

Assessing Syntactic Development among Arabic Speaking Stuttering and Non-Stuttering Children

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Abstract

The aim of the study was to assess the syntactic development of stuttering and non-stuttering Saudi Arabic-speaking children aged between five and ten years old. The research conducted in collaboration with a native Arabic-speaking phoniatrician. In the current study, the syntactic and morpho-syntactic development of (24) stuttering Saudi Arabic-speaking children (SACWS) (the experimental group) and (29) non-stuttering Saudi Arabic-speaking children (SACWNS) (the control group) were assessed and compared using two modified and validated Arabic tests (namely, Sentence Comprehension Test and Expressive Language Test; developed by Shaalan, 2010). The results indicated that both the receptive and expressive

syntactic abilities of the SACWS were lower than the same abilities of their SACWNS peers. When conducting group comparisons, the SACWS lagged behind the SACWNS in their receptive and productive syntactic development. It might be concluded that SACWS might have subtle syntactic deficits that may lead to lower syntactic development when compared to their fluent peers. Thus, Saudi Arabic-speaking children might face difficulties in understanding and producing various syntactic and morpho-syntactic features of Arabic; a state of affairs that ought to be considered by teachers, speech pathologists, and parents.

Keywords: Stuttering, Non-stuttering, Saudi Arabic-speaking Children Who Stutter (SACWS), Saudi Arabic-speaking Children Who do Not Stutter (SACWNS), Syntactic development

1. Introduction

Normal speech and the ability to communicate effectively play a vital role in a child's future academic, occupational and/or social success. That is, children who have language disorders may have difficulties in following their school curricula; consequently, they may have insufficient schooling. In turn, this may adversely affect the child's future career in the job market and negatively affect his/her normal integration into the social world. On this account, the study of language development is of particular and vital relevance within the area of child development research (Schlichting & Spelberg, 2003).

In fact, stuttering is one of the fluency barriers that handicaps a speaker to the point of impairing communication and/or causing speech anxiety (Byrne, 1991). Miles and Ratner (2001) stated that clinicians usually advise parents of children who stutter (CWS) to simplify their linguistic input as a means for promoting fluency. This advice, according to Miles and Ratner, may not only be inefficacious, but it might be potentially harmful to the child's communicative and syntactic development.

Through personal communication with the phoniatricians and speech pathologists at the Communication and Swallowing Disorders Unit, King Abdul-Aziz University Hospital, it has been realized that stuttering children tend to use simple structures while speaking to hide their disfluency. It is not clear yet whether this tendency is a result of stuttering or is caused by deficiencies in syntactic development of those children.

Similarly, the relationship between syntax and speech fluency is considered one of the most critical issues related to stuttering (Bauman, 2009). Previous research comparing the syntactic development of CWS and those who do not stutter (CWNS) has indicated inconclusive results (Bauman, 2009; Howell & Au-Yeung, 1995; Nippold, 2012; Ntourou, Conture, & Lipsey, 2011). As Nippold (2012) reported, for more than 80 years, researchers have proposed that there is a possible connection between stuttering and child language ability. Understanding this connection and the implications of such a link, as Nippold suggested, may contribute to the expansion of our knowledge base related to the nature, cause, and treatment of stuttering.

Owing to the above-mentioned remarks and since little is known about the syntactic development of SACWS, the present research is devoted to the investigation of the syntactic development among stuttering children whose native language is Saudi Arabic.

This research aims at the following:

- 1) Assessing syntactic development among CWS and CWNS whose native language is Saudi Arabic.
- 2) Developing reliable and valid tests for assessing the receptive and productive syntactic abilities of SACWS.
- 3) Exploring the impact of stuttering on syntactic development among Saudi Arabic-speaking children who are between five and ten years old.

2. Method

2.1 Research Setting

The study was conducted in the Communication and Swallowing Disorders Unit (CSDU), Research Chair of Voice, Swallowing, and Communication Disorders, King Abdul-Aziz University Hospital, College of Medicine at King Saud University in Riyadh- Kingdom of Saudi Arabia (KSA). The normal cases used for comparing the syntactic abilities were either selected from the hospital, Our Kids summer camp, Al-Rwad kindergarten, and Al-Rwad elementary school, or from Al-Hasad elementary school. The testing sessions began on March 13, 2013 and continued until November 7, 2013.

2.2 Participants

A participant had to meet the following criteria to be included in the experimental group:

- 1) Diagnosed with developmental stuttering by a qualified phoniatrician or speech and language pathologist.
- 2) Be monolingual native speaker of Saudi Arabic.
- 3) Chronological age between 5 and 10 years when the study began. The reason behind selecting this age group is that a child usually acquires most of the grammatical forms of his/her native language by the age of five or six years old (Goodluck, 1998; Kess, 1993; McLaughlin, 2006).
- 4) A history clear of any medical, neurological, or emotional problems (i.e. aphasia, autism, brain damage, anxiety disorders or depressive disorders) that might influence his/her performance during the study.
- 5) Free of any language and speech impairments, such as delayed language development, developmental dysphasia, misarticulation, etc., other than stuttering.

24 children met these criteria and were included in the experimental group. The control group included 29 similar age children without a history of stuttering.

The method used for selecting the cases for this study was the convenience sampling, also known as accidental sampling. Both groups were matched for age and non-verbal IQ. To determine group equivalence and homogeneity, an independent sample t-test was calculated for the differences in the chronological age.

Table 1. t-test statistic of the differences between the SACWS and the SACWNS groups on age and non-verbal IQ variables

Group	N	Mean	SD	Mean Difference	<i>df</i>	<i>t</i>	<i>p</i>
SACWS	24	7.38	1.50	.59	51	.123	.903
SACWNS	29	7.21	1.37				

2.2.1 Consent

A consent describing the research procedure was handed to the parents of the study participants requesting their permission for data collection. The consent form ensured a high degree of confidentiality of the obtained data and reassured the parents that meetings with their children will be used for research purposes only. Another consent form was submitted to the staff at King Abdul-Aziz University Hospital to allow interviews with children and offer access to archival records and medical reports. Moreover, in order to reach the participants in the targeted schools, a formal letter requesting school administrative staff to provide access for research purposes was issued.

2.3 Measurements

To assess the comprehension and production of the major syntactic structures in Arabic, two tests were used, i.e. the Sentence Comprehension Test (SC) and the Expressive Language Test (EL). These two tests were selected from a test battery developed by Shaalan (2010).

2.3.1 The Sentence Comprehension test

According to Fujiyoshi et al. (2012), the understanding of sentence structure is a key element of syntax. Thereby, sentence comprehension reflects a child's syntactic development. In the same vein, Howell (2004) viewed asking stuttering people to match a sentence with one of a number of pictures displayed to them as one method of examining their syntactic performance. For this reason, the SC test has been chosen to be one of the tests used in this research.

