

Review Paper

The Self-Reported Roles of Executive Functions, Behavior Experiences and Locus of Control in Adults Who Stutter

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Received: May 18, 2021

Accepted: May 25, 2021

Online Published: May 29, 2021

doi:10.22158/csm.v4n2p47

URL: <http://dx.doi.org/10.22158/csm.v4n2p47>

Abstract

Purpose: Myriad studies have endeavored to determine why people stutter. It has been suggested that prior experiences, self-perceptions, specific cognition abilities (i.e., executive functions), and/or whether a person perceives their stuttering to be controlled internally or externally can provide insight into stuttering behaviors. What is not known is whether a relationship exists between these variables has more influence on persons who stutter than another. This preliminary study used the Locus of Control of Behavior scale (LCB; Craig et al., 1984), Overall Assessment of the Speaker's Experience of Stuttering; (OASES; Yaruss & Quesal, 2006, Yaruss & Quesal, 2008), and the Comprehensive Executive Function Inventory, (CEFI-A-SR; Naglieri & Goldstein, 2013) to better understand what relationships, if any, exist between locus of control of behavior, stuttering experiences, and executive functions in persons with fluency disorders.

Method: A total of 116 adults who stutter completed online surveys which included demographic questions, the LCB, OASES, and CEFI-A-SR.

Results: Self-monitoring was the lone executive function scale score demonstrating a relationship to LCB and OASES scores.

Conclusions: An internal control of behavior and positive outlook on stuttering experiences as well as a sense of effective self-monitoring may be required for a person to manage stuttering behaviors effectively.

Keywords

executive functions, stuttering attitudes, stuttering behaviors, locus of control, stuttering experiences

The Relationship between Self-Reported Behavioral Control, Experiences, and Executive Functions in Persons Who Stutter

1. Introduction

Stuttering is a disorder of speech fluency that affects approximately 1% of adults (Craig et al., 2002). Although it can often be diagnosed early (i.e., around two years of age), stuttering may persist in as much as 20 percent of this population (Andrews et al., 1983; Bloodstein, 1995). For years, researchers have examined behaviors, perceptions, and cognitive functions of persons with fluency disorders. These investigations seek critical information, as adults who stutter report higher levels of stress, anxiety, depression, and social disorders than persons who do not stutter (Blood et al., 2001; Iverach et al., 2009; Tran et al., 2011). Persons who stutter also report feeling less control over life stressors than persons who do not stutter (Craig et al., 2009).

Research has investigated several theories about why stuttering occurs. From a behavioral standpoint, it has been speculated that a relationship exists between Locus of Control of Behavior (LCB; Craig et al., 1984) and long-term stuttering exists (DeNil & Kroll, 1995). Other research has endeavored to determine what impact stuttering experiences have on stuttering (OASES; Yaruss & Quesal, 2006, Yaruss & Quesal, 2008). Some researchers have reported functional brain differences may exist in persons who stutter compared to those who do not stutter (Gordon, 2002; Chang et al., 2009; Sowman et al., 2017). More specifically, abnormal attention and executive functioning network differences have been noted in children who stutter (Chang et al., 2017). These areas are discussed in depth in the following sections.

1.1 Locus of Control of Behavior and Stuttering

It has been suggested that the locus of control of behavior (i.e., whether persons feel their conditions arise due to internal vs. external factors) can impact long-term outcomes for individuals receiving behavioral therapy. In some studies, having an internal locus of control of behavior has been implicated in sustaining long-term outcomes in persons who stutter (Andres & Craig, 1988; De Nil & Kroll, 1995). In other works, locus of control has not been identified as a psychological predictor of stuttering (Ginsberg, 2010). Locus of control of behavior has also been shown to differ between persons who stutter and persons who do not stutter (Kumbhar & Gupta, 201). In a study aimed to determine the impact of self-reporting measures in persons who stutter, self-reporting of stuttering events were shown to be beneficial in the assessment and treatment of stuttering as they provided information about when a loss of control was perceived by the person who stutters. (Guntupalli, Kalinowski, & Saltklaroglu, 2010). Thus, there is the need to further examine the impact locus of control has on persons who stutter.

1.2 Experiences of Persons Who Stutter

In addition to the LCB, experiences and reactions of persons who stutter have been identified as factors influencing not only stuttering treatment outcomes but also quality of life in persons who stutter (Klompas & Ross, 2004; Nang et al., 2018). Negative self-perceptions of stuttering have been

associated with stuttering impairments (Nang et al., 2018), and attitudes have been identified as influencing the social interactions of persons who stutter (Leith et al., 1993). Fortunately, understanding the environment, attitudes, and social experiences of persons who stutter has been shown to help shape self-perceptions and personal narratives, which can improve stuttering outcomes (O'Dwyer et al., 2018).

1.3 Cognitive Skills and Stuttering: The Role of Executive Functions and Self-Reports

Another area that has been explored in persons who stutter involves cognition. The act of stuttering has been suggested to involve certain cognitive breakdowns (Karniol, 1995). More specifically, persons who stutter have demonstrated deficits in attention (Heitmann et al., 2004; Ofoe et al., 2018; Singer, et al., 2020), self-monitoring deficits (Goldiamond, 1965; James, 1981; Lickley et al., 2005; Vasic & Wijnen, 2005), and inhibitory control (Eggers et al., 2013). These specific cognitive processes fall under the umbrella term of “executive functions”, or “EFs”.

There are many definitions of EFs. EFs have been named as cognitive control activities that manage all other cognitive processes (Denckla & Reader, 1993). Baggetta and Alexander (2016) compared researcher definitions of EFs and found that most individuals identify EFs as a group of cognitive functions that provide guidance for learning and executing activities.

