Title:

Perfectionism and stuttering: Findings from an online survey

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Abstract

Purpose: Using a multi-dimensional measure of perfectionism: the Frost Multi-dimensional Perfectionism Scale (FMPS: Frost, Marten, Lahart, & Rosenblate, 1990), this study investigates: (a) whether adults who stutter (AWS) display more perfectionistic attitudes and beliefs than those who do not stutter, and (b) whether, in AWS, more perfectionistic attitudes and beliefs are associated with greater self-reported difficulty communicating verbally and speaking fluently.

Method: In the first analysis, FMPS responses from 81 AWS and 81 matched, normally-fluent controls were analyzed using logistic regression to investigate the relative contributions of four FMPS perfectionism-subscale self-ratings to the likelihood of being in the AWS group. In the subsequent analyses, data from the 81 AWS were analyzed using linear multiple regression to determine which FMPS subscale self-ratings best predicted their Communication-Difficulty and Fluency-Difficulty scores.

Results: Both the likelihood of being a member of the AWS group, and also the magnitude of the AWS group's Communication-Difficulty and Fluency-Difficulty scores, were positively part-correlated to respondents' Concern over Mistakes-Doubts about Actions (CMD) subscale self-ratings but negatively part-correlated to their Personal Standards (PS) subscale self-ratings.

Conclusions: The FMPS profiles of respondents who stutter suggest that, as a group, they are not abnormally perfectionistic overall, but may be (or perceive themselves to be) abnormally error-prone. Also, AWS who are more concerned about their errors and uncertain of their actions experience more difficulty communicating verbally and speaking fluently.

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1. Introduction

The possibility of a link between perfectionism and stuttering has been hypothesized by a number of researchers over the years (Amster, 1995; Amster & Klein, 2007, 2008; Brocklehurst, Lickley, & Corley, 2013; Froeschels, 1948; Johnson, 1946; Starkweather, 2002; Van Riper, 1973).

Despite the recurrence of such ideas in the stuttering literature, surprisingly little empirical research has been conducted into the actual relationship between perfectionism and stuttering, and there is currently no reliable data to indicate whether stutterers and non-stutterers differ in any of the standards of (speech or non-speech) performance that they aspire to. The present study constitutes our attempt to provide some such data.

For the study, we use a multi-dimensional measure of perfectionism, the Frost Multi-dimensional Perfectionism Scale (FMPS: Frost, Marten, Lahart, & Rosenblate, 1990). This allows us to investigate the ways in which different dimensions of perfectionism may be associated with persistent stuttering in adults. In particular it allows us to explore whether, in AWS, the experience of difficulty communicating verbally and, more specifically, difficulty speaking fluently in everyday situations may be associated with raised levels of (domain-general) perfectionism. The study design is cross-sectional and, as such, does not investigate possible causal relations between perfectionism and stuttering. We begin with an introduction to the concept of perfectionism. We then review key literature concerning associations between stuttering and perfectionism. Following this we present the analysis of the survey data acquired in the current study. The first analysis compares the FMPS data from 81 AWS and an individually matched control group of Adults who do not stutter (AWNS). Subsequent analyses investigate relationships between the FMPS profiles of the 81 AWS and their self-rated communication and fluency difficulty scores. All three analyses indicate that some, but not all, dimensions of perfectionism are associated with stuttering.

1.1. The nature of perfectionism

Although there is no universally agreed definition of perfectionism, there is nevertheless general agreement that the setting of high standards is central to the concept

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(e.g., Burns, 1980; Flett & Hewitt, 2002; Frost, et al., 1990; Hollender, 1965). Perfectionism is also frequently associated with high levels of concern over mistakes (e.g. Beck, 1976; Burns, 1980; Frost et al. 1990) and with hypervigilance (Hewitt, Flett, Besser, Sherry, & McGee, 2003; Shafran, Cooper, & Fairburn, 2002), although these are neither necessary nor sufficient criteria.

In some circles, for example in the world of performing arts, perfectionism is regarded in a positive light and associated with outstanding achievements. However, from the perspective of psychopathology, it has tended, at least until recently, to be regarded as an undesirable and debilitating trait (e.g., Burns, 1980; Pacht, 1984), associated with dysfunctional thinking styles (Beck, 1976), and a tendency to consistently overestimate how well an action has to be performed in order for it to fulfill its intended purpose. Such views reflect Hollender's (1965, p94) definition of perfectionism as "demanding of oneself or others a higher quality of performance than is required by the situation" although, as Hollender himself pointed out, this definition is problematic unless there is a consensus regarding what standards really are required by the situation.

1.1.1. Dimensions of perfectionism

Early conceptualizations of perfectionism (e.g. Hollender, 1965) tended to be unidimensional in nature, describing it as a personality trait. More recently, it has come to be considered as a multi-dimensional construct, involving a network of beliefs, attitudes, ideals and expectations (Frost, et al., 1990; Hewitt & Flett, 1991). This more recent trend has led to the development of two multidimensional scales: the Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990), and the Hewitt & Flett Multidimensional Perfectionism Scale (MPS-HF; Hewitt & Flett, 1991), which are now the two predominant measures of perfectionism used in research and clinical practice (Egan, Wade, & Shafran, 2011).

A notable result of this trend towards multidimensional conceptualizations of perfectionism and the use of multidimensional scales in research has been the steady accumulation of evidence supporting the view, originally proposed by Hamachek (1978), that the factors or dimensions underlying perfectionism fall into two distinct categories: *positive*,

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characterized by positive strivings and maintained primarily by positive reinforcement, and *negative*, characterized by the desire to avoid negative outcomes or evaluations (Enns & Cox, 1999; e.g., Frost, Heimberg, Holt, Mattia, & Neubauer, 1993; Slaney, Ashby, & Trippi, 1995; Terry-Short, Owens, Slade, & Dewey, 1995, see also Stöber & Otto, 2006 for a recent review of such evidence). The distinction between positive and negative dimensions of perfectionism is clearly reflected in the six FMPS subscales, three of which are "positive" (Personal Standards, Parental Expectations, and Organization), and three of which are "negative" (Concern over Mistakes, Parental Criticism, and Doubts about Actions). The current study makes use of the FMPS which is described in more detail in Section 1.3.1 of this article.

1.1.2. Error evaluation and monitoring

Central to perfectionism is the desire to achieve a perfect or near-perfect state or performance. However, whether such a desire is likely to be fulfilled depends, amongst other things, upon the judgments that an individual makes regarding what constitutes a perfect state or performance. Such value judgments are by their nature, categorical and, when made in reference to situations or performances, frequently involve drawing a line where, objectively speaking, no line exists. Thus, central to perfectionism is the concept of an "error" or "mistake", and again, the point at which an individual judges a performance or state of affairs to be adequate or "good enough" is dependent on the way in which errors or mistakes are evaluated. Hewitt and Flett (1991) point out that an individual may draw the line in different places depending on whether the priority, when performing an action, is to achieve one's own personal goals or to gain the approval or acceptance of others. Individuals may also draw the line differently with respect to their own performance and the performance of others.

Perfectionism is frequently associated with high levels of monitoring for errors (Hewitt, et al., 2003; Shafran, et al., 2002), and neural responses associated with domain-general action monitoring (error-related negativity and error positivity) have been found to be of higher amplitude in people who score more highly on measures of (negative) dimensions of perfectionism (Schrijvers, De Bruijn, Destoop, Hulstijn, & Sabbe, 2010). These findings suggest an association between perfectionism and fast automatic monitoring processes as

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revealed in EEG profiles by error-related negativity (ERN) as well as slower 'conscious' processes as revealed in EEG profiles by error positivity (Pe). In the Schrijvers et al. study, error-related negativity and error positivity amplitudes evoked during a non-verbal Flanker Task (see Eriksen & Eriksen, 1974) were associated with specific FMPS subscale scores: ERN amplitude was negatively associated with FMPS Doubts about Actions scores, whereas Pe amplitude was positively associated with FMPS Concerns about Mistakes (Schrijvers et al., 2010). In contrast, in the study, neither ERN nor Pe amplitudes were found to be associated with scores on standardized measures of depression (Hamilton Depression Rating Scale; Hamilton, 1960) or anxiety (State-Trait Anxiety Inventory; Spielberger, Gorsuch, Lushene, 1970). These findings therefore indicate a specific relationship between domain general action monitoring and negative dimensions of perfectionism.