The SC test consists of 40 items divided into two sections: Section (A) with 22 items and Section (B) with 18 items. According to Shaalan (2010), the division into two sections was meant to serve "an organizational purpose only" (p.79). SC test is a multiple-choice form test. The examiner produces a sentence and the child has to choose and point to the correct answer from three different pictures in section A, and from four different pictures in section B.

2.3.2 The Expressive Language Test

The EL test measures the ability of Gulf Arabic-speaking children to produce different syntactic and morpho-syntactic structures. Shaalan (2010) based his choice of linguistic structures on structures found in the language samples of 35 Gulf Arabic-speaking children¹ interacting with their fathers, previous research on Gulf Arabic and Saudi dialect, his experience as a speech language pathologist, and his native knowledge of Gulf Arabic. Shaalan consulted some English language tests, such as the Clinical Evaluation of Language Fundamentals-CELF3 (Semel, Wiig, & Secord, 1996) and Preschool Language Scale-PLS4 (Zimmerman, Steiner, & Pond, 1992). He also consulted some clinicians working with Gulf Arabic children in Qatar regarding appropriate structures to be used with his population and their comments determined the choice of the test's items (Shaalan, 2010, p. 91).

¹ Those children were typically developing aged between 2;11 and 4;11 years old (Khater & Shaalan, 2007; Shaalan & Khater, 2006)

The EL test consists of 68 items divided into two sections: Section A with 24 items examining early developing structures and Section B with 44 items targeting more advanced language learners. The test was divided for the same purpose stated in SC test above. After initial piloting of the tests, some modifications were made to ensure that the tests are culturally and linguistically appropriate for the Saudi environment (see Baraja'a, 2014). Several Saudi linguists and assessment specialists were consulted regarding the modified version of the SC test and EL test. Their remarks and suggestions were taken into consideration when the final forms of the two tests were prepared.

2.4 Procedure

The two groups (SACWS and SACWNS) completed the modified versions of both SC test and EL test. An iPad 3 or iPad mini was used to present the tests' pictures to the children.

To observe the case and language of the SACWS, an examiner (the first author) has attended the treatment sessions with the speech pathologists. Once the treatment session finished, the examiner sat with the child with/without his/her parents in a quiet room at King Abdul-Aziz University Hospital. The testing session usually began by free playing and chatting with the child to break the ice between the examiner and the child. Then the SC test was administered in a form of an iPad game, followed by the EL test.

Regarding the SACWNS, the testing session began with 5 to 10 minutes conversation with the child to informally assess the child's language and fluency. Records of these conversations were assessed by a native Arabic-speaking phoniatrician. Then as mentioned with the SACWS, the SC test was conducted using an iPad game and then immediately followed by the EL test.

All testing sessions were either audio or video recorded, depending on the permission taken from the child's parent for later assessments, investigations, and analyses. Testing sessions took between 25 to 40 minutes, depending on a child's age and whether or not he/she asked for a break. If the child asked for a break, it would be between the SC test and the EL test, or after Section A of either test. Most of the time, testing was completed in a one 25- minute session, especially with the SACWNS. Generally, all children were interested in the assessment process and in taking the tests. In fact, the children enjoyed playing with the examiner since the tests were presented as iPad games.

2.5 Scoring

The scoring pattern followed by (Shalan, 2010) was modified, i.e. incorrect answers and no response (NR) were assigned two different scores instead of one score as done by Shalan. For a correct answer, a child would get a score of (2) and for an incorrect answer, he/she would get a score of (1), based on the possible correct and incorrect answers provided by the original versions of the tests. If a child did not respond to any item, his/ her score was considered as NR and he/she would get a score of 0. The rationale behind using this pattern was to differentiate between the items the SACWS did not know and those they were not able to pronounce due to their stuttering (avoidance).

3. Instruments' Validation

It is important to validate the instruments used, i.e. the modified versions of the SC and EL tests, before analyzing the study's results.

3.1 Instruments' Reliability

To assess the reliability of the modified versions of the SC and EL tests, the content sampling (Cronbach's coefficient alpha) and scorer differences (correlations between raters) were calculated.

3.1.1 Internal Consistency

The Cronbach's alpha coefficients for both tests, i.e. SC test and EL test were calculated for the SACWS, the SACWNS, and all participants. Cronbach's α for the SACWS group's scores on the SC test was .782. This reveals that the SC test has an acceptable level of internal reliability. Shaalan (2010) reported similar coefficients. He reported that Cronbach's α for the SC test was .79. Cronbach's α measuring the internal consistency of the SACWS group on the EL test was .903, reflecting an excellent level of internal reliability. Again, the coefficient reported by Shaalan (2010) was .933. Test's reliability for the two tests combined was also calculated for the SACWS group. That is, Cronbach's α for the whole tests was .919, indicating an excellent level of internal reliability. Regarding the SACWNS group, the Cronbach's α for the SC test was .740, showing an acceptable level of internal reliability. The EL test had a good level of internal reliability for the SACWNS participants (Cronbach's α was .873). Lastly, the whole test's reliability was assessed. The Cronbach's α for whole tests as .904 reflecting an overall excellent level of internal reliability for the whole tests for the SACWNS participants.

Finally, the internal consistency as reflecting reliability for all participants, i.e. the SACWS and the SACWNS was calculated. In the case of the SC test, Cronbach's α for the SACWS and the SACWNS groups was .793, which showed a good level of internal reliability. Besides, Cronbach's alpha reliability coefficient indicated an excellent level of internal reliability for both the EL test and for the whole tests for all participants. That is, the Cronbach's α for the EL test and for the whole tests were .914, and .930 respectively.

3.1.2 Inter-Rater Reliability

Two raters, the examiner was one of them, scored the tests' booklets containing the modified versions of the SC and EL tests. The raters were provided with possible correct and incorrect answers, based on the possible correct and incorrect answers provided by the original versions of the tests. Further, both raters have followed the instructions provided in the tests' booklets regarding how to rate the tests.

The inter-rater reliability for scoring the modified version of the SC and the EL tests was estimated; Pearson product-moment correlation coefficient was 1.00, significant at the 0.00 level. This indicates total agreement between the two raters. As for the modified version of the EL test, Pearson's Coefficient yielded a result similar to that of the SC test. The inter-rater reliability was 1.00, significant at the 0.00 level. Finally, the correlation between the two

raters on the whole tests, i.e. the SC and EL tests, was calculated. Pearson's Coefficient was 1.00, significant at the 0.00 level. In fact, the coefficients for the SACWS and the SACWNS groups were all 1.00, indicating total agreement between raters on rating the correct and incorrect responses.