Because EFs include several processes, (e.g., working memory, cognitive flexibility, inhibitory control) learning which process is involved and to what extent in which activity can be challenging. Tests of EFs exist to help parse out which EFs may be stronger or more involved in determining task outcomes. In persons who stutter, brain-based differences have been reported by researchers (Etchell & Sowman, 2014). Additionally, attention to tasks that can impact comprehension have been shown to differ in persons who stutter compared to persons who do not stutter (Kamhi & McOsker, 1982).

Self-reporting has been suggested as a tool that may provide insight in stuttering behaviors (Guntupalli, Kalinowski, & Saltuklaroglu, 2006; O'Brien, Packman, & Onslow, 2004).

As the use of self-reporting has often been used by researchers and clinicians working with persons who stutter, this study investigated self-reported experiences, self-reported feelings of control, and self-reported EFs of persons who stutter. No research to date has directly examined these potential relationships. Therefore, gaining a better understanding about locus of control, life experiences and cognitive interactions of adults with persist stuttering can provide critical insights to drive support strategies and identify possible treatment options.

For this study, an examination of EFs, self-perceptions and opinions of control were selected for investigation in persons who study as they reflect the outcomes of prior research. Although EFs may relate to factors impacting stuttering events in adults, no research to date has directly examined the potential relationship between EFs, self-perceptions and locus on control to determine the interactions between these variables in adults who stutter.

1.4 Purpose of the Study

Few studies, if any, have investigated the relationships between the self-reported locus of behavior control, self-perceptions and cognitive functions (i.e., EFs) in adults who stutter. As locus of behavior control, experiences, and EFs have been suggested to influence stuttering behaviors and outcomes, the strength of each of these variables and the relationships between them in adults who stutter can provide valuable insight into this population. For example, if strong relationships exist between certain variables, or if certain EFs are identified as strengths or weaknesses by persons who stutter, treatment could be designed accordingly. Therefore, in this study, the self-reports of behavioral control, self-perceptions and self-reported EFs in persons who stutter were collected and analyzed. It is hypothesized that EFs (e.g., attention, working memory, self-monitoring) may play a more significant role in the act of stuttering than previously determined. It is further hypothesized that, self-perceptions, locus of control, and EFs will demonstrate relationships with each other. Descriptive statistics, correlations and regressions will be used to analyze the results received.

2. Method

2.1 Participants

This study investigated the self-reported EFs, behaviors and perceptions of persons who stutter who responded to an online invitation to participate. Upon receiving approval from the Institutional Review Board (IRB) at Old Dominion University, an announcement explaining the study purpose and invitation to participate was posted on the National Stuttering Association (NSA) website. Interested participants who met inclusion criteria (i.e., adults 18+ years of age who stutter) received further instructions via emailed links for completion.

2.2 Procedure

Data were collected anonymously, via online assessments. The invitation to participate in the assessments was posted for three months. Participants who volunteered for this study and met inclusion criteria received email access to the survey. The collection of information occurred online via self-reported responses to the materials listed below.

2.3 Materials

Following questions regarding demographic information and stuttering history, participants completed the Locus of Control of Behavior Survey (LCB; Craig et al., 1984), Overall Assessment of the Speaker's Experience of Stuttering; (OASES; Yaruss & Quesal, 2006, Yaruss & Quesal, 2008), and the Comprehensive Executive Function Inventory, (CEFI-A-SR; Naglieri & Goldstein, 2013).

2.4 Measures

2.4.1 Demographic questions. Participants responded to an online fluency questionnaire section with nine demographic questions devised in Qualtrics (see Appendix A).

2.4.2 Locus of Control of Behavior Scale (LCB). Participants also completed the LCB. The LCB is a 17-question, 5-point Likert scale designed to measure how much control a person perceives they have over their own behavior(s) and distinguishes between two personalities; internal (i.e., persons who perceive outcomes as the result of their own behavior or control) and external (i.e., persons who feel that what happens to them is the result of external circumstances). Higher scores indicate more externality. In studies of persons who stutter and persons who do not stutter, significant differences were noted in the LCB scale scores of the two groups (Craig et al., 1984; Kumbhar & Gupta, 2016; Nil & Kroll, 1995), with persons who stutter demonstrating higher scores, thus greater externality. Kumbhar and Gupta (2016) suggest that the LCB scale may provide valuable insight to guide assessment and treatment of persons who stutter.

2.4.3 OASES Self-Report. The next step included participants' responses to the online OASES self-report. This protocol measures the impact of stuttering impact on the individual's life and provides information via self-reporting which can be used in assessment and treatment. The OASES self-report includes the following sections: Overall Characteristics, General Information, Reactions to Stuttering Characteristics and Experiences, Communication in Daily Situations Characteristics and Experiences, and Quality of Life. Responses are grouped into five categories; mild (impact score of 1.00-1.49); mild-moderate (impact score of 1.50-2.24); moderate (impact score of 2.25-2.99); moderate-severe (impact score of 3.00-3.74); or severe (impact score of 3.75-5.00). Thus, the higher the impact score, the more severe the person who stutters feels their stuttering impacts each category.

2.4.4 Comprehensive Executive Function Inventory-Adult -Self-Report (CEFI-A-SR). Participants also completed the Comprehensive Executive Function Inventory-Adult -Self-Report (CEFI-A-SR). This Likert-like scale has been clinically proven to provide insight into an individual's assessment of the various components of their own EFs. This report assesses EF-related behaviors (e.g., inhibitory control, working memory), and identifies an individual's EF strengths and weaknesses. Information captured by the CEFI-A-SR is useful to help identify a person's specific EF skills based on the setting. The CEFI-A-SR provides a comprehensive look at overall EFs via standard scores and individualized subtest standard scores on 9 EF areas (i.e., attention, emotion regulation, flexibility, inhibitory control, initiation, organization, planning, self-monitoring, and working memory). The higher the scores, the stronger the individuals perceive their ability in that EF area.

