Natural Histories in Preschool Children Who Stutter
Histoires naturelles d'enfants bègues d'âge préscholaire

Pat Wevrick, MA
Children's Hospital of Eastern Ontario
Ottawa, Ontario

Janice Mervyn, MHSc
Children's Hospital of Eastern Ontario
Ottawa, Ontario

ABSTRACT

This report presents a study of the case histories of 50 children whose parents initiated referral for assessment of stuttering. Two analyses were performed. Study 1 investigated whether preschool children referred for assessment of stuttering had significantly more risk factors related to birth, developmental, health, or social histories than did preschool children with normal speech and language development. Groups were matched for age, gender, and socioeconomic status. Statistically significant differences were found in the areas of development and health factors. Study 2 investigated whether preschool children diagnosed with stuttering (a subset of the referred group) had significantly more risk factors than did preschool children with normal speech and language development. Participants were matched for age, gender, socioeconomic status, and ethnic and linguistic background. A significant difference was found between the social histories of these groups. The results of these two studies highlight the value of case history information.

ABRÉGÉ

Ce compte rendu présente une étude des observations de cas de 50 enfants dont les parents ont amorcé le processus de recommandation d'une évaluation du bégaiement. On a fait deux analyses : L'étude 1 a vérifié si les enfants bègues d'âge préscolaire renvoyés en évaluation du bégaiement présentaient un nombre bien plus grand de facteurs de risque relativement aux observations de naissance, de développement, de santé ou sociales comparativement aux enfants d'âge préscolaire présentant un développement normal de la parole et du langage. On a apparié les groupes selon l'âge, le sexe et la situation socio-économique. On a relevé des différences statistiquement importantes au niveau des facteurs de développement et de santé. L'étude 2 a vérifié si les enfants d'âge préscolaire faisant état d'un diagnostic de bégaiement (un sous-ensemble du groupe référé) présentaient un nombre bien plus grand de facteurs de risque comparativement aux enfants d'âge préscolaire présentant un développement normal de la parole et du langage. On a apparié les participants selon l'âge, le sexe, la situation socio-économique et les caractéristiques ethniques et linguistiques. On a relevé une différence importante par rapport aux antécédents sociaux de ces groupes. Les résultats de ces deux études font valoir l'importance de l'information que procurent les observations.

KEY WORDS: case histories • preschool children • stuttering

The history of speech-language pathology is replete with ideas about stuttering, many of which are theoretical. Empirically, it is known that stuttering: (a) is a disorder of childhood with an onset of two to four years of age, (b) often begins when a child is acquiring language at a rapid rate, but after simple fluent sentences have been established, (c) is usually inconsistent, varying within time frames and among situations, (d) tends to run in families, (e) affects three times more males than females, and (f) reveals a spontaneous recovery rate of approximately 80% (Conture & Fraser, 1989; Johnson & Heinze, 1994). Notwithstanding these descriptors, parents of children who stutter want to know why their child is stuttering and what they can do to eliminate it. Clinicians also want to increase their knowledge about the etiology and maintenance of stuttering in children, with the goal of making intervention more relevant and productive.

During early formal investigations of the causes of stuttering, developmental and health issues were considered. Berry (1938a) studied the developmental history of children who stutter and found the age of learning to walk was later than in children who do not stutter. Other pioneers (Blackburn, 1931; Hunsley, 1937; West, 1929; Westphol, 1933) found that children who stutter were less adequate in their control of voluntary muscular movement (i.e., slower in the rate of repetitive muscular movement, less able to follow a pattern of clicks presented auditorily, differed in the regularity of their muscular movement) than children who do not stutter. The children who stuttered

were also less successful when measured by standardized motor tests. Berry (1938b) also surveyed the medical history of 430 children who stuttered and 462 controls. She found that two groups of diseases (infectious diseases involving the respiratory system and convulsive disorders) appeared far more frequently and with greater severity in children who stuttered than would be found in nonstuttering children. West, Nelson, and Berry (1939) reported that 16-20% of their children began to stutter immediately upon recovery from one of these diseases. Other authors (Andrews & Harris, 1964; Johnson, 1959), who used control groups, did not find significant differences in the number of reported illnesses for children who stuttered.

The interactions between childhood illness and the psychological adjustment of children in the general population have been studied by several authors. Mattsson and Weisberg (1970) observed children with minor illnesses and noted behaviour changes including extreme irritability, an intolerance of frustration, as well as a decreased interest in physical and verbal contact. Common illnesses are reported to disrupt the usual patterns of parent-child interactions (Parmelee, 1986; Walker & Zeman, 1992).

Van Riper (1963) wrote that it is a fallacy to look for a single cause of stuttering and that stuttering can result from any of three etiologies or a combination thereof: it can be learned, it can be neurotic, or there can be constitutional differences. Riley and Riley (1980) reported the emergence of four factors in a group of 76 stuttering children. These factors were linguistic integration, decreased oral and fine motor abilities, reduced auditory perceptual skills, and reduced auditory processing skills.

The review of Andrews et al. (1983) looked for a model of stuttering which would fit with the established facts. They examined the research literature over the previous 20 years and designated as "facts" only the empirical knowledge which was gained from replicated findings. Their model proposed "a genetically determined reduction in central capacity for efficient sensory-motor integration" (p. 226). Such integration, at the level of the central nervous system, shows decreases in the ability to maintain an adequate relationship between motor events and the sensory consequences of those events.

