Anxiety Levels in People Who Stutter: A Randomized Population Study

The question of whether people who stutter are generally more anxious than people who do not stutter has not yet been resolved. One major methodological barrier to determining whether differences exist has been the type of stuttering sample used. Studies investigating anxiety levels of those who stutter have mostly assessed people referred to stuttering therapy clinics, which is arguably a biased sample. To date, no studies have been published that have measured the anxiety levels of people who stutter in the community using random selection procedures. Such a sample is more likely to be representative of the population of people who stutter. The present study involved a random selection and telephone interview of people in 4,689 households. The telephone respondent was given a description of stuttering and asked if any person living in their household stuttered. If yes, a number of corroborative questions were asked, and permission was requested to tape the speech of the person believed to stutter over the telephone. A definite case of stuttering was based on (a) a positive detection of stuttering from the tape and (b) at least one of the corroborative questions supporting the diagnosis. A total of 87 people were identified as definite cases of stuttering across all ages, and 63 participants who were 15 years or older completed a trait anxiety questionnaire over the telephone. Mean trait anxiety levels were significantly higher than levels generally found in society, though differences were not large. Implications of these results are discussed.

KEY WORDS: stuttering, anxiety, adult, children

The association between stuttering and anxiety has been robustly debated over the years, with early theorists arguing that anxiety plays a major causal role in the development of the disorder (Bloodstein, 1995; Craig, 2000). However, little evidence exists for supporting such theories, with the majority of evidence supporting a neurophysiological cause (Craig, 2000; Hulstijn, Peters, & Van Lieshout, 1997; Peters, Hulstijn, & Starkweather, 1991). Notwithstanding this, the role of anxiety in stuttering is poorly understood, hence, the need to explore this area further.

The results of most studies in the area of stuttering and its psychological effects suggest that people who stutter are not significantly different than those who do not stutter in terms of personality type or mood (Andrews & Craig, 1988; Andrews et al., 1983; Andrews & Harris, 1964; Hegde, 1972; Lanyon, Goldsworthy, & Lanyon, 1978; Miller & Watson, 1992; Molt & Guilford, 1979; Prins, 1972). However, earlier evidence suggested that they do have more difficulties with social adjustment (Prins, 1972; Wingate, 1962), which is more than likely a consequence
rather than a cause of stuttering. After all, verbal communication is an important societal skill, and a disorder that disrupts this skill may naturally result in fears and anxieties. Some have argued that anxiety is a reasonable reaction to the symptoms of stuttering (Menzies, Onslow, & Packman, 1999; Poulton & Andrews, 1994). In support of this notion, Kraamaat, Janssen, and Van Dam-Baggen (1991), using a social evaluation scale, showed a positive relationship between stuttering and being socially anxious, whereas Mahr and Torosian (1999) found that people who stutter were more socially anxious than nonstuttering controls. However, the stuttering group in the Mahr and Torosian (1999) study was not as socially anxious as a nonstuttering social phobic group. Stein, Baird, and Walker (1996), using structured interview techniques, found that many adults who stutter and sought therapy had salient difficulties with social anxiety. These authors argued that many people who stutter should be diagnosed as social phobic.

These studies suggest that social anxiety could develop as a consequence of having a stutter. This possibility is strengthened by research that suggests people who stutter have higher locus of control scores than people who do not stutter (Andrews & Craig, 1988; Craig, Franklin, & Andrews, 1984). Higher locus of control scores suggests that people perceive that their life outcomes are less likely controlled by their own efforts and ability and more by luck, chance, or powerful others (Craig et al., 1984).

Craig and Hancock (1996) found that older children who stutter were not any more anxious (trait anxiety) than children of a similar age who do not stutter. However, although the experience of stuttering as a child may not be associated with abnormal trait anxiety levels, research has consistently found that children with speech disabilities have an increased risk of anxiety disorder in early adulthood (Baker & Cantwell, 1987; Beitchman et al., 2001; Beitchman, Brownlie, Inglis, Wild, Ferguson, & Schachter, 1996; Cantwell & Baker, 1977). Furthermore, adolescents who stutter have been shown to have higher levels of communication fears (Blood, Blood, Bennett, Tellis, & Gabel, 2001; Hancock et al., 1998). Presumably, the above research suggests that as one grows older the continued negative influence of a chronic speech disorder such as stuttering can be debilitating socially and psychologically. We argue that this potentially negative influence throughout childhood and adolescence and into adulthood can result in raised trait anxiety levels. This is not to say that every consequence of stuttering is negative.