2.5 Data Analysis

This study was a correlation and a stepwise regression research design and included an analysis of descriptive statistics involving several variables. Data were imported into SPSS Version 25 for data management and analysis. LCB, OASES, and CEFI-A-SR scale and subscale scores were calculated according to publication manual guidelines. Analysis began by obtaining study sample characteristics. Frequencies and percentages were reported for all variables. Independent samples t-tests and one-way

analysis of variance (ANOVA) were used to compare LCB, OASES, and CEFI-A-SR total score and subscale scores across demographic variables. Post hoc pairwise comparisons with Tukey's correction for multiple comparisons was conducted for one-way ANOVA tests that yielded significant results. Pearson correlations were used to assess the correlation between LCB, OASES, and CEFI-A-SR total score and subscale scores. All assumptions for ANOVA and Pearson correlations were satisfied. A p -value < 0.05 was used to determine statistical significance.

3. Results

Initially, 171 individuals responded to the survey invitation. Among those individuals, 55 did not complete the survey in full and were excluded from the analytic sample. The final population consisted of 116 individuals. Table 1 displays the sample characteristics obtained from the nine demographic questions in the survey (see Appendix A).

Table 1. Sample Characteristics (N=116)

Characteristic	<i>n</i>	%
Region		
Midwest	25	21.6
Northeast	24	20.7
Southeast	28	24.1
Southwest	12	10.3
West	21	18.1
Outside the US	5	4.3
Did not answer	1	0.9
Race/ethnicity		
African American	7	6.0
Asian	6	5.2
Hispanic	6	5.2
White	89	76.7
Mixed race	4	3.4
Prefer not to answer	2	1.7
Age (in years)		
18-24	11	9.5
25-34	33	28.4
35-44	24	20.7
45-54	21	18.1

55-64	12	10.3
65+	14	12.1
Did not answer	1	0.9
Gender		
Male	74	63.8
Female	38	32.8
Prefer not to answer	4	3.5
Age determined to have a fluency disorder		
Preschool age	60	51.7
School age	51	44.0
Adult	2	1.7
Following an injury as a child	2	1.7
Seeking treatment		
Yes	13	11.2
No	102	87.9
Involved in a stuttering self-help group		
Public	62	53.4
Private	23	19.8
No	85	26.7
Other diagnoses		
ADHD	19	16.4
ADHD and speech impairment	1	0.9
Language impairment	1	0.9
Speech impairment	10	8.6
Speech and language impairment	1	0.9
No	84	72.4
Family history of a stuttering disorder		
Yes	46	39.7
No	70	60.3

3.1 Overall Demographics

A quarter of the sample came from the Southeast, while approximately one fifth of participants came from the Midwest, Northeast, and Southwest respectively. The majority of study participants identified as white (76.7%). Almost 50% of participants were between the ages of 25 and 44, and the majority were male (63.8%). There were 51.7% of participants who reported they were preschool age when it was

determined that they had fluency disorder, while 44% participants reported to be school age. Almost 90% of participants reported they were not currently seeking treatment for their disorder; however, 73.3% were/are involved with a stuttering self-help group (53% public and 20% private). There were 40% of participants who reported they had a family history of stuttering.

3.2 LCB, OASES, and CEFI-A-SR Scores by Region

Table 2 reports the descriptive statistics (mean, standard deviation, minimum and maximum) for the LCB, OASES, and CEFI-A-SR scale scores. (It should be noted that higher scores on the LCB indicate greater externality, higher scores on the OASES indicate a greater negative impact of stuttering, and higher scores on the CEFI-A-SR, the stronger the individual perceives their ability in that EF area.) Independent samples t-tests and one-way ANOVAs showed that LCB, CEFI-A-SR Organization (OG), CEFI-A-SR Self-Monitoring (SM), and CEFI-A-SR total score differed by region (all $p < 0.05$). Post hoc tests showed the following results: Participants from the West had lower LCB scores than those outside the US ($p = 0.01$). Participants from the Southeast and West had significantly higher CEFI-A-SR Organization subscale scores than those outside the US ($p = 0.049$ and $p = 0.02$). Similarly, participants from the Midwest, Southeast, and West had significantly higher CEFI-A-SR Self-Monitoring subscale scores than those from outside the US (all $p < 0.01$). Lastly, participants from the Southeast and West had significantly higher CEFI-A-SR total scores than those from outside the US ($p = 0.02$ and $p = 0.03$).

Table 2. Descriptive Statistics for LCB, OASES, and CEFI Scale and Subscale Scores

	Minimum	Maximum	Mean	Std. Deviation
Locus of control	19.00	57.00	35.5826	7.99998
OASES				
General Information Raw Score	16.00	86.00	51.2174	12.94847
General Information Impact Score	1.20	4.30	2.6627	.67342
Reactions to Stuttering Raw Score	32.00	136.00	86.0614	24.07116
Reactions to Stuttering Impact Score	1.10	4.64	2.8904	.78596
Communication in Daily Situations Raw Score	2.00	103.00	58.2435	18.45554
Communication in Daily Situations Impact Score	1.00	4.65	2.4742	.73844
QOL Raw Score	19.00	109.00	54.2435	20.70579
QOL Impact Score	1.00	4.86	2.2362	.84263
Overall Raw Score	89.00	407.00	249.0174	69.60742
Overall Impact Score	1.12	4.57	2.5749	.69986
CEFI				
Attention	1.00	34.00	22.8319	6.02510
Emotional Regulation	7.00	36.00	24.3929	4.93992

Flexibility	2.00	31.00	21.3274	4.71594
Inhibitory Control	2.00	33.00	23.6460	4.72629
Initiation	3.00	32.00	22.4690	4.73790
Organization	4.00	33.00	22.4690	5.17389
Planning	4.00	36.00	25.3186	5.80373
Self-Monitoring	3.00	27.00	20.0442	4.02978
Working Memory	4.00	35.00	22.3982	5.22450
Total	37.00	309.00	226.4071	42.76903

