International Journal of Health Sciences
March 2020, Vol. 8, No. 1, pp. 7-16
ISSN: 2372-5060 (Print), 2372-5079 (Online)

Published by American Research Institute for Policy Development
DOI: 10.15640/ijhs.v8n1a2
URL: https://doi.org/10.15640/ijhs.v8n1a2

Comparison of Executive Function Skills of Health Professional Undergraduate and Graduate Students

Paula D. Jarrard[1], OTD, OTR/L, Marianne Sergi[2], Jessica Hunt[3], Nicole Kiger[4], Samantha Memmer[5], & McKenzie Pollard[6]

Abstract

The purpose of this study was to assess and compare executive function (EF) skills between undergraduate and graduate students using the Weekly Calendar Planning Activity-Students (WCPA-S). The WCPA-S is useful in identifying EF deficits by observing performance scores and strategy use. Participants included a total of 20 students, ages 19-24, enrolled in health professional programs. Using a cross-sectional, two-group comparison research design, differences were analyzed between level of education and any variances between gender and students with or without specific self-reported conditions potentially impairing EF function. Mean, standard deviations, and ANOVAs were used for data analyses. The WCPA-S was administered to each student individually. Each participant completed the Behavior Rating Inventory of Executive Function (BRIEF-A).There were no significant differences found between groups for level of education or gender. One significant difference was found between students with and without self-reported conditions in task performance and strategy use of WCPA-S. No significant difference in BRIEF-A Global Executive Composite (GEC) scores was found among groups. A weak negative correlation was seen between the GEC and Grade Point Average (GPA). Global executive dysfunction was not predicted by level of education or gender.

Keywords: Executive function (EF), health professional program, Weekly Calendar Planning Activity-Students (WCPA-S), Behavior Rating Inventory of Executive Function (BRIEF-A), Grade Point Average, undergraduate and graduate students

1. Introduction

Previous research has been conducted with a purpose of measuring the components of executive function (EF) and demonstrating its role and importance in performing everyday activities (Cramm, Krupa, Missiuna, Lysaght, & Parker, 2013). Defining the constructs of EF and measurement of components is inconsistent across studies. Scant research has been performed that studies the significance of measuring EF in a real world setting with use of a dynamic occupation- and performance-based assessment, a perspective embraced by occupational therapy (Weiner, Toglia,& Berg, 2012; Cramm et al., 2013). The Weekly Calendar Planning Activity (WCPA), developed in 2012, utilizes completing a functional task to observe and measure these EF skills rather than relying on a self-report measure or caregiver report (Toglia, 2015; Weiner et al., 2012). The WCPA shows promising results as a way to test one's level of EF and is sensitive to distinguishing minute differences in EF (Weiner, Toglia, & Berg, 2012).

[1]Assistant Professor, Applied Medicine and Rehabilitation, Indiana State University. . E-mail: paula.jarrard@indstate.edu
[2]graduate student in the Master of Occupational Therapy program, Indiana State University at the time of this study
[3]graduate student in the Master of Science, Occupational Therapy program, Indiana State University at the time of this study
[4]graduate student in the Master of Science, Occupational Therapy program, Indiana State University at the time of this study
[5]graduate student in the Master of Science, Occupational Therapy program, Indiana State University at the time of this study
[6]graduate student in the Master of Science, Occupational Therapy program, Indiana State University at the time of this study

EF can be described as a set of higher-level cognitive processes that support an individual's ability to carry out goal-oriented behavior (Toglia, 2015). The main elements of EF include organization, planning, paying attention, initiation, inhibition, working memory, cognitive flexibility, and self-monitoring (Toglia, 2015). EF is used in reacting to new stimuli and adapting and modifying performance accordingly (Toglia, 2015).

Identifying EF skills may predict performance level of many aspects of a productive life, such as social participation, academic performance, employment, productivity, and participation in complex activities. Deficits in EF are frequently seen in both children and adults with a variety of conditions including, but not limited to, attention deficit hyperactivity disorder (ADHD), concussions, seizure disorders, learning disabilities, autism spectrum disorder, fetal alcohol syndrome, obsessive-compulsive disorder, bipolar disorder, schizophrenia, and depression (Hosenbocus & Chahal, 2012; Toglia, 2015; Pellicano, 2012). Other factors that may contribute to the development of poor EF in children may be early stressors, social deprivation, impoverished environments, or other negative life experiences (Toglia, 2015). EF deficits can lead to more profound issues in the individual's life such as cognitive and functional difficulties, negatively impacting one's ability to perform meaningful roles and activities of daily living (Stern &Maeir, 2014).

