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CICLO XXXI

ANXIETY AND STUTTERING:
FILLING THE RESEARCH GAPS IN EARLY ADOLESCENCE

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Summary

Stuttering is a neurodevelopmental disorder with early childhood onset, characterized by involuntary disruptions in the forward flow of speech as syllable repetitions, prolongations and blocking of sounds (Bloodstein & Ratner, 2008) and maladaptive emotional and behavioral reactions (Iverach, 2014). Stuttering during adulthood is associated with increased risk of anxiety disorders, especially social anxiety disorder (Craig & Tran (2014). The main purpose of this current study was to investigate if the presence of a chronic disorder such as stuttering is associated with an increased risk for development of psychopathological symptoms during the early adolescence. The study examines the relationship between anxiety and stuttering within the framework of the multidimensional interaction model of anxiety and stuttering, in which the behavioral, emotional, cognitive factors, although in a variable way, are all involved in the genesis and maintenance of these two phenomena, therefore, they deserve to be studied in order to design more effective integrated and multidisciplinary treatments. Specifically, we examined whether there is a differential effect of stuttering on anxiety levels and psychopathological symptoms. Furthermore, we examined which potential risk and protective factors may be able to moderate the link between stuttering and anxiety on youths' socio-emotional functioning. Participants were pre-adolescents who stutter (11–14 years), and matched non-stuttering control pre-adolescents for gender, age and socioeconomic status. Linear regression models and correlation analysis were used to investigate the relationship between stuttering and anxiety, and to evaluate the overall impact of protective and risk psychological factors on this relationship. This study includes a multidimensional approach to the relationship between stuttering and anxiety also through a comprehensive assessment from multiple

informants. In this regard, correlation analysis were computed between preadolescents and parents report to investigate possible differences across stuttering e control group.

Riassunto

La balbuzie è un disturbo del neurosviluppo con esordio nella prima infanzia, caratterizzato da involontarie alterazioni della normale fluenza dell'eloquio come ripetizoni di sillabe, prolungamenti e blocchi (Bloodstein & Ratner, 2008), e da reazioni emotive e comportamentali disadattive (Iverach, 2014). In età adulta la balbuzie si associa ad una maggiore rischio di disturbi d'ansia, e nello specifico disturbi d'ansia sociale (Craig & Tran (2014). Principale scopo del presente studio è stato quello di indagare se la presenza di un disturbo di natura cronica come la balbuzie si associ ad un aumentato rischio per lo sviluppo di sintomi psicopatologici durante l'età preadolescenziale. La cornice teorica nella quale si inserisce tale studio è fornita da una concezione multidimensionale e dinamica dei fenomeni, ansia e balbuzie, le cui variabili affettive, cognitive e comportamentali sono importanti mediatori non solo nello sviluppo, ma soprattutto nel mantenimento del disturbo; meritano, quindi, di essere oggetto di studio al fine di progettare trattamenti integrati e multidisciplinari più efficaci. Nello specifico, si è voluto indagare se esiste un effetto differenziale della balbuzie sui livelli d'ansia e sulla presenza di sintomi psicopatologici. Inoltre, si analizzato quali possibili fattori di rischio e di protezione potrebbero moderare la l'associazione tra ansia a balbuzie. I partecipanti dello studio sono stati preadolescenti che balbettano (11-14 anni) e un gruppo di controllo appaiati per genere, età e stato socioeconomico. Modelli di regressione lineare sono stati utilizzati per indagare la relazione tra ansia e balbuzie e per indagare l'impatto complessivo dei fattori di rischio e di protezione su tale relazione. Questo studio include un approccio multidimensionale alla relazione tra ansia e balbuzie attraverso una comprensiva valutazione che si avvale di informatori multipli. A questo riguardo, l'analisi delle

correlazioni tra i report genitoriali e quelli dei preadolescenti ha permesso di investigare possibili differenze tra gruppo clinico e di controllo.

GENERAL INTRODUCTION

More than 2500 years of history have contributed to the definition of stuttering. It is a disorder as old as it is widespread, since it seems to concern all the 5000 thousand languages spoken in the world. This phenomenon, probably as ancient as speaking, is already present at the time of the Egyptians (2000 B.C.) and is expressed with its own hieroglyph:

(Faulkner, 1991)

Silverman, speech pathologist and author of numerous publications, has speculated that the Egyptians could use earthquake as a metaphor for stuttering, thus depicting it as a tremor that starts from the mouth and reaches the ground (Silverman, 1996).

Other evidences can be found reading the Old Testament; in Exodus, Moses turns to God saying: "Please, Lord, I have never been eloquent, neither in the past nor since You have spoken to Your servant, for I am slow of speech and tongue." (Exodus 4, 10) and again " "If the Israelites will not listen to me, then how will Pharaoh listen to me, since I am unskilled in speech?" (Exodus 6:10). Among the most illustrious stutterers both historically and for the frequency of quotations, we can name the character of Greek orator Demosthenes and his tricks to correct his defect became famous. He spoke with pebbles in his mouth and also had a habit of going by the

seaside during a storm, to shout above the roar of the ocean waves (Cicero, http://www.lorem-ipsum.info/de-finibus).

Alessandro Manzoni is a more contemporary celebrity who suffered stuttering. This is how he described his stuttering: "I can see the word, it is there; but it does not want to get out of my mouth" (Angelo De Gubernatis, 1879). In a letter to his friend, journalist Giorgio Briano, who had invited him to run for a member of local parliament in Piemonte, Manzoni replied that he had to renounce to the parliamentary office also because of his disorder: «The man of whom you wanted to make a deputy, stuttered not only with his mind in a figurative sense, but also in the literal meaning of the word, in a physical way, so it's practically sure he could not attempt to speak without undermining the seriousness of any assembly: in such a new and terrible circumstance for him, he would certainly not succeed in anything, but trying" (Albertocchi, 1997).

Other well-known figures that stuttered include Charles Darwin, Lewis Carroll, Winston Churchill, King George VI of England, Isaac Newton, Marilyn Monroe, Woody Allen, Italo Calvino. The characters mentioned above have often characterized the popular argument on stuttering, are testimonies of the universal spread of the disorder, which, although considered a limit and was described in derogatory terms since ancient times, did not prevail over these outstanding personalities.

In 2018 the Italian population has reached 60 million. Applying the conventional 5% life-time incidence and 1% prevalence for stuttering, 3 million Italian people have experienced stuttering in their lifetime, including 1 million exhibiting active stuttering, of which 150 thousand are under 18 years.

Early adolescence represents a critical developmental period involving several changes not only at the physical level, but also in the emotional, cognitive and social domains. Such

developmental processes may be more complicated for youth who stutter, who additionally need to face the challenges linked to having their “fluency failure”.

To guarantee successful stuttering therapy and to ensure the effective participation by youth who stutter to the community, as well as prevent behavioral risk and disparities between of youth who stutter and non-stuttering peers, it is fundamental that societies not only provide effective speech treatment to reduce stuttering but also support healthy psychological development for youth with stuttering.

Throughout this doctoral thesis, the conventional guidelines for practice in stuttering treatment is support, by means of firmly believing that in order to promote youth’ adjustment it is essential that all people who stutter are enabled to get assessment and treatment for any secondary mental health issue. But how can we promote youths' who stutter socio-emotional adjustment?

The implementation of effective intervention programs for youth who stutter depends on the possibility to investigate specific features of stuttering in early adolescence age and to examine potential risk and protective factors which could become targets of both intervention and prevention efforts. The increasing evidence of the higher risk of anxiety disorders for people who stutter had point the need to investigate the relationship between stuttering and anxiety in youth populations (Iverach Adrian & Davis, 2004).Thus, the study of the complex interplay among family/social, and personal factors becomes crucial as to gain a more in-depth understanding of the conditions able to promote preadolescents' who stutter successful development and adjustment.

In the first chapter of this thesis, a general overview of stuttering syndrome is provided, highlighting the several factors under which psychological adaptation may be either promoted or compromised. Before reporting on the empirical studies, analysis of literature about the

relationship between anxiety and stuttering and the theoretical framework adopted in the present research project are presented. The subsequent paragraph explains why our focus is on early adolescence, introducing social, cognitive, and psychological factors involved in the present study. A general description of the main results of the present research project is then outlined. Finally, the main findings of the study are integrated and discussed. In addition, limitations, suggestions for further research, and theoretical and practical implications are addressed.

CHAPTER ONE

STUTTERING: TOWARDS A DEFINITION

1.1 Definition and primary symptomatology

It is not an easy task to propose an exhaustive definition of stuttering, because such a complex and extremely variable phenomenon cannot be reduced to a simple description; therefore, in this first chapter we will illustrate different aspects that characterize it, in order to reach a more integrated view of this syndrome.

The definition of stuttering that finds the greatest consensus today is the one given by the World Health Organization: "Stuttering is a disorder in the rhythm of speech in which the individual knows precisely what he wishes to say, but at the time is unable to say because of an involuntary repetition, prolongation or cessation of a sound" (WHO, 1997). In this first description the link between the mental representation and the difficulty of the pronunciation by the motor mechanisms governing articulated speech is evident. The person knows what he wants to say, but in his intention to speak, he fails to coordinate the motor centers of language and the centers that plan the linguistic structure.

Interruptions, repetitions and prolongations are classified as disfluencies and are the primary symptoms of the disorder. However, as many authors have repeatedly indicated, all stutterers have disfluencies but not all disfluencies are symptoms of stuttering (Adams, 1980; Wingate, 1984). In this regard, several disfluency classifications are in close agreement about the central characteristics of stuttering in terms of core speech features, making a distinction between

what is stuttering and what is typical. In fact, there are occasional disfluencies both in the normal speech of the adult and in that of the child during the period of language acquisition.