In support of a relationship between stuttering and anxiety linked to the moment of stuttering (state anxiety), recent research has shown physiological differences between people who stutter and those who do not under stress conditions (Blood, Blood, Bennett, Simpson, & Susman, 1994; Caruso, Chodzko-Zajko, Bidinger, & Sommers, 1994), while sympathetic activity has been shown to be associated with severe stuttering events (Weber & Smith, 1990). Dietrich and Roaman (2001), on the other hand, did not find any relationship between self-predicted anxiety levels and skin conductance (a measure of physiological arousal). It has also been established that higher levels of demand involved in the speaking task are associated with greater risks of stuttering in children (Weiss & Zebrowski, 1992). The possibility exists that more complex and difficult conversation is associated with higher state anxiety, which, in turn, raises risks of stuttering. Assuming stuttering can provoke anxiety, one should not be surprised that stuttering is more likely to be associated with autonomic arousal effects. Furthermore, Menzies et al. (1999) argued the relevance of anxiety to stuttering by pointing to the results of survey research that suggested the majority of people who stutter (and attend clinics to see a speech pathologist) believe their anxiety plays an important part in their stuttering (Lincoln, Onslow, & Menzies, 1996). Lincoln and colleagues also surveyed speech therapists who treated stuttering, and the results suggested that most speech therapists believed anxiety to be an important component of the problem (Lincoln et al., 1996). Further, Craig and Hancock (1995) found a significant relationship between trait anxiety and relapse in adults treated for stuttering. Participants who had relapsed following treatment were three times more likely to experience high anxiety levels than those who did not relapse.

The above information does suggest that anxiety is associated with stuttering. However, when it comes to determining whether people who stutter are more highly anxious individuals, the conclusions remain equivocal. This is demonstrated by the varying results of research projects that have attempted to compare anxiety levels with nonstuttering controls. Some have found no significant differences (Andrews & Harris, 1964; Cox, Seider, & Kidd, 1984; Craig & Hancock, 1996; Miller & Watson, 1992; Molt & Guilford, 1979; Oliver, 1981; Peters & Hulstijn, 1984; Zenner & Shepherd, 1980), but others have found significant differences (Craig, 1990; Fitzgerald, Djurdjic, & Maguin, 1992; Gabel, Colcord, & Petrosino, 2002; Kraaimat et al., 1991; Zeltzer, 1982). As a result, the debate over anxiety levels of persons who stutter is alive and well, demonstrated by the number of comments and letters written to journal editors in recent years arguing both sides (Attanasio, 1991, 2000; Craig, 1991, 1994; Onslow, Menzies, & Packman, 2000; Watson & Miller, 1994). There are a number of possible reasons that have contributed to this debate (Craig, 1990, 1994; Menzies et al., 1999). For example, if studies are mounted using insufficient participant
numbers to provide a reasonable probability (traditionally set at 80%) of rejecting a false null hypothesis, the chances of detecting true differences in anxiety levels are reduced. This is a problem called low statistical power (Cohen, 1988). A number of studies in this area have had this limitation, and accordingly, results may be biased against finding differences. For example, the study by Peters and Hulstijn (1984) found a 6-point difference in trait anxiety between the stuttering and control samples, yet no differences were found due to the low power in their study. Failure to control for potentially confounding factors is another problem. For instance, comparing anxiety levels in samples with an unbalanced sex distribution (i.e., an unequal mix of the sexes in the samples) could result in failure to find differences. It has been shown that matched for age, women have higher levels of trait anxiety than men (Craig, Cubbage, & Bell, 1988; Spielberger, Gorsuch, Luschene, Vagg, & Jacobs, 1983). Furthermore, comparing a younger stuttering sample with an older control group may minimize differences in trait anxiety, as younger persons who stutter have been reported to have near normal levels of trait anxiety (Craig & Hancock, 1996). Another limitation involves selecting biased samples for the comparison of trait anxiety levels (Craig, 1990, 1994; Menzies et al., 1999). Three possible sources of bias are (a) failure to randomly select the stuttering participants (in order to determine with any confidence whether anxiety levels are higher in people who stutter, a sample representative of the total population of stutterers must be investigated), (b) selecting only stuttering persons who have sought therapy (it stands to reason that people who seek therapy for stuttering are worried about the condition and consequently, may become more anxious than those who do not seek therapy), and (c) controlling for the influence of recent treatment. Craig (1990) found that anxiety levels were abnormally high before treatment and that levels reduced to normal immediately following treatment for stuttering. Therefore, anxiety levels should reflect the chronic effects of stuttering rather than any recent influence of improved fluency due to treatment.