Rosenfeld and Nudelman (1987) discuss a term called affect-sensitivity which refers to "the fact that stress alters motor output" (p. 6). They propose that stutterers have an affect-sensitivity problem and, therefore, stutter more in situations of stress. Starkweather, Armson, and Amster (1987) suggest that some children may develop stuttering due to a motor system which is vulnerable to environmental pressures or demands. The "demands and capacities" model (Starkweather & Gottwald, 1990) postulates that stuttering develops when the environmental demands exceed the child's ability to speak fluently. Similar ideas are held by other authors (Onslow, 1992; Shine, 1984).

Attempts to find subgroups of persons who stutter are now more successful. Poulos and Webster (1991) reported on 169 adults and adolescents who presented with developmental stuttering. Of those who reported a family history of stuttering, only 2.5% reported any birth or early childhood factor that was thought to be associated with stuttering. In contrast, 40% of those without a family history of stuttering reported such a factor or event. These factors included prenatal difficulties, birth complications, accidents, or head injuries during childhood.

Yairi and Ambrose (1992) interviewed parents (using a standard questionnaire) in order to obtain information about factors associated with the onset of stuttering, reporting data for 87 preschool children. Physical or emotional stress and family histories of stuttering were reported for many of these children. The reported histories of 43% of the participants suggested indicators of stress. The three variables of onset type, stress, and family history were found to be independent. A gradual onset seemed to be associated with a positive family history and no stress. The authors, Yairi and Ambrose, recommended that the relationship between specific stressors and the onset of stuttering be investigated further.

Nippold (1990) has emphasized the variability that exists among children who stutter. Further, she stressed that stuttering groups should be matched to control groups for potentially confounding factors such as age, gender, socioeconomic status, ethnic and linguistic factors, intelligence, and speech and language development.

Based on information obtained from the literature, and the concerns raised about developmental, health, and social factors, the authors of the present study recognized

that a detailed examination of the case histories of children referred for assessment of stuttering might provide valuable information about factors associated with the development and maintenance of stuttering.

The specific goals of this study focussed on whether children referred for assessment of stuttering had significantly more risk factors in their birth, developmental, health, or social histories than preschool children with normal speech and language development, including an absence of stuttering. Additionally, we also evaluated whether preschool children diagnosed with stuttering (a subset of those in the other phase of this project) exhibited significantly more risk factors in their birth, developmental, health, or social histories than preschool children with normal speech and language development, including an absence of stuttering.

Study 1

Method

Participants

A consecutive sample of 50 children whose parents initiated a clinical visit for stuttering assessment comprised the primary study group. All children were initially referred by a physician. Determination of cognitive status was based on the judgment of parents, the referring physician, and the authors, as well as the results of speech and language testing. Children with suspected or known cognitive deficits were not included in this group. Participants ranged in age from 2 years, 0 months to 4 years, 11 months (M = 3;6). Distribution by age identified three groups: two years (n = 11), three years (n = 28) and four years (n = 11) old. Males comprised 74% of the total group (a 3:1 male/female ratio). The percentage of males increased with age: accounting for 55% of the two-year-olds, 75% of the three-year-olds, and 91% of the four-year-olds.

Participants for the control group were obtained through the cooperation of local nursery schools. The director of each school identified children who, in their judgment, met the following criteria: (a) free of obvious neurological problems or severe emotional difficulties, and (b) normal speech and language development, including an absence of stuttering. The directors were requested not to include any child whose status in regard to these criteria was questionable. Children who met these criteria formed a pool of potential control participants.

Procedure

Case History Information

All parents of the children who were referred for stuttering completed a standard case history form. Abbreviated case history forms (see Appendix) were distributed to the parents of those children who met criteria for the control group; those returning the form (50%) were then considered for inclusion in the control group. In completing the case history form, parents provided information regarding their child's birth, development, health, and social histories.

Socioeconomic Status

The Blishen Socioeconomic Index (BSI; Blishen, Carroll, & Moore, 1987), based on 1981 Canadian census data, was used to code the socioeconomic status (SES) of each participant. This scale, which gives equal weight to education and income components, requires an occupation title for coding purposes. The index itself has a mean of 42.74 (*SD* = 13.28) over the 514 census occupations. Parental occupation titles were requested on the case history form. Of the original 50 cases, one was excluded because an occupation title was not provided; two additional incomplete case histories also had to be excluded. In order to maintain a sample size of 50, the next three complete case histories with at least one identified parent occupation title were included. Using the BSI, the mean SES score of the referred sample was 52.59 (*SD* = 17.46). The mean SES of the referred group was, therefore, within 1 *SD* of the mean SES of the BSI. However, there was greater variability in SES for the referred group than is found in the BSI (range = 25.74 to 101.74).

Matching Groups

The referred children were designated as the Children with Stuttering Characteristics (CSC) group. A control group matched to the CSC group for age, gender, and mean SES was obtained from those case histories which were returned. Ethnic and linguistic background was coded positive if another language in addition to English was spoken in the home. The control and CSC groups did not differ significantly in ethnic and linguistic background.