The first classification was schematically represented by the disfluencies continuum of Gregory & Hill (1980), that resulted from their research of the verbal fluency development in preschool children, and of the characteristics that induce a listener to consider a verbal communication as not normally fluent. Within the alterations of the fluency we can distinguish the typical disfluencies that are usually found in the normal speech, from the atypical ones, that characterize speech-language pathology, with intermediate forms in which the cross-over disfluencies are placed, also referred to as borderline disfluencies.

❖ *Typical disfluencies*

These disfluencies are never accompanied by effort and tension. They are found in the speech of those children during the period of language acquisition; they may be not particularly conscious and do not produce surprise or frustration. They are characterized by:

- hesitations (silent pauses);
- interjections of sounds, syllables, words, sentences (e.g. um, that is, what I mean is);
- revision of sentences or phrases (syntagms);
- repetitions of phrases (syntagms);
- incomplete words;
- repetitions of monosyllabic words (2 or less repetitions of each, without effort or tension);
- repetitions of syllables/parts of words (2 or less repetitions of each, without effort or tension);
- error revisions

❖ *Cross-over (or borderline) disfluencies*

They are placed in the middle of the stuttering continuum between typical and atypical disfluencies and can belong to one or another group based on the analysis of quantitative aspects (number of repetitions) and qualitative aspects (visible and/or audible tension and effort):

- under 5 years of age: 1-3 repetitions: typical, 4 or more: atypical;

- over 5 years of age: 1-2 repetitions: typical, 3 or more: atypical

❖ *Atypical disfluencies*

The atypical disfluencies are characterized by:

- repetitions of monosyllabic words (3 or more repetitions of each, with tension);

- repetitions of syllables or parts of words (3 or more repetitions of each, with tension; ex: "do - do- do- dog");

- repetition of phoneme ("d-d-dog");

- blocks that interrupt the emission of the word and stop the flow of air, necessary for the phonation (the "d" is tense). This block is not present in normal disfluency and is the main indicator of stuttering;

- prolongations, that generally occur at the beginning of the word (dooooog);

- tension of the voice accompanied with trembling of the lips (Gregory & Hill, 1980).

The stuttering classification widely used in clinical and research context has been proposed by the Illinois Stuttering Research Program (Ambrose & Yairi, 1999) and consists of two disfluency classes, stuttering-like disfluency (SLD) and other disfluency (OD).

❖ *Stuttering-like disfluency*

The stuttering-like dysfluency (SLD) such as part-word repetitions, single syllable word repetitions, dysrhythmic phonation are characteristic of the stuttering speech. They differ from

the stuttering other disfluency due to their greater uncontrollability, indeed, blocks and prolongations of syllables (in more than 10% of words) are produced with irregular durations and with signs of muscular tension and tremors that sometimes lead to immobilization of articulatory postures. They also include visible and audible phenomena that consist in anomalous changes in speech speed (either extremely slowed or, on the contrary, increased), the intensity of the voice (excessively weak or, on the contrary, strong) and in its frequency/voice pitch (too high or too low for the age or for the sex of the person) and often they are accompanied by voluntary movements of the body (eye blinking, swaying of the head, poor ocular contact).

❖ *Other disfluency*

Other disfluency (OD) typifies the speech of people who do not stutter but may occurs also in stuttering speech, although in lower frequency than SLD. It includes multisyllable and phrase repetitions, interjections, revisions and incomplete utterances. When a child uses a high number of non-stuttered (typical) disfluencies, differential diagnosis is critical to distinguish between stuttering, avoidance, and a language disorder.

1.2 Classification and Epidemiology of stuttering

Taking the classification of disfluencies as our starting point, the distinction between primary and secondary stuttering becomes clear.

Primary stuttering, also called physiological, affects 20-30% of children between the ages of two and five (Yairi & Ambrose, 2005), and is related to the physiological evolution of the

child's linguistic, motor, and cognitive skills. It can manifest itself after the first words the child says or after a period in which the acquired verbal production skills do not seem to be compromised. It generally manifests with disfluencies (other disfluency) with frequency of less than 2-3%, intermittent hesitations, repetitions and prolongations of syllables not associated with tension. Spontaneous remission of transient stuttering occurs 12-18 months after its onset (Yairi & Ambrose, 2005).

Secondary stuttering has a 0.72% life span prevalence with a wider range estimates from 0.33% (McKinnon et al. (2007)) to 5.60% (McLeod and Harrison, 2009) across cultures (Yairi & Ambrose, 2013) and across age (Craig et al., 2002). In all cultures and social groups stuttering tends to have a lower prevalence with advancing age; indeed, in adolescence it is reduced to 0.8% (APA, 2013). Furthermore, prevalence under age 6 is considerably higher than in later periods in life. Conversely, its life time incidence is found to be between 5% and 8% if we consider the cases in which the disorder disappears spontaneously or through therapy. According to recent reports, the time onset of stuttering is generally between the ages of 2 and 5 but sometimes as early as 18 months to 3 (Yairi & Ambrose, 2013). For 95% of those affected by stuttering, the onset ranges from 16 months to 66 months of age (with an approximate average of 33 months) without sex difference; less than 5% of children begin to stutter after the fifth year of life, over time there is a virtual disappearance of new cases after the twelfth year of age (Yairi & Ambrose, 2005).

Children who experience a spontaneous remission of the disorder are 4 out of 5, in 75% of cases the remission is within 18 months from the disorder onset, while with the remaining children the disorder disappears within maximum the fifth year of life (Yairi and Ambrose, 2005). If after the age of 36 months the problem persists, the percentage of healing is reduced to 16% and after 48 months from disorder manifestation, the healing is further reduced to 5%, so we

can state that time since the onset of the disorder is an important prognostic factor to establish the possible risk of persistent stuttering.

In stuttering there is a greater incidence in males that changes according to the age considered: for the remission form we must consider a male/female ratio of 2 to 1, while for the persistent form there is a ratio of 4 to 1 male/female) with an increased probability of spontaneous recovery for females (Yairi and Ambrose, 2005).

1.2.1 Etiology

Stuttering research collected a wide body of studies that embrace many perspectives, each of which has brought to light interesting etiological theories about the onset of this syndrome. To date is difficult to propose a unitary hypothesis for the etiology of stuttering. Although research evidences can describe the phenomenological characteristics of moment of stuttering, they still do not explain exactly the specific causes of it. Nevertheless, during the last twenty years several meaningful advances in the understanding of stuttering have accumulated. Today there is a general agreement between researches to consider stuttering onset as composite and complex, and to recognize that the factors that cause stuttering are different from those that favor its maintenance or that vary its severity or frequency. Although the cause of stuttering is still unknown, genetics studies provide evidences to consider stuttering a multifactorial combination of constitutional and environmental factors (Ingham et al., 2003). Kraft and Yairi have proved as genetic factors are involved in the genesis of stuttering. (Kraft & Yairi, 2011; Neef, Anwander, & Friederici, 2015). Specifically, stuttering is considered a polygenetic disorder (Yairi & Ambrose, 2013) and several techniques can be used to demonstrate the role of genes in stuttering onset. Neuronal pathways implicated have been shown through neuroimaging techniques (Morgan, 2013).The role of the two hemispheres and the right and

white matter have been investigated through Functional Magnetic Resonance Imaging. The results suggest a prevalence of more right-hemisphere dominant profile of activation during speech in stutters than adults without stuttering, who typically have a left-dominant profile (Brown, Ingham, Ingham, Laird, & Fox, 2005; Morgan, 2013), inducing compensatory processes for inefficient left hemisphere function in speech networks (Alm, 2004; Giraud et al., 2008). Considering brain structure, Sowman et al. highlighted a reuction of grey matter volume in parts of basal ganglia in stuttering groups when compared to typical controls(Sowman et al., 2017). Moreover, it has been demonstrate as the brain of the children who stutter is characterized by atypical white matter (Chang, Zhu, Choo, and Angstadt , 2015). This change, that involves left arcuate fasciculus and corpus callosum(Chow, & Chang 2017), could be induced by the observed adaptive laterality of auditory-motor interaction for speech processing as seen in stuttering adults (Chang, 2014).

1.3 Diagnosis

The diagnostic procedure for stuttering requires a high level of experience on the part of clinical operators. Diagnosis is at the first stage the competence of a speech pathologist or a speech therapist, however the contribution of other operators is fundamental to confirm the presence of the syndrome.

Making a diagnosis does not only mean framing stuttering in nosographic terms, but also reflecting on its natural history, on the meaning of that disorder, in that moment, in that social context, with its protective factors and its vulnerability. The dynamism and variability of this disorder require a multidimensional diagnosis capable of bringing to light all the factors that compose this syndrome, making it so complex. In general, the diagnostic assessment of stuttering

includes an interview that collects information on the disorder onset history and the evolution of stuttering, on any previous treatments, on emotional reactions, on awareness and negative feelings developed by the patient regarding his symptom, and also on linguistic evolution and general health conditions.

Diagnosis of stuttering usually consists, in the first phase, in the auditory analysis of the patient's verbal production and identification of the symptoms of disfluency, with their classification according to measurable dimensions such as frequency, type, average duration, speech velocity, position and severity. Currently, the tool that is most frequently used to make a diagnosis of stuttering in the clinical and research field is the Stuttering Severity Instrument 4 (SSI-4, Riley, 2009). It uses standard reference samples diversified by age groups, and measures the frequency of stuttering, the duration of stuttering events and associated behaviors through a sample of at least 200 fluent syllables.

The second phase of the diagnostic procedure involves the identification of risk factors for a possible maintenance of the disorder and its chronicity: the persistence of stuttering at 12 months from onset, the familiarity of the disorder, the presence of linguistic and motor difficulties, the presence of associated comorbidities, such as attentional, cognitive, learning or neurological difficulties (Yairi & Ambrose, 2005).