3.3 LCB, OASES, and CEFI-A-SR Scores by Race

The CEFI-A-SR scale and subscale scores were shown to differ by race. Post hoc tests showed the following: On the CEFI-A-SR Attention (AT) subscale, Asians scored lower than mixed race participants ($p = 0.02$). African Americans and Asians scored lower on the CEFI-A-SR Emotional Regulation (ER) subscale than mixed race on the CEFI-A-SR ER subscale ($p = 0.01$ and $p = 0.001$) while whites scored lower than Asians ($p = 0.02$). African Americans scored lower than all other race/ethnicity groups except Whites on the CEFI-A-SR Flexibility (FX) subscale (all $p < 0.05$). Asians scored less than mixed race participants on the CEFI-A-SR FX subscale ($p = 0.02$). Asians scored lower on the CEFI-A-SR Initiation (IT) subscale than Hispanics ($p = 0.04$). African Americans scored less than Hispanics, Whites, and mixed race on the CEFI-A-SR OG subscale (all $p < 0.02$). Asians scored less than mixed race participants on the CEFI-A-SR OG subscale ($p = 0.02$).

African Americans and Asians scored less than Hispanics, Whites, and mixed-race participants on the CEFI-A-SR Planning (PL) subscale (all $p < 0.03$). African Americans scored less than Hispanics, Whites and mixed-race participants on the CEFI-A-SR SM subscale (all $p < 0.04$). Asians scored less than Whites on the CEFI-A-SR subscale ($p = 0.03$). African Americans and Asians scored less than mixed race participants on the CEFI-A-SR Working Memory (WM) subscale ($p = 0.02$ and $p = 0.02$ respectively). African Americans and Asians had lower CEFI-A-SR total scores than Hispanics, Whites, and mixed-race participants (all $p < 0.05$). Post hoc pairwise comparisons of CEFI-A-SR Inhibitory Control (IC) subscale scores between racial/ethnic categories that corrected for multiple comparisons did not yield statistically significant results, despite the statistically significant one-way omnibus ANOVA test.

3.4 LCB, OASES, and CEFI-A-SR Scores by Age

LCB, OASES general information impact score, OASES reactions to stuttering raw and impact score, OASES communication in daily situations raw and impact scores, OASES QOL raw and impact scores, OASES overall raw and impact score, CEFI-A-SR Emotional Regulation subscale, and CEFI-A-SR Planning subscale scores differed by age. Post hoc tests showed the following: Participants 18 to 24 years

of age scored higher than participants 45 to 54 years of age and people 65+ years of age ($p = 0.001$ and $p = 0.03$ respectively) on LCB. Participants 25 to 34 years of age and participants 35 to 44 years of age also scored higher than participants 45 to 54 years of age on LCB ($p = 0.02$ and $p = 0.04$). Participants 25 to 34 years of age and 55 to 64 years of age had a lower OASES general information impact score than persons 35 to 44 years of age ($p = 0.03$ and $p = 0.01$). OASES reactions to stuttering raw scores and impact scores were lower in participants 65+ years of age than those 35 to 44 years of age ($p = 0.04$). OASES communication in daily situations raw scores were lower among participants 65+ years of age than participants 25 to 34 years of age and 35 to 44 years of age (all $p < 0.04$). OASES communication impact scores were higher in participants 18 to 24 years of age than participants 55 to 64 years of age ($p = 0.04$). OASES QOL impact scores were lower in participants 55 to 64 years of age than participants 18 to 24 years of age and participants 35 to 44 years of age ($p = 0.03$). The OASES overall raw and impact score was less in participants 35 to 44 years of age than participants 55 to 64 years of age ($p = 0.04$). Participants 18 to 24 years of age scored lower than participants older than 45 years of age on the CEFI-A-SR Emotional Regulation subscale ($p = 0.001$, $p = 0.02$, and $p = 0.03$ respectively). CEFI-A-SR Planning subscale scores were higher among 45 to 54 years of age than participants 18 to 24 years of age ($p = 0.03$).

3.5 OASES Scores

3.5.1 OASES scores by gender. LCB, OASES, and CEFI-A-SR scale and subscale scores did not differ by gender or whether they were currently involved in a self-help stuttering group.

3.5.2 OASES scores by age when fluency disorder was determined. OASES general information raw score, OASES reactions to stuttering raw and impact scores, OASES communication in daily situations impact score, and OASES overall impact score differed by what age it was determined a participant had a fluency disorder. Participants for whom it was determined that they have a fluency disorder at preschool age and school age had higher OASES general information raw scores than those for who it was determined that they have a fluency disorder as an adult (both $p = 0.01$). Post hoc pairwise comparisons of OASES reactions to stuttering raw and impact scores, OASES communication in daily situations impact score, and OASES overall impact score between age at diagnosis categories that corrected for multiple comparisons did not yield statistically significant results, despite the statistically significant one-way omnibus ANOVA test.

3.5.3 OASES scores and present involvement in treatment for stuttering. OASES general information raw and impact score differed by whether they were currently seeking treatment for stuttering, with those not seeking treatment scoring higher on both subscales than those seeking treatment (both $p < 0.02$).

3.6 LCB, OASES, and CEFI-A-SR Scores and Other Diagnosed Conditions

Locus of control, OASES communication in daily situations impact score, OASES QOL impact score, OASES overall impact score, CEFI-A-SR Attention subscale score, CEFI-A-SR Inhibitory Control

subscale score, CEFI-A-SR Organization subscale score, and CEFI-A-SR Working Memory subscale score differed by other diagnoses (all $p < 0.05$). There are too few participants in some of the other diagnosis categories to conduct post hoc pairwise comparisons.