Tabulating Case History Information

Risk factors in the birth and developmental histories of each child were identified. The presence of single, as well as multiple health and social factors also was noted. The most frequently reported birth conditions for both groups were induced labour and planned or unplanned Caesarean section. Use of forceps, breach presentation, and twinning were less frequently reported. The most frequently reported risk factors in development included delayed toilet training and delayed walking. Delayed toilet training was based on a criterion attainment age level of three years (Doleys & Dolce, 1982; Howe & Walker, 1992). Delayed walking was based on attainment at the criterion age of 17 months (Illingworth, 1983). Prevalent health issues reported were frequent colds and coughs, frequent ear infections, allergies, and high fevers. The most frequent social events were birth of a sibling and/or moving.

It is important to acknowledge the nature of some of the variables under consideration (e.g., toilet training). Children in the two-year-old group, at time of referral, would not have attained some of the milestones expected of the three- and four-year-olds. Since this study was cross-sectional, only the variables relevant to the child's age at the time of referral were examined. In addition, older children in this study would have more developmental, health, and social variables appropriate for comparison due to more developmental milestone expectations, and more time for health and social issues to arise. For this reason, specific age-based (all two-year-olds, all three-year-olds, all four-year-olds) comparisons were made in addition to the group comparisons.

Results

Parent-reported birth, development, health, and social histories were charted for the two groups studied (Table 1).

Birth, Developmental, Health, & Social History

There was no significant difference in the birth conditions between the CSC and control groups. More developmental issues were reported for the CSC group than the control group, but the difference was not significant. An examination of developmental issues by age revealed that for the three-year-olds, the difference between the CSC

Table 1. Frequency of Reported Case History Information.

	Referred (n = 50)	Control (n = 50)
Ethnic & Linguistic	20	26
Birth[a]	26	31
Development[b]	11	5
two-year-olds	0	0
three-year-olds	9	2*
four-year-olds	2	3
Health[c]	38	40
multiple factors	29	27
two-year-olds	2	6
three-year-olds	21	13*
four-year-olds	6	8
Social[d]	28	21
multiple events	9	5
two-year-olds	1	0
three-year-olds	7	5
four-year-olds	1	0

Most frequently mentioned included:
(a) induced birth, planned & unplanned C-section
(b) delayed toilet training, delayed gross motor milestones
(The standards used for normal development were obtained from Doleys & Dolce (1982), Howe & Walker (1992), and Illingworth (1983)).
(c) frequent colds and coughs, frequent ear infections, allergies, and high fevers
(d) birth of a sibling, moving
* $p < .05$

and control group was significant ($X^2(1,56) = 5.54$, $p < .05$). There was no significant difference between the health histories reported for children in the CSC and control groups. Among the three-year-olds, significantly more children with multiple health factors were reported for the CSC group than for the control group ($X^2(1,56) = 4.79$, $p < .05$). There was no significant difference in the incidence of social events between the CSC group and the control group. For the four-year-olds, no differences were found between the groups in any area (birth, development, health, social). Thus, the two groups, CSC vs. controls, did not differ significantly in their birth, developmental, health, or social histories. However, the three-year- olds in the CSC group had developmental and health histories which were significantly different from the three-year-olds in the control group.

Assessment

All of the children referred for stuttering were seen for speech, language, and stuttering assessment by one of the authors. The mean waiting period between receipt of the case history and assessment was 2.9 months (range = 1 to 5 months).

Speech and Language

A standard screening battery including Peabody Picture Vocabulary Test-Revised (PPVT-R; Dunn & Dunn, 1981), Preschool Language Scale-3 (PLS-3; Zimmerman, Steiner, & Pond, 1991), and Goldman-Fristoe Test of Articulation (Goldman & Fristoe, 1986) was used. Eighteen children (36%) who were referred for stuttering assessment had clinically significant delays in their speech and/or language development. A clinically significant delay was defined as a score of more than 1 *SD* below the mean on the PPVT-R or on either the Auditory Comprehension or Expressive Communication subtests of the PLS-3 and/or a score below the 16th percentile (1 *SD*) for the sounds-in-words subtest of the Goldman-Fristoe Test of Articulation. Of the 18 children with a concomitant speech and/or language delay, 17 were male; of these 17 males, 13 were three-year-olds. Three of these three-year-olds had a speech delay, seven had a language delay, and three had a delay in both speech and language. The other four males were four-year-olds. Of those, three had a language delay and one had a delay in both speech and language. The female was three years old and had a delay in both speech and language. Eight of these children were stuttering at the time of assessment. An additional eight children had a reported history of being "late to talk." Their parents noted that the child's first words appeared between 13 and 18 months and that they did not use two word combinations at two years of age; however, these eight children were within normal limits at the time of the assessment.

Of particular interest is the fact that although some parents mentioned speech sound development as an additional source of concern, no parent identified language issues as part of their child's problem.

Stuttering

The basis for the presence of stuttering was based on the protocol presented by Pindzola and White (1986). Seventeen children of the 50 in our sample (34%) were stuttering at the time of assessment. Stuttering behaviour(s) noted during the clinic assessment was corroborated by parental reports of continued stuttering at home. Children who were not identified through the protocol were reported to have stopped stuttering at home.