3.2 Instruments' Validity

Since the modifications of Shaalan's instruments were limited to changing a few vocabulary to fit the linguistic patterns used in Saudi Arabic, it seems safe to assume its content and concurrent validity. Shaalan (2010) investigated the correlations among the SC and EL tests and two other measures: namely Sentence Repetition Test (SR) and the Arabic Picture Vocabulary Test (APVT). The reported coefficients were .54 between SC and EL tests, .43 between SC and SR tests, and .63 between SC and APVT tests, which were all statistically significant at $p < .01$. The correlation coefficient between EL and SR tests was .69; the correlation coefficient between the EL and APVT tests was .50, which were also all statistically significant at $p < .01$.

In the current study, the relationship between the SC and EL tests was assessed. Pearson product-moment correlation coefficient between the two variables was .755, which was statistically significant $p < .0001$. It is clear that the coefficient index obtained in this study is higher than that reported by Shaalan. The discussion above demonstrated that the used instruments enjoyed acceptable levels of content and concurrent validity. However, it was deemed necessary in the current study to go one step further by assessing the construct validity of the used instruments. Hence, Principal Component Analysis statistic with varimax rotation was used to find out factor loadings and communalities shared by the various variables of the study.

Table 2. Communalities and Factor Extractions of the Study's Variables

Variables	Initial	Extraction
Total SC	1.000	.948
Total EL	1.000	.954
Modification	1.000	.624
Prepositional Phrases	1.000	.634
Indirect Object	1.000	.726
Verb Phrases (SC)	1.000	.617
Relative Clauses	1.000	.482
Subordinate Clauses	1.000	.663
Possessives	1.000	.689
Clitic Pronouns	1.000	.661
Pronominalization	1.000	.743
Nominalization	1.000	.636
Verb Phrases (EL)	1.000	.497
Modification	1.000	.772
Total SC and EL	1.000	.983

Table 3. Total Variance Explained, Eigen values, and Extraction Sums of Squared Loadings of the Study's Variables

Component	Initial Eigen values			Extraction Sums of Squared Loadings		
	% Cumulative	% Variance	Total	%Cumulative	% Variance	Total
1	53.678	53.678	8.052	53.678	53.678	8.052
2	63.528	9.850	1.478	63.528	9.850	1.478
3	70.865	7.337	1.101	70.865	7.337	1.101
4	77.300	6.435	.965			
5	82.608	5.308	.796			
6	86.891	4.283	.643			
7	90.885	3.994	.599			
8	93.910	3.026	.454			
9	96.579	2.669	.400			
10	98.159	1.579	.237			
11	99.201	1.042	.156			
12	99.578	.377	.057			
13	99.877	.299	.045			
14	100.000	.123	.018			
15	100.000	-1.084E-15	-1.626E-16			

Table 4. Factor Loadings with Varimax Rotation of the Study's Variables

	Component		
	1	2	3
Total SC	.903	.363	-.024
Total EL	.951	-.222	-.023
Modification	.581	.100	-.526
Prepositional Phrases	.521	.438	.413
Indirect Object	.180	.813	-.181
Verb Phrases (SC)	.508	.372	.469
Relative Clauses	.683	.117	.039
Subordinate Clauses	.751	.099	-.298
Possessives	.675	-.263	.406
Clitic Pronouns	.767	-.236	.130
Pronominalization	.791	-.300	.165
Nominalization	.774	-.180	-.065
Verb Phrases (EL)	.636	-.146	-.268
Modification	.863	-.059	-.154

Total SC and EL	.991	-.015	-.025
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Tables 2, 3, and 4 above showed that the extractions of the factors were capable of accounting for most of the shared variance between the various variables. It is noteworthy here that not all variables could be included in the analyses due to the lack of required variance. The tables demonstrate that all variables, with the exception of the items of the indirect object, loaded heavily on Factor 1. This factor might be labeled as G-factor, which is responsible for language production and comprehension. It is clear that the loadings and extractions of all variables were capable of explaining almost all shared variance among the SC and EL test items, leaving almost no reliable variance without being accounted for. These analyses support the claim that both SC and EL tests used in this study enjoy a high level of construct validity.

4. Results

The discussion in this section consists of three subsections, the result analyses of the SC test, the EL test, and the two tests combined.

4.1 Descriptive Statistics of the SC Test

Descriptive statistics calculated the means, standard deviations (SD), and standard error of the means of the participants' responses to the SC test's items assessing the comprehension of the syntactic features. The SC test consisted of thirteen syntactic and morpho-syntactic features, i.e. use of negative, modification, prepositional phrase, indirect object, verb phrase, relative clause, subordinate clause, interrogative, passive, indirect request, coordinated sentence, imperative, and topicalization.

The means of the SACWNS were higher than those of the SACWS, with only one exception. The exception was the means of the two groups on the items pertaining to the indirect object subsection of the SC test. The mean of the SACWS was ($X = 5.00$), whereas the mean of the SACWNS on the same measure was ($X = 4.76$). The performance of the SACWS and the SACWNS was approximately similar on the SC items related to the following features: negative, verb phrase past, interrogative, passive, and coordinated sentence structures. A closer look at the mean values obtained by the SACWNS revealed that their means were 3.66, 3.83, 3.66, 3.76, and 3.72 on the negative, verb phrase past, interrogative, passive, and coordinated sentence items of the SC test. The means of the SACWS group on the items for same syntactic features' were 3.50, 3.79, 3.21, 3.38, and 3.54 respectively.

Conversely, the SACWNS group obtained a mean value of (4.76) on the items assessing the indirect object structure which was lower than that obtained by the SACWS ones (5.00). The mean values were higher for the SACWNS group on a number of items of the SC test. That is, the means of items for the SACWNS group were 5.17, 5.72, and 6.86 on the verb phrase future, modification, and prepositional phrase respectively, while the SACWS scored 4.54, 5.25, and 6.58 on the aforementioned structures. The means of both groups on relative clause items of the SC test were 7.07 and 6.83, respectively.

Considering the SC test items, apart from the group, showed that the lowest obtained means

were those on the imperative items. In fact, the mean of the SACWS on items assessing the comprehension of imperatives was the lowest mean in the whole study, ($X = 1.29$). The highest mean ($X = 16.83$) was that of the SACWNS on the total of verb phrase items. When the lowest and highest means of a group (SACWS and SACWNS) were examined, the SACWS showed the lowest mean on items relating to imperatives, whereas the mean ($X = 16.00$) pertaining to total verb phrases items was the highest. By the same token, the SACWNS showed similar distribution, where their mean on imperatives was the lowest ($X = 1.48$) and their mean on total verb phrases was the highest.

