



Co-occurring disorders in children who stutter

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Abstract

This study used a mail survey to determine the (a) percentage of children who stutter with co-occurring non-speech disorders, speech disorders, and language disorders, and (b) frequency, length of sessions, and type of treatment services provided for children who stutter with co-occurring disorders. Respondents from a nationwide sample included 1184 speech–language pathologists (SLPs). Of the 2628 children who stuttered, 62.8% had other co-occurring speech disorders, language disorders, or non-speech–language disorders. Articulation disorders (33.5%) and phonology disorders (12.7%) were the most frequently reported co-occurring speech disorders. Only 34.3% of the children who stuttered had co-occurring non-speech–language disorders. Of those children with co-occurring non-speech–language disorders, learning disabilities (15.2%), literacy disorders (8.2%), and attention deficit disorders (ADD) (5.9%) were the most frequently reported. Chi-square analyses revealed that males were more likely to exhibit co-occurring speech disorders than females, especially articulation and phonology. Co-occurring non-speech–language disorders were also significantly higher in males than females. Treatment decisions by SLPs are also discussed.

Learning outcomes: As a result of this activity, the participant should: (1) have a better understanding of the co-occurring speech disorders, language disorders, and non-speech disorders in children who stutter; (2) identify the speech disorders, language disorders, and non-speech disorders with the highest frequency of occurrence in children who stutter; and (3) be aware of the subgroups of children with co-occurring disorders and their potential impact on assessment and treatment.

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1. Introduction

Clinicians and researchers working with individuals who stutter are all too aware of the fact that co-occurring speech and language disorders often complicate problem conceptualization, participant selection, methodological concerns, and therapy planning (Blood & Seider, 1981; Bloodstein, 1995; Conture, 2001; Conture, Louko, & Edwards, 1993; Nippold, 1990; Shapiro, 1999; St. Louis, Ruscello, & Lundeen, 1992). Studies examining co-occurring stuttering and other speech, language, and non-speech and language disorders have attempted to clarify the nature of stuttering in children and adults, the type and frequency of co-occurring speech, language and non-speech–language disorders, and provide support for reported subgroups in the heterogeneous population of individuals who stutter (Conture, 2001; Nippold, 1990; Schwartz & Conture, 1988; Watkins & Yairi, 1997; Yairi, 1990; Yairi & Ambrose, 1992, 1999).

Recently, Arndt and Healey (2001) conducted a study to determine the number of children who stuttered with co-occurring language disorders and phonological disorders. They concluded, based on the survey data from 241 speech–language pathologists (SLPs) from 10 states in the United States, that 56% of the 467 children who stuttered had verified fluency disorders only, while 44% (205) had verified fluency and concomitant phonological and/or language disorders. They also obtained information about treatment decisions for children who stutter with co-occurring language and phonological disorders. According to the authors, the majority of SLPs reported using a “blended treatment” approach for these co-occurring disorders, which was defined as treating both disorders simultaneously within the therapy program. Their results provide important additional information about the relationships among fluency, language, and phonology disorders and SLPs’ treatment choices.

The presence of co-occurring non-speech disorders such as those affecting learning, attention, reading and auditory processing may also influence decisions about treatment hierarchies for children who stutter (Conture, 2001; Manning, 2002). A number of older studies have reported on the frequency of these co-occurring non-speech–language disorders, but few studies have conducted systematic investigations in school-age children who stutter. For example, Heltman and Peacher (1943) reported that of the 102 children with spastic paralysis that they examined, 3.9% exhibited stuttering disorders. Similarly, Anderson, Hood, and Sellers (1988) reported the presence of subtle central auditory processing disorders (CAPD) in children who stutter. Nippold and Schwarz (1990) reported conflicting findings in a review of the literature on the frequency of co-occurring reading disorders in children who stutter. However, the frequency of occurrence, the number and type of disorders, and the treatment choices for children with co-occurring non-speech–language disorders has not been studied in a nationwide sample. Determining the frequency of occurrence of disorders in children who stutter could enhance our information about subgroups in children who stutter.

The recent Arndt and Healey (2001) study was an important first step in examining in a systematic manner co-occurring disorders of school-age children who stutter. Their data provide meaningful information for clinicians because children with fluency disorders and co-occurring phonology and/or language disorders may require different assessment and/or treatment programs than children with only a fluency disorder. The purpose of this study was to expand on earlier investigations about co-occurring disorders in children who stutter and specifically elaborate on the important contributions of the Arndt and Healey (2001) study. This type of research is important for enhancing our understanding about subgroups of children who stutter and the need to acknowledge/appreciate individual differences in children who stutter (Nippold, 1990; Schwartz & Conture, 1988; Watkins & Yairi, 1997; Yairi, 1990). Controversy still exists about the conclusions drawn from data about co-occurring disorders in children who stutter. For example, Conture (2001) concluded that in the last few decades we have learned that the “prevalence of phonological concerns in the population of children who stutter is greater than in the population of children who don’t stutter” (p. 156). However, Nippold (2002) in her review of 15 studies examining the relationship between phonology and stuttering in children cautioned that “empirical evidence of an interaction (between stuttering and phonology) remains elusive” (p. 106). Such contrasting interpretations of the research demonstrate the need for studies to clarify the relationship between co-occurring disorders and stuttering.