Study 2

Method

Participants

The seventeen children who were stuttering at the time of formal assessment comprised the clinical group. They ranged in age from 2 years, 1 month to 4 years, 9 months, (M = 3;4). Distribution by age again revealed that the majority (65%) fell in the three-year age grouping. There were 13 males and four females (male:female ratio = 3.25:1). The mean socioeconomic status of the clinical group was 53.33 (*SD* = 14.04). This is not significantly different from the SES (mean = 52.59) of the CSC group. Forty-one percent of the clinical group used a second language at home. This is comparable to the proportion of children coded with positive ethnic and linguistic background in the CSC group.

Control participants, who were selected from the larger control group of children, were individually matched to each clinical group participant. The criteria for matching included being of the same gender, being within six months

of the same age, being within 1 *SD* on the Blishen Scale for socioeconomic status, and having the same coding (presence or absence) of an ethnic and linguistic background.

Similar to Study 1, birth, development, health, and social information, as reported by parents, was tabulated for the clinical and control groups.

Results

Birth, Developmental, Health, & Social History

No significant differences in birth conditions, developmental history, or health factors were identified. Eleven children in the clinical group had reported social events in their history compared to that of five controls and this difference was significant ($X^2(1,34) = 4.25$, $p < .05$).

Speech and Language

In addition to stuttering, eight of 17 children (47%) in the clinical group had a clinical delay in their speech and/or language development and all were males. Of these eight, seven were three-year-olds. One was found to have a speech delay, four had a language delay, and two had delays in both speech and language. The remaining participant, a four-year-old male was found to have a language delay.

Discussion

The purpose of this study was to investigate whether preschool children referred for assessment of stuttering had significantly more risk factors in their birth, developmental, health, or social histories than did preschool children with normal speech and language development. One may logically question the discrepancy between the number of children referred for assessment and the number of children formally diagnosed with stuttering. Early identification of stuttering is recognized to be a difficult and complex task (Gordon & Luper, 1992a, 1992b). However, there are two observations to support the assumption that the referred children were appropriate candidates for assessment. First, it is assumed that a parent must be sufficiently concerned and motivated to obtain a referral from their physician and to complete and return a case history form. Second, it is well known that many children go through a period of speech disfluency which spontaneously resolves (Conture & Schwartz, 1984; Curlee, 1980; Gordon & Luper, 1992a). Thus, our initial sample probably included some children who fell into this latter group.

The factor of a higher proportion of males associated with early childhood stuttering, as found in this study, is well documented in the literature (Andrews & Harris, 1964; Bloodstein, 1981; Van Riper, 1963, 1982). The ratios found in this study are comparable to those documented in the literature. The mean age at assessment in this group of 50 children was 3 years 6 months. It is hypothesized that at this age the rapidly developing language system may stress the child's coordination of the oral mechanism and, thus, produce nonfluent speech (Andrews et al., 1983; Perkins, 1990; Yairi, 1983). Thirty-six percent of the 50 participants in this study had a concomitant speech and/or language delay. Of those participants diagnosed with stuttering, 47% had a concomitant speech and/or language delay.

The three-year-olds in the CSC group had significantly more developmental problems than the three-year-olds in the control group ($p < .05$). Developmental issues included delayed toilet training and delays in attaining gross motor milestones. Several authorities (Doleys & Dolce, 1982; Howe & Walker, 1992; Spock, 1957) have documented that readiness for toilet training implies neurological and muscular development which is necessary for such control. Spock (1957) noted that boys tend to be later than girls for dryness at night and that dryness at night is related to neurological maturity.

The gross motor delays of some children in the CSC group were notable in comparison with developmental norms (Doleys & Dolce, 1982; Howe & Walker, 1992; Illingworth, 1983). According to Blasco (1991), motor milestones are the least predictive of intellectual development. Conversely, he finds that the achievement dates of motor milestones are excellent indicators of motor competence. Stuttering, of course, manifests itself as a disruption of motor output. The typical description includes the blocking, repeating, and/or prolonging of sounds, syllables, or words. Secondary characteristics may include muscular tension or movement in the head and neck area and/or the limbs. Neurological theories about the cause of stuttering have a long history (Bender & Kleinfeld, 1938). Van Riper (1963) suggested the possibility of "dysphemia" which was defined as "an underlying neuromus-

cular condition which reflects itself peripherally in the nervous impulses which are poorly timed in their arrival in the paired speech musculatures" (p. 324). The model of stuttering proposed by Andrews et al. (1983) maintained that there was a reduction in the capacity of the central nervous system to integrate motor events and the sensory consequences of these events. Thus, the present data support the possibility of neuromuscular delays/differences in children who stutter.

Riley and Riley (1980) reported the emergence of four descriptive factors in a group of 76 stuttering children. One factor described as decreased oral and fine motor abilities accounted for 17.8% of the variance. Shine (1984) discusses his clinical approach which has evolved from his view of stuttering as a coordinative disorder resulting from a predisposing neurophysiological difference which may be neuromotor or neurolinguistic or a combination of both. It has been proposed that some children who stutter have a motor system which is vulnerable to pressures or demands (Starkweather, Armson, & Amster, 1987; Starkweather & Gottwald, 1990). Onslow (1992) in discussing the variable and episodic nature of early stuttering and the implications for misdiagnosis, suggested that some stuttering-like behaviours may be a "developmental faltering." Developmental delays in motor competence were found in this study, thus supporting the idea of a vulnerable motor system.