Efficient EF skills are critical for many academic tasks among higher education students (Preston et al., 2009). Diamond (as cited in Mann et al., 2015) theorized the measurement of this global ability to function is a better indicator for school performance than one's Intelligence Quotient value, which measures only cognitive ability. Using the Behavior Rating Inventory of Executive Function-Self Report (BRIEF-SR), a study by Mann et al. (2015) with high school students, demonstrated a significant difference in the Global Executive Composite (GEC) score on the BRIEF (GEC) between the successful and unsuccessful academic groups. Another study compared the performance of university students with or without ADHD using the Weekly Calendar Planning Activity-Students (WCPA-S), a version developed to assess students ages 18-24, tasked with scheduling daily appointments on a weekly schedule while following rules (Lahav, Ben-Simon, Inbar-Weiss, & Katz, 2015). This research demonstrated significant differences with the ADHD group underperforming compared to the control group in regards to accuracy, number of errors, and use of strategies (Lahav et al., 2015).Chu et al. (2019) studied the validity and reliability of the WCPA-S for college students comparing results using three measures. The study supported validity of the WCPA-S, but test-retest reliability of the WCPA-S was reported as low.

Few research studies have been done using the Weekly Calendar Planning Assessment (WCPA) since its availability in 2012. To address the paucity of research studying the measurement of EF skills in higher education students, this current study compared EF skills between undergraduate and graduate students in a health professional program using the WCPA-S, BRIEF-A Self Report, and a demographic survey. This cross-sectional, two-group comparison research design analyzed differences between undergraduate and graduate students, as well as any differences between gender and those students with or without specific self-reported conditions possibly impacting EF skills.

2. Methods

2.1. Recruitment and Participants

A convenience sample of 20 students (n=10 undergraduate and n=10 graduate) was recruited by posting flyers advertising the study at two local urban Midwestern university approved sites. Inclusion criteria were: (1) 18 through 24 years of age, (2) enrolled in a health professional undergraduate or graduate program, and (3) did not identify any cognitive or health issues that prevented completing a written informed consent, demographic form, WCPA-S, and the BRIEF-A Self-Report. Each participant session took approximately 40 minutes and each participant received a $10 Walmart gift card. The study was approved by the Institutional Review Board at the researcher's institution. After obtaining written informed consent, participants completed a demographic form. Participants were then individually tested by a trained research assistant in a private testing room following the WCPA-S protocol (Toglia, 2015) and given 30 minutes to complete the WCPA-S activity. To measure total performance time, the examiner allowed the participant to continue and did not stop the testing at this point. After completion of the WCPA-S, participants completed the BRIEF-A Self-Report Form.

2.2. Measures

A demographic form containing information about age, gender, level of education, race, interested career/health professional program, GPA, and self-reported conditions possibly impacting EF skills (Hosenbocus & Chahal, 2012; Toglia, 2015; Pellicano, 2012) was completed by each participant. The WCPA-S, an adapted version of

the original WCPA and created for college students (Lahav, Ben-Simon, Inbar-Weiss, & Katz, 2015), requires the participant to schedule 17 daily life appointments into a weekly calendar. The participant is asked to follow five rules, which are printed and available during the activity (Toglia, 2015): (1) once you have entered an appointment into the calendar, you cannot cross it out, (2) tell the examiner when there are 20 minutes left and 10 minutes left, (3) leave Tuesday free, (4) do not answer questions from the examiner during the activity, and (5) tell the examiner when you are finished.

The examiner observes and records the strategies the participant uses during the task on a list of 12 pre-identified strategies. Participant's score is determined by total accuracy of the appointments placed on the calendar, number of errors made, total time, number of rules followed, and types of strategies used (Weiner et al., 2012). The WCPA-S generates an overall efficiency score developed to combine speed and accuracy into a measure of efficiency. A lower efficiency score indicates that the participant obtained higher accuracy in less time. Inter-rater reliability of the WCPA-S ranged from r=.937 to .989 (Lahav et al., 2015). A study by Chu et al. (2019) supports validity of the WCPA-S, but test-retest reliability of the WCPA-S was reported as low.