3.6 LCB, OASES, and CEFI-A-SR Scores and Family Stuttering History

OASES reactions to stuttering impact score, OASES QOL impact score, OASES overall and impact scores, and CEFI-A-SR Attention subscale scores differed by family history of stuttering (all $p < 0.05$). Specifically, those who had a family history of stuttering had lower OASES reactions to stuttering impact score, OASES QOL impact score, and OASES overall and impact scores and higher CEFI-A-SR Attention subscale scores than those without a family history of stuttering.

3.7 Correlations

Table 3 presents the Pearson correlations for the locus of control, OASES, and CEFI-A-SR scale and subscale scores. Locus of control is positively correlated with all OASES measures and negatively correlated with all CEFI-A-SR measures except the CEFI-A-SR Self-Monitoring subscale (all $p < 0.01$). The OASES overall and subscale scores are all highly positively correlated with each other (all $p < 0.01$). Similarly, the CEFI-A-SR total and subscale scores are all highly positively correlated with each other (all $p < 0.01$).

OASES general information raw score is negatively correlated with CEFI-A-SR Attention ($p < 0.05$), Flexibility ($p < 0.01$), Planning ($p < 0.05$), and Total Scores ($p < 0.05$). OASES general information impact score is negatively correlated with all CEFI-A-SR scores except the CEFI-A-SR Self-Monitoring subscale score (all $p < 0.01$). The OASES reaction to stuttering raw score is negatively correlated to the CEFI-A-SR Emotional Regulation and Flexibility subscale scores ($p < 0.01$ and $p < 0.05$ respectively) but none of the other CEFI-A-SR scores. The OASES reaction to stuttering impact score is negatively correlated to the CEFI-A-SR Emotional Regulation, Flexibility, Inhibitory Control, Initiation, and Planning scores (all $p < 0.05$). The OASES communication in daily situations raw and impact scores is not correlated with the CEFI-A-SR measures. The OASES QOL raw score is negatively correlated with the CEFI-A-SR Emotional Regulation, Initiation and total scores (all $p < 0.05$). The OASES QOL impact score is negatively correlated with the CEFI-A-SR Emotional Regulation, Flexibility, Initiation, and total scores (all $p < 0.05$). The OASES overall raw score is negatively correlated with the CEFI-A-SR Emotional Regulation, Flexibility, and Initiation scores (all $p < 0.05$). The OASES overall impact score is negatively correlated with the CEFI-A-SR Attention, Emotional Regulation, Flexibility, Inhibitory Control, Initiation, Planning, and total score (all $p < 0.05$).

Table 3. Pearson Correlations for the Locus of Control, OASES, and CEFI Scale and Subscale Scores

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Locus	1																				
OASES																					
2. General	0.3	1																			
Information	8**																				
Raw Score																					
3. Gen Info	0.4	0.9	1																		
Impact Score	4**	2**																			
4. Reactions	0.5	0.7	0.7	1																	
Raw Score	1**	6**	3**																		
5. Reactions	0.5	0.7	0.7	0.9	1																
Impact Score	3**	4**	7**	9**																	
6. Comm raw	0.5	0.6	0.5	0.7	0.7	1															
Score	3**	3**	8**	3**	1**																
7. Comm Impact	0.3	0.6	0.6	0.7	0.7	0.9	1														
Score	7**	6**	5**	4**	4**	3**															
8. QOL Raw	0.4	0.6	0.6	0.8	0.8	0.7	0.7	1													
Score	7**	5**	4**	5**	4**	5**	9**														
9. QOL Impact	0.4	0.6	0.6	0.8	0.8	0.7	0.8	0.9	1												
Score	9**	6**	8**	3**	4**	2**	0**	8**													
10. Overall Raw	0.4	0.8	0.7	0.9	0.9	0.8	0.8	0.9	0.9	1											
Score	6**	2**	8**	5**	3**	7**	8**	2**	1**												
11. Overall	0.5	0.8	0.8	0.9	0.9	0.8	0.8	0.9	0.9	0.9	1										
Impact Score	1**	1**	3**	3**	4**	2**	9**	2**	3**	8**											
CEFI																					
12. Attention	-0.2	-0.2	-0.2	-0.0	-0.1	-0.0	-0.1	-0.1	-0.1	-0.1	-0.2	1									
	8**	0*	9**	9	4	3	7	1	6	2	0*										
13. Emotional	-0.5	-0.1	-0.2	-0.3	-0.3	-0.1	-0.2	-0.2	-0.2	-0.2	-0.3	0.5	1								
Regulation	2**	6	9**	0**	7**	3	3	6**	8**	2*	1**	9**									
14. Flexibility	-0.3	-0.2	-0.3	-0.2	-0.2	-0.0	-0.1	-0.2	-0.2	-0.2	-0.2	0.6	0.5	1							
	4**	9**	7**	3*	9**	7	7	1*	5**	3*	9**	4**	6**								
15. Inhibitory	-0.4	-0.1	-0.2	-0.1	-0.2	-0.0	-0.1	-0.1	-0.1	-0.1	-0.2	0.5	0.6	0.6	1						
Control	0**	6	7**	4	2*	5	8	5	8	5	3*	6**	5**	1**							

stuttering had a greater overall impact on their lives. Interestingly, studies of children who stutter have often reported little to no significant difference in the stuttering events of African American children and White children (Olsen et al. (1999). Similarly, when queried about their own confidence and social acceptance, young children who stutter reported no difference when compared to children who did not stutter (Hertsberg & Zebrowski, 2016). Likewise, there were no significant difference in the classroom interactions of students who stutter and students who do not stutter (Adriaensens et al., 2017). All studies, including the present investigation, underline the importance of understanding the individual and unique nature of stuttering.