The literature indicates that children appear to be most vulnerable to stuttering at the time of rapid language expansion including syntactical complexity and more intricate articulatory movements (Andrews et al., 1983; Perkins, 1990; Yairi, 1983). Significant developmental differences, as found in the histories of the present three-year-olds who were referred for stuttering, may support the suggestion of a developmental neuromotor component to stuttering (Andrews et al., 1983; Riley & Riley, 1980; Shine, 1984; Van Riper, 1963).

Significantly more of the three-year-olds in the CSC group had two or more factors emerge from their health histories. A possible interpretation of these health history factors provides for consideration of the relationship between ear infections and speech and language development. Menyuk (1986) suggested that variable auditory input resulting from frequent occurrences of otitis media might affect language skills. Feagans (1986) and colleagues (Feagans, Blood, & Tubman, 1988) proposed that poorer attention to language might result from variable auditory input. Gravel and Wallace (1992) demonstrated that four-year-old children with a history of otitis media in the first year of life had poor selective listening abilities at a later age. Thus, if one considers the hypothesis of a speech-language tradeoff at around three years of age, (Andrews et al., 1983), children who stutter may be less well equipped to successfully navigate this critical period. Andrews' (1983) description indicated that, as a group, people who stutter are late and poor talkers, have difficulties in stimulus recognition/recall in complex auditory tasks, and lag in tests of sensorimotor response. Watkins and Yairi (1997) also point out that, because stuttering usually represents an interruption of established fluency, it is suggestive of interference between speech and language production. In this study, eight of the 17 children (47%) diagnosed with stuttering had a clinical delay in their speech and/or language development. The mean age of those eight children was 3 years 8 months. For this group in particular, speech and language competence may not have been adequate for the needs of the rapidly developing language system.

As previously cited, Riley and Riley (1980) studied 76 children who stuttered and reported four major factors; two of the factors were related to reduced auditory perceptual and auditory processing skills accounting for 17.3% and 14.8% of the variance respectively. In the present study, 36% of children (n = 50) referred for stuttering assessment had delays in their speech and/or language development. Because stuttering often occurs at the time of rapid language development (Andrews et al., 1983; Perkins, 1990; Yairi, 1983), factors which have the potential to interfere with language development (e.g., recurrent ear infections) could also have implications for the development of stuttering.

An alternate interpretation of the complex health histories of the three-year-olds in the CSC group is possible. As early as 1947, Van Riper noted certain features including illnesses with high fever and allergic disturbance in the histories of some stuttering children. He speculated that these conditions could interfere with the coordination of the speech production system. Early surveys (Berry, 1938b; West, Nelson, & Berry, 1939) found an increase in the presence of diseases involving the respiratory and neural systems in children who stuttered. These findings were not replicated by Johnson (1959) or by Andrews and Harris

(1964), who used retrospective parent reports and control groups in their surveys. Poulos and Webster (1991) found that in stuttering adults and adolescents without a family history of stuttering, 40% reported birth or health issues that were thought to be associated with stuttering onset. This was in contrast to the group of subjects with a family history of stuttering, of whom only 2.5% reported birth or health issues thought to be associated with the onset of stuttering. The authors acknowledge that neither the recollections of critical life events associated with stuttering onset, nor the speech patterns of family members who were reported to stutter could be objectively verified. Yairi and Ambrose (1992) also reported that 43% of children who stuttered experienced physical or emotional stressors. However, direct comparison of the previously reported data (Yairi & Ambrose, 1992) to that gathered in our study is not possible because of their amalgamation of physical and emotional stressors.

Many authors have studied the interactions between childhood illness and the psychological adjustment of the child. Mattsson and Weisberg (1970) observed children over a three-year period. These children had minor physical illnesses and were at home under the care of their mothers. Behavioural changes noted included lowered activity level, diminished appetite, increased irritability, and transient regression in independence and self-care. Younger children (two-year-olds) became very dependent with moods of extreme irritability and an intolerance of any frustration. For older children (three- and four-year-olds), interest in physical and verbal contact was diminished. Emotional distress was common due to discomfort from within (illness) and imposed discomfort from without (treatment). During common illnesses, family social roles change (i.e., children are allowed to make more demands and are held less accountable for their behaviour) and work schedules are disrupted (i.e., different caregiving arrangements need to be made; Parmelee, 1986). Parent-child interactions, as noted above, lead to different patterns of reinforcement during minor illnesses (Walker & Zeman, 1992). Luchsinger and Arnold (1965) suggest that a breakdown in psychophysical well-being during minor illness may manifest itself in stuttering. Health issues as found in the present study could therefore be seen as both physical and emotional stressors interfering with the coordination of the speech production system, as noted by Van Riper (1947) and Yairi and Ambrose (1992).

A significant proportion of the children in the present clinical group had notable social events in their history. Several authors have speculated about the possible relationship between the environment and the presence of stuttering (Rosenfeld & Nudelman, 1987; Starkweather, Armson, & Amster, 1987; Starkweather & Gottwald, 1990). Social events such as the birth of a sibling and moving were associated with the maintenance of stuttering in the present clinical group. The dynamics of these events (i.e., the birth of a sibling involves the parental time and energy that are needed to care for an infant, as well as a change in the constellation of the family; moving is not only physically disruptive, but may also be psychologically disruptive if it entails leaving extended family, friends, caregivers, and familiar professional resources) are likely to result in the preoccupation of parents with practical matters, as well as less available time for the child, which is a potentially stressful situation.