The BRIEF-A is a standardized 75-item rating scale designed to assess an individual's perception of one's own EF skillswith respect to difficulties in self-regulation(Roth, Isquith, &Gioia, 2005). This self-report test for ages 18 to 90 generates clinical scale scores that combine to form two indexes, the *Behavioral Regulation Index(BRI)* and *Metacognition Index (MI),* and one summary composite, the *Global Executive Composite (GEC)*. The BRI represents ability to maintain appropriate regulatory control of behavior and emotional responses. The MI relates directly to the ability to problem solve actively in a variety of contexts. Clinical scale scores have a mean of 50 and a standard deviation of 10. Higher T scores indicate greater degrees of executive dysfunction with T scores at or greater than 65 considered clinically significant (Mann et al., 2005).Inter-rater reliability was shown by a moderate (.44-.68) correlation between Self-Report and Informant report forms. Individuals and their informants reported T scores were within one standard deviation of each other 50-70% of the time. Internal consistency was demonstrated by Cronbach's alpha for the self-report form, resulting in moderate to high clinical scales (.73-.90) (Roth et al., 2005).

2.3. Statistical Analysis

Data were analyzed using IBM SPSS for Windows 24.0 software (IBM SPSS, Inc., Chicago, IL). A cross-sectional, two-group comparison research design was utilized to test any differences in performance according to student status, gender, and self-reported health conditions. Dependent variables were performance scores and strategies used for the WCPA-S and T scores for the BRIEF-A. Data analysis included means, standard deviation, and analysis of variance. Statistical significance was established at $p<.05$ for all tests.

3. Results

The sample (n=20) included 12 female (60%) and 8 male (40%) students, ranging in ages 19 to 25 years, with a mean age of 21.75 $\pm$ 2.124. The participants were predominantly Caucasian (90%) with a majority of students pursuing a career in physical therapy (55%).

Table 1. Demographics (n=20)

Characteristics	Participants (n = 20)
Age, yr.; *M (SD)*	21.75 (2.124)
Gender, n (%)	
Male	8 (40)
Female	12 (60)
Level of Education, *n (%)*	
Undergraduate	10 (50)
Graduate	10 (50)
Race, *n (%)*	
Caucasian	18 (90)
African American	1 (5)
Hispanic	1 (5)
Program/Interested Career, *n (%)*	
Physical Therapy	11 (55)
Nursing	4 (20)
Physician's Assistant	3 (15)
Athletic Training	1 (5)
Nutrition	1 (5)
GPA, *M (SD)*	
Undergraduate	3.53 (.29)
Graduate	3.67 (.20)
Male	3.67 (.165)
Female	3.56 (.296)
Self-Reported Conditions, *n (%)*	
ADHD	2 (10)
Anxiety	2 (10)
History of Concussions	1 (5)

3.1. WCPA-S Performance Scores

Means, standard deviations, and one-way ANOVAs were used to compare WCPA-S performance. Table 2 compares the level of education (graduate vs. undergraduate) and gender (male vs. female). Table 3 compares the students with a self-reported condition vs. the students not reporting a condition (control). There were no significant differences found between groups for level of education or gender. There was one significant difference for self-reported conditions for *rules followed* ($F = 5.582$; $p = 0.03$), showing the group with a self-reported condition followed significantly fewer rules than the control group.