1.1.3. Perfectionism and Psychopathology

As mentioned in Section 1.1, from the perspective of psychopathology, perfectionism has tended to be regarded as an essentially undesirable and debilitating trait (e.g., Burns, 1980; Pacht, 1984), associated with dysfunctional thinking styles (Beck, 1976), and a tendency to consistently overestimate how well an action has to be performed in order for it to fulfill its intended purpose. Generally speaking "negative" dimensions of perfectionism (e.g. fear of failure and uncertainty about actions) are more likely to be associated with psychopathology than "positive strivings", and in this regard Stöber and Otto concluded, on the basis of the evidence presented in their (2006) review that in the absence of a fear of adverse outcomes, positive strivings (as exemplified by high personal standards) are generally associated with adaptive behavior. However, the association between psychopathology and negative dimensions of perfectionism is not straightforward and high levels of positive strivings do also play a role in a number of pathological conditions (see Shafran & Mansell, 2001, for a review). Maladaptive perfectionism is associated with raised anxiety and stress response (Frost & DiBartolo, 2002; Gnilka, Ashby, & Noble (2012); Wirtz et al., 2007; for a review see Egan, Wade, & Shaffran, 2011). People with disorders associated with perfectionism are prone to catastrophization (Beck, 1976), and high levels of rumination (Egan, Hattaway, & Kane, 2014).

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Individuals may be more perfectionistic with regard to some aspects of their life than others, and (as noted previously) they may apply different standards to themselves compared to others. In these regards Flett and Hewitt (2002) have suggested that the more domain-general perfectionism becomes, the more likely it is to cause difficulties, and that perfectionism is most likely to become maladaptive when it becomes global and over-generalized. In a review of clinical studies of perfectionism, Shafran, Cooper, and Fairburn (2002, p. 773) proposed "that the defining feature of clinically significant perfectionism is the overdependence of self-evaluation on the determined pursuit (and achievement) of self-imposed personally demanding standards of performance in at least one salient domain, despite the occurrence of adverse consequences". Maladaptive perfectionism is particularly associated with high levels of perfectionistic concerns (negative perfectionism; see section 1.1.1), whereas adaptive perfectionism is associated with high levels of perfectionistic strivings only (positive perfectionism; see section 1.1.1; see also Stoeber & Otto, 2006). With respect to the FMPS, dimensions associated with maladaptive perfectionism are Concerns about Mistakes, Doubts about Actions, and Parental Criticism, whereas dimensions associated with adaptive perfectionism are Personal Standards and Organisation (see Rice & Ashby, 2007).

The clinical consequences of maladaptive perfectionism are widespread, and it has been identified as an important factor behind a number of common pathological conditions including: depression, anxiety disorders, eating disorders, obsessive-compulsive disorders, post-traumatic stress disorder, and suicidal tendencies (Bieling, Summerfeldt, Israeli, & Antony, 2004; Egan, et al., 2014; Shafran & Mansell, 2001).   In this respect it has been suggested that perfectionism is best characterized as "an aspect of cognition or behavior that may contribute to the maintenance of a psychological disorder" (Egan, et al., 2011; Harvey, Watkins, Mansell, & Shafran, 2004, p. 14). Indeed, the presence of perfectionistic cognitions can predispose an individual to a number of psychological disorders, and it is not uncommon to find individuals with such cognitions presenting with a number of co-morbidities (Bieling, et al., 2004). However, as measures of perfectionism have come to reflect its multiple dimensions, it has become apparent that the perfectionism profiles of such psychological

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disorders differ substantially from one another. For example high *Doubts about Actions* and *Concern over Mistakes* FMPS subscale self-ratings have been confirmed to be associated with self-reported depression (Frost & DiBartolo, 2002; Frost et al., 1993), clinically diagnosed eating disorders (Minarik & Ahrens, 1996; Sassaroli et al., 2008), and Beck Depression Inventory (BDI: Beck, Steer, & Garbin, 1988) scores in patients with major depressive disorder (Enns & Cox, 1999), whereas other specific patterns of FMPS subscale scores have been shown to be associated with Social Phobia (Juster, Heimberg, Frost, & Holt, 1996) and Obsessive Compulsive Disorder (Frost & Steketee, 1997; Sassaroli et al., 2008).

1.2. Perfectionism and stuttering

1.2.1. Perfectionism and the onset of stuttering

A key proponent of an association between parental perfectionism and stuttering was Johnson, who, in response to his perception that parents of children who stutter exhibited perfectionistic traits, advocated indirect therapy that involved "encouraging parents to adjust their ideals to the actual level of development and ability of the child" (1946, p449). More recent literature reviews have concluded that there is no firm evidence indicating a role of parental attitudes and interaction styles in the onset of stuttering (Nippold & Rudzinski, 1995; Yairi, 1997). However, it has been suggested that in some individuals perfectionism may contribute to stuttering as an epigenetic phenomenon (Starkweather, 2002, p280).

1.2.2. Perfectionism and stuttering severity and persistence

Despite the lack of evidence that parental perfectionism plays a causal role in the onset of stuttering, it remains possible that parental attitudes and interaction styles may influence the severity of stuttering and the likelihood of persistence in children who already stutter. And, reflecting this possibility, the modification of parental expectations and interaction styles constitutes an important part of some programs of therapy (e.g., Biggart, Cook, & Fry, 2007; Millard, Nicholas, & Cook, 2008, Starkweather & Gottwald, 1990). The existence of a relationship between perfectionism and stuttering severity and persistence is consistent with a "demands and capacities" theoretical perspective (Starkweather, 1987) inasmuch as parents with perfectionistic attitudes and beliefs are likely to place increased demands on their

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children. In children with weak or impaired language or speech production capacity, such increased demands are likely to increase the frequency of instances where speech production breaks down, which may then increase the frequency of moments of stuttering . Increased demands may also contribute to the development of maladaptive secondary symptoms, which may then reduce the chances of recovery. A longitudinal study by Kloth et al. (1999) provides some support for this hypothesis, inasmuch as it found that children who recovered from stuttering tended to have parents whose interaction style remained stable and non-directive irrespective of the presence or absence of stuttering, whereas children whose stuttering persisted tended to have parents whose interaction style became more directive following the initial appearance of stuttering symptoms.

Irrespective of the parents' interaction style, it is also possible that a pre-existing perfectionistic temperament may itself predispose children who stutter to struggle to control their disfluencies, and that such behavior may contribute to the persistence of stuttering into adulthood and also to the tendency to relapse following therapy (Amster, 1995; Starkweather, 2002; see also Egan et al., 2002, for further information on the role of perfectionism in mediating outcomes). As an initial test of this proposal, Amster investigated whether AWS exhibit higher levels of perfectionism than controls. Perfectionism levels of 47 AWS and 22 AWNS controls were assessed via the 10-item uni-dimensional Burns Perfectionism Scale (Burns, 1980). As a group, the participants who stutter scored more highly on the perfectionism scale than did the controls, and also considered themselves to have been more perfectionistic when they were aged four or five.

Preliminary support for the hypothesis of a link between a perfectionistic cognitive style and stuttering *severity* is provided by the findings of a subsequent clinical treatment study (Amster & Klein, 2007, 2008): Eight AWS underwent a short course of Cognitive Behavioral Therapy focusing on issues related to perfectionism and adapted to include Stuttering Modification techniques. Outcome measures taken during the course and at follow-up indicated decreases in both their perfectionism ratings, as measured by the Burns (1980) perfectionism scale, and their stuttering rates, as measured by the Stuttering Severity Instrument (SSI-3: Riley, 1994).