Nippold's (1990) critique of several studies related to concomitant speech and language disorders in stuttering children found them to be inconclusive. Methodological problems were present in many studies. Current researchers are attempting to improve this situation by being more aware of potentially confounding factors such as age, gender, socioeconomic status, and speech and language development. Also, because of the variability that exists among children who stutter, individual differences are being given more attention. Throneburg, Yairi, and Paden (1994) studied the relationship between phonologic difficulty and the occurrence of disfluency in the early stages of stuttering. In that study, the occurrence of disfluencies was not influenced by the phonologic difficulty of the disfluent word. However, Ryan (1992) measured articulation, language, rate, and fluency characteristics of stuttering and nonstuttering preschool children and found that selected variables of language proficiency were moderately predictive of stuttering behaviour. The functional relationship between stuttering and language ability remained unclear.

Wolk, Edwards, and Conture (1993) assessed differences in stuttering, phonological, and diadochokinetic behaviours between young children (aged four to six years) with both stuttering and disordered phonology and chil-

dren who exhibited only one of the disorders. During a conversational speech task, those who stuttered plus had disordered phonology produced significantly more sound prolongations and significantly fewer repetitions per whole word repetition than those children who stuttered but had normal phonology. Diadochokinetic rates did not differ among the three groups. These authors discuss the possibility of two types of stuttering: one with and one without disordered phonology. Their findings indicated that the phonological disorder (i.e., linguistic system) may influence the type of stuttering behaviour (i.e., motor control) when they occur in the same individual. There was a nonsignificant trend for stuttering children with normal phonology to have more sound and syllable repetitions, suggesting that their difficulty may be at the level of the vowel or in the transition from vowel to the initial consonant of the following syllable. In contrast, children who stuttered and had disordered phonology exhibited more sound prolongations suggesting greater difficulty at the level of the consonant or in the transition from consonant to vowel within the same syllable or from the consonant to vowel of the following syllable. The fixed articulatory posture causing the prolongation of a sound suggested that the children were struggling to select, sequence and accurately produce specific consonants and consonant sequences.

Finally, the language production capabilities of three groups of young children were evaluated in a study by Watkins and Yairi (1997). Their stuttering followed divergent paths: one group whose stuttering persisted, one group who stuttered briefly and recovered, and one group who stuttered for a longer period prior to recovery. Three measures of language production (mean length of utterance, number of different words, and number of total words) were obtained from spontaneous language samples. Although most children who stuttered performed within the average range, comparison of the three groups noted greater variability and atypical patterns of development in the group of children whose stuttering persisted. Participants in this particular study were not equated for chronological age or age of onset. In our study, 36% of the children referred for assessment of stuttering and 47% of children diagnosed with stuttering had a clinically significant speech and/or language delay. This was an unexpected finding and has left us with much to ponder. Of special interest are the three- and four-year-old boys who constituted 62% (31 out of 50 participants) of our sample. Over half (55%) of these young boys did have a speech and/or language delay. We are therefore left to wonder about the influence of inadequate vocabulary, grammar, and sentence structure on their inability to consistently speak fluently. Furthermore, although 45% of these boys had a language component to their delay, none of the parents had identified language development as a concern on their child's case history form. It seems therefore unlikely that they were providing extra developmental language learning support to their child.

Conclusions

In summary, the profile of the stuttering preschool child which emerged from this sample of 50 consecutive parent-initiated referrals included significant developmental and multiple health issues found in association with the development of stuttering for the three-year-olds in the CSC group. Significant differences in the social history were associated with the maintenance of stuttering, as reflected by the child's inclusion in the clinical group. Certain limitations of this study are evident. First, the participants were physician referred to an out-patient clinic and, thus, the results cannot be generalized to those who are not referred by their physician. As well, although the timeline between referral and assessment was expedient, an even shorter interval would be useful in further studies. This would allow a closer observation of the development of stuttering behaviour with descriptions of gradual or sudden onset potentially being more accurate. Associated behaviours could be noted in an objective fashion. This knowledge of developmental patterns could have prognostic value. As well, professional support could be provided to parents at an earlier time. In addition, a more detailed examination of the oral-motor system using a refined measure would have added information to the developmental history. For example, would the results of diadochokinetic rate testing have been within normal limits? Family history of stuttering was not included as a variable. The presence of stuttering was intermingled with delayed speech and/or language development for some participants. This complicating factor appears to warrant further attention in future research. Finally, the coexistence of developmental and multiple

health issues found in association with the development of stuttering in the three-year-olds in the CSC group, and the significant differences in social history associated with the maintenance of stuttering in the clinical group, do not imply cause-effect relationships. Further investigation may verify the presence of such relationships as well as clarify their nature.

Acknowledgements

We express sincere thanks to the directors of the participating Nursery Schools for their assistance in obtaining subjects for the control group. Our colleagues in speech-language pathology and psychology have been most supportive and for this we are grateful. Special thanks are given to Lynn Wackid and Heather Mace for technical assistance in manuscript preparation. The editorial guidance of Dr. Philip Doyle is greatly appreciated.