Table 2. WCPA-S Performance Scores for Level of Education and Gender

Table 2

WCPA-S Performance Scores for Level of Education and Gender

WCPA-S Performance Scores for Level of Education and Gender

	M (SD)						ANOVA			
Group	Undergraduate			Graduate			Group Undergraduate vs. Graduate		Group (Male vs. Female)	
Gender	Female (n = 9)	Male (n = 1)	All (n = 10)	Female (n = 3)	Male (n = 7)	All (n = 10)	F	P	F	P
WCPA-S Scores										
Total Time	1301.56 (291.26)	1580	1329.4 (288.37)	1241.67 (593.27)	1516.0 (426.55)	1433.70 (465.91)	0.362	0.555	1.959	0.179
Rules Followed	4 (1)	5	4.1 (.99)	4.33 (1.15)	4 (.58)	4.1 (.74)	0	1	0.011	0.918
Total Strategies	6.22 (1.72)	9	6.5 (1.84)	6 (1.73)	7.29 (1.80)	6.9 (1.79)	0.242	0.628	2.973	0.102
Appointments Entered	16.67 (.71)	17	16.70 (.67)	16.67 (.58)	16.86 (.38)	16.8 (.42)	0.158	0.696	0.677	0.421
Correct Appointments	13 (2.06)	14	13.1 (1.97)	14.33 (3.06)	12.86 (3.08)	13.30 (2.98)	0.031	0.862	0.084	0.776
Efficiency Score	140.94 (63.73)	137.39	140.58 (60.10)	129.81 (119.39)	182.25 (99.38)	166.52 (101.95)	0.48	0.497	1.046	0.32
Total Errors	2.56 (1.01)	3	2.60 (.97)	2.33 (2.52)	3.71 (2.81)	3.30 (2.67)	0.608	0.446	1.588	0.224
20 Minutes Left*	1.125 (.354)	1	1.111 (.333)	1	1.333 (.516)	1.286 (.488)	0.961	0.341	2.282	0.149
10 Minutes Left*	1.375 (.518)	1	1.333 (.500)	1	1.333 (.516)	1.286 (.488)	0.036	0.851	0.036	0.851

Note. WCPA-S = Weekly Calendar Planning Activity for students.
M (SD) = Means and Standard Deviation
*n = 16
Significant Level = .05

Table 3. WCPA-S Performance Scores for Self-Reported Conditions

WCPA-S Performance Scores for Self-Reported Conditions

	M (SD)		ANOVA	
Group	Self-Reported Condition (N = 5)	Control (N = 15)	F	P
WCPA-S Scores				
Total Time	1473.40 (411.115)	1350.93 (380.24)	0.375	0.548
Rules Followed	3.40 (1.14)	4.33 (.61)	5.582	**0.03**
Total Strategies	7.40 (.55)	6.47 (2.00)	1.033	0.323
Appointments Entered	16.80 (.45)	16.73 (.59)	0.052	0.822
Correct Appointments	14.20(1.92)	12.87 (2.59)	1.106	0.307
Efficiency Score	136.31 (77.42)	159.30 (85.97)	0.28	0.603
Total Errors	2.60 (1.52)	3.07 (2.15)	0.198	0.661
20 Minutes Left*	1.250(.500)	1.167 (.389)	0.004	0.95
10 Minutes Left*	1.500(.577)	1.250 (.452)	0.808	0.384

Note. WCPA-S = Weekly Calendar Planning Activity for students.
M (SD) = Means and Standard Deviation
*n = 16
Significant Level = .05

3.2.Strategy Use

Means, standard deviations, and ANOVA scores for strategies used by participants are presented in Table 4 (level of education and gender) and Table 5 (self-reported conditions). No significant differences were found in strategies used between gender or level of education.

When comparing the self-reported conditions to the control group, one significant difference was found for the *rearrangement* strategy ($F = 5.143$, $p = .036$). All participants with a self-reported condition were seen rearranging their materials during the activity (M = 1.000) with the control group having a mean of .467. A near significant interaction was found in verbal rehearsal ($p = .083$). The self-reported conditions group used it often ($M = .200$) compared to the control group, who did not use verbal rehearsal at all ($M = .000$).

Table 4.WCPA-S Strategies Comparing Level of Education and Gender

Table 4

WCPA-S Strategies Comparing Level of Education and Gender

WCPA-S Strategies Comparing Level of Education and Gender

Group	Undergraduate			Graduate			Group (Undergraduate vs. Graduate)		Group (Male vs. Female)	
Gender	Female (n = 9)	Male (n = 1)	All (n = 10)	Female (n = 3)	Male (n = 7)	All (n = 10)	F	P	F	P
Strategies										
Underlines Key Words	0.333 (.500)	1	.400 (.516)	.333 (.577)	.429 (.535)	.400 (.516)	0	1	0.514	0.482
Uses Finger	.889 (.333)	1	.900 (.316)	.333 (.577)	.714 (.488)	.600 (.516)	2.455	0.135	0	1
Verbal Rehearsal	0 (0)	0	.000 (.000)	.333 (.577)	.000 (.000)	.100 (.316)	1	0.331	0.655	0.429
Crosses Off	.778 (.441)	1	.800 (.422)	1.000 (.000)	1.000 (.000)	1.000 (.000)	2.25	0.151	1.44	0.246
Rearrangement	.556 (.527)	1	.600 (.516)	.667 (.578)	.571 (.535)	.600 (.516)	0	1	0.031	0.862
Organize Before	.333 (.500)	0	.300 (.483)	.333 (.577)	.714 (.488)	.600 (.516)	1.8	0.196	1.618	0.22
Fixed First	.778 (.441)	1	.800 (.422)	.667 (.578)	.429 (.535)	.500 (.527)	1.976	0.177	1.271	0.274
Rough Draft	.556 (.527)	1	.600 (.516)	.667 (.578)	.857 (.378)	.800 (.422)	0.9	0.355	1.938	0.181
Cross off Tuesday	.222 (.441)	1	.300 (.483)	.000 (.000)	.143 (.378)	.100 (.316)	1.2	0.288	0.189	0.669
Self-Check	.889 (.333)	1	.900 (.316)	.667 (.578)	1.000 (.000)	.900 (.316)	0	1	1.44	0.246
Pause and Reread	.889 (.333)	1	.900 (.316)	1.000 (.000)	1.000 (.000)	1.000 (.000)	1	0.331	0.655	0.429