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1.2.3. Hypervigilant error-monitoring and perfectionism in AWS

As noted in Section 1.1.2, Perfectionism is frequently associated with high levels of monitoring for errors and, in particular, elevated neural responses associated with domain-general action monitoring (ERN and Pe) have been found in people who score more highly on measures of perfectionism. It is thus noteworthy that a recent study by Arnstein, Lakey, Compton, and Kleinow (2011) which compared ERN and Pe responses produced by AWS and non-stuttering controls found that these responses were also elevated in AWS compared to the controls. The Arnstein et al. (2011) study involved a rhyme-judgment task and also a (non-verbal) flanker task (which involved identifying the direction an arrow was pointing in a series of conditions of varying difficulty). Interestingly, the AWS responses were greater than those of the non-stuttering controls on both tasks, and these differences were found irrespective of whether or not participants' judgments were actually erroneous. Also of note is that the two groups did not differ with respect to the number of errors they made on the two tasks. Arnstein et al. (2011) interpreted these findings as providing evidence that AWS are hypervigilant in their monitoring of (speech-related and non-speech related) actions. The elevated error related negativity reported in AWS is similar to that observed in people with higher perfectionism ratings on self-report scales (Schrijvers et al., 2010) as discussed in Section 1.1.2.

The findings of Arnstein et al. (2011) are in line with behavioral evidence that AWS engage in hyper-vigilant monitoring of their own speech and the speech of others (Lickley, Hartsuiker, Corley, Russell, & Nelson, 2005), and with theories proposing that hyper-vigilance can be a contributory factor to moments of stuttering (Brocklehurst, et al., 2013; Vasić & Wijnen, 2005)

1.2.4. Anxiety and Perfectionism in AWS

Craig and Tran's (2014) meta-analysis of studies that have investigated the prevalence of both trait and social anxiety in PWS concluded that a significant minority of PWS show symptoms of both these anxiety conditions. Current consensus appears to be that anxiety does not play a causal role in the onset of childhood stuttering, but that stuttering may contribute to raised anxiety levels which may, in turn, be associated with stuttering maintenance (Craig,

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2014). In a review of studies investigating the relationships between stuttering and temperament, anxiety, and personality, Alm (2014, p. 5) concluded that "Studies have not revealed any relation between the severity of the motor symptoms of stuttering and temperamental traits." Alm (2014, p.5) also concluded that "situational variability of stuttering ... is an effect of interference from social cognition and not directly from the emotions of social anxiety." Bearing in mind the well-established link between perfectionistic cognitions and Social Anxiety (See section 1.1.3), this latter conclusion raises the question to what extent perfectionistic social cognitions mediate social anxiety in people who stutter, and whether such cognitions are also implicated in the situational variability of stuttering.

Speech therapy outcomes have been found to be poorer and relapse is more likely in AWS with concomitant symptoms of social anxiety (Iverach, et al., 2009). This finding provides some theoretical motivation for the use of various forms of psychotherapy, such as Cognitive Behavioral Therapy (CBT) for AWS, especially those with concomitant social anxiety, and a number of studies have investigated the usefulness of CBT in treating adults who stutter, either alone or in conjunction with speech therapy (Amster & Klein, 2008; Craig, 2007; Helgadóttir, Menzies, Onslow, Packman, & O'Brian, 2009; Menzies, et al., 2008). A repeated finding of such studies is that CBT does not increase fluency, but does reduce secondary symptoms, including stuttering-related anxiety. It is likely that the CBT administered in many of these studies will have included tasks aimed at reducing perfectionistic cognitions. We are, however, not aware of any published studies that have systematically investigated the nature or prevalence of perfectionistic cognitions in AWS attending therapy or the effectiveness of the perfectionism-reduction components of CBT that is administered (however, see Amster & Klein, 2008). So it remains unclear to what extent AWS attending therapy hold maladaptive perfectionistic cognitions. There is, therefore, a clear need for such research to be conducted.

1.3.   The Current Study

To summarize so far: Potential associations between stuttering and perfectionism, or certain dimensions of perfectionism, are suggested by clinical practice and outcomes, by

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experimental evidence concerning hypervigilant error monitoring, as well as by a number of theoretical accounts of stuttering. The matter is of considerable clinical significance because perfectionism has been shown to mediate treatment outcomes across a wide range of disorders, and is itself responsive to treatment if addressed directly (for a review see; Egan, Wade, & Shafran, 2010).

The current study directly investigates (a) whether AWS as a group exhibit higher levels of perfectionism than an individually-matched control group of AWNS, and (b) whether in AWS higher perfectionism self-ratings are associated with higher self-ratings of difficulty communicating verbally and (more specifically) with higher self-ratings of difficulty speaking fluently.

1.3.1. The measure of perfectionism

The FMPS comprises 35 general statements reflecting perfectionistic attitudes and beliefs which were divided by Frost et al. into six subscales: (1) *Concern over Mistakes, e.g.* "I should be upset if I make a mistake." (2) *Personal Standards*, e.g. "It is important to me that I be thoroughly competent in everything I do." (3) *Parental Expectations*, e.g. "My parents wanted me to be the best at everything." (4) *Parental Criticism*, e.g. "As a child, I was punished for doing things less than perfect." (5) *Doubts about Actions*, "Even when I do something very carefully, I often feel that it is not quite right." and (6) *Organization,* e.g. "Organization is very important to me." The validity of the subscales as reflective of differing dimensions of perfectionism was originally confirmed by Frost et al. (1990) through factor analysis of data from a (non-clinical) sample of psychology students. Subsequently, the FMPS has been found to have similar psychometric properties in clinical samples to those in nonclinical samples, and factors very similar to those observed by Frost et al. (1990) have been extracted in clinical studies (Antony, Purdon, Huta, & Swinson, 1998). The FMPS is well established in both clinical and research settings and there is "compelling evidence of [its] construct, concurrent, and discriminant validity" (Enns & Cox, 2002, p. 42).

For the present study we chose to use the FMPS; firstly, because the FMPS subscales *Concern over Mistakes* and *Personal Standards* have been found by Frost et al. (1990) to be

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correlated to the Burns Perfectionism Scale, so use of the FMPS in the current study allows relatively direct comparisons to be made with the findings of the Amster (1995) study; and secondly, because the FMPS maps well to theories of stuttering, inasmuch as it tests a range of factors that have been suggested to be associated with stuttering, including: parental standards and interaction style (addressed via the Parental Standards and Parental Criticism questions); personal standards (Personal Standards questions); and hypervigilance (Doubts About Actions and Concern About Mistakes questions).

1.3.2. The choice of communication difficulty and fluency difficulty measures

As a measure of general communication difficulty, suitable for both respondents who stutter as well as controls, we chose to use Section 3a of the Overall Assessment of the Speaker's Experience of Stuttering (OASES;Yaruss & Quesal, 2006), which asks participants to rate how difficult they find it to communicate verbally in 10 commonly occurring situations including, for example: talking with another person one to one; initiating conversations; speaking to strangers; and continuing to speak regardless of how your listener responds to you. As a more specific assessment of difficulty speaking *fluently*, we devised an additional set of 10 questions, equivalent to the OASES questions, that asked (stuttering respondents only) how difficult they currently find it to "speak fluently (i.e. without stuttering)" under the same ten conditions. For both sets of questions, respondents were instructed to select the most appropriate response from a 5-point Likert scale ranging from "not at all difficult" to "very difficult".

Due to an oversight, in the version of the questionnaires for people who stutter, only 9 out of the 10 questions were included (the 10th question, relating to difficulty over the telephone, was omitted. Consequently, two analyses that made use of these data (the communication difficulty and fluency difficulty analyses) are each based on responses to the initial 9 questions.

2. Method

2.1. Questionnaires

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Following the granting of ethical approval for the study by the Edinburgh University ethics committee, two versions of the survey were made available online: one for people who stutter and the other for non-stuttering controls (Copies of the two survey versions are included as Supplementary Materials).

Both versions of the survey began with the 35 statements of the FMPS, to which respondents were instructed to select the most appropriate response from the 5-point Likert scale ranging from *"strongly disagree"* to "strongly agree".