First, we decided to use a nationwide sampling procedure to ensure large geographic representation. The Arndt and Healey (2001) study was restricted to 10 states which shared similar definitions of “verifiable fluency disorders.”

Second, we requested data *only* on speech, language, and non-speech–language disorders that *could be documented* through the students’ case histories, school files, information shared by parents, teachers, members of collaborative teams, or current diagnostic terms used to describe the child. The Arndt and Healey (2001) study supplied respondents with state verification/eligibility criteria. In the discussion section of the Arndt and Healey study they stated that it “is difficult to know whether respondents accurately interpreted and followed the verification criteria provided” (p. 77). Their study addressed co-occurring non-speech–language disorders in children who stutter in an interesting manner. They asked respondents to “provide information . . . of students who were verified as having a fluency disorder and were *suspected of having a concomitant disorder*, but did not meet their state’s verification criteria A suspected concomitant disorder was defined as one that was thought to exist but did not meet state verification standards” (p. 72). They reported that SLPs identified 109 children with “suspected concomitant disorders” including phonology, language, and non-speech–language disorders (voice, learning disorders, reading disorders, emotional disturbances, and attention deficit with hyperactivity disorders). Although these instructions provided some guidance, they could have resulted in an overestimate of the

frequency of co-occurring disorders or may have been confusing for SLPs who tried to interpret what disorders should be included in a category of “suspected concomitant disorders.” In contrast, the SLPs surveyed in the present study were requested to provide information only on co-occurring disorders if they knew they could provide evidence (if requested). We explained that the rationale for this procedure was that we did not want to over-represent the students’ disorders by speculation, “clinical hunches,” or even the best intuitive guesses (Appendix B).

Third, we provided a detailed and more complete list of potential co-occurring speech disorders, language disorders, and non-speech–language disorders based on practicing SLPs’ feedback. We randomly sampled 35 SLPs prior to the survey about the types of co-occurring disorders of children on their caseloads who stutter. As a result, we included 18 categories including specific syndromes (e.g., Tourette’s) and specific disorders (e.g., sensory integration). We also subdivided language disorders into receptive and expressive problem categories, and further subdivided these categories into syntactic, semantic, and pragmatic disorders. We also provided a specific language impairment category. Similarly, instead of examining primarily phonology disorders, we included categories for other speech disorders including: articulation, voice, cluttering, dysphagia, and English as a second language.

Finally, one of the unquestionable facts about stuttering is the higher prevalence among males than females. The generally accepted ratio is 3 males:1 female (Bloodstein, 1995; Van Riper, 1982). Few studies have examined the gender factor when reporting on co-occurring disorders. It is possible that males may demonstrate different types and frequencies of co-occurring disorders than females. The Arndt and Healey (2001) study did not comment on the gender of the children in their methodology or results.

Therefore, we specifically wanted to determine (a) the percentage and frequencies of male and female children who stutter with co-occurring speech disorders, language disorders and non-speech–language disorders, and (b) the frequency (number of therapy sessions), length of sessions (in minutes), and type (group vs. individual) of treatment services provided to children with co-occurring disorders.

2. Method

2.1. Respondents

Two thousand practicing SLPs employed in the public schools in the United States were randomly selected from the American Speech–Language–Hearing Association’s (ASHA) national list of members. Computer-generated address labels were obtained for a fee from ASHA. The sample surveyed included SLPs from each state in the country, with the number of

participants from each state being based on the population of the state. This increased the likelihood of having representation from all geographic locations and states.

2.2. *Survey*

A cover letter, an informed consent form, and a survey containing demographic items and practice-based items about SLPs and demographic information about children who stutter currently in their schools were mailed to the potential participants' school addresses. The first part of the survey contained questions about the SLPs, including: age, gender, ethnicity, education, and geographic work location. It also included practice-based items, including: caseload size, current number of children who stutter on their caseloads, number of years working as an SLP, and number of years at current position.

The second part of the survey required SLPs to complete individual forms for each child who stuttered in the schools. They were asked to provide information ONLY on the children if they knew it could be documented through the children's case histories, files, information shared by parents, teachers, members of collaborative teams, or current diagnostic terms used to describe the child. The specific directions are included in [Appendix B](#). Although this a priori methodological decision might have decreased the number of children who stutter identified with co-occurring disorders, we believe the decision provided a more accurate and defensible (albeit conservative) estimate of the frequency of these disorders in children who stutter.

SLPs were requested to complete separate survey sheets for each child. These included demographic information on age, gender, ethnicity, current grade level, stuttering severity, onset of stuttering (if known), and family history of stuttering (if known). They were also requested to "check" the category(ies) of the co-occurring problem(s) they could document.

The first list of disorders included a checkbox for no co-occurring speech disorders, followed by co-occurring articulation, phonology, voice, dysphagia, cluttering, and other disorders. A space was also provided for additional disorders. The second list for expressive language disorders included a checkbox for no co-occurring expressive language disorders, followed by co-occurring expressive language disorders in vocabulary/semantics, syntactic, and pragmatics. A third list was provided for receptive language disorders, including a checkbox for no co-occurring receptive language disorders followed by co-occurring receptive language disorders in vocabulary/semantics, syntactic, and pragmatics.