The third and last objective useful for clinical diagnosis is the evaluation of the non-perceivable aspects of the disorder, for example the awareness of one's own disfluency and the emotional reactions it causes. This is important because the global assessment of a person with impaired fluency never concerns the only pathology but includes all the neuropsychological characteristics that make that patient unique, in their entirety: those that constitute the core of his disorder and those that influence it indirectly.

Following this principle, it is important for health care professionals who examine examines pre-adolescents who stutter to verify the presence of associated psychological difficulties, which may favor the maintenance or worsening of stuttering. In this phase it may be useful to use screening tools to verify problems that require much more than stuttering therapy. In light to this becomes more evident that when diagnosing stuttering, a criteria that should be investigate is the interference in some way with the daily life (e.g. avoidance of social interaction, difficulties in studying, experiences of being bullied) and with emotional development of the youth (e.g. anxiety and depression mood). In this issue a contribution from two diagnostic classification systems will improve the understanding of stuttering more as a syndrome than as an actual disorder.

- *International Classification of Functioning, Disability and Health*

A diagnostic classification that defines health as a state of complete physical, mental and social well-being, and not just as the state of absence of disease, was proposed by the World Health Organization in its "International Classification of Functioning, Disability and Health" (ICF; WHO, 2001). The ICF shows a significant evolution compared to the previous framework of "International Classifications of Impairments, Disabilities and Handicaps" (ICIDH).

The ICF describes disability as a universal human experience and focuses on individual differences.

In adapting the ICF to the study of stuttering, Yaruss & Quesal (2004) describe three fundamental components:

1. The component *Body Functions* addresses aspects of communication related to oral production (producing voice, articulation, fluency) and impairments with the flow, rhythm, and speed of speech.

2. The *Body Structures* component addresses all major structural components of the human body involved in voice and speech (mouth, pharynx and larynx). Although there might be no clearly identified structural deficit in these structures associated with stuttering, recent findings point to a possible structural difference in the nervous system of adults who stutter (Chang et al., 2018).

3.The *Activities and Participation* component describe aspects of communication that might be affected by stuttering. For example, starting a conversation, using telephone, interacting with others in occupational or social settings.

4. The *Contextual Factors* are the environmental and personal factors. A great variety of contextual factors can influence, directly or indirectly, the experiences of a person who stutter. Environment factors make up the physical, social and attitudinal context which can influence the experience of functioning and disability in people who stutter. Environmental factors can also play a facilitative role, supporting person's participation in a speaking situation that he might otherwise miss. For example, self-help groups and speech therapy services help managing the effect of stuttering disorder in daily life. Otherwise, they can hinder the communication because of negative or stereotyped attitudes of society toward person who stutter.

Numerous authors have highlighted the important role of speaker's affective, behavioral, and cognitive reactions to stuttering. These factors can affect the speaker's experience of stuttering in a variety of ways. Although many of affective reactions are regarded as negative (e.g., fear, anxiety, shame), there are also some positive feelings that can help person to cope with his/her stuttering in everyday life (e.g., optimism, acceptance, hope). Behavioral reactions include tension and struggle during speech in order to prevent stuttering or avoidance of certain words.

Finally, examples of cognitive reactions include low self-confidence and reduced self-esteem on the one hand, and high self-efficacy in speaking ability on the other. In conclusion, many different factors can contribute to a speaker's experience of stuttering. However, it is not the stuttering severity that determines the degree of limitations or restrictions, what matters is the way the speaker (and others) react to that impairment. Indeed, it is not so very unusual to find people with a severe stuttering that anyway fully participate in social life, whereas others who have a mild stuttering are severely limited (Mulcahy, Hennessey, Beilby & Byrnes, 2008).

- *DSM 5*

The complexity of this syndrome is made evident by the Diagnostic and Statistical Manual of Mental Disorders (APA, 1994) which is a standard classification used by clinicians, researchers, and public health professionals in the United States to diagnose and classify mental disorders.

The latest version of this classification, the DSM-5 (APA, 2013), added some important change to the criteria that must be met to make the diagnosis of stuttering. Firstly, it changed the terminology from stuttering to childhood-onset fluency disorder. This new term was used to distinguish cases with onset in early childhood from later-onset cases which are diagnosed as adult-onset fluency disorder. Second, there are no longer any requirements for the use of speech interjections, such as "you know", or "um", which are also normally used for others without this disorder. Third, since anxiety reactions and avoidance behaviors toward speech situation have been noted to be a disabling problem for many people who stutter, these symptoms have been added to the diagnostic criteria for stuttering. Indeed, what contributes to giving a clearer description of the nature of the disorder is the disturbance with the adaptation of the person to social life. In fact, the impact on school results, work, or emotional functioning (anxiety, frustration, low self-esteem) may be sometimes enormous.

Lastly, in contrast to previous edition of DSM, the new version DSM-5 allows the identification of social anxiety as a source of disability, opening access to treatment for people who stutter who received a diagnosis of social phobia. As consequence of this results, the DSM-5 Social Anxiety Disorder (SAD) diagnosis now states, “If the person suffers from another medical condition – for instance, stuttering or obesity – the fear or anxiety experienced must be unrelated to the other condition or out of proportion to what would normally be felt” (APA, 2013).

Taking into account the above mentioned changes, diagnosis of stuttering is based on the following criteria:

"A. Disturbances in the normal fluency and time patterning of speech that are inappriopriate for the individual’s age and language skills, persist over time, and are characterized by frequent and marked occurrences of one (or more) of the following:

- Sound and syllable repetitions.
- Sound prolongations of consonants as well as vowels
- Broken words (e.g., pauses within a word).
- Audible or silent blocking (filled or unfilled pauses in speech).
- Circumlocutions (word substitutions to avoid problematic words).
- Words produced with an excess of physical tension.
- Monosyllabic whole-word repetitions (e.g., "I-I-I-I see him").

B. The disturbance causes anxiety about speaking or limitations in effective communication, social participation, or academic or occupational performance, individually or in any combination.

C. The onset of symptoms is in the early developmental period (Later-onset cases are diagnosed as adult-onset fluency disorder.)

D. The disturbance is not attributable to a speech-motor or sensory deficit, dysfluency associated with neurological insult (e.g., stroke, tumor, trauma), or another medical condition and is not better explained by another mental disorder. "

This significant step obtained in the DSM-5 context has not been generalized to other tools for clinical diagnosis. For example, according to International Classification of Diseases 11th revision (ICD-11) (WHO, 2018) it is not necessary to explicitly recognize the influence of stuttering on the social life of the person for meet a diagnosis. What deserves attention according to ICD-11 are the overt features of stuttering, like repetitions of sounds, syllables or words, prolongations, word breaks, blockage of production, excessive use of interjections, and rapid short bursts of speech. Although intention for DSM-5 and ICD-11 is to ensure similar standards of diagnosis whose validity and clinical utility has been established and across geographical boundaries, this is still not the case for stuttering syndrome.

1.3.1 Differential diagnosis

Some indicators have been found that help predict the gravity of stuttering that has been developing. These also have a prognostic value, suggesting a differentiated diagnosis among children with whom the disorder will become chronic compared to those who will undergo spontaneous remission.

• In stuttering children, the ratio between the number of atypical disfluencies and the number of total disfluencies exceeds 70% (Pellowski & Conture, 2002);

• There is a tendency in stuttering children to stutter on the function words, perhaps for problems related to the morphosyntactic construction of phrases (Howell, Au-Yeung & Sackin, 1999)

• These also present a phonological delay (Melnick, Conture & Ohde 2003);

• Worse articulatory and linguistic skills;

• Coarticulation problems;

• Greater motor instability;

• Negative affective reactions towards the disorder

(Yairi & Ambrose, 2005);

It has also emerged that in some children with chronic stuttering, the syndrome manifested itself suddenly, in a rather serious form, starting from its very onset, without going through an intermediate borderline form (Yairi & Ambrose, 2005). Regarding the differential diagnosis of stuttering and other disorders, in DSM-5 it is noted that disfluencies can be associated with impaired hearing, with sensory deficits, or motor deficits of speech. In cases when speech difficulties are present beyond the disfluencies usually associated with these problems, a concomitant diagnosis of stuttering is indicated (APA, 2013).

In rare cases, stuttering can be acquired in adulthood as a result of focal or diffused damages to the central nervous system, but in this case, stuttering is only one of many neurological disorders that arise as a result of stroke, head trauma or degenerative diseases. In scientific literature many authors have provided a differential clinical picture of neurogenic stuttering compared to the developmental one, both in its linguistic and in the cognitive-affective manifestations, thus considering it as different form compared to stuttering of children (Van Borsel & Taillieu, 2001).

1.4 Comorbidity

One of the most important tasks of the clinician is to investigate a possible simultaneous presence of multiple disorders that the patient might have. The term co-morbidity indicates, in fact, the possible presence of several simultaneous manifested disturbances in that particular person.

It has been shown that stuttering appears to be associated with other communication disorders, such as phonation disorder and language expression disorder, which sometimes

anticipate stuttering onset. This is confirmed by several studies that report a greater prevalence of co-morbidity among children who stutter (CWS) (St. Louis, Hinzman, 1998, St. Louis, 1991, Wolk and collaborators, 1993). The researchers' attention to phonological characteristics of speech in CWS has led to the recognition of the importance of phonological factors in stuttering; even the same people who stutter report that they commonly have difficulty pronouncing specific sounds depending on their position within a word (Van Riper, 1971).

In a research study Blood, Ridenour, Qualls and Hammer (2003) reported the responses of 1184 language therapists referring to 2628 children and adolescents they have been treating. The research showed that 62.8% of the young patients had some other associated disorder. Articulation (33, 5%) and phonological (12%) disorders are the most prevalent in CWS and even their incidence is higher than the one in general population (2 to 6%). These results are in line with the findings of another research carried out in the clinical environment by Yaruss, La Salle e Counture (1998), according to which 37% of CWS also manifest phonological disorders. Furthermore, in the study of Blood (2003) the rate of children presenting non-linguistic problems was also rather high: 11.4% had learning disabilities, whereas 8.2% had a specific disorder in learning to read; finally, attention deficit disorder was found in 5.9% of the group. This study also reported that males show a significantly more complex comorbid condition than females, especially regarding speech disorders.