In fact, this remark may be seen as a further corroborating of the validity of the SC test. When the values of the standard deviations of the two groups were analyzed, the values of the SACWNS group were generally lower than those of the SACWS group. This reflects the magnitude of variation within the group. It seems to indicate that the SACWNS formed a more homogeneous group than the SACWS. The SACWNS group showed higher means than those of the SACWS; they also showed lower values on standard deviations than those of the SACWS group. A Pearson product-moment correlation between the means and the standard deviations of the two groups yielded a high correlation coefficient ($r = .964$, $P < .0001$). This confirms the previously mentioned remark that increase in means and decrease in standard deviation values appear to be inversely proportional. Another significant observation is that the variations among the SACWS in their abilities to comprehend various syntactic and morpho-syntactic features were higher than those of the SACWNS. It was quite obvious that the performance of some of the SACWS on those features was better than the performance of their SACWS peers. This variation among the SACWS was less conspicuous among the SACWNS.

The total mean of the SACWNS group ($X = 71.72$) was higher than that of the SACWS ($X = 67.50$). This indicates that the SACWNS group outperformed the SACWS on most of the SC test's items used to assess various syntactic and morpho-syntactic features. Apparently, there were differences between the SACWS and the SACWNS in their syntactic development.

4.2 Comparing the Participants' Performance on the SC Test

To avoid Type I error, a One-way Analysis of Variance (ANOVA) was used to investigate whether or not the observed differences between the means of the SACWS and SACWNS on the various syntactic and morpho-syntactic features of the SC test were statistically significant. However, the independent sample t-test statistic was calculated to confirm the outcomes of the investigation (see Baraja'a, 2014).

Table 5. ANOVA for the differences between the means of the SACWS and SACWNS on the syntactic features of the SC test

Syntactic feature	Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	Sig.
	Between Groups	1	.316	.316		
	Within Groups	51	22.552	.442		

Negative	Total	52	22.868		.715	.402
Modification	Between Groups	1	2.952	2.952	6.754	.012
	Within Groups	51	22.293	.437		
	Total	52	25.245			
Prepositional Phrase	Between Groups	1	1.020	1.020	1.777	.188
	Within Groups	51	29.282	.574		
	Total	52	30.302			
Indirect object	Between Groups	1	.765	.765	1.429	.237
	Within Groups	51	27.310	.535		
	Total	52	28.075			
Verb Phrase Present	Between Groups	1	.340	.340	1.287	.262
	Within Groups	51	13.471	.264		
	Total	52	13.811			
Verb Phrase Past	Between Groups	1	.017	.017	.107	.745
	Within Groups	51	8.096	.159		
	Total	52	8.113			
Verb Phrase Future	Between Groups	1	5.224	5.224	9.483	.003
	Within Groups	51	28.096	.551		
	Total	52	33.321			
Total Verb Phrase	Between Groups	1	8.994	8.994	7.627	.008
	Within Groups	51	60.138	1.179		
	Total	52	69.132			
Relative clause	Between Groups	1	.729	.729	.650	.424
	Within Groups	51	57.195	1.121		
	Total	52	57.925			
Subordinate clause	Between Groups	1	12.169	12.169	5.712	.021
	Within Groups	51	108.661	2.131		
	Total	52	120.830			

Interrogative	Between Groups	1	2.622	2.622	7.224	.010
	Within Groups	51	18.510	.363		
	Total	52	21.132			
Passive	Between Groups	1	1.933	1.933	5.205	.027
	Within Groups	51	18.935	.371		
	Total	52	20.868			
Indirect request	Between Groups	1	.869	.869	7.478	.009
	Within Groups	51	5.924	.116		
	Total	52	6.792			
Coordinated sentence	Between Groups	1	.437	.437	1.622	.209
	Within Groups	51	13.751	.270		
	Total	52	14.189			
Imperative	Between Groups	1	.480	.480	.640	.427
	Within Groups	51	38.200	.749		
	Total	52	38.679			
Topicalisation	Between Groups	1	.065	.065	.448	.506
	Within Groups	51	7.407	.145		
	Total	52	7.472			
Total SC	Between Groups	1	234.320	234.320	8.880	.004
	Within Groups	51	1345.793	26.388		
	Total	52	1580.113			

As Table (5) shows, not all observed differences between the means of the SACWS and SACWNS on the study variables were statistically significant. Statistically significant differences were observed between the two groups' means on items assessing the verb phrase future, total verb phrase, indirect request, modification, subordinate clause, interrogative, passive, and total SC test. However, the observed differences were statistically insignificant in the cases of the differences between the means on the negative, prepositional phrase, indirect object, verb phrase present, verb phrase past, relative clause, coordinated sentence, imperative, and topicalisation items of the SC test.

The SACWNS as a group receptively outperformed their SACWS counterparts. However, the observed differences between the means of the two groups on the syntactic and

morph-syntactic features were not all statistically significant. The SACWNS showed significantly higher means than those of the SACWS on items related to the following structures: modification, verb phrase future, total verb phrase, subordinate clause, interrogative, passive, and indirect request. More importantly, when the overall performance of the SACWS and the SACWNS on the SC test was taken, the SACWNS appreciably outperformed the SACWS. The mean of the SACWNS children was ($X = 71.72$), whereas the mean of the SACWS on the same measure was ($X = 67.50$). The mean difference between the two groups was (4.22), which was statistically significant ($F = 8.880$, $df = 52$, $p < 0.004$). It is evidently clear that the performance of the SACWNS as a whole was significantly better than that of the SACWS. Although attempting to establish a cause and effect relationship among statistically dependent variables is quite risky, there is enough evidence to conclude that SACWS are facing real difficulties when trying to comprehend certain syntactic and morph-syntactic features of Arabic. Stuttering might be the cause of such deficiency. However it may be the case that both stuttering and the deficiency associated with it are caused by a third factor that was not included in the present study. This might be a good topic to consider in future research.

4.3 Descriptive Statistics of the EL Test

Descriptive statistics, namely, the means, standard deviations, and standard error of the means, were calculated. It is worth to mention that the EL test contains items assessing children's production of the following syntactic and morpho-syntactic structures: possessives, pronominalization, prepositions, nominalization, verb phrase, construct state, modification, comparative and superlative, negation, and question formation.