Finally, SLPs were requested to check the appropriate box from the fourth list for co-occurring non-speech–language disorders. The list began with a checkbox for no additional non-speech–language disorders followed by a list of 18 co-occurring non-speech–language disorders. These included: learning disabilities, literacy disorders including reading, writing, and spelling disorders, central

auditory processing disorders, hearing impairments, cerebral palsy, Down's syndrome, attention deficit disorder, behavioral disorders, blindness, neuropsychological disorders, autism, traumatic brain injury, Tourette's syndrome, sensory integration disorders, other neurological disorders including epilepsy, congenital physical conditions including cleft lip and/or palate, acquired physical conditions including diabetes, asthma or chronic obstructive pulmonary disorders, and hormonal imbalances. Additional space was provided for other co-occurring non-speech–language disorders not listed.

A final set of questions about treatment choices (if appropriate for the co-occurring problem) was also included. These consisted of: (a) group versus individual treatment sessions for the co-occurring disorders; (b) the number of times and approximate number of minutes per session seen for stuttering therapy; and (c) number of times and approximate number of minutes per session seen for co-occurring disorders. Additional space was provided for comments, other treatments, and any additional information.

To further validate the survey, a preliminary draft was reviewed by 35 randomly selected SLPs working in the schools. Their comments on wording, item choices and placements, and additional selections for non-speech–language disorders (for example, Tourette's syndrome, sensory integration, and autism) were reviewed and included in the final version.

2.3. Procedures

The final version of the survey was distributed. Follow-up mailings were sent at 2-week (post-card reminders), 4-, and 8-week (mailing of another copy of the survey) intervals following the initial mailing. This resulted in 1242 responses from SLPs (return rate of 62.1%). Fifty-eight of the responses were deemed unusable because of returned unopened surveys, change of address, participants no longer employed in schools, or failure to complete demographic and/or questionnaire data. This produced a response from 1184 SLPs representing a 59.2% response rate for the sample. This is an acceptable response rate for survey research (Babbie, 1990; Fink, 1995). Survey results were entered into the data programs and checked for accuracy by two independent judges who were not authors of the study.

2.4. Statistical analyses

First, it should be noted that we did not employ a control group in this study. However, we did make comparisons with reported prevalence estimates of the co-occurring disorders in the general population. Descriptive data analyses were employed. Responses were analyzed according to the frequency of occurrence and converted percentages. The chi-square test was conducted to analyze the associations between the number of co-occurring disorders and the children's grade level and gender.

3. Results

3.1. SLP participant characteristics

The majority of the SLPs were female (95.4%) and European-American (95.8%), with a mean age of 43.8 years. Ninety-nine percent (1172) indicated that they had obtained a master's degree. SLPs reported working a mean of 19.1 years and working in their current positions a mean of 10.1 years. Participants included SLPs working in 46 states. One hundred and seventy-eight (15.1%) of the respondents reported working in rural areas, while 40.7% (483) reported working in suburban areas and the remaining 44.2% (523) reported working in urban areas (Table 1). SLPs reported average caseload sizes of 59.8 children. The mean number of children who stuttered on all SLPs' caseloads (1184) was 2.22 children. However, 107 (9%) of these participants reported providing no services to children who stutter at the present time. Of the 1077 remaining SLPs providing services to children who stutter, the mean number of children on their caseloads was 2.44 children.

3.2. Children who stutter characteristics

Data were reported on 2628 children who stutter and who were currently receiving treatment on the caseloads of the SLPs. According to Table 2, the majority of the children who stuttered were male (78.4%), European-Americans (59.8%), with a mean age of 9.4 years. Children were unevenly distributed among grade levels with the largest number of children in grades 1–3 (36.2%) and the smallest number of children in the 9th through 12th grades (8%). SLPs reported that they used both formal and informal tests for diagnosing stuttering. Nineteen percent of the SLPs used only formal or commercially available tests. Some of these included: Protocol for Differentiating the Incipient Stutterer (Pindzola & White, 1986), Scale for Rating the Severity of Stuttering (Williams, Darley, & Spriestersbach, 1978), Stuttering Severity Instrument (Riley, 1994), Cooper Personalized Fluency Control Therapy, Revised (Cooper & Cooper, 1985), Systematic Fluency Training for Young Children (Shine, 1980), S-Scale (Erickson, 1969), etc. Thirty-three percent reported using only informal measures for assessment. These included measures such as: word and/or syllable counts, speaking rate, amount and types of disfluency, duration of the moments of stuttering, physical concomitants, level of awareness, case history, client motivation, etc. The majority of SLPs (56%) reported using both formal and informal measurements.