Additional evidences in literature suggests that the prevalence of Attention Deficit Hyperactivity Disorder (ADHD) in school-aged children who stutter is between 5.9 % (Ardnt & Healey, 2001; Conture, 2001, Riley & Riley, 2000) compared to 3–6% of non-stuttering peers. Moreover, clinical findings often report that clinical levels of ADHD symptoms may not be a key feature in early stuttering. Ineed, subclinical symptoms of ADHD seem to occur in a large proportion of children who stutter and may negatively affect the outcome of stuttering treatment.

Thus, clinicians must be on the lookout for the possible negative effect that both diagnosed and undiagnosed ADHD disorders may have on therapy outcomes.

In adulthood, growing evidence has showed comorbidity with anxiety disorders and specifically social anxiety disorders (Stein, Baird, & Walker, 1996; Blumgart, Tran, & Craig, 2010; Gunn et al., 2014). In this regards, stuttering has been consistently associated to social anxiety disorder, with approximately 22%–60% of prevalence compared to 8%–13% of adults who do not stutter (Iverach, O'Brian, et al., 2009; Menzies et al., 2008)

Regarding adolescence age, stuttering was found to be accompanied by a high rate of anxiety disorders (Gunn et al., 2014; Iverach et al., 2017), whereas as far as early and late childhood, research data report mixed results, and to date it does not favor a clear comorbidity with stuttering and anxiety disorders (McAllister, 2016; Smith et al., 2017).

1.5 Prognosis

Research has established that the prognosis of stuttering is the better the earlier it was diagnosed, literally depending on the time passed between the onset of the disorder and the first therapeutic intervention. It is important to be able to recognize the symptoms early, because delayed start of treatment increases the risk of consolidation of the disorder to the point of making it resistant to any rehabilitative intervention (Yairi & Ambrose, 2005).

The prognosis factors can be subdivided into primary, secondary and other factors as shown in the Yairi and Ambrose table (2005).

Table 1: prognostic factors: Primary, Secondary and Tertiary (Yairi and Seery, 2015, pp. 288)

Primary factors	*Secondary factors*	*Tertiary factors*
Family history of stuttering	Stuttering Severity	Concomitant Disorders
Gender (male)	Head and neck movements	Awareness and affective reactions to stuttering
Stuttering (SDL) tends	Phonological skills (reduced)	
Duration of stuttering (12-18 months)	Expressive language	
Age at onset (3-5 years)	Acoustic features (speech irregularities)	
Dysfluency lenght		
Persistence of prolongations/ and blocks		

If stuttering chronicize, its treatments will not aim at its complete remission, but rather at improving fluency and normalizing communication skills to the point where the patient can feel his stuttering no longer as a constant concern or disability rather recognizing it as a specific deficit. Gregory (1986) states that achieving fluence in adolescents and adults is not particularly difficult during treatment. The critical aspect of therapy is represented by the transfer of what has been learned in a clinical setting to daily life, and by the long-term maintenance of the results without major recurrent episodes.

1.6 Secondary symptoms

During stuttering experience, the loss of control of one's articulations gradually becomes more conscious, causing feelings of frustration and anxiety, negative emotional experiences and avoidance of words or situations that create difficulties (Tichenor & Yaruss, 2018).

In a reciprocal manner the distress can cause general body tension. With time this leads people who stutter may employ a series of strategies to cope with speech disruption: bodily synkinesis (associated movements), winking, movements of the limbs like foot tapping or tapping with the fingers, and even spasmodic movements of the face (Vanryckeghem, Brutten, Uddin, & Van Borsel, 2004). Although these mechanisms are not convenient, they are often considered

necessary for the speech production and are used, in a conscious way, to avoid manifestations of disfluencies or to try to interrupt them.

Beyond specific accessories behavior related to speech production disfluency, people who stutter may encounter difficulties in developing a positive definition of themselves, building their emotional control, and social relationships (Blood, Blood, & Gabel, 2003; Iverach & Rapee, 2014). Each of these areas, if not adequately treated, might be associated with a negative prognosis.

In this case we are dealing with emotional symptoms, which derive from the interaction of the pathognomonic characteristics of the disorder and the social, school or professional environment of which people with this syndrome make part. This disorder is, indeed, often associated with negative feelings such as fear, embarrassment, anxiety (Iverach & Rapee, 2014). These emotional concomitants add to a "simple" fluency disorder the connotation of syndrome that may condition the entire course of life to varying degrees. Understanding stuttering only as a series of episodes of stuttering does not allow, therefore, to grasp other important dimensions, which transcend the simple symptom of disfluency. These are cognitive-emotional, behavioral and physiological factors, integrated and interacting with each other, both in the constitution of the syndrome and in its treatment.

Stuttering is therefore considered a dynamic disorder, that is present even when the speech has no interruptions and flows smoothly. That is why various aspects that characterize stuttering, have to be observed and divided into sub-levels (Smith, 1999). For example, the existence of PWS who do not manifest disfluencies is well documented in scientific literature. These individuals are affected by a specific form of asymptomatic stuttering, the "covert stuttering" in which although the speech is characterized by minimal changes, often imperceptible even to an expert clinician, the speaker experiences excessive levels of muscular

effort and psychological distress, due to fear of stuttering (Constantino, Manning & Nordstrom 2017). Thus, what is observed as a stuttering behavior is the final product of a series of earlier processes, that are cognitive, linguistic and emotional and have occurred long before the observed disfluency (Healey, Trautman & Susca, 2004).

1.7 The CALMS model: an integrated approach to stuttering

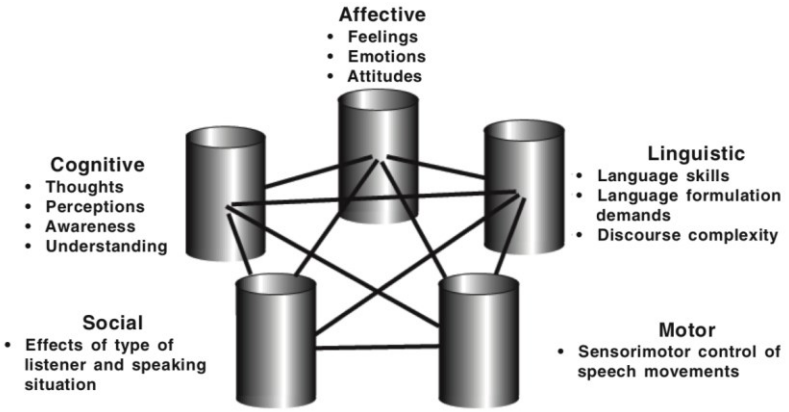
In order to examine the stuttering syndrome according to a multidimensional perspective, we adopted the integrated multidimensional model by Healey and collaborators (2004) named with the acronym "CALMS". This model represents stuttering as the results of a complex interaction of five components that include Cognitive, Affective, Linguistic, Motor and Social components. As emphasized by Conture (2001), stuttering does not operate in a vacuum and is not only subject to the influence of motor difficulties. Indeed thoughts, perceptions and feelings may prevent, within certain limits, the incurrence of disfluency or mediate its manifestations. In light of the above, disfluencies are not considered as isolated events but rather belong to a continuum of verbal behavior influenced by a multiplicity of factors.

Each area of the model, measurable and definable both qualitatively and quantitatively, represents an important element, involved both in the pathogenesis and in the maintenance of stuttering. Each component is an essential part interdependent with the other ones, providing a unique and characteristic contribution to the whole.

The CALMS model may be used during each phase of speech treatment. Firstly, during the assessment it is fundamental for the diagnosis of stuttering and for the classification of concomitant disorders. Second, during the planning of a rehabilitative path, it allows the constitution of a unique and personalized treatment according to the needs of the patient, his age and to the severity of the disorder. Finally, when some time has passed after the therapy, it

becomes a follow-up tool useful for the evaluation of the maintenance of the results obtained in each area. The different components of the model will be considered in detail and with respect to the main developmental stages of life.

Figure 1. A cognitive, affective, linguistic, social (CALMS) model of stuttering (Healey, Trautman, Susca, 2004, p. 42)



The ***cognitive*** **component** includes thoughts, perceptions and the set of knowledge that the patient has concerning his stuttering. In PWS it is important to investigate the presence of dysfunctional thoughts, beliefs and attributional style about the nature of the disorder. These components may, indeed, generate negative emotional reactions, determine avoidance behavior and contribute to the maintenance of disfluency (St Clare et al., 2009). For example, past researches showed that people with stuttering who adopted self-directed, realistic or positive thinking had better outcomes and positive long-term effect on fluency than did those who were not able to make these cognitive changes (Craig & Andrews, 1985; Madison, Budd, & Itzkowitz, 1986). In this domain, moreover, it may be useful to investigate the presence of introspective abilities and metacognitive skills that the patient has developed concerning the disorder. For example, awareness of one's performance in difficult situations, knowledge of one's own limits, abilities and variables that influence the difficulty and strategies used to overcome obstacles as

well as their effectiveness, belongs valid data for the management of the syndrome not only in its cognitive aspects, but also in function of emotional, behavioral and motor functions.

In pre-school age, children have in general a poor awareness of their disorder, however contrary to what is thought, children can be aware of the difficulties of speech already around three years (Ambrose & Yairi, 2005; Vanryckeghem & Brutten, 1997; Ezrati, Platzky, & Yairi, 2001). During school age, the perception of the disorder and beliefs with respect to stuttering gradually develop and tend to stabilize. Finally, during adolescence and adulthood, the PWS acquires greater awareness and knowledge of his disorder.

