0.045	0.201	0.156	0.129	0.147	-0.040	-0.135	0.230	-0.017	0.158	-0.047	-0.105	-0.213
M	-	-0.277	0.277	0.288	0.383*	0.356	0.356*	0.331	0.224	0.181	-0.265	-0.372*	-0.448*	-0.050	0.162	-0.191
BR	-	0.152	-0.152	-0.109	0.004	0.029	-0.066	-0.006	-0.293	-0.258	-0.114	0.002	-0.149	0.095	0.040	0.212
Mc	-	-0.280	0.280	0.282	0.286	0.228	0.262	0.231	0.260	0.241	-0.060	-0.257	-0.344	0.034	0.221	-0.266
GEC	-	-0.108	0.108	0.135	0.208	0.183	0.150	0.165	0.003	0.010	-0.109	-0.174	-0.333	0.086	0.178	-0.060

*p≤0.05, **p≤0.01, ***p≤0.001

WSCT Domains - TA- Total Administered, TC- Total Correct, TE- Total Error, %E- Percentage Error, PR- Perseverative Responses, %PR- Percentage Perseverative Responses, PE- Perseverative Errors, %PE- Percentage

Perseverative Errors, NPE- Nonperseverative Errors, %NPE- Percentage Nonperseverative Errors, CLR- Conceptual Response, %CLR- Percentage Conceptual Response, CC- Category Completed, TCC- Trials to Complete First Category, FMS- Failure to Maintain Set, LL- Learning to Learn

BRIEF Domain - In- Inhibit, Sh- Shift, EC- Emotional Control, Inta- Initiate, WM- Working Memory, P/O Plan/Organize, Org- Organization of Materials, M- Monitor, BR- behavior Regulation, Mc- Metacognition, GEC- Global Executive Composite

Table no.3 shows that there is a significant positive correlation between WCST domain TE (0.362) and BRIFE domain P/O among the students of standard IXth. There is a significant negative correlation between WCST domains TC (-0.362) and CC (-0.398) and BRIEF domain P/O on 0.05 level. Thus, the results show that students of standard IXth had correlation between executive functioning skills like plan & organization with type of responses. Further, there are significant positive correlations between WCST domains PR (0.383), PE (0.356), CC (-0.448) and BRIEF domain M. also significant negative correlation was found between WCST domain %CLR (-0.372) and BRIEF domain M. The results show that there is correlation between monitoring and conceptual responses and perseveration in responses of students of standard IXth.

DISCUSSION

In this study, teachers rated the students on the BRIEF, which gave us the objective view of the executive functioning skills present in them. The study used WCST as the subjective measure of executive functioning skills in children. The study comprised of 19 (63.3%) boys and 11 (36.7%) girls from IIIrd and VIth std and 22 (73.3%) boys and 8 (26.7%) girls from XIth std.

Scoring on BRIEF is lower the score better the performance and in WCST higher score on Total Correct response, Conceptual Response, Percentage of Conceptual Response and CC- Category Completed means better performance. The remaining scoring categories is lower the score better the performance.

Result shows that there are significant correlations between WCST domains Perseverative Responses, Percentage Perseverative Responses, Perseverative Errors, Percentage Perseverative Errors and Percentage Nonperseverative Errors with BRIEF domain Inhibit among the students of standard IIIrd. Students who were rated and who scored higher on Inhibit domain of BRIEF by teachers had problems in set shifting and framing concepts in WCST. Thus, children having problem to appropriately stop or inhibit their own behaviour and emotional expression at proper time have difficulty to shift from one situation, activity or aspect of a problem to another as the change in situation demands. Further, there are significant correlations between WCST domains Perseverative Errors, Nonperseverative Errors, Percentage Nonperseverative Errors, Conceptual Response and Percentage Conceptual Response with BRIEF domain Initiate. This explains that students who had been scored as having problem in initiating or beginning a task or activity on BRIEF by teachers had problem framing conceptual responses on WCST. Thus, the result indicates that children having problems in conceptualizing academic works or day to day activities demonstrate problem in starting their tasks. Result shows that there are significant correlations between WCST domains Total Correct, Total Error, Category Completed and BRIEF domain Plan/Organize among the students of standard IXth. Thus, the results show that students of standard IXth who were observed by teachers as performing good on plan and organization domain of BRIEF had positive correlation with concept formation and correct responses on WCST. Results thus indicate that students having better ability for planning and organizing are good at conceptualizing the tasks at hand. Further, there are significant correlations between WCST domains Perseverative Responses, Perseverative Errors, Percentage Conceptual Response, Category Completed and BRIEF domain Monitor. The results explains that students who were observed by teachers as one who assessed performance during or after finishing a task to ensure attainment of goal demonstrated better conceptual responses and poor perseveration responses on WCST. Thus, students who assess the works done by them has better concept formation ability.

CONCLUSION

The results indicate that there is a high correlation between the two tests (WCST & BRIEF) in two groups but no significant correlation was found in students of standard VIth. Results show a significant positive correlation between inhibition and perseverative responses; and negative correlation between initiation and conceptual responses; among the students of standard IIIrd. The results show that students of standard IXth had positive correlation between executive functioning skills like plan and organization with conceptual responses. Further, the results show that there is positive correlation between monitoring with conceptual responses; and negative correlation between monitoring and perseveration in responses of students of standard IXth.

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