The above review suggests that prior research attempting to establish anxiety levels of people who stutter had design limitations that can and should be addressed. For example, none of the published studies investigating anxiety levels in persons who stutter have used a stuttering sample that theoretically is representative of the population of people who stutter. In other words, no study to date has randomly selected stuttering participants from the community. The present study assessed levels of trait anxiety in stuttering persons aged 15 years and over using a randomized and stratified design. Results for the stuttering group were compared to accepted norms for trait anxiety in people who do not stutter. Implications of these findings for theories and the treatment of stuttering are discussed.

**Method**

**Participants and Random Sampling Procedure**

The methodological procedures used in this study have been described elsewhere (Craig, Hancock, Tran, Craig, & Peters, 2002). The study used a random and stratified selection of households in New South Wales (NSW), Australia. The population of NSW was around 6 million people (of a total of about 18 million in Australia) during 1995 and 1996 when the data were collected. The population consisted primarily of city and urban dwellers and is ethnically diverse. The most common regional groups in NSW, in rank order, are people of European or British descent, Asian, Middle Eastern, and Indian (Australian Bureau of Statistics, 1998). Families living in city, urban, and rural areas across NSW were randomly selected so that (a) all families had equal chances of being selected and (b) the distribution of people in the sample from these three types of areas was proportional to the known population spread in NSW. Table 1 shows the breakdown for the regions sampled as well as the final sample sizes surveyed from each region.

<table>
<thead>
<tr>
<th>Region in NSW</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sydney region</td>
<td>3,625</td>
<td>3,648</td>
<td>7,274</td>
</tr>
<tr>
<td>Central Coast</td>
<td>277</td>
<td>259</td>
<td>536</td>
</tr>
<tr>
<td>South Coast</td>
<td>111</td>
<td>115</td>
<td>226</td>
</tr>
<tr>
<td>Windsor area</td>
<td>85</td>
<td>80</td>
<td>165</td>
</tr>
<tr>
<td>Campbelltown area</td>
<td>289</td>
<td>272</td>
<td>561</td>
</tr>
<tr>
<td>Penrith area</td>
<td>298</td>
<td>312</td>
<td>610</td>
</tr>
<tr>
<td>Southern Tablelands</td>
<td>103</td>
<td>110</td>
<td>213</td>
</tr>
<tr>
<td>Albury area</td>
<td>96</td>
<td>112</td>
<td>208</td>
</tr>
<tr>
<td>Bathurst area</td>
<td>176</td>
<td>169</td>
<td>346</td>
</tr>
<tr>
<td>Cooma area</td>
<td>78</td>
<td>79</td>
<td>157</td>
</tr>
<tr>
<td>Singleton area</td>
<td>288</td>
<td>269</td>
<td>557</td>
</tr>
<tr>
<td>Northern Rivers</td>
<td>186</td>
<td>173</td>
<td>359</td>
</tr>
<tr>
<td>New England area</td>
<td>158</td>
<td>186</td>
<td>344</td>
</tr>
<tr>
<td>Western Plains</td>
<td>102</td>
<td>119</td>
<td>221</td>
</tr>
<tr>
<td>South West Plains</td>
<td>128</td>
<td>160</td>
<td>288</td>
</tr>
<tr>
<td>Broken Hill area</td>
<td>35</td>
<td>31</td>
<td>66</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6,035</td>
<td>6,096</td>
<td>12,131</td>
</tr>
</tbody>
</table>

Note. The number of persons interviewed in each region was based upon the population distribution across the state, so that the numbers sampled in each area of the study were proportional to the population spread (total N = 12,131).
Our hypothesized proportion of people who stutter in the community was 1% or 0.01 (Bloodstein, 1995), and we planned in the study to identify up to 100 people who stutter (as this would provide sufficient and stable numbers of people who stutter to determine anxiety levels). This implies a sample size of 100/0.01, or 10,000 people, from which to collect data regarding stuttering. Evidence is growing for a genetic basis for stuttering (Bloodstein, 1995), and as a result, the randomness of the selection process could be negatively influenced by cluster sampling (i.e., stuttering tends to occur in families). Therefore, we aimed to collect a larger sample to overcome any possible influence of cluster sampling. The final number of participating families was 4,689, consisting of 12,131 persons.