Two theoretical constructs, external to the CALMS model, could clarify why the development in the PWS of specific cognitive belief of the disorder, has the potential to interfere with the syndrome itself. Those who stutter can perceive their verbal and communicative experiences as uncontrollable, developing over time a condition of "*learned helplessness"* (Seligman, 1993, 1995), against their own stuttering in which they become passive spectator of their own disfluencies with the feeling of not being able to cope with the situation (Van Riper, 1971). The expectation of failure in fluency is not only subject to the control of stuttering but may also depend on the *locus of control*, that is, on the perception that the individual has of being able to manage and decide his own life. From a research on the attributional style prevalent in PWS (Simon, Daly, Koviak, 1997), it has emerged that with age stutterers tend to develop a more outsourced style of attribution than non-stutterers. The investigation of these aspects becomes therefore relevant considering that in people who stutter the perception of external control implies a greater difficulty to generalize and maintain stable the results obtained during the speech treatment to other contexts of daily life. On the contrary, the perception of a place of internal

control seems to be related to the ability to implement and maintain changes in verbal behavior over the long term (De Nil & Kroll, 1995).

The ***affective component*** includes those thoughts that are closely connected to feelings, emotional reactions, and attitudes that accompany both stuttering and communication in general. In children, the first experiences of disfluency generally cause frustration for the discomfort of perceiving interrupted communication (Healey et al., 2004). After five years of age, with starting school, the child can be teased and humiliated by his peers, thus developing negative emotions, that are much more unfavorable towards his disorder. These include such shame, embarrassment and the sense of guilt (Murphy, 2005) that during early childhood leads the children who stutter to the adoption of new strategies in response to disfluency: changing the word, give up communication or delegate it to an adult. However, the use of these strategies does not relieve the discomfort that during adulthood may evolve in stable feelings of anxiety and fear towards communicative contexts (Iverach & Rapee, 2014).

Talking about emotions, however, it is difficult, if not impossible, to separate them from thoughts, thus it could be said that they are the consequence of the latter (Healey, 2004). A useful contribution to understand the close relationship between thoughts and emotions, external to CALMS, comes from the so-called ABC model of Ellis (1977), according to which emotions (C) are the result of cognitive processes (B) such as thoughts, beliefs on a certain event (A). Therefore, it is not so much the event itself that causes our emotions, but it is the interpretation and evaluation we make of ourselves in that event (Ellis, 1993). Siegel (1999) has stated that the emotional and cognitive components of stuttering have been recognized for several decades as factors that deteriorate and maintain the syndrome, in particular because of the way they interact with behavioral factors (Clare et al., 2009). In the case of the PWS, the formulation of irrational beliefs when confronted with disfluency such as "when I speak, I absolutely must not stutter",

produces consequences both in the constitution of negative emotions, such as anger, anxiety and depression because of one's own verbality and in withdrawal from communication or delegating of it to others. These behaviors lead to the avoidance of the problem rather than to facing it (Clare et al., 2009).

Returning to the CALMS model, the authors consider the attitude associated to stuttering and communication in general as an important factor of the emotional domain of the PWS. Before the model was introduced, several authors had already shown that a decisive factor in improving stuttering was the ability to manage negative feelings, attitudes and emotional reactions to stuttering (Van Riper, 1982; Siegel, 1999).

One of the basic and distinctive features of stuttering syndrome is a negative communicative attitude toward speech (Cooper 1977; Brutten & Vanryckeghem, 1997). It can be described as either positive or negative perception that the speaker, based on his own experience, develops towards his own verbality and himself as an efficient or not-efficient communicator. A negative attitude towards communication has been showed to correlate positively with negative emotion and dysfunctional "coping" responses. Research has consistently shown that, across languages and cultures, CWS demonstrate a communicative attitude that is significantly more negative than that of children who do not stutter (CWNS) (Bernardini, Vanryckeghem, Brutten, Cocco, & Zmarich, 2009; De Nil & Brutten, 1991; Jaksic-Jelcic & Brestovci, 2000; Johannisson et al.,2009; Vanryckeghem & Brutten, 2007; Vanryckeghem, Hylebos, Brutten, & Peleman, 2001; Vanryckeghem & Mukati, 2006).

Moreover, evidences from research and clinical context underscore as the communication attitude of the PWS plays an important role both in achieving and maintaining fluency (Guitar, 1976, 2006, Peters & Guitar, 1991). In this regard, there is evidence that the presence of negative attitude in PWS increases the likelihood of relapse (Andrews & Cutler, 1974), while a positive

view about one's verbal skills tends to help long-term maintenance of therapeutic progress (Guitar, 2006, Guitar & Bass, 1978). These results have led many clinicians to considering the evaluation and subsequent modification of the communicative attitude to be an essential part of the therapy (Guttormsen, Kefalianos & Næss, 2015). The attitude is also a variable that influences the tendency to post-treatment relapse. Although within this syndrome the relationship between causes and effects often becomes reciprocal and bidirectional, results by meta-analytic review indicate that negative communication attitudes can be an effect of stuttering rather than a possible cause (Guttormsen, Kefalianos & Næss, 2015).

The ***linguistic component*** of the model is related to the linguistic abilities of the PWS, and the degree to which they influence the frequency of stuttering (Healey, 2004). Stuttering episodes do not appear randomly within the verbal expression, in fact, the characteristics of the verbal expression can condition the distribution patterns of disfluencies in stuttering.

It has been shown that the linguistic demands of communication processes, such as changes in syntactic complexity or the lengthening of a sentence (or the production of longer sentences) can have a negative effect on the frequency and nature of disfluencies (Yairi & Ambrose, 2005).

At the beginning, stuttering occurs mainly on function words (articles and prepositions), and this is more due to difficulties with managing the whole syntactic unit rather that a difficulty with that single word. At the same time the majority of spontaneous healing occurs when the syntactic system becomes well-rooted and complete. In case of persistence of the disturbance, we witness the displacement of the disfluencies from the function words to those of content (names and verbs)(Yairi & Ambrose, 2005). In pre-adolescence and adulthood, stuttering is less and less influenced by the complexity of the sentence and is more susceptible to words with a high emotional content and to those that communicate important information (Alm, 2008).

Another component is the ***motor component*** that is associated with a range of factors that characterize stuttering, such as frequency, type, duration and severity of the disorder, as well as presence of secondary coping behaviors used to control and modulate disfluency manifestation. In preschool children, this component consists mainly of holophrases and repetitions of speech parts; moreover prolongations and blocks may occur. In school age, the presence of word repetitions, prolongations and blocks is stabilized. In pre-adolescent and adult age the characteristics remain similar to those of school age, but the severity of stuttering may increase and accessory elements of disfluency may be manifested (Healey, 2004).

The last area of the model is the ***social component***. There are specific situations that can reduce the frequency of stuttering, such as reading in chorus or speaking in the presence of background noise; other situations, like speaking on the telephone, under communicative pressure or to important people, seriously increases the frequency of stuttering (Andrews et al., 1983). Therefore, the most important step in investigating this area, is to understand the ability of the PWS to deal effectively with different communication partners in a variety of language situations. It is also necessary to identify avoidance behavior towards specific social contexts, as well as possible episodes of bullying or teasing that may occur during the school-age years.

The social component also refers to the knowledge of all rules (conversation rules) of the communicative context that allow assertive and pragmatic communication as, for example, the use of adequate timing and communication times functional to the characteristics of one's speech as well as management of mockery and being laughed at. The potential negative effect of stuttering within social domain of the individuals who stutter was investigated across lifespan.

During preschool years, a child who stutter may initially not be the object of social judgment, however, high demands of the family concerning his fluency may favor the development of a negative communication attitude (Starkweather, 1987). In school age, the

choices of participation and social interaction are associated to the disorder; the first experiences of situational avoidance may occur as a result of teasing (Blood & Blood, 2004).

In adolescence and adult age, the problem of stuttering can lead to negative consequences in the relationships and work contexts, bringing serious limitations even in academic and professional choices that are often united and marked by the desire to reduce one's verbal exposure (Klein, & Hood, 2004; McAllister, Collier & Shepstone, 2012).

CHAPTER TWO

STUTTERING AND ANXIETY: WHAT IS THE RELATIONSHIP?

The stuttering disorder is tightly linked with emotional reactions: as one could easily grasp, this linkage is particularly evident in certain relational situations. Indeed stuttering, more than any other language disorder, is connected to the emotional and relational side of the affected subject, with effects on the cognitive, behavioral and social dimension of the syndrome itself (Schindler, 1989).

In light of what has been said, emotions play a fundamental role in stuttering: the person who stutter experiences with anxiety the act of speaking, obviously not because of a lack or shallowness of content, but because of the act itself of communicating such content to an interlocutor. Moreover, the expression of such disorder is influenced by the presence of other speakers: as already observed by Kenner (1953), many people affected by such disorder do not stutter if they believe they are alone or unnoticed, or if they speak in a dark room.

Struggling to manage a lack of fluency in the natural relational context, certain academics (Conture, 2001) focused their study on the emotional side of the individual affected by stuttering; indeed emotions are factors that can influence oral communication and its result. Backing-up what has been said, the next paragraphs will focus on the studies explaining the presence, in both adolescents and adults, of a

possible linkage between anxiety (meant as both status and trait anxiety and social phobia) and stuttering.

2.1 The nature of anxiety

Anxiety is an emotion that is considered unpleasant, rather than pathologic, in the human existence, and it developed a specific meaning and history during the course of evolution. In coping terms, it can be described as a defence pattern, deriving from natural selection processes, that are useful to face dangerous situations effectively and to foster the behavioral fitness in those instances of real or potential threat. Appropriate anxiety levels are not only natural but essential to ensure the species survival in conditions of indefinite uncertainty and danger. A brief and moderate level of anxiety can be a useful motivation to mobilize cognitive and physical resources able to face threats, satisfy environment requirements or achieve personal objectives (Reynolds, Richmond, 2008).