4.2 Perceptions of Stuttering

The present study supports the work of other investigations that report fluency disorders and/or the perception of fluency change over time for the person who stutters. Researchers have found that changes occur for individuals who stutter throughout the life span (Peters & Starkweather, 1989). In the present study, self-consciousness related to stuttering becomes more apparent with age. Self-consciousness also increased the longer a person had been identified or self-identified as a person who stutters. Specifically, participants in this study who stuttered as preschool and school age had higher OASES general information raw scores than those for whom it was determined had a fluency disorder as an adult. For persons working with individuals who stutter, the importance of knowing how long that person had been dealing with stuttering is important to consider, as time since onset or diagnosis may impact perceptions and outcomes in therapy.

Participants who were seeking treatment had lower OASES general information raw and impact scores than those not seeking treatment. These findings support the work of other researchers who have identified the importance of support groups for persons who stutter (Bradberry, 1997; Krall, 2001; Ramig, 1993; Yaruss et al., 2002). The current study suggests support groups may help persons better internalize control over their stuttering and reduce the overall impact of stuttering in their lives. These results suggest participation in support groups should be encouraged for persons who stutter.

4.3 Self-Monitoring

The CEFI-A-SR Self-Monitoring subscale was the lone variable that demonstrated a positive correlation between LCB scores and the OASES general information impact score. As previously noted, the CEFI-A-SR Self-Monitoring subscale is defined as the ability to evaluate behaviors internally and make changes as needed to fix or amend mistakes. This suggests that participants in this study feel that when their self-monitoring is not effective, their feelings of internal control diminish, and their experiences about stuttering are also negatively affected. Introspection or self-monitoring has long been examined to support long-term therapeutic changes in persons who stutter (Goldiamond, 1965; James, 1981; Lickley et al., 2005; Martin & Haroldson, 1982; Vasic & Wijnen, 2005).

The concept of self-monitoring is straightforward, with the impetus of the control following on the person who stutters. But therein may lay the challenge. If a person who stutters feels that their ability to self-monitor is determined by their ability to manage their fluency, anything other than a stutter-free event may create a negative feeling about their internal control abilities and that entire experience. This may be what occurred for the persons in this study. It could be that persons who usually feel they possess control of their situations internally and overall have a positive life experiences related to stuttering feel when a stutter event happens, their ineffective or poorer self-monitoring is to blame. Both traditional means of stuttering management (i.e., fluency-shaping and stuttering management techniques) incorporate the use of self-monitoring. Therapists and clinicians should understand the importance of self-monitoring and how it influences perceptions of t abilities and even reality for persons who stutter. For example, the work of Lickley et al. (2005) reported that persons who stutter are often hypervigilant about their speech and may even assume or identify dysfluencies even when they do not occur. If self-monitoring of speech in all persons is likely rooted in a person's inner speech as suggested by Levelt (1983), persons who stutter may be underestimating their self-monitoring abilities their own internal control of fluency events that negatively impacts their stuttering experience.

4.4 Conclusion

Findings in this study provide insight into the behaviors, perceptions and cognitive functions of persons who stutter. Clinicians and therapists must be knowledgeable of effective ways to provide guidance and therapy to persons who stutter. The results strongly suggest there is the potential need for increased studies involving the influence and perceptions of self-monitoring in persons who stutter. As many individuals in this study have suggested, internal control of behavior and perceptions of their experiences with stuttering is not enough to override feelings of limited or ineffective self-monitoring in persons who stutter.

4.5 Limitations

Since the design of this research involved online data collection, it is possible that internal validity was influenced by instrumentation, selecting and administration. Posting the invitation to participate solely on the National Stuttering Association webpage limits the randomness of this sample. Instrumentation limits internal validity in that the survey was designed and validated by the researchers of this study via a pilot sampling of 10 individuals. Although all instructions were provided in a written format, the influence of a prior question response on a subsequent answer, especially if survey fatigue set in cannot be ruled out.

As the survey was administered online, the potential for someone other than the NSA member to complete it was a present, albeit small danger. External validity threats are few as it can be presumed the persons who responded to the invitation to participate were a representative sample of the population of persons with fluency disorders. Thus, the findings of this research may be widely applied

to assist persons who stutter.

The possibility that participating individuals were either highly motivated for or against the topic being questioned cannot be overlooked in this online format. Accordingly, the motivation for responding and participating may have some inherent outcome bias. The persons who stutter and chose to participate in this survey may not represent the feelings or comfort level of all persons who stutter.

4.6 Future Directions

To strengthen the validity of this study's findings, future studies should include direct assessments (i.e., not self-reports) to determine whether self-monitoring skills is an EF difficulty consistently present in persons who stutter. Additionally, these direct assessments can help identify other EF challenges that persons who stutter may encounter and thus guide treatment, management, and behavior modification. These studies could then be compared to the self-reported EF results to determine whether persons who stutter accurately portray their actual EF abilities. As many studies focus on children who stutter, an increased focus on adults who stutter and persons who have are known to be lifelong stutters would provide insight into the changes in the perceptions, behaviors, abilities, and needs of persons who stutter. This data would also provide valuable insight into the needs of persons who stutter over time.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

- Andrews, G., Craig, A. R., Feyer, A. M., Hoddinott, S., Howie, P., & Neilson, M. (1983). Stuttering: A review of research findings and theories circa 1982. *Journal of Speech and Hearing Disorders*, 48, 226-246. <https://doi.org/10.1044/jshd.4803.226>
- Andrews, G., & Craig, A. (1988). Prediction of outcome after treatment for stuttering. *British Journal of Psychiatry*, 153, 236-240. <https://doi.org/10.1192/bjp.153.2.236>
- Arnold, H. S., Conture, E. G., Key, A. P., & Walden, T. (2011). Emotional reactivity, regulation and childhood stuttering: A behavioral and electrophysiological study. *Journal of Communication Disorders*, 44(3), 276-293. <https://doi.org/10.1016/j.jcomdis.2010.12.003>
- Bloodstein, O. (1995). *A handbook on stuttering* (5th ed.). San Diego, CA: Singular.
- Bradberry, A. (1997). The role of support groups and stuttering therapy. *Seminars in Speech and Language*, 18(4), 91-399. <https://doi:10.1055/s-2008-1064083>
- Chang, S., Kenney, M., Loucks, T., & Ludlow, C. (2009). Brain activation abnormalities during speech and non-speech in stuttering speakers. *Neuroimage*, 46, 201-212. <https://doi.org/10.1016/j.neuroimage.2009.01.066>