All respondents were next instructed to answer the OASES questions about general communication difficulty. In the AWS version of the questionnaire, the general communication difficulty questions were followed by the questions which asked specifically about difficulty speaking fluently in the same situations. Respondents who stutter were then asked to answer a series of (free response) biographical questions relating to age of onset, therapy and changes in severity over time. Respondents who do not stutter were requested to provide *"brief details of whether you have ever suffered from a condition that affects the ease with which you are able to speak, including whether or not you are still affected by it"*. Finally, both versions of the questionnaire asked respondents for demographic details, including age, gender, nationality, bilingual status, and employment.

2.2.   Respondents

A series of requests for respondents (both stuttering and non-stuttering) were posted on the websites and Facebook pages of the British Stammering Association, regional stuttering self-help groups, and on the web group "Stuttering Chat". Requests also asked members to forward invitations to take part in the survey to their non-stuttering friends. The strategy of recruiting the control group via the same channels as the stuttering group was intended to maximize group comparability. Most responses from people who stutter were from males, whereas, initially, most responses from non-stutterers were from females. We therefore continued to send out further requests asking specifically for people who do not stutter, this time offering entry into a prize draw for two £30 Amazon vouchers, until we had a similar

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number of responses from stuttering and non-stuttering males. (This policy resulted in a large number of responses from females who do not stutter, most of which were not utilized)

The requests for participants described the survey as an "Online survey, comparing attitudes and beliefs of people who do and do not stammer." In all cases, specific mention of perfectionism was avoided.

In total, 137 responses were received from AWS. Of these, 45 were excluded for the following reasons: 21 had a first language other than English; 3 were duplicates (the respondent had pressed the Enter button twice); and 21 had accidentally filled in questionnaires intended for controls (which, among other things, lacked the "Fluency Difficulty" self-ratings). This left 92 properly completed questionnaires, received from AWS, 64 of whom were males.

165 from normally-fluent speakers also completed questionnaires, 74 of whom were males.

We succeeded in matching 81 of the eligible respondents who stutter with 81 normally fluent native English speaking respondents of the same age and gender (ages matched to within 1 year). The remaining respondents, for whom age and gender matched controls could not be found, were excluded from the analyses. Mean age of both groups was therefore identical at 34.67 (range 18-66), and in both groups there were 52 males and 29 females.

Participants reported a range of ages of onset of stuttering, many of the earliest onsets (below 6 years) were approximate. responses . Participants could, however, be successfully divided into two groups: 47 reported early onset (≤5) and 21 reported late onset (≥7).

The questionnaire for people who stutter did not ask respondents directly whether their stuttering had been formally diagnosed by a speech therapist or other professional. It did, however, ask if they had received therapy that had made a lasting difference. Two participants, reported that they had never received any therapy. Fifty five reported that they had received therapy (Of these, 32 stated that it had brought them some lasting benefit abd 23 stated that it had not). 18 respondents failed to answer this question and 6 simply answered

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"no" or "none". In these latter 24 cases it is unclear whether the individuals had never received therapy or whether they had received therapy but had not derived any lasting benefit from it.

The free-response question asking respondents about their employment revealed a wide range of occupations. For clarity, we categorized their responses into 14 overarching categories (See Figure 1). As far as possible respondents who stutter and controls were matched for employment category.

insert Figure 1 here

Figure 1. Respondents' employment categories

2.3.   Procedure for data analysis.

We conducted an initial analysis to determine the factor-loading validity of the six FMPS subscales with respect to our particular sample. This analysis revealed that only four factors in the current data matched well to individual FMPS subscales (Concern over Mistakes; Personal Standards; Parental Expectations; and Organization). We therefore adopted a solution proposed by Stöber (1998), and subsequent analyses were performed using the four factors extracted from the current data set.

We then performed three regression analyses. The first analysis investigated whether AWS exhibit higher perfectionism levels than AWNS. The second and third analyses concerned only data from AWS, and investigated whether perfectionism levels were associated with reported Communication-Difficulty(analysis 2) and/ or Fluency-Difficulty (analysis 3). All three regression analyses investigated the roles of specific dimensions of perfectionism (as indicated by the four factor solution). Specific details of each analysis are provided in Section 3.

3. Findings

3.1.   Factor Analysis and FMPS subscale reformulation

Prior to addressing the key research questions, we performed analyses to assess the validity of the six FMPS subscales with respect to our particular sample of respondents. This

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was necessary because the factor loading of the original six FMPS subscales has been found to be somewhat unstable across populations (e.g., Parker & Adkins, 1995; Rhéaume, Freeston, Dugas, Letarte, & Ladouceur, 1995; Stöber & Otto, 2006).

To check the validity of the six FMPS subscales, we performed a series of Principal Components Analyses (PCA) with Oblique (Promax) rotation (as is appropriate for factors that are expected to be moderately correlated with each other). Missing FMPS responses were replaced by the participant's median response for other items in the same subscale (there was never more than one response missing from a subscale). A preliminary screeplot revealed Eigenvalues (4.06; 2.30; 2.00; 1.72; 1.46; and 1.24) indicating that 6 factors could be extracted from the data. However, when we conducted a 6 Factor PCA analysis on our data, only four of the factors closely matched Frost et al.'s (1990) factors: Concern over Mistakes (CM); Personal Standards (PS); Parental Expectations (PE); and Organization (O). The remaining two factors did not.

Similar findings in previous studies employing the FMPS led Stöber (1998) to recommend adopting a 4 factor solution whereby the Concern about Mistakes (CM) and Doubts about Actions (DA) subscales are merged to form a new subscale, CMD (Concern over Mistakes and Doubts about Actions), and the Parental Expectations (PE) and Parental Criticism (PC) subscales are merged to form PEC (Parental Expectations and Criticism). Following Stöber's recommendation, we reanalysed the FMPS data using a 4 factor solution. This resulted in item loadings that unambiguously reflected Stöber's four factors (See Appendix A). Cronbach's Alphas for the final 4 factor, solution were as follows: Concern about Mistakes-Doubt about Actions (12 items) $\alpha = 0.90$; Parental Expectations and Criticism (8 items) $\alpha = 0.90$; Organization (6 items) $\alpha = 0.89$; Personal Standards (9 items) $\alpha = 0.89$. After oblique rotation, the 4 factors were moderately correlated, as would be expected for dimensions of a single construct. (See Appendix B).

3.2.   Regression Analyses

We used the four factors extracted from this PCA analysis as four predictors in the regression analyses described below. Items were only allowed to contribute to a predictor if

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their loading on the corresponding factor was equal to or above 0.4. All self-ratings provided by participants were multiplied by their corresponding factor loading. Where an item loaded on two factors, it was allowed to contribute to both of the corresponding predictors, with the contribution to each predictor being weighted according to the corresponding factor loading (only one item - Item 13 - loaded onto two factors). Variance Inflation Factors (VIF) for the four predictors were as follows: CMD = 2.09, PS = 2.13, O = 1.14, PEC = 1.28, indicating no multicollinearity.

The first analysis investigated whether AWS exhibit higher perfectionism levels than AWNS (i.e., Is belonging to the AWS group associated with higher self-ratings on the FMPS subscales?). The second analysis investigated whether, in AWS, higher Communication-Difficulty and/ or Fluency-Difficulty scores are associated with higher perfectionism levels (i.e. Are communication- and/ or fluency-difficulty levels associated with higher self-ratings on the FMPS subscales?)

We chose to use regression analyses because they give a clear indication of the independent contributions of each of the predictor (input) variables to the response (outcome) variable once shared variance has been partialled out. We use these terms (predictor variable and outcome variable) in keeping with the mathematical terminology employed in regression analysis reporting: In the context of the current (cross-sectional) study it is important to remember that these terms only reflect roles within a statistical model and do not imply details of a causal relationship between variables.

Logistic regression was used to address the first question with the FMPS subscale scores as predictors and with group membership (AWS/AWNS) as the dichotomous outcome variable. The second question was addressed using two multiple linear regressions. In each case a forward stepwise approach was used; this allowed us to determine which, if any, FMPS dimensions were significantly associated with stuttering status (analysis one) and severity (analyses two and three).

3.2.1. Analysis 1: Group differences in perfectionism

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T-tests revealed that the stuttering group's mean Concern about Mistakes-Doubts about Actions (CMD) score (adjusted to take factor loadings into account) was significantly higher than that of the control group (t = 3.14, *p* = 0.002). The groups did not differ significantly on the other three subscale scores (PS, PEC, O; all *p > 0.3*; see Figure 2).