From a clinical point of view, anxiety is described as the apprehensive anticipation of a risk or a future adverse event, complemented by physical symptoms of tension or feelings of dysphoria (APA, 1994). Anxiety has a multidimensional nature, implying cognitive aspects (a mental activity characterized by anticipation, apprehension, worry and obsessive ideas) as well as psychophysiological (an activation of the autonomous nervous system and the production of vegetative symptoms) and behavioral ones (a facing or escape reaction to re-establish the optimal conditions of wellbeing) (Galeazzi & Meazzini, 2004). Anxiety is an excessive emotional state, out of proportion in comparison to the triggering event, and so negative as to be considered similar to the phenomenon of fear (Stegagno & Palomba, 2004). In

clinical practice, there is not a clear-cut difference between fear and anxiety, and often these two terms are used in an exchangeable manner since the rise of tension, the perception of a danger or threat are elements that bring the two emotional states together. However, a distinction between these two phenomena becomes possible analysing the causes, length, and sustain of such emotional states. Fear is an emotion towards an identifiable threat which generally triggers a reaction of intense and sudden activation which disappears as its cause extinguishes; anxiety is instead a status of amplified vigilance, it has a wide and persistent nature for which it is difficult to identify the cause of discomfort or the reason of the anticipation of an event which is perceived as dangerous (Buodo, 2004).

In the previous definitions, anxiety is represented as a transient state; nevertheless, in both common language and scientific literature, anxiety refers to a type of relatively stable personality that characterizes some individuals and differentiate them from others. Even though it was Cattell who, for the first time, discerned the anxiety construct in emotional personality state and variable personality state, the development and international spread of the concept of "state anxiety and trait anxiety" is attributed to Spielberger (Galeazzi, Meazzini, 2004).

State anxiety refers to a "transient emotional state or condition of the human organism which is characterized by subjective feelings, perceived at a conscious level, of tension and apprehension and by the amplified activity of the autonomous nervous system." It can vary and fluctuate in time (Spielberger and others, 1970). It reflects an individual tendency to reply with higher or lower level of anxiety to a variety of situations.

Trait anxiety is instead conceptualized as a set of "relatively stable individual differences in inclination towards anxiety, that is to say the difference between people in their inclination to react with higher degrees of intensity of state anxiety to situations perceived as threatening" (Spielberger 1970). It corresponds to the individual anxiety level in reaction to a specific situation. According to Spielberger (1979), the way an individual perceives a threat determines his reaction; therefore, an event will not be considered stressful if the individual does not consider it dangerous or if he believes he can face it. However, reflecting on these two types of anxiety as unique constructs has however limited the possibility of identifying additional trait or state components in anxiety (Spielberger and others, 1970).

An innovative contribution to the definition of anxiety derives from the interactionist vision of personality, which investigates the situational variables and analyses the context in which the person experiencing anxiety is (Endler and Magnusson, 1976). According to this perspective, the most accurate forecast of a person's anxiety level derives from the interaction between his specific personality traits and the situation's relevant variables. In light of this, state anxiety means the presence of a transient emotional state referred to a particularly stressing situation. Trait anxiety is no longer considered as a unique and global construct, but it is segmented in four principal situational related components: social evaluation, the threat of damage or physical danger, the threat of unknown and uncertain situations, the threat of normal daily routine situation (Galeazzi, Meazzini, 2004). The expression of anxiety is therefore mediated by factors such as personality, contingencies, and the individual perception of the situation.

An anxious emotional state, if experienced with excessive intensity and outside the real context of one's own physical survival's threat, can represent a socially unsuitable and damaging reaction (Akiskal, 1985). An excessive and irrational anxious state is a core element of many anxiety disorders (Buodo, 2004). According to Mowrer's two-factor theory, the anxiety disorders acquisition mechanism happens initially by classical conditioning and through the association of specific situations to unpleasant emotional events, and is subsequently retained according to operant conditioning mechanisms, in which the decrease of tension and discomfort produced by the avoidance of the anxious situation, would have less probability of producing a settlement of the acquired reply.

Further processing of the elements involved in the pathogenesis of the anxiety disorder includes temperamental and biologic components (Eysenck 1967; Gray, 1982), which incline the individual to emotional instability and to an excessive reaction to events perceived as adverse. After Mowrer's hypothesis, it emerged that the feeling of fear and the behaviour of avoidance are not only retained in the presence or absence of escape behaviour. Further variables exist, such as motivation, the level of expectation of a damaging trigger, or the availability of security's signals that can influence the avoidance of the unpleasant event. Indeed it seems like that escape behaviours are determined by an anticipated overestimation of the frightening object's fear, which will lead to avoid those events which are expected to be too unpleasant or prompting fear (Buodo, 2004). If the anticipated overestimation of the fear fosters avoidance behaviours, it also decreases the possibility of discrediting the individual's own expectations resulting from distorted cognitive maps. The following notions of anxiety emphasized the role of the cognitive component in the processing

of inappropriate and distorted mental schemes in regards to the environmental input. The relevant schemes in anxiety disorders are not only the ones related to the perception of danger but concern as well the perception of personal vulnerability and of the resources which the individual is capable of in order to face threatening events.

Following the analysis of the different variables that contribute to the multifaceted nature of anxiety, the next paragraph will examine the studies analysing the linkages between such emotional state and stuttering. Indeed it is almost spontaneous to talk about the linkage between anxiety and stuttering; there can be a two-way connection between these two phenomena: anxiety presents stuttering amongst its symptoms and, indeed, an excessive anxiety can trigger fluency issues also in non-stuttering individuals, while it can increase the fluency issue in an individual who already stutter. At the same time, stuttering becomes a stimulus that triggers negative reactions such as anxiety in the speaker; this happens especially when a series of criticisms to stuttering symptoms strengthens the associations between fluency issues and the adverse emotional reaction in the speaker.

However, there are contrasting research results on the involvement of anxiety in the stuttering syndrome; reaching higher clarity over this issue could shed light on the important role that the handling of the anxiety has in the effectiveness of the therapy and on its maintenance in the long term.

2.2 Comorbidity studies between anxiety and stuttering

Anxiety disorders are associated with high rates of comorbidity with various pathological conditions, both psychiatric and medical. With the same medical

condition, individuals with important mental disorders tend to have a worse state of well-being compared to people without psychiatric disorders. In this regard, anxiety is configured as one of the most frequently observed and most widely studied psychological concomitants of stuttering. For a number of reasons, this association between anxiety and stuttering is so widespread. In particular, speaking is a fundamental mechanism for daily functioning, for the development and maintenance of networks and social relations (Messenger and collaborators, 2004). In people who stutter, linguistic production is often unpredictable and can become a source of embarrassment and frustration in communicative situations. In fact, the reduced ability to speak fluently affects participation in daily activities and limits professional prospects (Yaruss & Quesal, 2006). Living with a chronic disability such as stuttering, can negatively affect the emotional and social adaptation of the individual (Blood and co-workers, 2007). The negative repercussions of stuttering can begin immediately after its onset during the preschool years and continue throughout the entire life span. Children and adolescents who stutter are at high risk of negative reactions, social rejection, teasing, of bullying behaviour on the part of peers (Menzies and collaborators, 2009). In children who stutter, the critical period of the early stages of social development is often bleak and dysfunctional, and this could help to fear a negative assessment in future social situations (Menzies et al., 2009). In adulthood, stuttering is associated with negative consequences that can adversely affect quality of life, mental health and social functioning. The adult who stutter is subject to a high risk of experiencing stress and negative mood regardless of the severity of his disorder. (Craig and collaborators, 2009). The extent of the impact of stuttering on psychosocial well-being is considered equivalent to that of chronic

disorders such as spinal cord injury, diabetes and coronary heart disease (Craig et al., 2009). In view of what has just been said, it is not surprising that a good part of the individuals who stutter develop anxiety disorders. Poulton and Andrews (1994) state that anxiety is a predictable and reasonable reaction to the debilitating effects of stuttering; Likewise, Watson and Miller (1992) consider anxious symptom in stammering as a justified response considering the negative evaluations that all stuttering people have experienced at a given moment in their lives. Despite the presence of numerous evidences regarding the relationship between anxiety and stuttering, the nature of this relationship has not been identified yet; when it comes to determining whether people who stutter are more highly anxious individuals than those who are fluent, the conclusion is not easy to answer. In fact, there are ambiguous and conflicting results on the involvement of anxiety in the syndrome and on the mechanisms underlying this relationship (Menzies, Onslow, & Packman, 1999). Anxiety plays an essential role in some theories of stuttering (Bloodstein, 1987). One of the first is the *diagnosis genetic theory* by Johnson (1955), which considers stuttering as a reaction to an apprehensive anticipatory escape, that the speaker uses to avoid the normal disfluencies that occur when he has to talk. This disorder can therefore be considered as a device to avoid stuttering; it decreases when one tries to hide it. According to Johnson, the development of stuttering in the child would depend on excessive parental attention or a distorted perception of it against the normal disfluency, which, made aware of the child, would determine in him an anxiety response with respect to his verbality. Chronication of the symptom is identified in the fact that stuttering presents itself to the subject as an unpleasant and not welcome phenomenon. After Johnson, Sheenan (1953) suggests that episodes of