Note. WCPA-S = Weekly Calendar Planning Activity for students.
M (SD) = Means and Standard Deviation
Significant Level = .05

Table 5. WCPA-S Strategies for Self-Reported Conditions

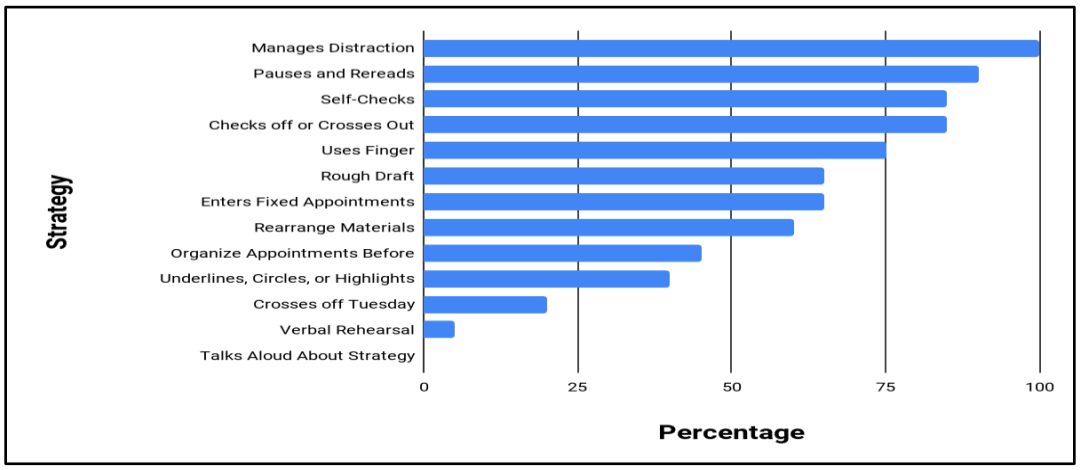
WCPA-S Strategies for Self-Reported Conditions

	M (SD)		ANOVA	
Group	Condition (N = 5)	Control (N = 15)	F	P
Strategies				
Underlines Key Words	.400 (.548)	.400 (.507)	0	1
Uses Finger	.800 (.447)	.733 (.458)	0.08	0.78
Verbal Rehearsal	.200 (.447)	.000 (.000)	3.375	0.083
Crosses Off	1.000 (.000)	.867 (.352)	0.692	0.416
Rearrangement	1.000 (.000)	.467 (.516)	5.143	**0.036**
Organize Before	.600 (.548)	.400 (.507)	0.563	0.463
Fixed First	.600 (.548)	.667 (.488)	0.066	0.8
Rough Draft	1.000 (.000)	.600 (.507)	3	0.1
Cross off Tuesday	.000 (.000)	.267 (.458)	1.636	0.217
Self-Check	.800 (.447)	.933 (.258)	0.692	0.416
Pause and Reread	1.000 (.000)	.933 (.258)	0.321	0.578

Note. WCPA-S = Weekly Calendar Planning Activity for students.
Significant Level = .05

Figure 1 presents the strategies that participants used most commonly when completing the task. One-hundred percent of participants engaged in management of distractions beyond the three scripted questions asked by the examiner, including noise outside of the testing room or unplanned interruptions. Ninety percent of the sample used the strategy of pausing and rereading. The next most frequent strategies observed were self-checks (85%), checks off or crosses out (85%), using finger (75%), and rough draft (65%).