Insert figure 2 here

Figure 2. Comparing mean self-ratings for AWS and Control groups on the four FMPS subscales (adjusted to take factor-loadings into account). Error bars show standard error.

Analysis using stepwise logistic regression revealed that the likelihood of belonging to the stuttering group was best described by a model that retained CMD and Personal Standards as predictors (the improvement to the model due to retention of Personal Standards was marginal; see Table 1).

Insert Table 1 here

Table 1. Results of logistic regression analysis of factors that associated with being a member of the stuttering group of respondents. Table includes the Analysis of Deviance, and β coefficients of predictors retained in the best-fitting model.

The model revealed that higher CMD self-ratings are associated with AWS group membership: When the Personal Standards score was held constant, a one point increase in mean CMD score was associated with a 2.5 ($e^{0.91}$) greater likelihood of AWS group membership. In contrast, when CMD score was held constant, higher Personal Standards scores were associated with a lower likelihood of AWS group membership (at a marginal significance level; p = 0.07): If stuttering were associated with abnormally high personal standards, we would expect higher Personal Standards scores to be associated with a greater rather than lower likelihood of AWS group membership.

3.2.2. Analysis 2: Communication Difficulty in AWS Group

To study the relationship in the AWS group between OASES Communication-Difficulty scores and the four FMPS subscale scores we performed a multiple (linear) regression analysis in which age, gender and the four FMPS subscales were entered as

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predictor variables and OASES Communication-Difficulty score as the response variable. Data included in this analysis comprised that acquired from the 81 AWS included in the above analysis.

A Shapiro-Wilk test confirmed that participants' Communication-Difficulty scores were normally distributed W = 0.9727, p = 0.08. Diagnostic tests, using the "CAR" package in R (Fox & Weisberg, 2010) confirmed that participants' data were within acceptable limits for collinearity, normality of error-distribution, and homoscedasticity. *Age* and *Gender* were entered first. Then participants' four FMPS subscale self-ratings were entered with a forward stepwise procedure. This procedure revealed that the severity of (self-rated) difficulty communicating was best described by a model that included Concern about Mistakes-Doubts about Actions (CMD), Personal Standards and Organization as explanatory variables (See Table 2). Parental Expectations and Criticisms scores did not contribute to model fit.

Insert Table 2 here

Table 2.Results of multiple regression analysis of factors that predict stuttering respondents' Communication Difficulty scores. Table includes the Analysis of Variance, and β coefficients of predictors retained in the best-fitting model.

The model shows that higher CMD scores were associated with higher Communication-Difficulty scores. In contrast, and mirroring the previous analysis, the part-correlation between participants' Personal Standards self-ratings and Communication-Difficulty scores was negative, indicating that, when CMD and Organization were held constant, higher Personal Standards self-ratings were associated with lower Fluency-Difficulty scores. Specifically, when all other explanatory variables were held constant, an increase of one point in mean Personal Standard score was associated with a decrease of 4.34 points on the Communication-Difficulty score: As in the comparison of AWS and AWNS groups, it is noteworthy that the Personal Standards *beta* value is negative ($p < 0.001$). Organization scores were positively part-correlated to stuttering participants' Communication-Difficulty scores. Specifically, when Personal Standards and CMD were

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held constant, a one point increase in Organization score was associated with an increase of 1.85 points on the Communication-Difficulty score.

3.2.3. Analysis 3: Fluency Difficulty in AWS Group

To study the relationship between Fluency-Difficulty scores and the 4 FMPS subscale scores we performed a further multiple linear regression analysis in which age, gender and the 4 FMPS subscales were entered as predictor variables. Once again, data from the same 81 AWS were used for this analysis. A Shapiro-Wilk test confirmed that participants' Fluency-Difficulty scores were normally distributed W = 0.978, $p = 0.191$. *Age* and *Gender* were entered first. Then participants' four FMPS subscale scores were entered via a forward stepwise procedure. This procedure revealed that the severity of (self-rated) difficulty speaking fluently was best described by a model that included Concerns about Mistakes-Doubts about Actions (CMD), Personal Standards, and Parental Expectations and Criticism (PEC) as explanatory variables (See Table 3). Organization did not contribute to model fit.

Insert Table 3 here

Table 3. Results of multiple regression analysis of factors that predict stuttering respondents' Fluency-Difficulty scores. Table includes the Analysis of Variance, and β coefficients of predictors retained in the best-fitting model.

The model shows that higher CMD scores were associated with higher Fluency-Difficulty scores. In contrast, but mirroring the previous findings of the above analyses, the part-correlation between participants' Personal Standards self-ratings and Fluency-Difficulty scores was negative: When PEC and CMD scores were held constant, higher Personal Standards self-ratings were associated with lower Fluency-Difficulty scores. Specifically, when all other input variables remained constant, a one point increase in mean Personal Standards score was associated with a 3.56 point decrease in Fluency-Difficulty score: Once again, the Personal Standards *beta* value is negative ($p < 0.01$).

In this analysis of associations between self-rated Fluency-Difficulty and dimensions of perfectionism, participants' Parental Expectations and Criticism scores were negatively part-correlated to their Fluency-Difficulty scores. Specifically, when CMD and Personal

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Standards scores were held constant, a one point increase in mean Parental Expectations and Criticism (PEC) score was associated with a 1.85 point decrease in Fluency-Difficulty score: Across the AWS group lower scores on the PEC subscale were associated with greater Fluency-Difficulty.

3.2.4. Differences in Communication and Fluency difficulty by age of onset

Following a reviewer's suggestion we performed a series of (post-hoc) analyses to investigate whether the FMPS profiles, Communication difficulty, and Fluency difficulty self-ratings of respondents whose stuttering began before 6 years of age differed from the profiles of respondents whose stuttering began at or after 7 years of age. No significant differences were found (all p values > .05). Descriptive statistics are provided in Table 4

Insert Table 4 here

Table 4.Descriptive statistics comparing mean scores for members of the AWS group below 6 years and above 7 years of age on the 4 FMPS dimension and on mean Communication Difficulty and Fluency Difficulty self-ratings.

3.3. Summary

To summarize: Stuttering group membership is associated with higher Concerns about Mistakes-Doubt about Actions (CMD) scores and marginally lower Personal Standards scores. Within the AWS group, higher Communication-Difficulty and higher Fluency-Difficulty scores are likewise associated with higher CMD scores and lower Personal Standards scores. We did not find evidence of any associations between Parental Expectations and Criticism scores and either stuttering group membership or Communication-Difficulty scores. However, amongst AWS, Parental Expectations and Criticism scores tended to be higher in those who reported less Fluency-Difficulty (i.e., who were more fluent).

4. Discussion

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Across three regression analyses, both the likelihood of being a person who stutters, and stuttering respondents' Communication Difficulty and Fluency Difficulty scores were found to be positively part-correlated to self-ratings on the revised FMPS CMD subscale, and negatively part-correlated self-ratings on the Personal Standards subscale.

Concern over Mistakes and Doubts about Actions have previously been found to be positively correlated with the Burns Perfectionism Scale (Frost et al., 1990). Thus, the finding in the present study of positive part-correlations of CMD with the three outcome variables is fully in line with the findings reported by Amster (1995) and Amster and Klein (2007, 2008) – that stuttering and stuttering severity were positively correlated to respondents' Burns Perfectionism Scores. However, our finding of *negative* part-correlations between respondents' Personal Standards subscale self-ratings and the three outcome variables (likelihood of being a respondent who stutters and Communication-Difficulty and Fluency-Difficulty scores) does not support earlier conclusions that AWS are perfectionistic (Amster, 1995; Amster & Klein, 2007, 2008) at least not insofar as perfectionism is defined as "striving for flawlessness" or a "desire to be perfect". Indeed, Frost et al. (1990, p.450) note that "Virtually all writing on this topic emphasizes the setting of excessively high standards as central to the concept".