- Chang, S., Angststadt, M., Chow, H., Etchell, A., Garnett, E., Choo, A., Kessler, D., Welsh, R., & Sripada, C. (2017). Anomalous network architecture of the resting brain in children who stutter. *Journal of Fluency Disorders*, 55, 46-67. <https://doi.org/10.1016/j.jfludis.2017.01.002>
- Craig, A. R., Franklin, J. A., & Andrews, G. (1984). A scale to measure locus of control of behaviour. *British Journal of Medical Psychology*, 57(2), 173-180. <https://doi.org/10.1111/j.2044-8341.1984.tb01597.x>
- Craig, A., Karen, H., Yvonne, T., Magali, C., & Karen, P. (2002). Epidemiology of stuttering in the community across the entire life span. *Journal of Speech, Language, and Hearing Research*, 45, 1097-1105. [https://doi.org/10.1044/1092-4388\(2002\)088](https://doi.org/10.1044/1092-4388(2002)088)
- Eggers, K., De Nil, L.F., & Van den Bergh, B. R. (2013). Inhibitory control in childhood stuttering. *Journal of Fluency Disorders*, 38(1), 1-13. <https://doi.org/10.1016/j.jfludis.2012.10.001>
- Etchell, A., Johnson, B., & Sowman, P. (2014). Behavioral and multimodal neuroimaging evidence for a deficit in brain timing networks in stuttering: A hypothesis and theory. *Frontiers in Human Neuroscience*, 8, 467. <https://doi.org/10.3389/fnhum.2014.00467>
- De Nil, L., & Kroll, R. (1995). The relationship between locus of control and long-term stuttering treatment outcome in adult stutterers. *Journal of Fluency Disorders*, 20(4), 345-364. [https://doi.org/10.1016/0094-730X\(95\)00024-2](https://doi.org/10.1016/0094-730X(95)00024-2)
- Ginsberg, A. P. (2000). Shame, self-consciousness, and locus of control in people who stutter. *The Journal of Genetic Psychology*, 161(4), 389-399. <https://doi.org/10.1080/00221320009596720>
- Goldiamond, I. (1965). Stuttering and fluency as manipulatable operant response classes. In L. Krasner, & L. P. Ullman (Eds.), *Research in Behavior Modification*. New York: Holt, Rinehart and Winston.
- Gordon, N. (2002). Stuttering: Incidence and causes. *Developmental Medicine and Child Neurology*, 44(4), 278. <https://doi.org/10.1017/S0012162201002067>
- Guntupalli, V. K., Kalinowski, J., & Saltuklaroglu, T. (2006). The need for self-report data in the assessment of stuttering therapy efficacy: Repetitions and prolongations of speech. The stuttering syndrome. *International Journal of Language & Communication Disorders*, 41(1), 1-18. <https://doi.org/10.1080/13682820500126627>
- Heitmann, R. R., Asbjørnsen, A., & Helland, T. (2004). Attentional functions in speech fluency disorders. *Logopedics Phoniatrics Vocology*, 29(3), 119-127. <https://doi.org/10.1080/14015430410017379>
- Hertsberg, N., & Zebrowski, P. M. (2016). Self-perceived competence and social acceptance of young children who stutter: Initial findings. *Journal of Communication Disorders*, 64, 18-31. <https://doi.org/10.1016/j.jcomdis.2016.08.004>
- James, J. E. (1981). Behavioral self-control of stuttering using time-out from speaking. *Journal of Applied Behavior Analysis*, 14(1), 25-37. <https://doi.org/10.1901/jaba.1981.14-25>

- Kamhi, A., & McOsker, T. (1982). Attention and stuttering: Do stutterers think too much about speech? *Journal of Fluency Disorders*, 7(3), 309-321. [https://doi.org/10.1016/0094-730X\(82\)90025-0](https://doi.org/10.1016/0094-730X(82)90025-0)
- Karniol, R. (1995). Stuttering, language, and cognition: A review and a model of stuttering as suprasegmental sentence plan alignment (SPA). *Psychological Bulletin*, 117(1), 104-124. <https://doi:10.1037/0033-2909.117.1.104>
- Klompas, M., & Ross, E. (2004). Life experiences of people who stutter, and the perceived impact of stuttering on quality of life: Personal accounts of South African individuals. *Journal of Fluency Disorders*, 29(4), 275-305. <https://10.1016/j.jfludis.2004.10.001>
- Krall, T. (2001). The International Stuttering Association: Objectives activities outlook: Our dreams for self-help and therapy. In H. G. Bosshardt, J. S. Yaruss, & H. F. M. Peters (Eds.), *Fluency disorders: Theory, research, treatment, and self-help. Proceedings of the Third World Congress on Fluency Disorders* (pp. 30-40). Nijmegen, the Netherlands: Nijmegen Univ. Press.
- Kumbhar, S. B., & Gupta, D. (2016). Comparison of Locus of Control Behaviour scores in normal and individuals with stuttering—A new way to approach stuttering disorder for Speech—Language Pathologists. *International Journal of Community Health and Medical Research*, 2(2), 43-48. <https://10.21276/ijchmr.2016.2.2.07>
- Levelt, W. J. (1983). Monitoring and self-repair in speech. *Cognition*, 14(1), 41-104. [https://doi.org/10.1016/0010-0277\(83\)90026-4](https://doi.org/10.1016/0010-0277(83)90026-4)
- Lickley, R. J., Hartsuiker, R. J., Corley, M., Russell, M., & Nelson, R. (2005). Judgment of disfluency in people who stutter and people who do not stutter: Results from Magnitude Estimation. *Language and Speech*, 48(3), 299-312. <https://doi.org/10.1177/00238309050480030301>
- Martin, R. R., & Haroldson, S. K. (1982). Contingent self-stimulation for stuttering. *Journal of Speech and Hearing Disorders*, 47(4), 407-413. <https://doi.org/10.1044/jshd.4704.407>
- Murphy, W. P., Yaruss, J. S., & Quesal, R. W. (2007). Enhancing treatment for school-age children who stutter: I. Reducing negative reactions through desensitization and cognitive restructuring. *Journal of Fluency Disorders*, 32(2), 121-138. <https://doi.org/10.1016/j.jfludis.2007.02.002>
- Naglieri, J. A., & Goldstein, S. (2013). *Comprehensive Executive Function Inventory: Technical manual*. North Tonawanda, NY: Multi-Health Systems Inc.
- Nang, C., Hersh, D., Milton, K., & Lau, S. R. (2018). The impact of stuttering on development of self-identity, relationships, and quality of life in women who stutter. *American Journal of Speech-Language Pathology*, 27(3S), 1244-1258. https://doi.org/10.1044/2018_AJSLP-ODC11-17-0201
- Ntourou, K., Anderson, J. D., & Wagovich, S. A. (2018). Executive function and childhood stuttering: Parent ratings and evidence from a behavioral task. *Journal of Fluency Disorders*, 56, 18-32. <https://doi.org/10.1016/j.jfludis.2017.12.001>