Families were geographically stratified from regions (using 1995/1996 telephone directories) until a sufficient number agreed to participate in the survey. In accord with the population distribution across NSW (Australian Bureau of Statistics, 1998), three-quarters of the sample were from city/urban areas spread across NSW, and the remaining sample came from regional or rural areas across NSW. If a survey is strategically conducted according to known distributions of a population, regional coverage rates are higher and, therefore, are believed to be valid representations of the population (Cannell, 1985).

Households were contacted by telephone and interviews were then conducted. More than 95% of Australian households had a telephone in 1995/1996, so a high penetration rate in the community was assured and only a small chance existed of introducing population bias into the sample. We believe that the design of this study raises the probability that the sample is representative of the Australian population in NSW and should, therefore, yield accurate data on anxiety levels of people who stutter. The random procedure used (Dillman, 1978) involved the estimation of the total length of columns of listings for each of the telephone directories used in NSW. A sampling distance (in centimeters) was computed by dividing this estimated length by the proposed sample size from that region. For each telephone directory, a different starting point was selected using random numbers. This proposed sample size was then used as the sampling interval between each selected telephone number in the telephone books. Using this procedure ensures that the majority of names in each directory has the potential to be selected for the study (Dillman, 1978). However, families in which there was no member who could speak English well enough to complete the interview were not included in the study. If this occurred, the interviewer noted this and proceeded to the next random number. Telephone numbers that were disconnected or where no response was obtained (e.g., no answer after three attempts), were also noted and the same procedure followed. The time and day of interviews varied across the week and weekend to ensure a high penetration rate.

**Interviewing Procedure and Stuttering Definition**

Interviewers consisted of research assistants (with an undergraduate degree in psychology or biomedical science) who were trained to conduct the interview procedure. The procedure began with a brief statement on the purpose of the survey. This involved a scripted introduction (indicating the university being represented and purposes of the survey). The interview was structured, involving forced-choice questions so that responses were able to be categorized. The results from each telephone interview were recorded on response forms provided for each interview (see Craig et al. 2002). The scripted introduction included informed verbal consent, and this involved the interviewer asking the person answering the telephone for permission to be interviewed. If another time was more convenient, a new time was arranged for the interviewer to call. If a young child answered the telephone, the interviewer requested to speak to a parent who would then be interviewed. All refusals were recorded as missing data along with “no answers.”

Stuttering was defined in detail using a standard definition (Craig et al., 1996) over the telephone to all households. It was defined to all interviewees as “a disorder involving repetitions of syllables, part or whole words or phrases; prolongations of speech; or blocking of sounds.” Associated symptoms such as embarrassment and anxiety were also described and discussed. If requested, the interviewer gave a demonstration over the telephone of examples of stuttering. The person answering the telephone was asked whether they or a member of their household currently stuttered. If the person answering the telephone believed that they or a member of their household stuttered, a number of corroborative questions were then asked of the person believed to stutter (or to parents if a young child stuttered), such as “Has the stuttering persisted for the last three months?” “Has the stuttering caused fear and avoidance of situations?” “Has the person consulted a speech professional?” and “Has the person had therapy for stuttering?” This information acted as corroborative evidence if one of the questions was answered affirmatively. If someone in the family was believed to stutter, the interviewer asked for permission to speak to that person and requested permission to (a) assess his or her anxiety (if over 15 years old) and (b) tape his or her speech over the telephone for up to 5 min. Taping involved the interviewer engaging...
the person in conversation for up to 5 min, during which the participant’s speech was taped (with the person’s permission). During this interview time the interviewer also listened for the presence of stuttering.