Figure 1. Strategies Participants Used in Completing the WCPA-S (*n = 20*)



3.3. BRIEF-A Composite Scores

Means, SD, and ANOVAs to compare Behavioral Regulation Index (BRI), Metacognitive Index (MI), and Global Executive Composite (GEC) scores are presented in Table 6. Results of the ANOVA indicated no significant difference with either group. Visual plotting to show relationships among independent groups is represented in Figure 2. The results for GEC scores show that the participants averaged similar scores for level of education ($F = .002$, $p = .966$) and gender ($F = .088$, $p = .77$). Even though no significance for BRI was found ($F = 2.451$, $p = .135$), the female participants scored higher on the BRI ($M = 53.42$) than the male participants ($M = 49.63$). No significant differences were found between the self-reported conditions group with the control group.

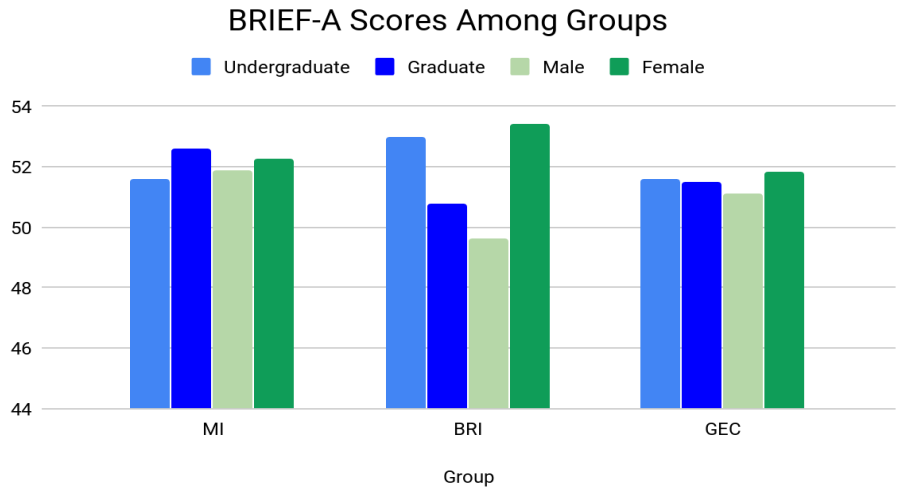
Table 6. BRIEF-A Scores to Assess Level of Education and Gender

BRIEF-A Scores to Assess Level of Education and Gender

	M (SD)				ANOVA			
	Level of Education		Gender		Undergraduate vs. Graduate		Male vs. Female	
Group	Undergraduate (N = 10)	Graduate (N = 10)	Male (N = 8)	Female (N = 12)	F	P	F	P
BRI	53 (4.47)	50.80 (6.43)	49.63 (7.90)	53.42 (3.75)	0.79	0.386	2.451	0.135
MI	51.60 (6.24)	52.6 (6.78)	51.88 (7.66)	52.25 (5.69)	0.118	0.735	0.016	0.901
GEC	51.60 (4.06)	51.5 (6.2)	51.13 (7.26)	51.83 (3.35)	0.002	0.966	0.088	0.77
GPA*	3.53 (.29)	3.67 (.25)	3.67 (.17)	3.56 (.30)	1.23	0.285	0.857	0.369
Efficiency Score	140.58 (60.10)	166.52 (101.95)	176.64 (93.37)	138.16 (74.64)	0.48	0.497	1.046	0.32

Note. BRIEF-A = Behavioral Rating Inventory of Executive Function for adults
Significant Level = .05

Figure 2. Mean BRIEF-A Composite Scores among Groups



3.4. Relation between Scores

A Pearson's Product Moment Correlation was used to identify relationships between the BRIEF-A GEC score and the WCPA-S Efficiency Score. There was a negative correlation between GEC and Efficiency Score, however it was not significant ($r = -.325$, $p = .162$). Results for GEC and GPA ($r = -.248$, $p = .336$) indicate a negative correlation, but demonstrated no significant difference.

4. Discussion

The purpose of this study was to contribute to the knowledge base in measuring EF skills in higher education students using an occupation-based dynamic assessment and self-report and to compare these skills by gender, student status, and self-report of conditions that may impact EF skills.