3.3. Co-occurring speech, language and non-speech–language disorders

Of the 2628 children who stutter, 62.8% (1650) had at least one co-occurring speech disorder, language disorder, or non-speech–language disorder. These children had a total of 3567 co-occurring speech, language, and non-speech–language disorders. Each child who stuttered with co-occurring disorders had a

Table 1
Demographic data for 1184 SLPs working in public school settings

Variable	Public school SLPs	
	Percent	Number
Gender		
Female	95.4	1130
Male	4.6	54
Ethnicity		
European-American	95.8	1134
African-American	1.9	23
Hispanic-American	1.3	15
Asian-American	1.0	12
Educational level		
Master's degree or higher	99.4	1177
Bachelor's degree	0.06	7
Geographic location (based on population)		
Rural <5000 residents	15.0	178
Suburban >5000 to <100,000 residents	40.8	483
Urban >100,000 residents	44.2	523
Number of children who stutter on SLPs' caseloads		
No children who stutter	9.0	107
One child who stutters	23.3	276
Two children who stutter	40.1	475
Three children who stutter	11.5	136
Four children who stutter	6.8	81
Five children who stutter	4.6	54
Six children who stutter	1.4	17
Seven or more children who stutter	2.3	27
Eight, 9, or 10 children who stutter	<1.0	11
Years in profession		
Mean	19.1	
Range	1–34	
Years at current position		
Mean	10.1	
Range	1–21	
Age in years		
Mean	43.8	
Range	24–64	
Caseload size (children)		
Mean	59.8	
Range	13–112	
Caseload size (children who stutter)		
Mean	2.2	
Range	0–10	

Table 2
Demographic data for 2628 children who stutter

Variable	Children who stutter	
	Percent	Number
Gender		
Male	78.4	2060
Female	21.6	568
Ethnicity		
European-American	59.8	1572
African-American	17.9	470
Hispanic-American	12.4	326
Asian-American	6.5	171
Other (Native American, etc.)	3.4	89
Grade level		
Kindergarten through 1st grade	15.3	401
2nd to 3rd grade	26.2	690
4th to 5th grade	31.6	830
6th to 8th grade	18.9	497
9th to 12th grade	8.0	210
Age in years		
Mean	9.4	
Range	5–18	
Age at diagnosis		
Mean	3.4	
Range	2–8	

mean of 2.16 disorders. Three percent of the students presented with more than six co-occurring disorders as noted in Table 3. The range of co-occurring disorders was 0–10 for all students.

Of the six speech disorders included in this study, articulation disorders were the most common with a frequency of 33.5%. The next most frequent speech disorders were phonological disorders (12.7%). The least common of all co-occurring speech disorders was dysphagia (0.5%).

Among co-occurring language disorders, both expressive semantic (13.5%) and receptive semantic (12.1%) were the most frequently occurring (Table 4).

With specific reference to non-speech–language disorders, 34.5% of children reported co-occurring disorders. As detailed in Table 5, the most frequently co-occurring non-speech–language disorders were learning disabilities (11.4%), literacy disorders (8.2%), and attention deficit disorders (ADD) (5.9%). Five non-speech–language disorders occurred with less than 5% frequency including: central auditory processing disorders (3.1%), neuropsychological disorders (2.9%), behavioral disorders (2.4%), sensory integration (2.1%) and acquired physical conditions (1.3%). The remaining 10 non-speech–language disorders occurred with less than 1% frequency and can be reviewed in Table 6.

Table 3

Frequency of co-occurring speech, language, and non-speech–language problems in the 2628 children who stutter

Frequency of co-occurring speech, language, and non-speech–language problems	Percent	Number
Total students with no other co-occurring problems	37.2	978
Total students with co-occurring problems	62.8	1650
Students with either one co-occurring speech, language or non-speech–language problem	18.4	483
Students with either two co-occurring speech, language or non-speech–language problems	28.7	754
Students with either three co-occurring speech, language or non-speech–language problems	3.5	92
Students with either four co-occurring speech, language or non-speech–language problems	7.1	187
Students with either five co-occurring speech, language or non-speech–language problems	1.2	32
Students with either six or more co-occurring speech, language or non-speech–language problems	3.9	102

Table 4

Frequency and percentage of co-occurring speech disorders in children who stutter

Co-occurring speech disorders	Total (<i>N</i> = 2628)		Male (<i>N</i> = 2060)		Female (<i>N</i> = 568)	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Articulation ^a	880	33.5	712	34.5	168	29.5
Phonology ^a	336	12.7	283	13.7	53	9.3
English as second language	96	3.6	77	3.7	19	3.3
Voice	55	2.1	44	2.1	11	1.9
Cluttering	18	0.7	15	0.5	3	0.5
Dysphagia	13	0.5	11	0.5	2	0.3
No co-occurring speech disorders ^a	1230	46.8	918	44.5	312	54.9
Co-occurring expressive language						
Semantic	354	13.5	275	13.3	79	13.9
Syntactic	258	9.9	201	9.8	57	10.0
Pragmatic	329	12.5	261	12.7	68	12.0
Co-occurring receptive language						
Semantic	318	12.1	255	12.4	63	11.1
Syntactic	269	10.2	218	10.5	51	9.0
Pragmatic	239	9.1	184	8.9	55	9.7
Specific language impairment	162	6.2	123	5.9	39	6.8
No co-occurring language disorders	699	26.5	535	25.9	164	28.8

Does not total 100% because students may have more than one additional speech and language disorder.

^a Male and female group means are significantly different at $P < 0.01$.