4.1. Theoretical Implications

Considering that the Personal Standards self-ratings of the respondents who stutter were no higher than those of the controls, it appears to us likely that their higher Concern about Mistakes-Doubt about Actions (CMD) self-ratings reflect an increased tendency of those individuals to perceive that they frequently make mistakes and/or frequently perform actions do not result in the desired outcomes. Insofar as this tendency relates to speech errors, this would be consistent with empirical research that has found that adults who stutter make significantly more speech errors than matched controls (Brocklehurst & Corley, 2011). It is also consistent with theories of stuttering that equate the production of stuttered disfluencies with covert speech-error repair (Vasić & Wijnen, 2005) and also with speech-error avoidance (Brocklehurst, et al., 2013). Both these theories conceptualize stuttered disfluencies as a by-

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product of speakers' maladaptive attempts to minimize the number of overt speech errors they make.

It is also possible that the higher CMD self-ratings of the respondents who stutter were reflective of their high levels of concern about *stuttering*. This is especially likely in AWS who consider their stuttered disfluencies to constitute a form of speech error. With regard to this possibility, central to both the above psycholinguistic theories is the notion that the categorization of stuttered disfluencies as "errors" may itself be an important contributory factor in the persistence of stuttering, in that such a categorization may potentially lead to a vicious circle. Specifically, if a speaker categorizes stuttered disfluencies as "errors", this categorization is likely to result in the initiation (consciously or unconsciously) of error-repair or error-avoidance behavior. Consequently, stuttered disfluencies may then result from the speaker's attempts to repair (or avoid) stuttered disfluencies. Such disfluencies would occur in addition to those disfluencies that result from the speaker's attempts to repair or avoid (more conventional) speech errors.

This interpretation of the findings of the current study necessarily raises a question about the extent to which the FMPS self-ratings provided by the stuttering respondents really were domain-general Thus perhaps, despite the domain-general nature of the FMPS questions, respondents who stutter may have responded to them as though they referred specifically to stuttering and speech quality, rather than to performing actions generally. This would be inline with DiLollo, Neimeyer, & Manning's (2002) Personal Construct based hypothesis that people who stutter tend, automatically, to relate events in their lives to stuttering in order to make them more meaningful.

If stuttering respondents' FMPS self-ratings reflected primarily their experiences of stuttering, it would raise the possibility that the negative part-correlations between Personal Standards self-ratings and the three output variables could plausibly be interpreted as reflecting stuttering respondents' adaptation to the disorder, insofar as lower personal (speaking) standards may enable them to coexist more comfortably with their stuttering.

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Similarly, it may reflect strategies learned during speech-therapy, psychotherapy or as a result of attending self-help groups.

Conversely, if the AWS group really did interpret the FMPS questions in a domain general way, their responses suggest that, as a group, they may be abnormally error-prone across more domains than just speech.

A yet further possibility is that the AWS group's lower Personal Standards scores may reflect their distorted awareness, especially those who have most communication and fluency difficulty, of how high their standards really are.

The finding that a liking for Organization was a positive predictor of Fluency-Difficulty could have a number of explanations. It too could potentially be a contributory factor to stuttering or an example of adaptation to stuttering. However, as this finding was not reflected in the other two analyses, we are less confident of its reliability.

Somewhat surprisingly, Parental Expectations and Criticism (PEC) was a *negative* predictor of Communication-Difficulty scores. However, as this PEC finding was not reflected in the other two analyses, we are not confident of its reliability. Whatever the case, the findings indicate that the AWS participants did not consider that their parents were overly demanding of them as children. As such they do not support Johnson's (1942) theory.

4.2.   Clinical implications

Although the AWS and control groups' CMD and Personal Sandards scores differed significantly, there was nevertheless considerable overlap between individuals in the two groups. This overlap suggests that the balance and significance of these factors differs substantially from individual to individual. Thus a key clinical implication of the current study is the need to determine the unique perfectionism profiles of individual AWS presenting for therapy. Having determined the specifics of a client's profile, together, the clinician and client may then explore the extent to which the beliefs and perceptions revealed in the profile are realistic. Ideally, this could be done both on a domain-general level as well as specifically with regard to speech. Clients' individual profiles may also alert the clinician

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to the likelihood of other psychopathologies that may be interacting with stuttering, such as social anxiety, depression and obsessive compulsive disorder, thus enabling these disorders to be taken into account in therapy.

In clients with high self-ratings of concern over mistakes and doubts about actions, therapy may explore what exactly they interpret as a mistake or error. The findings of the current study highlight the need for clinicians to be careful to distinguish between clients' high levels of concern stemming from their attempts to maintain excessively high standards, and high levels of concern stemming from their accurate awareness that their performance frequently falls short of what is required by the situations they find themselves in. For clients whose profiles suggest the latter, to conceptualize their condition as perfectionistic may be unhelpful. However, even if the speaking standards that a PWS aspires to are not perfectionistic, this does not automatically imply that they are optimally adaptive. Thus is possible that, in some clients, a understandable desire simply to achieve speaking standards comparable to other speakers may result in cognitive demands that exceed the clients' capacities, and lead to a breakdown of fluency. Whatever the case, therapies such as CBT may play an important role in helping PWS re-evaluate the adaptiveness of their personal standards – both with regard to speech as well as other life domains – and make appropriate adjustments.

4.3.   Caveats and Future directions

Although the AWS and control groups in this study were well matched, the use of social media and reliance on self-selected samples leaves open the possibility that the two groups were not representative of the wider population of AWS and AWNS. The same criticism can be made of Amster's (1995) use of a clinical sample, inasmuch as AWS who score more highly in some dimensions of perfectionism may be more likely to attend therapy. The way to avoid these confounds would be for researchers to randomly select PWS from within a cohort where the PWS have already been identified. Now that a number of cohort studies are being carried out, this may become a future possibility.

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Another recognized weakness of surveys of the type conducted in the current study is that respondents' self-ratings may be subject to demand characteristics (Nichols & Maner, 2008). Thus, for example, if the respondents who stutter were open to the suggestion that stuttering and perfectionism might be linked, and also aware that the FMPS statements measured dimensions of perfectionism, they might have tended to bias their responses in directions that support such a link. However, if such demand characteristics were responsible for the group differences in CMD scores in the current study, we would expect Personal Standards self-ratings to be similarly distorted, with AWS scoring higher AWNS on that dimension too. The actual finding that lower (rather than higher) Personal Standards were associated with stuttering group membership, difficulty communicating and difficulty speaking fluently, suggests that such demand characteristics did not play a significant role in participant responses.

In future studies of perfectionism and stuttering, it would be useful to additionally compare AWS and control groups' self-ratings on the MPS-HF scale (Hewitt & Flett, 1991) which investigates *self orientated, other orientated,* and *socially prescribed* perfectionism, as all of these factors are relevant to therapy. Furthermore, to minimize the confound arising from stuttering respondents possibly interpreting domain-general questions in a domain specific way, it would be useful if questions explicitly emphasized the domain-general nature of the questions, or alternatively requested both domain general as well as domain specific responses.

Where practical considerations allow, future studies would also profit from the use of objective measures of stuttering severity and of speech errors in addition to the (subjective) ratings of difficulty provided by the respondents themselves. These would enable researchers to clarify how closely participants' (self-reported) perceptions of difficulty communicating and speaking fluently correlate with such objective measures. A longitudinal study design might contribute valuable information concerning whether and how stuttering maintenance

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and remission are related to the various dimensions of perfectionism (we thank an anonymous reviewer for this suggestion).

5. Conclusions

This study investigated whether adults with persistent stuttering have more perfectionistic attitudes and beliefs than matched controls, and whether associations exist, in such adults, between the extent of their perfectionistic attitudes and beliefs and the extent of difficulty they experience communicating verbally and speaking fluently. Its findings suggest that stuttering and stuttering severity in adults tends to be associated with higher self-ratings of concern over mistakes and doubts about actions. However, it is *not* associated with higher personal standards. Importantly, by abandoning a uni-dimensional construct of perfectionism and using regression modeling to evaluate these findings, it was possible to reveal a profile of attitudes and beliefs, in adults who stutter, that could in part reflect an adaptive response to underlying speech and/or language production impairments that cause their speech to be error-prone and unreliable.