Submitted: October 1998
Accepted: December 1999

Please address all correspondance to: Pat Wevrick, 281 Crestview Rd., Ottawa, Ontario, K1H 5G4.

Note: Pat Wevrick is currently affiliated with the Ottawa-Carleton District School Board.

References

Andrews, G., Craig, A., Feyer, A., Hoddinott, S., Howie, P., & Neilson, M. (1983). Stuttering: A review of research findings and theories circa 1982. *Journal of Speech and Hearing Disorders, 48,* 226-246.

Andrews, G., & Harris, M. (1964). *The syndrome of stuttering.* Clinics in Developmental Medicine No. 17. London: Heinemann.

Bender, J. F., & Kleinfeld, V. M. (1938). *Principles and Practices of Speech Correction.* New York: Pitman.

Berry, M. F. (1938a). The developmental history of stutrering children. *The Journal of Pediatrics, XII* (2), 209-218.

Berry, M. F. (1938b). The medical history of stuttering children. *Speech Monographs, 1,* December.

Blackburn, W. B. (1931). A study of voluntary movements of diaphragm, tongue, lips, and jaw in stutterers and normal speakers. *Psychological Monographs, XLI,* 1-13.

Blasco, P. A. (1991). Pitfalls in developmental diagnosis. *Pediatric Clinics of North America, 38,* 1425-1438.

Blishen, B. E., Carroll, W. K., & Moore, C. (1987). The 1981 socioeconomic index for occupations in Canada. *Canadian Review of Sociology and Anthropology, 24,* 465-488.

Bloodstein, O. (1981). *A Handbook on Stuttering* (3rd ed.). Chicago: National Easter Seal Society.

Conture, E. G., & Schwartz, H. D. (1984). Children who stutter: Diagnosis and remediation. *Communicative Disorders, 9,* 1-16.

Conture, E. G., & Fraser, J. (1989). *Stuttering & Your Child.* Memphis, TN: Speech Foundation of America.

Curlee, R. F. (1980). A case selection strategy for young disfluent children. *Seminars in Speech, Language and Hearing, 1,* 277-287.

Doleys, D. M., & Dolce, J. J. (1982). Toilet training and enuresis. *Pediatric Clinics of North America, 29,* 297-313.

Dunn, L. M., & Dunn, L. M. (1981). *Peabody Picture Vocabulary Test-Revised.* Circle Pines, MN: American Guidance Service.

Feagans, L. (1986). Otiris media: A model for long-term effects with implications for intervention. In J. F. Kavanagh (Ed.), *Otitis Media in Child Development* (pp. 192-208). Parkton, MD: York Press.

Feagans, L., Blood, I., & Tubman, J. G. (1988). Otitis media: Models of effects and implications for intervention. In F. H. Bess (Ed.), *Hearing Impairment in Children* (pp. 347-374). Parkton, MD: York Press.

Goldman, R., & Fristoe, M. (1986). *Goldman-Fristoe Test of Articulation.* Minnesota: American Guidance Service.

Gordon, P. A., & Luper, H. L. (1992a). The early identification of beginnning stuttering I: Protocols. *American Journal of Speech Language Pathology, 1* , 43-53.

Gordon, P. A., & Luper, H. L. (1992b). The early identification of beginnning stuttering II: Problems. *American Journal of Speech Language Pathology, 1* , 49-55.

Gravel, J. S., & Wallace, I. F. (1992). Listening and language at 4 years of age: Effects of early otitis media. *Journal of Speech and Hearing Research, 35,* 588-595.

Howe, A. C., & Walker, C. E. (1992). Behavioral management of toilet training, enuresis and encopresis. *Pediatric Clinics of North America, 39,* 413-432.

Hunsley, Y. L. (1937). Disintegration in the speech musculature of stutterers during the production of a non-vocal pattern. *Psychological Monographs, XLIX,* 32-49.

Illingworth, R. S. (1983). *Infant and Young Child.* New York: Livingstone.

Johnson, K. L. & Heinze, B. A. (1994). *The Fluency Companion.* East Moline, IL: LinguiSystems.

Johnson, W. (1959). *The Onset of Stuttering.* Minneapolis, MN: University of Minnesota Press.

Luchsinger, R., & Arnold, G. E. (1965). *Voice-Speech-Language.* Belmont, WA: Wadsworth.

Mattsson, A., & Weisberg, I. (1970). Behavioral reactions to minor illness in preschool children. *Pediatrics, 46,* 604-610.

Menyuk, P. (1986). Predicting speech and language problems with persistent otitis media. In J.F. Kavanagh (Ed.), *Otitis Media in Child Development* (pp. 83-96). Parkton, MD: York Press.

Nippold, M. A. (1990). Concomitant speech and language disorders in stuttering children: A critique of the literature. *Journal of Speech and Hearing Disorders, 55,* 51-60.

Onslow, M. (1992). Identification of early stuttering: Issues and suggested s trategies. *American Journal of Speech-Language Pathology, 1,* 21-27.

Parmelee, A. H. (1986). Children's illnesses: Their beneficial effects on behavioral development. *Child Development, 57,* 1-10.

Perkins, W. H. (1990). What is stuttering? *Journal of Speech and*

Hearing Disorders, 55, 370-382.