- O'Dwyer, M., Walsh, I. P., & Leahy, M. M. (2018). The role of narratives in the development of stuttering as a problem. *American Journal of Speech-Language Pathology*, 27(3S), 1164-1179. https://doi.org/10.1044/2018_AJSLP-ODC11-17-0207
- Ofoe, L. C., Anderson, J. D., & Ntourou, K. (2018). Short-term memory, inhibition, and attention in developmental stuttering: A meta-analysis. *Journal of Speech, Language, and Hearing Research*, 61, 1626-1648. https://doi.org/10.1044/2018_JSLHR-S-17-0372
- Olsen, L. T., Steelman, M. L., Buffalo, M. D., & Montague, J. (1999). Preliminary information on stuttering characteristics contrasted between African American and White children. *Journal of Communication Disorders*, 32(2), 97-108. [https://doi.org/10.1016/S0021-9924\(98\)00032-X](https://doi.org/10.1016/S0021-9924(98)00032-X)
- Ramig, P. R. (1993). The impact of self-help groups on persons who stutter: A call for research. *Journal of Fluency Disorders*, 18(2-3), 351-361. [https://doi.org/10.1016/0094-730X\(93\)90014-U](https://doi.org/10.1016/0094-730X(93)90014-U)
- Sasisekaran, J., & Basu, S. (2017). The influence of executive functions on phonemic processing in children who do and do not stutter. *Journal of Speech, Language, and Hearing Research*, 60(10), 2792-2807. https://doi.org/10.1044/2017_JSLHR-S-17-0033
- Shames, G. (1989). Stuttering: An RFP for a cultural perspective. *Journal of Fluency Disorders*, 14(1), 67-77. [https://doi.org/10.1016/0094-730X\(89\)90025-9](https://doi.org/10.1016/0094-730X(89)90025-9)
- Singer, C., Walden, T., & Jones, R. (2020). Attention, speech-language dissociations, and stuttering chronicity. *American Journal of Speech-language Pathology*, 29(1), 157-167. https://doi.org/10.1044/2019_AJSLP-19-00039
- Sowman, P., Ryan, M., Johnson, B., Savage, G., Crain, S., Harrison, E., Martin, E., & Burianova, H. (2017). Grey matter volume differences in the left caudate nucleus of people who stutter. *Brain and Language*, 164, 9-15. <https://doi.org/10.1016/j.bandl.2016.08.009>
- Vasić, N., & Wijnen, F. (2005). Stuttering as a monitoring deficit. In R. J. Hartsuiker, R. Bastiaanse, A. Postma, & F. Wijnen (Eds.), *Phonological encoding and monitoring in normal and pathological speech* (pp. 226-247). Psychology Press.
- Yaruss, J. S., Quesal, R. W., Reeves, L., Molt, L. F., Kluetz, B., Caruso, A. J., McClure, J. A., & Lewis, F. (2002). Speech treatment and support group experiences of people who participate in the National Stuttering Association. *Journal of Fluency Disorders*, 27(2), 115-134. [https://doi.org/10.1016/S0094-730X\(02\)00114-6](https://doi.org/10.1016/S0094-730X(02)00114-6)
- Yaruss, J., & Quesal, R. (2006). Overall Assessment of the Speaker's Experience of Stuttering (OASES): Documenting multiple outcomes in stuttering treatment. *Journal of Fluency Disorders*, 31(2), 90-115. <https://doi.org/10.1016/j.jfludis.2006.02.002>
- Yaruss, J. S., & Quesal, R. W. (2008). *OASES: Overall Assessment of the Speaker's Experience of Stuttering Interpretive Report*. Bloomington, MN: Pearson.

Appendix

Appendix A. Demographic Questions

- 1) Which region of the world do you live in?
- 2) What is your ethnicity?
- 3) What is your age?
- 4) What is your gender?
- 5) At what age was it determined you had a fluency disorder (stutter)?
- 6) Are you currently seeking treatment for your stuttering?
- 7) Are you currently involved with a stuttering self-help group?
- 8) Other than stuttering, were you ever diagnosed with any of the following:
attention deficit hyperactivity disorder
speech impairment
language impairment
- 9) Does anyone in your family have a stuttering disorder?