The findings of the current study are of interest clinically. In particular, they highlight the potential usefulness of multidimensional measures of perfectionism in the planning and implementation of therapies, such as CBT, that aim to help people who stutter re-evaluate their personal standards – both with regard to speech as well as other life domains – and make appropriate adjustments.

The findings of this current study point to the need for researchers to make use of perfectionism measures that allow a distinction to be made between the levels of respondents' personal standards and their level of their concern over mistakes and doubts about actions.

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Respondents' Employment
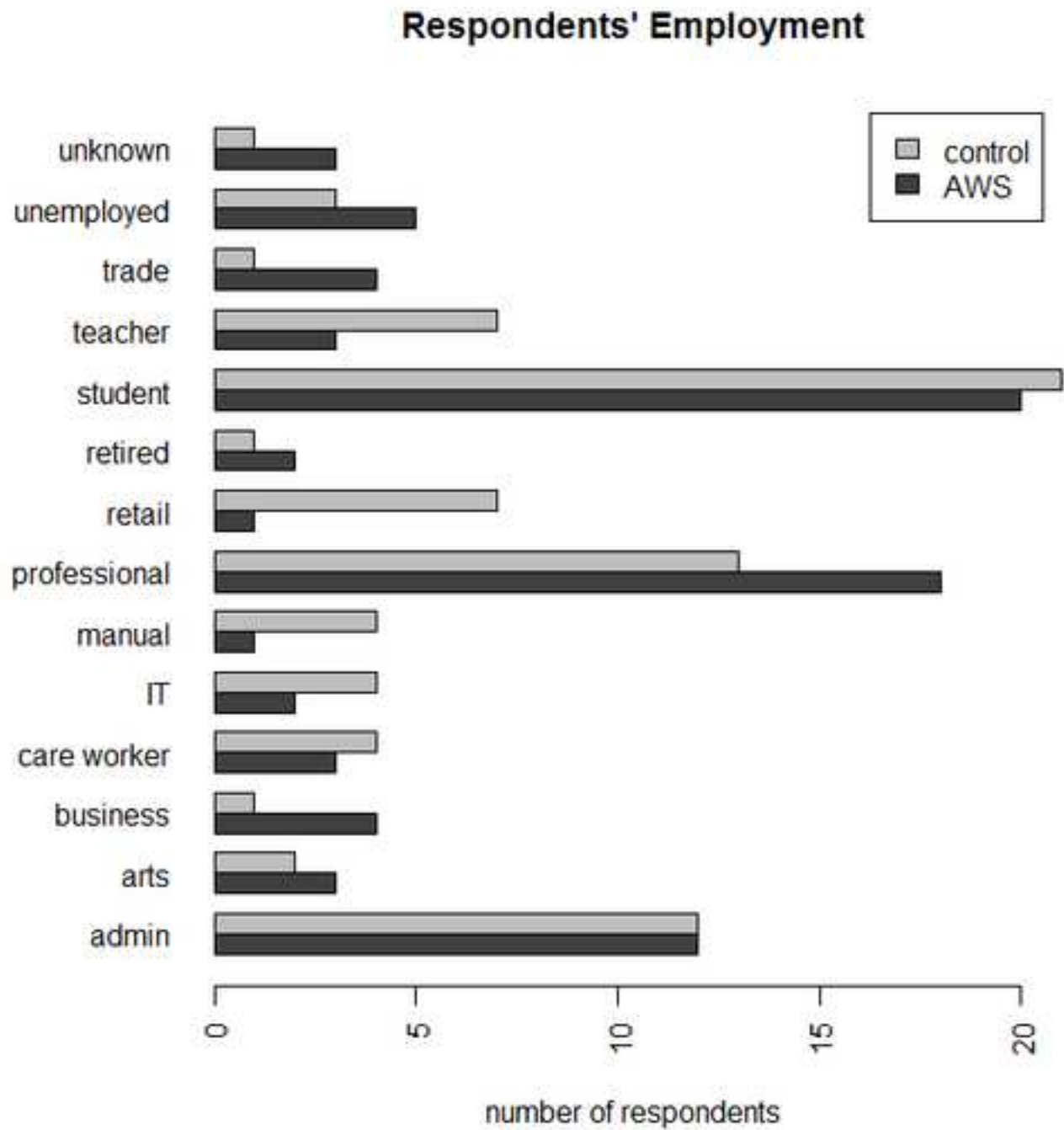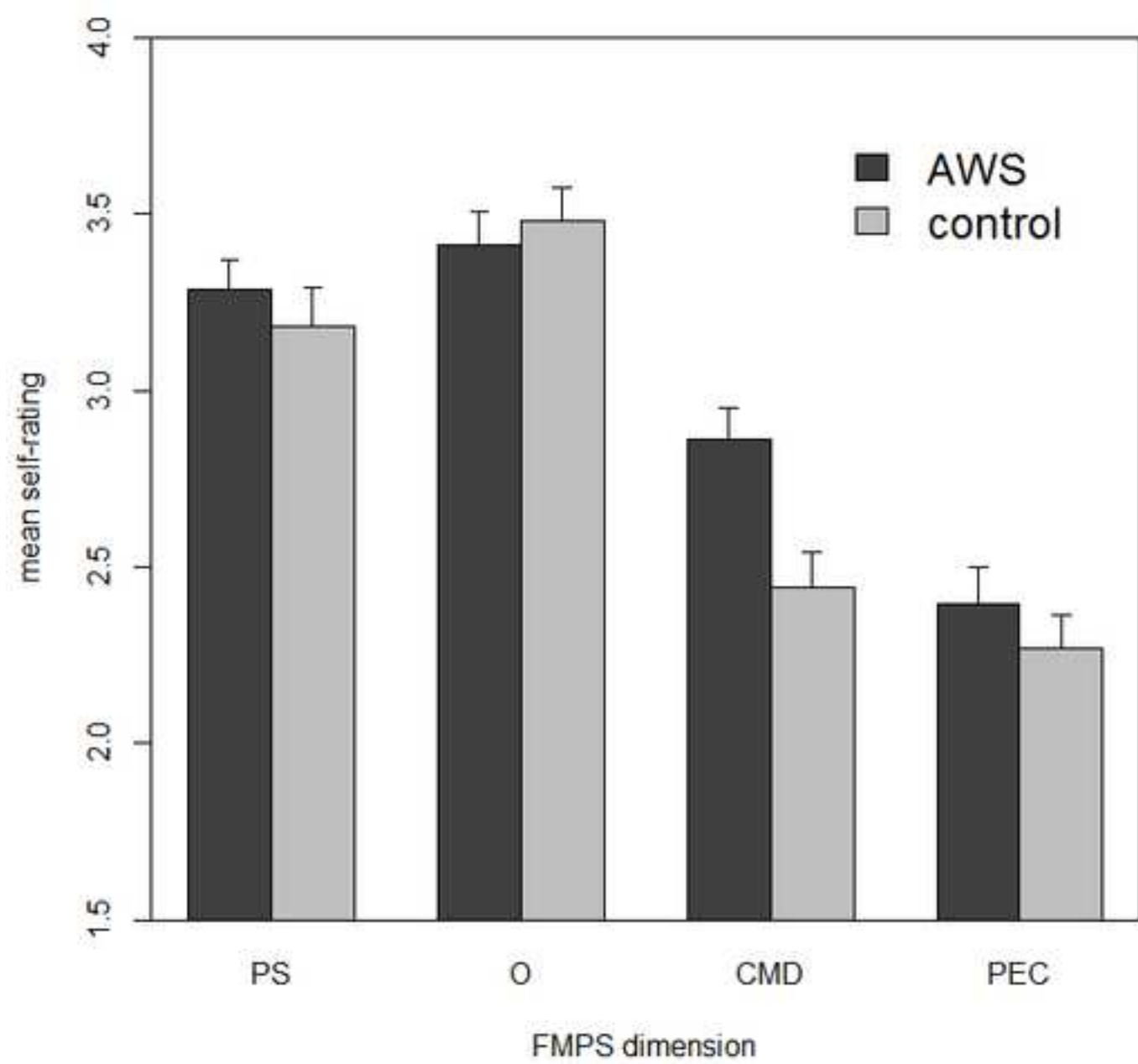
Table 1

Analysis of deviance	Df Residual	Deviance	p	
NULL	161	226		
CMD	160	215	0.002	**
PS	159	212	0.066	.
O	158	211	0.478	
PEC	157	211	0.703	

Predictors retained in the best-fitting model

	β	Std. Error	z value	p	
(Intercept)	-0.88	0.64	-1.37	0.170	
CMD	0.91	0.27	3.35	<0.001	***
PS	-0.47	0.26	-1.81	0.070	.