Pindzola, R. H., & White, D. T. (1986). A protocol for differentiating the incipient stutterer. *Language Speech and Hearing Services in the Schools, 17*, 2-15.

Poulos, M. G. & Webster, W. G. (1991). Family history as a basis for subgrouping people who stutter. *Journal of Speech and Hearing Research, 34*, 5-10.

Riley, G., & Riley, J. (1980). Motoric and linguistic variables among children who stutter: A factor analysis. *Journal of Speech and Hearing Disorders, 45*, 504-514.

Rosenfeld, D. B., & Nudelman, H. B. (1987). Neuropsychological models of speech dysfluency. In L. Rustin, H. Purser, & D. Rowley (Eds.), *Progress in the Treatment of Fluency Disorders* (pp. 3-18). London: Whurr.

Ryan, B. (1992). Articulation, language, rate, and fluency characteristics of stuttering and non stuttering preschool children. *Journal of Speech and Hearing Research, 35,* 333-342.

Shine, R. (1984). Assessment and fluency training with the young stutterer. In M. Feins (Ed.), *Contemporary approaches in stuttering therapy* (pp.173-216). Boston, MA: Little, Brown

Spock, B. (1957). *Baby and Child Care.* Montreal: Pocket Books of Canada.

Starkweather, C. W., Armson, J. M., & Amster, B. J. (1987). An approach to the study of motor speech mechanisms in stuttering. In L. Rustin, H. Purser, & D. Rowley (Eds.), *Progress in the treatment of fluency disorders* (pp. 43-60). London: Whurr.

Starkweather, C. W., & Gottwald, S. R. (1990). The demands and capacities model II: Clinical applications. *Journal of Fluency Disorders, 15,* 135-141.

Throneburg, R. N., Yairi, E. & Paden, E. (1994). Relation between phonological difficulty and the occurrence of disfluencies in the early stage of stuttering. *Journal of Speech and Hearing Research, 37,* 504-509.

Van Riper, C. (1947). *Speech Correction Principles & Methods* (2nd Ed.). Englewood Cliffs, NJ: Prentice-Hall.

Van Riper, C. (1963). *Speech Correction Principles & Methods* (4th Ed.). Englewood Cliffs, NJ: Prentice-Hall.

Van Riper, C. (1982). *The Nature of Stuttering* (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.

Walker, L. S., & Zeman, J. L. (1992). Parental response to child illness behavior. *Journal of Pediatric Psychology, 17*, 49-71.

Watkins, R., & Yairi, E. (1997). Language production abilities of children whose stuttering persisted or recovered. *Journal of Speech and Hearing Research, 40,* 385-399.

West, R. (1929). A neurological test for stutterers. *Journal of Neurology and Psychopathology, XXXVIII,* 10:14.

West, R., Nelson, S., & Berry, M. F. (1939). The heredity of stuttering. *Quarterly Journal of Speech, XXV (1)* 23-30.

Westphol, G. (1933). An experimental study of certain motor abilities of stutterers. *University of Iowa Studies in Child Development, IV*, 214-221.

Wolk, L., Edwards, M. L., & Conture, E. G. (1993). Coexistence of stuttering and disordered phonology in young children. *Journal of Speech and Hearing Research, 36*, 906-917.

Yairi, E. (1983). The onset of stuttering in two- and three-year-old children: A preliminary report. *Journal of Speech and Hearing Disorders, 48*, 171-177.

Yairi, E. & Ambrose, N. (1992). Onset of stuttering in preschool children: Selected factors. *Journal of Speech and Hearing Research, 35*, 782-788.

Zimmerman, I. L., Steiner, V. G., & Pond, R. E. (1991). *Preschool Language Scale-3.* Toronto: The Psychological Corporation.

APPENDIX

DEPARTMENT OF SPEECH-LANGUAGE PATHOLOGY: INTAKE FORM
(Abbreviated version)

FAMILY HISTORY

Child's Name: _____ Birthdate: __/__/__ Sex: _____
Mother's Occupation: _____ Father's Occupation: _____
Language(s) spoken in the home Mainly: _____ Some: _____
Language(s) spoken by child: At home: _____

BIRTH HISTORY

Birth weight: _____ lbs _____ oz. Was labour induced: Yes [ ] No [ ]

Type of delivery: (1) Normal [ ] (3) Unplanned C-Section [ ] (5) Breech [ ]
(2) Planned C-Section [ ] (4) Forceps [ ] (6) Other: _____

DEVELOPMENTAL HISTORY

At approximately what age did your child perform the following: *(please estimate if you cannot remember the exact age)*

(1) Sit up usupported: _____ months
(2) Crawl: _____ months
(3) Walk independently: _____ months
(4) Toilet trained:
day : _____ years _____ months
nights: _____ years _____ months

HEALTH HISTORY

Please indicate whether the child has had the illness and at what age. Check appropriate box.

	YES	NO	Under 1 Year	1 Year - 2 Years	2 Years - 3 Years	3 Years - 5 Years
Frequent colds and coughs						
Frequent ear infections						
Allergies						
High fevers						
Hearing problems						
Vision problems						
Convulsions						

SOCIAL HISTORY

Please indicate recent or current family events by checking the following:

Death of person close to the child [ ] Birth of sibling [ ] Move [ ]
Family break-up [ ] Other: _____