Validation and Reliability of Stuttering Assessment

A reliable assessment of trait anxiety levels in persons who stutter depends on a valid and robust method of detecting stuttering. All family or household members who were believed to stutter were consequently interviewed for up to 5 min. As stated above, the interviewer listened and reached a conclusion on whether the person stuttered during this interview. The interviewer also taped the suspected stutterers’ speech using digital technology (Sony Pro II TCD D10, Sony condenser microphone, ECM-MS5) to ensure high quality recording. The interviewer then passed on the tape to a co-researcher “rater” (not the interviewer) with over 15 years of experience in treating and diagnosing stuttering. The rater qualitatively and quantitatively evaluated the tape of each participants’ speech for stuttering. If both interviewer and rater agreed that the person stuttered, they then determined the frequency of stuttering (percentage syllables stuttered [%SS]) and speech rate (syllables per minute [SPM]). This was the primary measure of stuttering. Although using these measures will not readily detect those people who stutter and exhibit avoidance behavior, %SS and SPM have been shown to be reliable and valid indicators of stuttering severity (Craig et al., 1996). To ensure reliability, an independent rater (i.e., not the interviewer or rater) assessed a proportion of the rated tapes for %SS and SPM. The interrater reliability was demonstrated using Pearson correlation coefficients. The interrater reliability with the second experienced rater was .93 for %SS and .91 for SPM on 15 randomly selected tapes (i.e., 17.2% of the total number of tape recordings of the 87 people who were confirmed to stutter). If stuttering was diagnosed from the tape, the corroborative evidence mentioned above was then used to confirm the diagnosis of stuttering. The rater and independent rater were shown to have over a 96% agreement on the diagnosis of stuttering from the tape. Where there was disagreement or no corroborative evidence, the case was not confirmed as a person who stuttered. Only confirmed stuttering cases were used in the analysis to determine anxiety levels. Obviously, taping speech on the telephone will not assess secondary aspects of stuttering, such as facial grimace; however, secondary symptoms are extremely variable and are not generally considered necessary to measure frequency of stuttering (Bloodstein, 1995).

Reliability of the Interviews

Reliability of the survey itself was also an important consideration, and a 1-week test–retest reliability measure conducted on 15 interviews showed 100% agreement on the interview material. This involved re-contacting families who had participated in the study. Interviewers were trained in the interview protocols, with emphasis placed on establishing rapport with the respondent. Interview structure and rapport have been found to be more important in determining the validity and reliability of telephone sampling than in face-to-face and self-administered modes (Quine, 1985). Traditionally, personal interviews have been regarded as more valid and reliable measures than telephone interviewing. However, several studies have reported no significant differences between these modes of interview in terms of outcome and sociodemographic data obtained (Aneshensel, Frerichs, Clark, & Yokopenic, 1982; Cannell, 1985; Paulsen, Crowe, Noyes, & Pfohl, 1988; Quine, 1985). Low response rate is a possible problem when conducting telephone interviews, but it is also a problem that besets all modes of interview. Studies conducted in the United States have reported only 3–5% lower response rates for telephone interviewing than for face-to-face interviewing (Cannell, 1985). Telephone samples give higher response rates than mail surveys and share many of the advantages of the face-to-face interview over the self-completion questionnaire. Although it is likely that a person who stutters will be less likely to answer the telephone, it is probable that someone else in the house at the time who does not stutter will answer the telephone. It is important to state that we had no refusals to conduct an interview from persons who stutter.

Trait Anxiety Measures

This study was designed to identify stable anxiety attributes (trait anxiety) rather than contextual differences in anxiety (called state anxiety). Therefore, in addition to the fluency measures discussed above, trait anxiety was assessed using the State-Trait Anxiety Inventory (STAI), which was constructed by Spielberger et al. (1983). The STAI consists of two separate self-report scales, one to measure state anxiety and the other to measure trait anxiety. Only the trait anxiety scale was used in this study. It contains 20 items measuring how anxious people generally feel. Scores range from 20 to 60, with a higher score representing higher anxiety. Research on adults has demonstrated that scores on the trait scale are stable and relatively impervious to the conditions under which this scale is given and not greatly influenced by the immediate environment (Cross & Huberty, 1993; Oei, Evans, & Crook, 1990; Spielberger
Results

Analysis

Descriptive statistics were collected for the people confirmed to stutter in the study. In order to test whether trait anxiety differences existed between the people who stutter and the nonstuttering controls, a one-sample \( t \) test was performed. In addition, independent \( t \) tests were performed to test whether those participants who had received treatment at some time had higher \%SS and trait anxiety than those who had never received treatment. Pearson correlations were also computed to determine whether associations existed between demographic factors, trait anxiety, and speech measures.

Results

The response rate for telephone calls was considered satisfactory, with 63\% of the telephone numbers initially selected resulting in completed interviews (for a minority, after 2 or 3 calls). This meant that for 37\% of telephone numbers, a second or third telephone number was randomly selected. Of the 37\% of calls where interviews did not occur, 19\% refused, giving no reason, 0.15\% were too busy or unwell, and 6.9\% had language problems. The remaining 10.95\% could not be contacted due to disconnected lines or unanswered calls. After three attempts without contact a new number was selected.