Table 5

Co-occurring non-speech–language disorders reported with greater frequency than 1% frequency in 2628 children who stutter

Co-occurring non-speech–language disorders	Total (<i>N</i> = 2628)		Male (<i>N</i> = 2060)		Female (<i>N</i> = 568)	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Learning disabilities	299	11.4	252	12.2	47	8.3 ^a
Literacy disorders	215	8.2	188	9.1	27	4.8 ^a
Attention deficit disorder	155	5.9	122	5.9	33	5.8
Central auditory processing disorders	101	3.8	82	4.0	19	3.3
Neuropsychological disorders	76	2.9	61	3.0	15	2.6
Behavioral disorders	63	2.4	51	2.5	12	2.1
Sensory integration	55	2.1	45	2.2	10	1.7
Acquired physical conditions including diabetes, asthma, or chronic obstructive pulmonary disorders	35	1.3	22	1.1	13	2.3
No additional co-occurring non-speech–language disorders	1727	65.7	1325	64.3	402	70.8 ^a

Does not total 100% because students may have more than one additional speech and language disorder.

^a Male and female group means are significantly different at $P < 0.01$.

3.4. Analysis related to children's gender and grade level

The final sample consisted of 2060 males and 568 females who stuttered. Table 4 shows the percentage and frequency of co-occurring speech disorders by gender. Among those children who stutter with co-occurring speech disorders, males were significantly more affected than females ($\chi^2 = 76.2$; d.f. = 1; $P < 0.001$). Males had higher percentages than females on all of the six speech disorders categories. However, significant differences between males and females were found only for

Table 6

Co-occurring non-speech–language disorders reported with less than 1% frequency in 2628 children who stutter

Non-speech–language disorders	Percent of children	Number of children
Autism	0.8	23
Other neurological disorders including epilepsy	0.8	21
Mental retardation	0.7	18
Hearing impairments	0.6	17
Congenital physical conditions including cleft lip and/or palate	0.6	17
Traumatic brain injury	0.6	15
Hormonal imbalances	0.6	15
Emotional disorders (added to the list by SLPs)	0.5	13
Tourette's syndrome	0.5	12
Cerebral palsy	0.4	10

Table 7

SLPs' responses to treatment decisions for children who stutter with co-occurring speech disorders, language disorders, and non-speech–language disorders

	Percent of children	Number of children
1. Is the child receiving treatment for his/her stuttering?		
Yes	96	1584
No	4	66
2. Is the child being seen at this time for ONLY his/her stuttering problem?		
Yes	12.6	200
No	87.4	1384
3. If the student is receiving treatment for stuttering and the additional disorders(s) during the same treatment session		
a. How many times a week does the child receive treatment?		
Once a week	17.7	280
Twice a week	64.5	1022
Three times a week	14.5	231
More than three times a week	3.2	51
b. How many minutes does the treatment session last?		
10 min	2.0	32
20 min	45.5	720
25 min	36.9	586
30 min	14.3	227
More than 45 min	1.2	19
c. How many minutes per session, on average, focus on stuttering?		
5 min	2.0	32
10 min	69.6	1103
15 min	14.7	232
20 min	7.0	111
25 min	3.0	48
More than 30 min	3.7	58
4. If the child is receiving services for both stuttering and co-occurring disorders, is she/he receiving		
a. Separate, individual sessions for both stuttering and co-occurring disorders	5.7	91
b. Separate, group sessions for both stuttering and co-occurring disorders	2.7	43
c. Individual sessions for stuttering; group sessions for co-occurring disorders	11.4	181
d. Group sessions for stuttering; individual sessions for co-occurring disorders	8.2	130
e. Both stuttering and co-occurring disorders are treated during the same individual session	70.2	1112
f. Both stuttering and co-occurring disorders are treated during the same group session	1.7	27

articulation disorders ($\chi^2 = 37.4$; d.f. = 1; $P < 0.01$) and phonology disorders ($\chi^2 = 17.5$; d.f. = 1; $P < 0.01$). Among co-occurring language disorders, both expressive semantic (13.5%) and receptive semantic (12.1%) were the most frequently occurring. A similar number of males and females were affected by co-occurring language disorders. Results of the analysis revealed no significant differences between groups ($\chi^2 = 1.2$; d.f. = 1; ns). When considering the non-speech–language disorders, 8 of the 18 disorders were reported to occur with greater than 1% frequency (Table 5). Overall, males were significantly more affected than females ($\chi^2 = 51.8$; d.f. = 1; $P < 0.001$). Significant gender differences were found for learning disabilities ($\chi^2 = 47.4$; d.f. = 1; $P < 0.01$) and literacy disorders ($\chi^2 = 29.8$; d.f. = 1; $P < 0.01$). Table 6 shows that the remaining 10 disorders were reported with less than 1% frequency.

To determine if the number of co-occurring disorders was related to grade level, children were placed into one of five age groups: kindergarten through 1st grade; 2nd to 3rd grade; 4th to 5th grade; 6th to 8th grade; and 9th to 12th grade. A 5 (grade level) \times 3 disorders (speech disorders, language disorders, non-speech–language disorders) chi-square analysis revealed no significant relationships between the number of co-occurring disorders and grade level ($\chi^2 = 1.4$; d.f. = 8; $P = 1.15$).