Significance: *p<0.001* '***' *p<0.01* '**' *p<0.05* '*' *p<0.10* '.'

Table 1.Results of logistic regression analysis of factors that predict the likelihood of being a member of the stuttering group of respondents. Table includes the Analysis of Deviance, and β coefficients of predictors retained in the best-fitting model.

Table 2

Analysis of Variance Table

	Df	Mean Sq	F value	p	
age	1	.05	0.00	0.968	
gender	1	.39	0.01	0.913	
CMD	1	1081	32.87	<0.001	***
PS	1	415	12.63	<0.001	***
O	1	175	5.33	0.0238	*
PEC	1	40	1.23	0.271	
Residuals	74	32			

Predictors retained in the best-fitting model

	β	S.E.	t value	p	
(Intercept)	17.76	3.30	5.39	<0.001	***
CMD	6.22	0.98	6.35	<0.001	***
PS	-4.34	1.06	-4.11	<0.001	***
O	1.85	0.77	2.40	0.019	*

Probabilities: *p<0.001 '***' p<0.01 '**' p<0.05 '*' p<0.10 '.'*
Residual standard error: 5.7 on 77 degrees of freedom
Multiple R-squared: 0.3967, Adjusted R-squared: 0.3732
F-statistic: 16.88 on 3 and 77 DF, p-value: 1.613e-08

Table 2.Results of multiple regression analysis of factors that predict stuttering respondents' Communication Difficulty scores. Table includes the Analysis of Variance, and β coefficients of predictors retained in the best-fitting model.

Table 3

Analysis of Variance Table

	Df	Mean Sq	F value	p	
age	1	36	0.91	0.345	
gender	1	87	2.23	0.140	
CMD	1	752	19.18	<0.001	***
PS	1	514	13.11	<0.001	***
O	1	54	1.39	0.243	
PEC	1	143	3.65	0.06	.
Residuals	74	2903	34.22		

Predictors retained in the best-fitting model

	β	S.E.	t value	p	
(Intercept)	26.48	3.21	8.25	<0.001	***
CMD	6.89	1.10	6.24	<0.001	***
PS	-3.56	1.14	-3.11	0.003	**
PEC	-1.63	0.81	-2.03	0.046	*

Probabilities: *p<0.001* '***' *p<0.01* '**' *p<0.05* '*' *p<0.10* '.'
R Residual standard error: 6.22 on 77 degrees of freedom
Multiple R-squared: 0.3364, Adjusted R-squared: 0.3106
F-statistic: 13.01 on 3 and 77 DF, p-value: 5.837e-07

Table 3. Results of multiple regression analysis of factors that predict stuttering respondents' Fluency-Difficulty scores. Table includes the Analysis of Variance, and β coefficients of predictors retained in the best-fitting model.

Table 4

Age of Stuttering Onset	n	CMD	PEC	PS	O	COMDIF	FLUDIF
0 to 5	47	2.89	2.33	3.27	3.39	28.55	32.23
7 to adult	21	3.06	2.46	3.46	3.47	28.00	29.90

Table 4.Descriptive statistics comparing mean scores for members of the AWS group below 6 years and above 7 years of age on the 4 FMPS dimension and on mean Communication Difficulty and Fluency Difficulty self-ratings.

Table(s)

Appendix A.

Factor loadings of participants' self-ratings from the 35 FMPS items (four factor solution).

Bold font *indicates items that contributed to predictors (i.e. those with loadings ≥0.4).*

Item	Factors (used as predictors in regression analyses)				Frost et al. 1990 Subscale	
	CMD	PEC	PS	O		
X1	-0.4	**0.76**	0.28	-0.04	PE	My parents set very high standards for me.
X2	-0.13	0.1	0.07	**0.71**	O	Organisation is very important to me.
X3	0.06	**0.76**	-0.13	0.03	PC	As a child I was punished for doing things less than perfectly.
X4	0.37	0.11	**0.46**	-0.02	PS	If I do not set the highest standards for myself, I am likely to end up a second-rate person.
X5	**0.49**	0.3	-0.3	0.05	PC	My parents never tried to understand my mistakes.
X6	0.23	-0.1	**0.5**	0.2	PS	It is important to me that I be thoroughly competent in everything I do.
X7	-0.01	-0.07	0	**0.79**	O	I am a neat person.
X8	-0.08	0.01	0.06	**0.79**	O	I try to be an organised person.
X9	**0.53**	0.01	0.27	0.04	CM	If I fail at work/school, I am a failure as a person.
X10	0.36	0.2	0.22	0.01	CM	I should be upset if I make a mistake.
X11	-0.11	**0.79**	0.14	-0.05	PE	My parents wanted me to be the best at everything.
X12	0.12	-0.06	**0.8**	-0.09	PS	I set higher goals than most people.
X13	**0.45**	0.1	**0.4**	-0.08	CM	If someone does a task at work/school better than I, then I feel like I failed the whole task.
X14	**0.57**	0.13	0.28	-0.12	CM	If I fail partly, it is as bad as being a complete failure.
X15	0.07	**0.67**	0.3	-0.07	PE	Only outstanding performance is good enough in my family.
X16	-0.29	-0.1	**0.63**	0.18	PS	I am very good at focussing my efforts on attaining a goal.
X17	**0.61**	-0.09	0.2	0.05	DA	Even when I do something very carefully, I often feel that it is not quite right.
X18	0.23	0.15	**0.58**	-0.05	CM	I hate being less than the best at things.
X19	0.16	-0.11	**0.83**	-0.06	PS	I have extremely high goals.
X20	-0.25	**0.77**	0.38	-0.04	PE	My parents have always expected excellence from me.
X21	**0.63**	0.08	0.17	0.03	CM	People will probably think less of me if I make a mistake.
X22	0.21	**0.78**	-0.24	0.1	PC	I never felt like I could meet my parents' expectations.
X23	**0.7**	-0.01	0.19	-0.06	CM	If I do not do as well as other people, it means I am an inferior human being.
X24	0.25	-0.03	**0.62**	0.01	PS	Other people seem to accept lower standards from themselves than I do.
X25	**0.6**	0.09	0.28	-0.06	CM	If I do not do well all the time people will not respect me.
X26	0.15	**0.73**	-0.28	0.04	PE	My parents have always had higher expectations for my future than I have.
X27	0.12	0.02	-0.11	**0.86**	O	I try to be a neat person.
X28	**0.83**	-0.02	-0.12	-0.01	DA	I usually have doubts about the simple everyday things I do.
X29	0.18	0.02	-0.08	**0.84**	O	Neatness is very important to me.
X30	0.23	-0.03	**0.62**	0.2	PS	I expect higher performance in my daily tasks than most people.
X31	-0.17	0.02	0.08	**0.81**	O	I am an organised person.
X32	**0.69**	-0.18	-0.02	0	DA	I tend to get behind in my work because I repeat things over and over.
X33	**0.77**	-0.21	0	0.01	DA	It takes me a long time to do something 'right'
X34	**0.68**	0.13	0.02	0.09	CM	The fewer mistakes I make, the more people will like me.
X35	0.22	**0.84**	-0.27	0.06	PC	I never felt like I could meet my parents' standards.

Appendix B.

Correlation matrix of our PCA analysis of respondents' FMPS self-ratings, based on a 4 factor solution with Promax rotation.

	CMD	PEC	PS	O
CMD				
PEC	0.43			
PS	0.41	0.34		
O	0.17	0.06	0.33	

note: the highest correlation is .43