The sample of 4,689 families consisted of 12,131 persons (6,023 males: mean age = 35.5, \( SD = 21.6 \), age range from < 1 to 95 years; 6,108 females: mean age = 37.3, \( SD = 22.1 \), age range from < 1 to 99). There was an average of 2.9 members in each of the 4,689 families interviewed. A total of 87 persons were confirmed as people who stutter, and 63 were 15 or more years old (mean age = 38.4, \( SD = 16.9 \)). Nine of the 63 were between 15 and 20 years old (there were no significant differences between these 9 and the older persons in terms of anxiety, \%SS, and SPM). There were 44 males and 19 females, giving a M:F ratio of .43, a slightly higher percentage of females than expected (Craig et al., 2002).

The mean trait anxiety, \%SS, and SPM values for the sample \((N = 63)\) are shown in Table 2. The stuttering sample \((N = 63, \text{mean anxiety} = 38.5)\) was shown to be significantly more anxious than the nonstuttering controls \((N = 102, \text{population mean anxiety} = 35.8)\) using a one-sample \( t \) test, \( t(N = 62) = 2.23, p < .05 \).

In addition, the 63 stuttering persons were asked whether they had received any treatment directly for their stuttering. Table 2 also shows a breakdown of the 63 into those who stated that they had never had treatment for their stuttering \((n = 33)\) and those who stated that they had received treatment for their stuttering at some point in their life \((n = 18)\). There was no significant difference in age between those who had received treatment \((\text{mean age} = 34.5, \text{SD} = 17.6)\) and those who had never received treatment for their stuttering \((\text{mean age} = 37.9, \text{SD} = 15.7)\). Types of treatment received for stuttering included speech therapy, psychological therapy, drug therapies, alternative therapies (e.g., acupuncture), and family therapies. None of the 18 had received therapy in the past 3 months and the majority of the 18 had received more than one therapy for their stuttering in their lifetime. For example, 1 person had received acupuncture in addition to psychological and speech therapies. Twelve were unsure whether they had ever received any therapy for their stuttering. The nonstuttering controls were not asked whether they had ever received therapies for a comparable disorder.

There was no significant difference in anxiety between those who had and had not received therapy \((\text{mean anxiety of } 37.3, \text{SD} = 9.9, \text{for the } 33 \text{ who had never received therapy and mean anxiety of } 40.1, \text{SD} = 9.4, \text{for the } 18 \text{ who had received therapy})\). Furthermore, no significant difference in trait anxiety was found \((p = .3)\) when the 33 who had never received therapy were compared with the nonstuttering controls. In contrast, those who had received therapy were significantly more anxious than the nonstuttering controls \((p = .02)\). As a
possible explanation for this, those who had received therapy for their stuttering (mean %SS = 7.7, SD = 5.1) exhibited a significantly higher frequency of stuttering than those who had never received therapy (mean %SS = 4.4, SD = 3.4), t(49) = 2.7, p < .01. To test further the possibility that severity of stuttering is related to trait anxiety, the stuttering group was dichotomized into a less severe (< 6%SS) group and a more severe (> 6%SS) group. However, those who had more severe stuttering (mean trait anxiety = 39.2, SD = 12.3) were not significantly more anxious than those who had less severe stuttering (mean trait anxiety = 37.6, SD = 7.6). Table 3 shows the Pearson correlations between trait anxiety, age, %SS, and SPM scores. There were no significant associations found between any variables.

### Discussion

The issue of whether people who stutter have raised levels of anxiety has been keenly debated, but this possibility has been difficult to resolve (Craig, 1990, 1991, 1994; Menzies et al., 1999; Watson & Miller, 1994). It has not been clearly shown that people who stutter are more anxious than those who do not stutter. Most previous research has tested this question by measuring only those people who had sought or received therapy. From the results in this paper and elsewhere (Craig, 1990), if one only measures anxiety levels of those seeking treatment, then results will suggest that people who stutter have raised anxiety levels when compared to those who do not stutter. Alternatively, if one measures anxiety levels of only those who have recently been treated, then results will suggest that people who stutter do not have raised anxiety levels when compared to those who do not stutter (Craig, 1990; Miller & Watson, 1992).