Beginning with the lowest means obtained by the participants, the means of the SACWS were 1.38, 1.46, 2.42, and 2.67 on the items assessing the children's production of the question formation, subject pronouns, superlative, and comparative respectively. Meanwhile, the SACWNS group obtained 1.69, 1.55, 2.79, and 2.97 on the same features. In fact, the lowest mean on the whole EL test was that of the stuttering SACWS on items assessing question formation ($X = 1.38$). Besides, the lowest mean obtained by the SACWNS was that on subject pronouns items ($X = 1.55$).

The means of the SACWS and the SACWNS on items pertaining to the preposition feature were identical. The children's responses, SACWS and SACWNS, to the preposition items of the ELL test were unlike their responses to other syntactic and morpho-syntactic features of the EL test. That is, the mean of the SACWS was equal to that of the SACWNS, i.e. 4.00. Considering the standard deviation, the SD of the two groups on the prepositions items was 0 (zero). A closer examination of children's responses to EL test's items assessing the prepositions, i.e. items number 1 and 4 of the EL test, revealed that all children participating in the study have answered the mentioned items correctly.

The means of both the SACWS and the SACWNS reached their peak on items assessing the children's production of the verb phrase, total nominalization, clitic pronouns, and total pronominalization. That is, the highest means of the SACWNS group, were 20.93, 21.97, 22.31, and 32.48 for the verb phrase, clitic pronouns, total nominalization, and total

pronominalization respectively. Whereas the SACWS obtained their highest mean values 19.83, 20.13, 20.54, and 30.21 on the verb phrase, total nominalization, clitic pronouns, and total pronominalization items of the EL test. It is evident that the SACWNS group obtained the highest means on items assessing the pronominalization structure ($X = 32.48$).

The highest *SD* values of the SACWNS scores on the whole EL test were 2.19, 1.94, and 1.84 on the total pronominalization, total nominalization, and clitic pronouns items, while SACWS' highest *SD* values 3.43, 2.76, and 2.41 were those for the total nominalization, total pronominalization, and total modification items of the EL test respectively.

The total mean of the SACWNS ($X = 124.17$) was higher than that of the SACWS ($X = 114.75$) on the EL test. This can be seen as an indication that the SACWNS group outperformed the SACWS on most of the syntactic and morpho-syntactic structures assessed by the EL test's items.

Needless to say, similar to the values of the standard deviations obtained by the two groups on the SC test, the standard deviation values of the SACWNS participants were generally lower than those obtained by their SACWS counterparts which may indicate that the SACWNS group was more homogeneous than the group of the SACWS.

4.4 Comparing the Participants' Performance on the EL Test

One-way ANOVA was used to investigate whether or not the observed differences between the means of the SACWS and SACWNS on the various syntactic and morpho-syntactic features of the EL test were statistically significant. Besides, independent sample t-test statistic was calculated to explore the statistical significance of the observed differences between the means of both groups on the assessed syntactic and morpho-syntactic features of the EL test (see Baraja'a, 2014).

Table 6. ANOVA for the differences between the means of the SACWS and SACWNS on the syntactic features of the EL test

Syntactic feature	Source	<i>df</i>	<i>SS</i>	<i>MS</i>	F	Sig.
Nominalization – Dual	Between Groups	1	3.691	3.691	3.990	.051
	Within Groups	51	47.177	.925		
	Total	52	50.868			
Nominalization - Plurals	Between Groups	1	28.984	28.984	10.008	.003
	Within Groups	51	147.695	2.896		
	Total	52	176.679			

Nominalization - Derivation of Nouns	Between Groups	1	.377	.377	.774	.383
	Within Groups	51	24.868	.488		
	Total	52	25.245			
Total Nominalization	Between Groups	1	62.715	62.715	8.488	.005
	Within Groups	51	376.832	7.389		
	Total	52	439.547			
Modification - Plural	Between Groups	1	2.171	2.171	5.500	.023
	Within Groups	51	20.131	.395		
	Total	52	22.302			
Modification - Dual	Between Groups	1	3.494	3.494	6.919	.011
	Within Groups	51	25.751	.505		
	Total	52	29.245			
Modification - Feminine	Between Groups	1	.651	.651	4.870	.032
	Within Groups	51	6.820	.134		
	Total	52	7.472			
Modification – Derivation of adjective	Between Groups	1	.711	.711	.651	.424
	Within Groups	51	55.741	1.093		
	Total	52	56.453			
Total Modification	Between Groups	1	24.932	24.932	6.203	.016
	Within Groups	51	204.993	4.019		
	Total	52	229.925			

Pronominalization -Reflexive pronouns	Between Groups	1	6.996	6.996	19.796	.000
	Within Groups	51	18.023	.353		
	Total	52	25.019			
Pronominalization - Subject pronouns	Between Groups	1	.115	.115	.445	.508
	Within Groups	51	13.131	.257		
	Total	52	13.245			
Pronominalization -Demonstrative pronouns	Between Groups	1	.010	.010	.057	.813
	Within Groups	51	8.820	.173		
	Total	52	8.830			
Pronominalization - Clitic pronouns	Between Groups	1	26.623	26.623	7.342	.009
	Within Groups	51	184.924	3.626		
	Total	52	211.547			
Total Pronominalization	Between Groups	1	67.932	67.932	11.133	.002
	Within Groups	51	311.200	6.102		
	Total	52	379.132			
Possessive pronouns	Between Groups	1	5.272	5.272	8.982	.004
	Within Groups	51	29.935	.587		
	Total	52	35.208			
Possessive particle	Between Groups	1	.255	.255	1.325	.255
	Within Groups	51	9.820	.193		

	Total	52	10.075			
Total Possessives	Between Groups	1	7.847	7.847	7.141	.010
	Within Groups	51	56.040	1.099		
	Total	52	63.887			
Superlative	Between Groups	1	1.861	1.861	2.912	.094
	Within Groups	51	32.592	.639		
	Total	52	34.453			
Comparative	Between Groups	1	1.173	1.173	1.562	.217
	Within Groups	51	38.299	.751		
	Total	52	39.472			
Comparative and Superlative	Between Groups	1	5.988	5.988	3.020	.088
	Within Groups	51	101.144	1.983		
	Total	52	107.132			
Verb phrase	Between Groups	1	15.823	15.823	7.820	.007
	Within Groups	51	103.195	2.023		
	Total	52	119.019			
Construct state	Between Groups	1	1.791	1.791	3.790	.057
	Within Groups	51	24.096	.472		
	Total	52	25.887			

Negation	Between Groups	1	1.654	1.654	5.067	.029
	Within Groups	51	16.648	.326		
	Total	52	18.302			
Question formation	Between Groups	1	1.300	1.300	4.188	.046
	Within Groups	51	15.832	.310		
	Total	52	17.132			
Total Preposition	Between Groups	1	.000	.000	.	.
	Within Groups	51	.000	.000		
	Total	52	.000			
Total EL	Between Groups	1	1165.890	1165.890	14.730	.000
	Within Groups	51	4036.638	79.150		
	Total	52	5202.528			

The SACWNS, as a group, showed a generally better productive performance than the SACWS. Nevertheless, not all the observed differences between the means of the two groups on the syntactic and morpho-syntactic structures assessed were statistically significant. The means of the SACWNS differed significantly on items pertaining to the following features: plural nouns, total nominalization, modifications (i.e. dual, plural, and feminine adjectives), total modification, reflexive pronouns, clitic pronouns, total pronominalization, possessive pronouns, total possessives, negation, question formation, verb phrase, and total items of the EL test.