4.1. WCPA-S

WCPA-S scores demonstrated both undergraduate and graduate students with comparable scores and employing similar strategies, resulting in no significant differences regardless of student status. Interestingly, the female graduate students outperformed the other groups in total time, rules followed, correct appointments, efficiency score, and total errors. This is consistent with results obtained in a previous study in which female students were more accurate and missed fewer appointments (Lahav et al., 2015). The study completed by Chu et al. (2019) showed no differences in gender or student status.

A significant difference was found regarding the performance scores of the WCPA-S between the self-reported conditions and control group. Participants with self-reported conditions required more time to complete the task and followed fewer rules than the control group. However, the findings of the current study indicated the participants with self-reported conditions averaged a better efficiency score, higher number of appointments, and fewer total errors than the control group. These participants were observed spending extra time checking and rereading the appointments entered, which may explain this performance. The mean number of strategies observed was higher than that of the control group, but appeared only to increase the time spent to complete the activity because of constant switching between strategies. These results are consistent with previous studies that state participants with ADHD required more time to complete the task and expressed difficulty more often (Lahav et al., 2015). Chu et al. (2019) showed no differences between students with or without learning challenges.

4.2. Strategies

There were no significant differences found between gender or level of education regarding the use of different strategies. It is interesting to note the male graduate students used a high number of strategies and entered the highest number of appointments, but resulted in being outperformed in number of correct appointments and efficiency score by the female participants. This did not fit previous findings from Lahav et al. (2015) that stated "increased strategy use was associated with better accuracy, suggesting that interventions to promote strategy use may be important in enhancing task performance." This may be explained by how the participants utilized the chosen strategies. The excessive number of strategies used may have negatively impacted efficiency.

By observing the specific strategies used and looking at the correct appointments and efficiency score, practitioners can determine if further interventions need to be implemented to promote *effective* strategy use. When comparing strategy use, the self-reported conditions group used the *rearrangement* strategy significantly more than the control group participants. The strategy of *verbal rehearsal* was also observed being used more often in the self-reported conditions group compared to the control group.

4.3. BRIEF-A

There were no significant group differences in gender or level of education found in the BRIEF-A scores. The BRIEF-A self-report scores specific to the Behavioral Rating Index (BRI), when comparing gender were higher for females than males. Composite EF scores using the Global Executive Composite (GEC) were not specific to level of education or gender, all averaging similar scores for the GEC.

4.4. Relationships between WCPA-S, BRIEF-A, and GPA

Decreased EF was associated with low GPA regardless of group, as a negative correlation between GPA and GEC was represented. This is consistent with a previous study done by Mann et al. (2015), which compared GEC and GPA scores of high school students and resulted in a medium negative correlation between the two scores. Possible EF deficits in participants were associated with a high efficiency score from the WCPA-S (A lower efficiency score indicates that the participant obtained higher accuracy in less time). One study has validated the WCPA-S against other known EF instruments, but further research needs to be completed (Chu et al., 2019).

5. Conclusion and Implications

The WCPA-S meets recommended criteria as a valid occupation-based assessment that permits observation and measurement of EF skills with performance in a real-world context (Cramm et al.,2013; Chu et al., 2019). The assessment is simple to administer, requires 30 minutes, and provides easy directions understood by the participant. The WCPA-S may be useful as a tool to identify higher education students who may benefit with learning supports for EF skill development. The WCPA-S has the potential to informof specific interventions, such as development of efficient strategies to enhance EF function, thus expanding the role of occupational therapy practitioners to better prepare at-risk students with necessary skills to succeed in occupational role performance ((Weiner, Toglia, & Berg, 2012, Toglia& Berg, 2013).

6. Limitations

This study has many attributes that limit its generalizability to measuring and comparing EF skills in higher education students. First, a convenience sample of 20 participants in one locale was used. Second, this study tested EF skills in undergraduate and graduate students currently enrolled in a health professional program. Assessing EF is important for high-risk populations and this population may not have been well represented in this particular study. Further studies would need to be done to test EF skills in an at-risk population among students in higher education. This study and preliminary data gathered from previous studies (Lahav et al., 2015; Mann et al., 2015; Chu et al., 2019) provide a baseline for screening that may help identify students at-risk for these deficits and target individualized interventions (Toglia& Berg, 2013). Further research is necessary to compare different assessments for EF to determine the best predictive instrument for educational success in this population (Chu et al., 2019).

7. Conflict of Interest

The authors state they have no conflicts of interest.

8. References

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