In contrast to prior studies, the present research investigated levels of anxiety in a group of people who stutter who were selected randomly from a heterogeneous society (i.e., participants were not selected on the basis that they had attended a clinic or sought therapy). This sample was therefore more likely to be representative of the total population of persons who stutter. The stuttering sample was shown to have higher chronic anxiety levels than the nonstuttering controls (though it must be recognized that most of the difference is due to those whose stuttering is more severe and who seek therapy). Although this difference was moderate, it was significant. This suggests that people who stutter are at risk of developing higher levels of anxiety than expected, regardless of whether they have had treatment or not. Other researchers have reached similar conclusions (Stein et al., 1996). A potential concern with this finding involves the use of the nonstuttering controls from prior research and performing a one-sample t test. Clearly, the use of such a design limits the ability to compare the stuttering sample with a nonstuttering control group.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Trait anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.03</td>
</tr>
<tr>
<td>%SS</td>
<td>.20</td>
</tr>
<tr>
<td>SPM</td>
<td>-.11</td>
</tr>
</tbody>
</table>

Note. There were no significant relationships at .05.
matched for age and sex that has been collected at the same period of time. However, the control group had appropriate anxiety levels for adult populations as shown by studies examining norms for the trait anxiety scale (Gauthier & Bouchard, 1993; Spielberger et al., 1983).

The study also examined differences in anxiety between those who had received therapy for their stuttering (although not within the prior 3 months) and those who had never received therapy. The effectiveness of therapy received was not assessed. The majority of people in the sample who stuttered had never sought or received therapy (n = 33; 52.4%) and a minority had received some form of therapy (n = 18; 28.6%). The remaining people were unsure of whether they had ever received therapy (19%). Those who had received therapy at some time in their life were significantly more anxious than the nonstuttering controls (12% higher levels of anxiety). This group’s anxiety (M = 40.1) is similar in trait anxiety to the Craig (1990) pretreatment stuttering group level of trait anxiety (M = 43.1; see Table 2). It is also relevant to point out that abnormal levels of trait anxiety begin around the mean + 1 SD, and in this case, abnormal anxiety would constitute a trait score of around 44 (U.S. mean of 35, SD of 9; Spielberger et al., 1983).

Clearly, those with more severe stuttering who seek therapy are more likely to be more anxious. The group who had sought treatment also had a higher frequency of stuttering than those who had never received therapy, so a reasonable interpretation of these results most likely involves their stuttering severity as motivation to seek treatment. More severe stuttering is most likely associated with greater levels of social and psychological concern (e.g., embarrassment, frustration, shyness) leading to higher levels of anxiety. Consequently, their worries and concerns lead them to seek professional help for their stuttering. One of the treatment implications of these findings is that clinicians should be aware that clients presenting for treatment are at risk of having high levels of trait anxiety. Therefore, anxiety should be assessed at the initial interview and therapeutic action taken if the person has raised levels.

In contrast, those who had never received therapy were not significantly more anxious than the nonstuttering controls (though their mean anxiety level was slightly higher than the controls [a mean 4.2% higher anxiety score]). This group also had less severe stuttering levels than those who had received therapy. Presumably, people in this group have never sought therapy because they were not as concerned about their stuttering, and their stuttering was not as severe or potentially debilitating.

In conclusion, it is becoming clearer that a fluency disorder like stuttering, if it becomes chronic, is associated with higher levels of trait anxiety. This is especially the case if the stuttering is severe enough to warrant treatment. As suggested by others (Menzies et al., 1999; Stein et al., 1996), one should not be surprised that people become concerned and distressed about a disability that can be socially and psychologically limiting. Although severity of stuttering most likely plays a major role in determining higher levels of trait anxiety, it is also more than likely that a complex interplay of factors predisposes a person to develop high levels of anxiety.

Acknowledgments

This research was funded by The University of Technology, Sydney, and a Commonwealth Department of Health Grant (NHMRC). Thanks also to the following funding bodies who also contributed financially to the research: the Big Brother Movement, the Australian Rotary Health Research Fund, the Sunshine Foundation, and the Inger Rice Foundation. Thanks to Karen Peters and Karen Siccardi for their assistance in conducting this research.

References


Received June 12, 2002
Accepted February 24, 2003
DOI: 10.1044/1092-4388(2003/093)

Contact author: Professor Ashley Craig, Department of Health Sciences, University of Technology, Sydney, Broadway, New South Wales, Australia 2007.
E-mail: a.craig@uts.edu.au