It is worthwhile to consider the performance of the SACWS and the SACWNS on the whole EL test. The SACWNS appeared to outperform the SACWS (Table 6). The mean difference between both groups was ($X = 9.422$), which was statistically significant ($F = 14.730$, $df = 52$, $P < 0.000$). The mean of the SACWNS was ($X = 114.75$), while the mean of their SACWS peers on the same measure was ($X = 124.17$). Therefore, it is evident that the performance of the SACWNS as a whole was significantly better than that of SACWS.

4.5 Analyses of the Study's Tests as a Whole

Since language production and comprehension are inextricably interrelated, the total scores of the participants on the production and comprehension tests were considered. This was

achieved through considering the participants' scores on the SC and EL tests combined; The SACWS and SACWNS's comprehension and production of major Saudi Arabic syntactic and morpho-syntactic structures were assessed.

4.5.1 Descriptive Statistics of the Whole Test (SC test and EL test)

The means, standard deviations, and standard error of the means of the children's responses to the whole tests' items were calculated. As shown in Table (7), the means of the SACWNS were higher than those of their SACWS counterparts on the total SC test, the total EL test and the whole test. On the other hand, the same group, i.e. the non-stutterers, obtained lower standard deviations compared to their stutterer peers on all above mentioned tests.

Table 7. Descriptive statistics of the two groups on the whole test

	Status	N	Mean	SD	Std. Error Mean
Total SC	Stuttering	24	67.50	5.703	1.164
	Non- stuttering	29	71.72	4.621	.858
Total EL	Stuttering	24	114.75	10.613	2.166
	Non- stuttering	29	124.17	7.187	1.335
Total Tests	Stuttering	24	182.25	14.964	3.055
	Non- stuttering	29	195.90	11.207	2.081

The mean of the SACWNS group for all tests was ($X = 195.90$), whereas the mean of the SACWS group was ($X = 182.25$) for both SC and EL tests. On the other hand, the lowest mean of the SACWNS group was ($X = 71.72$) for the SC test. Also, the lowest mean of the SACWS group was ($X = 67.50$) for the same test. Both the SACWS and the SACWNS groups obtained their highest and lowest means on the same tests.

4.5.2 Comparing the Participants' Performance on the Whole Test

As Tables (7) and (8) show, the means difference (13.647) between the mean of the SACWS ($X = 182.25$) and that of the SACWNS ($X = 195.90$) was statistically significant ($F = 14.390$, $df = 52$, $P < 0.000$).

Table 8. ANOVA for the differences between SACWS and SACWNS on the syntactic features of the whole test

	Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	Sig.
Total SC	Between Groups	1	234.320	234.320	8.880	.004
	Within Groups	51	1345.793	26.388		

	Total	52	1580.113			
Total EL	Between Groups	1	1165.890	1165.890		
	Within Groups	51	4036.638	79.150	14.730	.000
	Total	52	5202.528			
Total Tests	Between Groups	1	2445.565	2445.565		
	Within Groups	51	8667.190	169.945	14.390	.000
	Total	52	11112.755			

5. Discussion

The differences in the syntactic performance of the SACWS and the SACWNS were quantitatively reported for the purpose of comparison. When comparing the comprehension of the syntactic features assessed by the SC test, the study's results indicated that the SACWNS generally outperformed their SACWS counterparts. Thoroughly speaking, the statistical analyses revealed significant differences between the SACWS and the SACWNS on items pertaining to modification, verb phrase future, total verb phrase, subordinate clause, interrogative, passive, indirect request and total items of the SC test. Hence, there was evidence supporting the proposition that SACWS are generally deficient in receptive syntactic development.

The present study has further found that the SACWNS group generally demonstrated better expressive performance on various syntactic and morpho-syntactic structures the EL test assessed. Statistically speaking, the significant differences in favor of the SACWNS were obtained on items pertaining to the following features: plural nouns, total nominalization, modifications (i.e. dual, plural, and feminine adjectives), total modification, reflexive pronouns, clitic pronouns, total pronominalization, possessive pronouns, total possessives, negation, question formation, verb phrase, and total items of the EL test.

In summary, the results of this study claims that the receptive and expressive syntactic performance of the SACWS is lower than their SACWNS peers, as reflected by their answers on both the SC test and EL test. Based on these findings, one can argue that stuttering children are facing difficulties in understanding and producing syntactic and morpho-syntactic features of Arabic. In an attempt to search for the causes behind this deficiency, stuttering might be considered one of them. Yet this claim must be considered with caution due to the statistical procedures used. In other words, to establish a cause-effect relationship among variables in academic research, other statistical procedures other than those utilized in this study are required.

Watkins and Johnson (2004) suggested that socioeconomic status (SEC), maternal education, may be considered as a variable contributing to any observed difference between the performance of stuttering and the non-stuttering on the standardized language tests. However, it was difficult for the present study to match all participants on the socioeconomic

status for many reasons. One reason was a practical one. Permissions for conducting the study on public schools would take a long time, and with the limited time the researchers had this cannot be done. Thus, the researchers had no option but to contact private schools, usually approached by educated and rich parents. Fortunately, private schools agreed to allow the examiner to administer the test to their students, but with some restrictions like giving only few days or specific hours to finish her task. One of the owners of the private schools was very cooperative and provided all facilities and permissions, but the age of children in that school was under seven years old. Other reasons were related to parents who sometimes refused to allow their children to participate in the study, either out of fear that they would fail the test, since some of them dealt with it as a win or lose test, or because they were not adequately aware of the importance of scientific research. In a similar vein, Shaalan (2009) has observed the aforementioned difficulties and said "many families in Gulf Cooperation Council countries hesitate to bring their children for assessment because they do not want to lose face or let it known that the family has a child with any kind of impairment (p. 297)".

Conducting the task of testing SACWS and the SACWNS yielded a number of remarks. These remarks may be useful for clinical considerations and/ or giving guidelines for test designers, teachers, parents, and care givers. Bearing such remarks in mind may pave the way for further investigations and inspire researchers to find more genuine answers for questions relevant to the current study. First, remarks related to the SC test will be explicated followed by the ones related to the EL test.