3.5. Treatment decisions by SLPs for children receiving treatment

SLPs were asked a series of questions about treatment decisions. Ninety-six percent of the children who stuttered with co-occurring disorders were receiving treatment for their fluency disorders. SLPs reported that 4% of the children were not receiving stuttering services at the current time for three primary reasons. These included: (a) co-occurring disorders were evaluated as more important at the current time, (b) the child/IEP team had elected not to work on stuttering at the current time, or (c) treatment schedules had been selected so that stuttering would be treated after the severity of one or more of the co-occurring problem(s) was reduced. The frequency and percentage of the SLPs' responses are shown in Table 7. The range of treatment durations was 10 min once a week (children in transfer phases of treatment) to 60 min twice a week (children on block schedules). Children who stutter with co-occurring disorders received a mean of 23.4 min of treatment (S.D. = 4.8 min) 2.04 times a week (S.D. = 0.71) for a total of 47.7 min a week. SLPs reported that a mean of 12.6 min (S.D. = 5.5 min), more than half the session, “focused on stuttering” when there were co-occurring disorders reported.

4. Discussion

The results of this study present additional evidence that a majority of children who stutter have at least one co-occurring speech, language, or non-speech–

language problem. The high percentage of problems that were confirmed would indicate that SLPs need to be aware of and include in their evaluations the type and number of co-occurring disorders in children who stutter. According to the 23rd Annual Report to Congress on the Implementation of Individuals with Disabilities Education Act (2001) more than one-third of all students who receive special education and/or related services have co-occurring disabilities. The largest percentage (49%) of children with co-occurring disabilities are those with speech–language disabilities. Our results show that children who stutter demonstrate a higher percentage (62.8%) of co-occurring disorders than children with other speech–language disorders.

Guitar (1998) has suggested the co-occurring disorders in children who stutter may have several explanations. For example, some researchers propose that these additional disorders complicate the communication process and children begin to believe that communication is demanding and difficult resulting in anticipatory struggle (Bloodstein, 1995) or greater demands than the children's current capacities (Starkweather, Gottwald, & Halfond, 1990). Some motor theories of stuttering would also suggest that additional speech and language processing errors could not only complicate the emergence of fluency but actually contribute to the development of stuttering (Bloodstein, 1995; Conture, 2001; Guitar, 1998; Shapiro, 1999). Co-occurring disorders may contribute to reduced capacities for speech motor control and language formulation necessary for fluent speech. Ludlow (1999) discussing the neurobiology of stuttering suggests that the co-occurrence of stuttering and other speech–language disorders may reveal a speech encoding and language production system that is more fragile and susceptible to disruption. The high percentage of children with co-occurring speech disorders found in this study may provide additional support for her hypotheses. Guitar (1998) also suggests that the children with co-occurring speech disorders and stuttering may be displaying a single disorder (with multiple facets) associated with subtle brain dysfunctions or genetically linked traits.

We found that articulation and phonology disorders are the highest co-occurring disorders for children who stutter. Estimates of the incidence of articulation disorders in the school-age population vary from 2 to 6% (Beitchman, Nair, Clegg, & Patel, 1986; Conture, 2001; Gierut, 1998). We used these percentages from the general school-age population for comparisons to the children who stutter in this study. With more than 33% of the children who stutter reporting articulation disorders and 12% reporting phonology disorders, the groups of children with these disorders are higher than would be expected in the general population. Our findings support those reported in other studies (Arndt & Healey, 2001; Blood & Seider, 1981; Louko, Edwards, & Conture, 1999). For example Yaruss, LaSalle, and Conture (1998) reported 37% of the children who stutter in their clinic had co-occurring phonology disorders. SLPs should be aware of the groups of children who exhibit these co-occurring disorders. It is likely that they will be present on their caseloads and some research suggests that specific treatment programs are beneficial (Bernstein Ratner, 1995; Louko et al., 1999; Melnick & Conture, 2000;

Nippold, 2001; Paden & Yairi, 1996; Paden, Yairi, & Ambrose, 1999; Wolk, 1998; Yaruss & Conture, 1996).

There were small groups of children with other co-occurring speech disorders. The reported prevalence of voice disorders in school-age children varies from a low of 4% in some rural areas to as high as 23%, and a generally accepted figure of 7% (Boone & McFarlane, 1997; Wetmore, Muntz, & McGill, 2000). Although voice disorders may co-occur in some children who stutter (2.1%), it is considerably less than is typically reported in the general population. The frequency of occurrence of ESL in school-age children who stutter (3.6%) was lower than the 6–7% estimate reported in the school-age population (Kayser, 1995). Both cluttering and dysphagia have no reliable prevalence rates reported in the school-age population for comparisons purposes. However, groups of children with these co-occurring cluttering and dysphagia disorders were very low, 0.7 and 0.5%, respectively.