disruption in the speaker are related to a conflict of *approach / avoidance;* the subject fearing of not being able to have an adequate and fluent verbal realization tends to avoid communicative situations even if intrinsically he would like to speak. When the two tendencies of approach and departure from the language reach the maximum contrast, shortly before speaking, stuttering occurs. In the two factors theory by Brutten & Shoemaker (1967) stuttering is configured, instead, as a behaviour following the classical conditioning processes and maintained by operating conditioning. This theory postulates that the person who stutter, following reproaches and corrections received from the environment to his disfluency, learns to associate the conversation with negative emotional states such as anxiety, fear and stress. The anxiety response conditioned to one's own verbality, lays the foundations for behavior of escape, avoidance and communicative renunciations, aimed at alleviating the perceived strong discomfort. Later, Bloodstein (1995) describes stuttering as a behavior of anticipatory *struggle* and avoidance put in place by the speaker in order to avoid disruption. In particular, in the child stuttering derives from the perception of fluent language as a difficult and difficult undertaking to be realized. In this case a conscious effort is made to speak adequately and to anticipate the communication failures and the difficulties of speaking, in spite of the negative beliefs of not being able to do so. According to Bloodstein, when the speaker abandons the thought of his stuttering, this would manifest itself in a more contained way. According to the *Model of applications and skills* by Starkweather (1987) the development of states of anxiety is to be related to the expectations and high demands made by parents to the child's fluence. When these exceed the child's ability (cognitive, motor, linguistic and emotional) to produce fluent verbality, an episode of stuttering occurs that is

perceived by the subject as a communicative performance not adequate to the requests (Bernardini, 2008).In contemporary research, although stuttering is considered primarily as a speech disorder, it has been suggested that some psychological variables may influence those motor processes of speech that allow fluent production (Zimmerman, Smith, & Hanley, 1981). In particular, the researchers agree that anxiety is one of the main predisposing, precipitating and persistent factors that could play an essential role in stuttering (Menzies, Onslow, & Packman, 1999). In 1984, Ingham made a significant contribution to research by reviewing the principles of the theoretical models underlying the relationship between anxiety and stuttering. In particular, he examined the influence of psychological theories on the development of treatment of stuttering and assessed the techniques for reducing anxiety used in language rehabilitation. By identifying a series of methodological errors in the literature of stuttering, Ingham suggested that these could explain the lack of evidence of a relationship between anxiety and stuttering in some research. Moreover, in his opinion, a linear relationship between the incurring of stuttering and the manifestation of anxiety should not be taken for all people who stutter; in fact, in some cases, state anxiety may have a facilitating rather than debilitating effect on fluence (Menzies, 2011). Overall, Ingham concluded that "the overall tenor of research from the reviewed studies is that there is little evidence of a clinically significant relationship between stuttering and anxiety". Fifteen years after the article by Ingham, Menzies et al. (1999) conducted a review of the literature to further explore the complex, and often poorly understood, relationship between anxiety and stuttering. In their review they identified five fundamental methodological questions of scientific literature, as possible obstacles to the

emergence of clear and consistent research results concerning the nature of anxiety and stuttering. The first question refers to the use of physiological measures rather than self-report measures concerning behaviours such as avoidance, or feelings such as the fear of a negative evaluation. The second methodological problem concerns the analysis of anxiety as a unitary and global construct without recognizing its multidimensional nature. The third possible problem is the use of a reduced number of participants at the expense of reduced statistical power. The fourth question hypothesises that the presence, in the sample, of stuttering patients during treatment, could lead to less significant results compared to the selection of people not in therapy. The last problem is the construction of generic experimental designs, rather than the use of individualized tasks based on the characteristics of the subject, capable of clearly eliciting the anxious response. A decade after their publication, Menzies and collaborators (2011) have again analysed the research according to the five methodological questions mentioned above, concluding that there are stronger evidences concerning the relationship between stuttering and anxiety. However, its nature cannot be fully understood until the aforementioned theoretical gaps have been overcome.

2.2.1 Anxiety in adults who stutter

The impulse to investigate the relationship between anxiety and stuttering in adolescents was born from the study of this relationship in adulthood. In an article, Menzies (1999) and collaborators affirm that the presence, in the scientific literature, of ambiguous and unclear results on the role that anxiety assumes in stuttering, is not only an academic problem, since this damages the development of a good clinical practice and delays the development of new treatment procedures.

A common problem in the treatment of stuttering is, in fact, the inability to ensure the long-term maintenance of the successes obtained in therapy. This evidence has led researchers to hypothesize the presence of psychological factors such as state and trait anxiety as possible variables that can influence the progression of disorder in the person who stutter. The investigation of this relationship focused initially on psychophysiological measures, which showed in people with stuttering compared to fluent controls, a greater physiological arousal, a higher cutaneous conductance response (Dietrich and Roaman, 2001), and a greater increase during periods of distress of the salivary cortisol level (Blood, Blood, Bennet, Simpson, Susman, 1994). While recognizing the importance of the physiological phenomena involved in states of anxiety, Menzies and collaborators (2011) consider that the use of physiological measures in anxiety research (in particular social anxiety) and stuttering are indicators, perhaps less useful, in the study of stuttering since it is not correlated with verbal and cognitive components. On the contrary, the use of self-assessments and behavioral measures may be more informative indices in the study of the relationship between stuttering and anxiety.

Historically, the first self-evaluation tools used to research the verbal and cognitive aspects of anxiety were personality inventories (Ezrati-Vinacour, Levin, 2004). From the use of the Minnesota Multiphasic Personality Inventory, the overall results suggest that people who stutter show a tendency towards a less favourable adaptation than the fluent speakers, presenting higher psychopathological scores, while still remaining within a normal range (Sermas & Cox, 1982). Following the distinction between state anxiety and strait anxiety, personality scales have given way to more specific, one-dimensional measurements that are generally associated, in the search

for stuttering, with questionnaires suitable for measuring social anxiety over speech, typical phenomenon for some people who stutter. Several studies confirm in adults a positive relationship between speech-related anxiety and stuttering (Craig, 2003, Ezrati-Vinacour & Levin, 2004; Alm & Risberg, 2007). In one of their first studies, Mahr and Torosian (1999) illustrated how the stammerers who were most exposed to adverse interactions, derision and sometimes hostility because of their disorder, reported to fear those communicative situations in which social judgment is more likely, and to be more afraid of talking to strangers, deemed authoritative, or to *a large audience (Mahr and Torosian, 1999).*Subsequently, among the different studies that have highlighted the presence of this association, interesting is that of Ezrati-Vinacour & Levin (2004) who have compared the trait anxiety and status in language situations in adults with medium or severe stuttering with normofluent controls. Trait anxiety measured with the State-Trait Anxiety Inventory (STAI) was higher in the stutterer group when compared to controls, while state anxiety in social communication (Speech Situation Checklist -Emotional Reaction) was found to be associated with the severity of stuttering, whereby individuals with the most severe stuttering exhibited greater state anxiety. Ezrati-Vinacour and Levin (2004) defined anxiety in stutterers as a personality trait that develops gradually and tends to stabilize over time. Subsequently, the frequent feedback in people who stutter for the fear of negative evaluation, social threat and avoidance behavior in communicative contexts has led literature to focus on the study of a possible comorbidity between chronic stuttering and social anxiety (Blumgart and collaborators, 2010, Iverach and Rapee, 2013; Kraaimat and collaborators, 2002; Mulcahy collaborators, 2008).In fact, similar to social phobia, the symptomatic picture of stuttering is characterized by

social avoidance and fear limited to public situations limited to the public or performance situations in which you are exposed to the presence or to the judgment of other people *(Mahr & Torosian, 1999).*

This fear favours the adoption of protective behaviours in order to reduce anxiety and the probability that the feared events will occur (Clark and McManus, 2002).

In line with what was reported by clinical observations, Stein's research (1996), Kraaimaat (2002) and Menzies (2008), who report that the prevalence rate of social anxiety disorder among people with stuttering is between 21 and 60%, while it is significantly reduced in the general population with a range that ranges from 8 to 13% (Iverach & Rapee, 2013).

Another interesting study in the relationship between social anxiety and stuttering is that of Kraaimaat and collaborators (2002). The authors compared the anxiety and fear of negative social evaluation in a sample of adults who stuttered with non-stuttering controls, and adults with social phobia. The results of the two studies showed that adults who stuttered showed a significant increase in symptoms of generalized anxiety and social avoidance compared to non-patient controls. When, however, compared with social phobic, they presented significantly lower scores in the fear of negative evaluation, and in social avoidance, and fewer symptoms of agoraphobia and social phobia. However, there was no significant difference between the stutterer group and the phobic group with regard to generalized anxiety symptoms. This led to the hypothesis that stuttering people are more anxious than fluent individuals, but without going through a diagnosis of social phobia, so we must recognize that not all people who stutter experience anxiety in social life; in fact, the fears are limited to language situations.

Later, consistent data are reported by the studies of Messenger (2004), Iverach and O'Brian (2009), Blumgart and collaborators (2009) whose results indicated that adult stutterers were characterized by an increased fear of a negative evaluation, from an increased anxiety in socially evaluative situations, and in new or ambiguous ones.

Although research over the last two decades has provided more convincing evidence on the relationship between stuttering and anxiety, some research studies have not identified this association. For example, Miller and Watson (1992) compared the experiences of a group of stuttering and fluent people in relation to variables such as trait anxiety, depression and attitudes towards communication. The results collected, consistent with other similar studies (Andrews and Craig, 1988), showed a greater sensitivity of the stutterers compared to problems related to communication, with a condition of discomfort circumscribed to the management of the disorder, rather than significantly different values in the clinics scales of the groups

In the adult stuttering population, two other phenomena potentially involved in the maintenance of an anxiety disorder have also been highlighted: the attention bias for phobic environmental stimuli compared to pleasant or neutral ones; and the tendency to generate mental images or intrusive memories connected to anxious situations (Florio and Bernardini, 2014).