Beginning with the SC test, item 15-SC might have been affected by the method of the picture presentations, since some children thought that the examiner was asking them not to touch the iPad. Though the examiner has repeated the item saying "point to the picture /L:a ʾl:a talmis /", some children responded after the second repetition and some did not respond at all. The total number of no responses (NR) to this item was 13 cases out of 53 (the total number of participants in the study); 7 of them were stutterers and 6 were non-stutterers.

/L:a ʾl:a talmis/

Item 15-SC.

"Do not touch" with a picture of a boy touching a flaming candle, a boy playing, a girl sleeping.

Sometimes the word /qa:'d/ or /qa:'dh/ were used according to the child's dialect. That is, the examiner modified her dialect after detecting the child's dialect while freely chatting with the child. The two words, i.e. /qa:'d/ or /qa:'dh/ were put between parentheses, the same was applied for the EL test.

Regarding the EL test, some children (mostly stuttering) tried to use a different word when they could not utter or provide the correct one. For instance, for item 36-EL test, a number of children used the word /dar:aj:at/ when they failed to give the correct irregular plural form of the word /sekal/ which is /siyakel /. Initially, a child would provide the incorrect plural form /sekalat/. Then he/she changed the answer and self-corrected his/ herself by saying /dar:aj:at/.

A possible explanation for this observation might be the difference between stuttering and non-stuttering children in their semantic ability as the meta-analysis run by Ntourou et al (2011)

revealed noticeable differences between the two groups in expressive and receptive vocabulary. However, Ntourou et al. have thereafter commented that there was no known theoretical reason justifying the difference in performance between stuttering and non-stuttering on terms of vocabulary development. They made their own attempt to explain this difference by attributing it to "the relation between attention and vocabulary development" since vocabulary acquisition requires children to direct their attention to words and their referents (p.174).

It is worth noting that observed stuttering children have generally faced difficulties in dealing with agreement (inflections) in the cases of dual, regular and irregular plurals, and as a consequence were led to produce ungrammatical forms. That is, Cases 1, 2, 3, 4, 6, 8, 12, 17, 20, 22, and 24, of stuttering participants aged between 5 to 10 years old provided answers such as the following:

/ħʂa:an sre ʔtħn:in/ [horse fast two], /say:arħ ʔtħn:in ħmr:aʔ/ [car two red], /ħʂa:an ʔtħn:in/ [horse two], /shirt:i ʔtħn:in/ [policeman two], /bedah ʔtħn:in/ [egg two], /bataħ tħal:a tħh/ [duck three], /tħal:a tħh ħʂa:an sre ʔin/ [three horse (fast +Pl)], /say:arħ ħmr:aʔ tħal:a tħh/ [car red three], /tawlah xamsah/ [table five], /mudaris tħal:a tħh/ [teacher three] /sa ħ arba ħ/ [clock four] or /sa ʔat arba ħ/ [clocks four], /qalam tħal:a tħh/ [pen three] or / tħal:a tħ qalamat/ [three pens (incorrect irregular plural form for the Arabic equivalence of the word *pen*)], /kurs:i arba ħ/ [chair four] or /karas:i arba ħ/ [chairs four], /sekal arba ħ/ [bicycle four] or / arba ʔsekalat/ [four bicycles (incorrect irregular plural form)], / tħal:a tħħ tilifon/ [three phone]. These instances were for items assessing the dual structure (items 17, 19, 37, 38, and 39) and the plural structure (items 3, 18, 20, 31, 32, 33, 34, 35, and 36) respectively. A similar observation was noted with the SACWNS till the age of 6.

As for item 54-EL, the majority of the tested children articulated the correct clitic pronoun /ħa/. But they failed to use the correct preposition /taħt/ [under]. That is, children answered /l:iħa/ instead of /taħħa/.

Item (54-EL):

/ħlrijal yaq đ taħt ʔshjarah. ya ʔni ħadi ʔshjarah ʔlli
 ʔlrijal yaq đ (taħħa) /
 The-man 3MS-sit under the tree. So, this the-tree that
 the-man 3MS-sit.....(under-it)

The man sits under the tree. So, this is the tree

the man sits(under)

(Shaalán, 2010, p. 326)

Based on the children's responses, the examiner suggested changing the picture of swimming girls to a picture of boys in items 63-EL and 64-EL. Some children appeared confused as to whether the swimmers in the picture were girls or boys. Others were not used to see females swimming.

Similar to the results reported by Shaalan (2010), item 47-EL turned out to be a difficult item. In a number of items, for example 29-SC, 31-SC, 40-SC, 22-EL, and 51-EL, the pictures of known Cartoon characters such as Dora and Shaun the Sheep were used. It was noticed that such pictures attracted children's attention and made them enthusiastic to continue taking the

test. Interestingly, some children used classical Arabic as Case 11 (stutterer) and Cases 42 and 46 (non-stutterers) show. This may reflect the effect of schooling or television programs on child's language.

Case 22, who was a stuttering girl, provided a good justification for giving the "wrong" answer and the "no response" answer two different and separate scores. The "no response" answer was assigned a value of zero (0). This is because the child, particularly the stuttering one, may have known the answer but could not pronounce it due to his/ her disfluency, as observed with the above-mentioned case in which the participant said she was unable pronounce it for item 43-EL. Such items may give speech pathologists and/or teachers a clue that this structure is in need of special focus in treating stuttering cases.

Regardless of the assessed syntactic development, item 57- EL reinforces the moral of honesty. Case 53 answered this pen is /`manah/ [deposit]. Hence, items of this kind are considered culture appropriate and needed to be used in tests designed for Arab and Muslim children.

Item (57-EL):

`l-walad laqa `lqalam w `atah l iṣahb-h w qalah `msik
had a (qalamik)

The-boy found pen and-gave to friend-his (M) and said: hold this
(pen-your 2M)

The boy found a pen and gave it to his friend and said: hold it this is
(your pen) (Shalan, 2010, p. 326)

It was coincidental that all participating children in the current study, stutterers or non-stutterers, were right-handed. This point is useful for controlling the variable of handedness which may have an effect on children's language abilities and as a consequence on the study's results, as suggested by one of the models of stuttering etiology, namely theory of Cerebral Dominance (Travis, 1931). According to this theory, sometimes called "handedness theory", it is believed that a connection exists between cerebral dominance (i.e. for language and motor hemispheres), handedness and stuttering (Sargent, 2007, p. 10).