Approximately 8–10% of all school-age children have language disorders or delays (Fahey & Reid, 2000). In the area of expressive language disorders, diagnosed semantic disorders had the highest frequency of occurrence. Children who stutter may be attempting to avoid “feared words.” The Demands and Capacities Model (Starkweather et al., 1990) suggests that heightened linguistic demands in one area such as semantics and pragmatics may force the child to compromise another area such as vocabulary and/or syntax. Co-occurring language disorders in children who stutter may be showing the cumulative negative effects of overloading complex motor and linguistic systems. Our results support the fact that SLPs working with children who stutter might expect a greater likelihood of co-occurring language disorders. As can be seen in Table 4, there were no differences in percentages of co-occurring receptive and expressive language disorders. The results of the present survey suggest that co-occurring expressive and receptive language disorders support the notion that subgroups of children who stutter experience linguistic difficulties (Nippold, 1990; Watkins & Yairi, 1997; Watkins, Yairi, & Ambrose, 1999; Yairi, 1990). Our data also offer support for Tetnowski’s (1998) suggestion of a fluency and linguistic subgroup in stuttering. The frequency of these co-occurring language disorders would indicate that complete and extensive language assessment of children who stutter is warranted. Linguistic processing may play a role in stuttering as children are expected to produce longer and more complex utterances. Further studies are needed to determine which aspects of language impact children’s fluency and the role of co-occurring disorders.

According to Shriberg, Tomblin, and McSweeney (1999), the prevalence of specific language impairments (SLI) is approximately 8% in school-age children. SLI was not a primary disorder co-occurring with stuttering in our study (6.1%). Recent data by Boscolo, Bernstein Ratner, and Rescorla (2002) reported that children with SLI were significantly more disfluent than their peers. Other studies could examine the relationship between SLI and speech fluency, as well as the possibility of a distinct subgroup of children with both SLI and stuttering characteristics.

The co-occurring non-speech–language disorders with the highest frequency of occurrence were learning disabilities, literacy, and attention deficit disorders. Our study found that percentages for learning disabilities (11.4%), literacy disorders (8.2%) and attention deficit disorders (5.9%) were all higher than reported in the general school-age population. Arndt and Healey (2001) reported that 24% of the children in their study were “suspected” of having a co-occurring learning disability and 14% were “suspected” of having a co-occurring reading disability. Although our study found lower percentages for learning disabilities and reading disorders, these were “known” disorders that could be “confirmed” and may explain the conflicting results. As mentioned above, more than 8% of the children had co-occurring literacy disorders. Some studies have suggested that children who stutter will not differ from their peers in reading ability and narrative skills (Conture, 2001; Nippold & Schwarz, 1990). However, oral reading performance in some children may be related to stuttering behaviors. Bosshardt and Nandyal (1988) reported differences between oral and silent reading in children who stutter. Conture (2001) cautions SLPs to be aware of these co-occurring disorders, especially if reading material is used to assist in fluency treatment activities. These subgroups of children need to be examined more systematically to determine if treatment/assessment protocols may be changed to produce more effective outcomes.

A small group of children (5.9%) presented attention deficit disorders. Riley and Riley (1988) have discussed the relationship between attention deficit disorders and recovery in children who stutter. The incidence of ADD is between 3 and 5% in the school-age population (Anastopoulos & Shelton, 2001). We found a slightly higher percentage in children who stutter. Another small subgroup of children (3.8%) presented central auditory processing disorders. Chermak and Musiek (1997) state that no adequate prevalence data are currently available for CAPD. A number of theories have suggested that stuttering may be caused and/or maintained by subtle auditory disturbances (Andrews et al., 1983; Bonin, Ramig, & Prescott, 1985; Dietrich, Barry, & Parker, 1995). Further examination of subgroups of children with and without these co-occurring disorders may provide important information to clinicians about successful treatment approaches and the interrelationships among co-occurring disorders.

The mean number of children who stutter on all SLPs’ caseloads in this nationwide survey was 2.2 children and identical to the number of children reported by Arndt and Healey (2001) in their survey of 10 states. There were more children in the 4th to 5th grade (31.6%) group than the 9th to 12th grade group (8%), which was expected. As children progress through school, they become successful at learning and using stuttering modification and/or fluency shaping techniques and may require less treatment time. However, the number of co-occurring disorders did not show a corresponding reduction over time. Children in the early grades, middle school years, and high school showed similar percentages of co-occurring disorders. It is possible that these children were successfully treated for one problem and then a new or additional problem was diagnosed at a

later time. For example, a child who stutters may have presented with reading and expressive language disorders in the 2nd grade and reached grade level performance by the 5th grade. However, when the child transferred to middle school he may have been diagnosed with attention deficit disorder and a voice disorder. This child would be reported as having two co-occurring disorders in the 2nd grade and two co-occurring disorders in the 6th grade. Another less optimistic scenario is that the child who stutters was diagnosed with two co-occurring disorders in the 3rd grade and these disorders had not been remediated by the 9th grade. Of course, these are speculations because we did not ask SLPs how long the co-occurring disorders had been treated.

Another interesting finding was related to gender differences. Males (56.5%) were reported to have a significantly greater percentage of co-occurring speech disorders than females (45.1%). SLPs reported that males had a significantly greater number of co-occurring articulation and phonology disorders than females. Similarly, males who stutter were more affected by non-speech–language disorders, especially learning disabilities and literacy disorders. In contrast, there were no significant differences between males and females for the language categories. It may be that co-occurring or competing speech processing tasks stress the physiological system to a greater extent in males than females. Further research should include gender as an important variable which may influence assessment and treatment in children with co-occurring disorders.

Finally, one of the most interesting findings was the data concerning the amount of time spent in treatment for children who stutter with co-occurring disorders. These children received a mean of approximately 23 min of treatment, two times a week with a mean of approximately 12.6 min “focused on stuttering.” That means that if the child who stuttered with co-occurring disorders was seen in a typical public school setting for 36 weeks (not including any time missed for diagnostic assessment at the beginning of the school year and final reports at the end of the school year, holidays, illnesses, special events, etc.), s/he would receive 925.3 min or 15.4 h of treatment for the entire year. The remaining 10.8 min (two times a week) of treatment yields 793.2 min (or 13.2 h) of treatment for co-occurring disorders. Amazingly, school-based SLPs are expected to treat children who stutter and expect changes in a school year when they have approximately 15 h per year to work on the child’s stuttering problem.

All of the above findings support the notion that children who stutter are more likely to exhibit co-occurring speech, language, and non-speech–language disorders. This study provides new information about the specific types of speech and language disorders, and non-speech–language disorders. This study also provides new information on the differences between males and females in the frequency of co-occurring disorders. It appears that males are more likely to be affected by co-occurring disorders than females. The data encourage SLPs to continue to be aware of co-occurring disorders and how these disorders may influence stuttering in school-age children. Finally, most SLPs are faced with

treating approximately 2.2 children who stutter on their caseloads each year. Based on the results of this survey, 6 of every 10 children who stutter will have 2.16 additional disorders. SLPs will continue to determine which disorders are most urgent and decide how to best use the approximately 1 h a week (23 min, two times a week) for treating stuttering and the co-occurring disorders. Researchers should continue their efforts at determining optimal treatment programs for children who stutter with co-occurring disorders.

Appendix A. Continuing education

1. Studies examining co-occurring stuttering and other speech, language, and non-speech and language disorders have attempted to clarify
 - (a) the nature of stuttering in children and adults
 - (b) the type of co-occurring speech, language and non-speech–language disorders
 - (c) the frequency of co-occurring speech, language and non-speech–language disorders
 - (d) provide additional support for reported subgroups
 - (e) all of the above
2. The current study differed from the [Arndt and Healey \(2001\)](#) study in that
 - (a) it used a nationwide sampling procedure to ensure large geographic representation
 - (b) it requested data only on speech, language, and non-speech–language disorders that could be documented through the students' case histories, school files, information shared by parents, teachers, members of collaborative teams, or current diagnostic terms used to describe the child
 - (c) it provided a detailed and more complete list of potential co-occurring speech disorders, language disorders, and non-speech–language disorders based on practicing SLPs' feedback
 - (d) it examined the gender variable
 - (e) all of the above
3. The results of this study suggest that
 - (a) articulation and phonology disorders are the highest co-occurring disorders for children who stutter
 - (b) expressive and receptive language disorders are the highest co-occurring disorders for children who stutter
 - (c) females have more co-occurring speech disorders than males
 - (d) articulation and phonology disorders in children who stutter are very similar to the percentages reported in the general population of school-age children
 - (e) none of the above

4. Based on the results of this study, SLPs
 - (a) should be aware of the large groups of children with co-occurring voice, cluttering and dysphagia disorders on their caseloads
 - (b) work closely with the special education teachers because of the large groups of children who stutter with severe cognitive, behavioral and social disorders
 - (c) should be aware that children who exhibit co-occurring speech, language and non-speech–language disorders will be present on their caseloads
 - (d) do not need to complete extensive language assessment of children who stutter because it is obvious that linguistic processing does not play a role in stuttering
 - (e) all of the above
5. Which of the following is not true
 - (a) children who stutter received a mean of approximately 23 min of treatment, two times a week
 - (b) learning disabilities, literacy disorders and attention deficit disorders were the highest reported co-occurring non-speech–language disorders
 - (c) Males were reported to have a significantly greater percentage of co-occurring speech disorders than females
 - (d) The percentage of co-occurring disorders reported in school-age children who stutter was less in the early grades (K-1; 2–3) and significantly greater during the high school years
 - (e) The results of this study present additional evidence that a majority of children who stutter have at least one co-occurring speech, language, or non-speech–language problem

Appendix B. Instruction for completing the survey

We are asking that you provide information about students who stutter in your schools. The students may be currently receiving treatment services or may not be receiving services for some reasons. We **ONLY** want you to provide information about their stuttering and co-occurring disorders that you could (you don't have to for this study) provide documentation or support from parental reports, collaborative team meetings, student reports, regular classroom teacher or special education classroom teacher reports/meetings, medical diagnoses, etc. if someone were to request it. We know that some children on your caseload or in your schools "might" have co-occurring disorders that are undiagnosed at the present time. We are also aware that you might suspect some of the children have undiagnosed disorders based on your years of clinical experience, but have not been diagnosed. For this study we **ONLY** want you to complete information that you could document, if requested. When we analyze the results, we do not want to over-

represent the students' disorders by speculation, "good clinical hunches," or even the best intuitive guesses, hence our request. Thanks in advance for understanding and for helping us find out more about children who stutter.

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