All children participated in the study were cooperative and agreed to be tested, except for only one stuttering child diagnosed later on with Hyperactivity disorder and therefore was excluded from the study. This strongly supported what Chomsky (1969) observed in her study that children between age 5 and 10 years were willing to participate in her study's activities and ,in her own words, "agreed to revealing various aspects of their knowledge of syntactic structures in question" (p. 2). Moreover, using iPad as a medium for presenting tests items might have contributed to breaking the ice of the testing atmosphere by changing it into a more playful and flexible setting. Thus, using technology, iPad in our case, can be interpreted as a possible facilitative factor.

In general, the non-stuttering children, unlike stuttering ones, were talkative, eager to speak, and provided more details in describing the pictures. This can be attributed to the

psychological nature of stuttering children who seemed less adaptive to change and affectively more reactive in comparison to their fluent peers (Karrass et al., 2006). Thereby, stuttering children "are somewhat more hesitant to enter and adapt to novel situations such as a clinic, lab, or testing environment" than non-stuttering children (Ntourou et al., 2011, p. 174). Moreover, this tendency may further support the claim that stuttering children experience syntactic difficulties compared to non-stuttering children with respect to syntactic ability in particular and language ability in general.

Throughout the visits to a number of schools, summer camps, and kindergartens to find the control group, many children were noticed to have language and speech problems such as Language Delay, Stuttering, or Selective Mutism. Mothers and teachers of those children were concerned about language difficulties their children faced and they were keenly asking for advice to help their children overcome certain language problems. Those mothers and teachers were advised to consult phoniatricians and speech pathologists at King Abdul-Aziz University Hospital. Also, brochures published by King Abdul-Aziz University Hospital were distributed to educate parents and teachers around the symptoms, nature, and general advices for dealing with stuttering and language impaired children. However, all reported observations are difficult to generalize and need further systematic investigations.

Based on the Demands and Capacity (DC) model (Starkweather, 1987), we speculated that syntax might be a possible factor in increasing the demands put on children such that when it exceeds the child's capacity stuttering is more likely to occur. Hence, language teachers and/or speech pathologists may find it useful to combine conscious explicit teaching methods and subconscious grammar facilitation techniques to enhance children's acquisition of critical syntactic and morpho-syntactic structures. The aim of grammar facilitation techniques such as imitation, modeling, and recasting, [for detailed description of these techniques, see Ebbels, (2014)], is to frequently expose children to target forms in order to increase their familiarity with the targeted structures. This has been found to help children recognize grammatical rules and practice producing forms children tend to omit (Ebbels, 2014).

In closing, considering thoroughly the answers of stuttering participants on both SC and EL tests declared that some children got scores almost similar to those of SACWNS peers. This could be attributed to individual differences within a group in language abilities, the influence of schooling (Nippold, 2004), or the effect of treatment sessions they took. Actually, the performance of the above mentioned cases made us conceded that finding arguing Saudi Arab non- stuttering children, as a group, syntactically outperformed stuttering ones does not necessarily indicate that the syntactic development of stuttering children is disordered in the clinical sense. Instead, this might be seen as an indication that SACWS have subtle syntactic deficiencies that caused them to be lower in their syntactic development compared to their fluent peers. Ntourou et al. (2011) have reached a similar conclusion in their observation that lower language abilities by CWS do not necessarily prove that stuttering children have clear-cut language disorders in the clinical sense. However, their interpretation was that CWS exhibited "relatively consistent but subtle differences in language abilities when compared to their normally fluent peers" (p.173).

6. Conclusion

The results of the current research suggested that receptive and expressive syntactic abilities of SACWS are lower than those of SACWNS. This was reflected by participants' answers to the modified versions of both SC test and EL test utilized in the study. Thereby, the results of this study argued that the SACWS aged between 5 and 10 years of age, as a group, lagged behind their SACWNS peers in: (a) their receptive syntactic development in general, particularly on the following features: modification, verb phrase future, total verb phrase, subordinate clause, interrogative, passive, indirect request, and total items of the SC test, (b) their productive syntactic development, particularly on features pertained to the following: plural nouns, total nominalization, modifications (i.e. dual, plural, and feminine adjectives), total modification, reflexive pronouns, clitic pronouns, total pronominalization, possessive pronouns, total possessives, negation, question formation, verb phrases, and total items of the EL test. However, the above-mentioned differences do not necessarily indicate that syntactic development of the SACWS is disordered in the clinical sense. But, they might indicate that SACWS suffer from syntactic deficiencies that caused low syntactic development when compared to their fluent peers. Hence, it may reasonably be assumed that SACWS are facing difficulties in understanding and producing various Arabic syntactic and morpho-syntactic features. Stuttering could be responsible for this deficiency. However, such an assumption must be considered with caution due to the statistical procedures used and the need for further investigation to corroborate such a view.

A number of limitations were exist with this study. First, only test-based method were used to compare the syntactic development of SACWS and SACWNS. However, combining standardized test data with other performance data may enhance the quality of comparisons between groups, especially when examining subtle language skill differences through the combination of language knowledge, as measured by standardized tests, and performance, as measured by language samples (Bauman, 2009). This limitation was virtually inevitable since, excepting the mean length of utterance (Shaalán and Khater, 2006; Khater and Shaalan, 2007) which is appropriate for preschool children (Shaalán, 2009), there were no available indices of syntactic development, to the researchers' best knowledge, for Arabic-speaking children similar to those used with English children, e.g. the Index of Productive Syntax (IPSyn) (Scarborough, 1990) or Developmental Sentence Scoring (DSS) (Lee, 1974). Further studies are advised to consider developing such measures for Saudi Arabic or, for that matter, any other spoken Arabic dialect so that multiple comparison methods may be used. Second, the emphatic conclusion that stuttering might be the cause of observed deficiency in comprehending and producing syntactic and morpho-syntactic features of Arabic must be received with caution due to the statistical procedures used and the need for further confirmation from similar studies. Having said this, one may attribute stuttering and the aforementioned deficiency to factors that did not show up in the present study. This is a hypothesis to be further explored by future research. Third, it was difficult to match all participants in the current study on the socioeconomic status for reasons previously mentioned in the discussion section. In particular, there is a problem of accuracy with the socioeconomic factor in the sense that socioeconomic status may contribute to any observed

difference between the performance of stuttering and non-stuttering speakers on the standardized language tests (Watkins, & Johnson, 2004). Future research should consider matching all participants on a more developed socioeconomic scale so that the possible effect of this variable yields controllable results. Finally, despite children's positive responses towards the tests used, it is difficult to make the unconditional assertion that using technology as a medium for language assessment, whether in schools or clinics, is better than using traditional ones, i.e. picture book or pencil and paper. Further studies are needed to explore this area in a more focused manner

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