In a recent study, using a paradigm of emotional Stroop, Hennessey and colleagues (2014) show an attentive bias in adult stammerers, but not in controls, described as less rapid reaction time towards words that involve emotional threat than neutral ones. The implications of threat perception have also been deepened by the research of Lowe and collaborators (2012), who asked a sample of stutterers and normofluents

to produce a speech for a public previously trained to show neutral, positive or negative expressions. Comparing the observation time of facial expressions, it emerged that people who stuttered spent less time on faces with positive expressions than faces with negative or neutral expressions. In a subsequent study, the same author (Lowe et al., 2015) investigated the tendency to generate mental images through a restriction of the attentional focus towards one's own person, imagining oneself as observers of oneself, in groups of adult stutterers and normofluential controls.

This is to investigate whether, within social situations, people who stutter have cognitive processes similar to those typically found in people with a social phobia disorder. The study found that when the stammerers generated images and memories of anxious situations they were referred to, to a significantly greater extent than the controls, from the perspective of an external observer. Always compared to the researches that investigate the presence of recurrent and involuntary images in adults who stutter, in the research of Tudor and collaborators (2013) it was highlighted how a sample of stutterers presented, compared to the control group, a greater quantity of memories associated with social situations, and exclusively to issues such as shame, sadness and frustration. Overall, these results suggest that, similar to what observed in social phobic, people who stutter may neglect positive indications in social situations. In this way they would avoid the questioning of their beliefs concerning the dangers of social interactions, reinforcing both negative thoughts and the emission of protective behaviours useful to alleviate anticipatory fears.

A quantitative summary of the studies that investigated the relationship between anxiety and stuttering in adulthood, was carried out in a recent meta-analysis by Craig

& Tran (2014) on 19 studies that deal with the difference of levels between trait anxiety and social origin anxiety in fluent adults or with speech impairment. The results confirm the presence of a significantly higher anxiety in adults who stutter compared to controls, with an effect size of 0.82 for social anxiety and 0.57 for trait anxiety.

It has been demonstrated a strictly correlation between stuttering, seeking of clinical help and social anxiety disorder. Iverach has reported that the prevalence of the disorder is between 8 and 13% of the population (Iverach, 2014). However, case reports of social anxiety disorder are common for those who stutter (De Carle, 1996) with the condition reported for 40%, 44% and 60% of cases in speech clinics (Blumgart et al.,2010; Iverach et al, 2009; Stein et al., 1996). The latter report was that such cases have 34-fold increased odds of meeting criteria for social anxiety disorder diagnosis compared to age and gender matched community controls. Those reports are consistent with studies reporting that adults who stutter in general have anxiety scores higher than controls but slightly lower than those with psychiatric conditions (Mahr & Torosian, 1999). However, a report of older stuttering participants after a lifetime with the disorder did not showanxiety scores in the range associated with social anxiety disorder (Bricker-Katz, 2009). A recent report has compared the demographics of clients presenting to speech clinics for stuttering treatment with and without social anxiety disorder (Iverach et al., 2018). Apart from the group with social anxiety disorder being significantly younger, no evidence of demographic differences have been shown.

In conclusion, in the light of the literature concerning adulthood, the results emerged from clinical evaluations and experimental data seem to support the hypothesis that

individuals affected by stuttering experience greater levels of anxiety than people who are fluent, and present, compared to these, a significantly higher risk for the development of anxiety disorders, especially social anxiety. However, the group of stutterers seems to have a heterogeneous nature, in fact, all people with stuttering experience high levels of anxiety in social situations, while recognizing in them a peculiar emotional reactivity circumscribed to situations of speech.

The study of the relationship between anxiety and stuttering of relatively stable personality characteristics would not allow to understand the evolution of this experience, which is even considered a factor contributing to the genesis of the disorder. Consequently, the investigation of this phenomenon, limited to adulthood alone, could however represent a limit.

As for the investigation of anxiety in the evolutionary age, through experimental paradigms, to date no study has investigated the possible presence of an attentive bias in adolescents who stutter. The investigation of this phenomenon, limited to adulthood alone, can therefore represent a limit. Studying anxiety within relatively stable personality traits does not allow us to grasp the evolution of this emotional experience which is even considered a factor contributing to the genesis of the disorder.

2.2.2 Anxiety in children and preadolescents who stutter

Although many studies report the presence of anxiety disorders in adults who stutter, there are still few researches that investigate the presence of such psychopathological phenomena in the age of development and their course in the various stages of development.

The survey on the presence of a clinical relationship between anxiety and stuttering, limited to adulthood alone, may however represent a limitation; studying anxiety within relatively stable personality traits does not allow us to grasp the evolution of this emotional experience which is even considered a factor contributing to the genesis of the syndrome. Delaying the assessment of the emotional sphere of an individual who stutter at mature age means losing an important period of his growth, such as preadolescence, whose investigation would allow a better knowledge on how the relationship between anxiety and stuttering and on the nature of this relationship.

Preadolescence can therefore represent a time of passage crucial for the study of anxiety and stuttering in order to understand if in the course of the development of individuals who stutter, anxiety belongs only to the domain of speech or is a distinctive element of this syndrome. Comparing the studies on the relationship between anxiety and stuttering in preschool age and then in adult age, it is probable that the risk of developing an anxiety disturbance increases in a significant way in the passage from childhood to adolescence.

However, even today, it is not clear what the nature of anxiety is in children and pre-adolescents who stutter; and the onset and the course of the disturbance during development is equally ambiguous.

Starting from pre-school age, the studies investigating this relationship do not show any family risk factors for the development of the disorder, nor confirm the presence of psychopathological precursors of anxiety in children between the ages of 2 and 4 (Kefalianos and colleagues 2014; Lau and colleagues, 2012).

However, other research on a sample of pre-schoolers (Conture, 2001) reported that a state of excitement increased the episodes of stuttering. In particular, more than

positive emotions, it is above all the negative ones that show the influence of the flu of people with stuttering: anger, anxiety and fear more easily increase the number of disfluencies in the course of their conversation. Further research conducted on pre-school children shows the existence of differences in emotions compared to normofluents (Conture, 2001; Arnold et al., 2006; Conture & Curlee, 2007). In particular, the scholars (Arnold and collaborators, 2007) have shown how the disfluent children compared to the normofluents showed greater degrees of emotional reactivity or, they showed stronger emotional responses than the normofluents. Several studies have shown how the degree of emotions of disfluent children, together with their mode of reaction to emotionally engaging situations, influences the frequency, duration and severity of stuttering in conversation (Tomaiuoli et al., 2008). In two studies,the autonomic nervous systems of pre-schoolers who stuttered and controls have been considered.121 ,141 The first report included 20 pre-schoolers in both of above mentioned groups. the aim of the study was to analyze the temperament feature of emotional regulation, through sympathetic (via skin conductance index) and parasympathetic (via respiratory sinus arrhythmia index). Respiratory sinus arrhythmia is heart rate fluctuations linked to breathing that occur naturally meaning that with inspiration, heart rate increases and with expiration heart rate decreases. After the baseline condition where children are in front of a neutral screen, they watched short videos that successfully elicited positive and negative emotions. Then, the children told a story about the videos. The group who stuttered have showed lower (parasympathetic) respiratory sinus arrhythmia during the baseline, which theoretically means they had increased vulnerability to a sympathetic response. Moreover, for children who stuttered (sympathetic) skin conductance

increased more during positive emotions while they were watching and talking about videos. Interestingly, a maximum effect size of d=0.62 was reported consistent with the observations in a previous review.Instead, school-age studies have rather mixed results. Craig and colleagues (1996) found no difference between state and trait anxiety levels in 96 stuttering children and fluent controls between 9 and 14 years. Coherent data come from investigations using salivary cortisol (Ortega, 2011; van der Merwe, 2011). According to these studies, there are no significant differences between children with stuttering and normal-fluid controls in cortisol levels. However, in a study by Oyler (1994), features of vulnerability and sensitivity were reported in a group of children between 7 and 12 years.

Studies concerning the relationship between anxiety and stuttering in pre-adolescent age are still few and, for the most part, tend to assimilate the sample of adolescents to the sample related to the age of development or that of adults. If this can be valid from a technical point of view, it is not according to a psychological view of stuttering that does not present itself as an isolated and stable event over time, but is subject to evolution, in all those components that make it a syndrome. Moreover, the only evidence that in English the acronym PWS (person who stutter) was only distinguished in AWS (adult who stutter) and CWS (children who stutter) shows the limited consideration that the research has turned to this stage of development, important and delicate for each individual, whether he is affected or not by stuttering.

The study of the relationship between anxiety and stuttering in adolescence (to be adapted to pre-adolescent age) cannot disregard the analysis of the very singular and complex characteristics of this evolutionary phase. Adolescence is a period of transition between the years of childhood and adulthood. This phase is characterized

by considerable modifications, in different fields, and in rapid succession, especially as regards the image of oneself, the structure of personality and interpersonal relationships. According to Galimberti (1992), these changes occur on different levels: on the level of identity (with the redefinition of a new identity), on the cognitive level (with a progressive acquisition of reasoning, reflection, abstraction), on the sexual plan (with physiological transformation and identification with one's sexual role) and on the moral and social level (with the expansion of interpersonal relationships and adaptation to new social conditions). It is therefore a period of rapid physiological and psychological changes, of profound rehabilitation of the family, school, work and social life.

The amount and kind of changes during this phase of development are a challenge for the growing adolescent in terms of its psychological functioning and can sometimes be a source of stress, anxiety, discomfort, fear, instability and low self-esteem (De Vit, Der Veer, 1993); therefore, the evolutionary stage preceding adolescence is characterized by a certain emotional reactivity, with rather intense emotional responses. The conquest of an emotional balance during this period represents a critical stage for the formation of adult personality, which risks becoming even more problematic in the presence of such a socially debilitating disorder as stuttering. In fact, in adolescence, the development of identity also derives from socialization processes; is known as in this period of development, the group of peers is increasingly said to be the main point of reference for the adolescent, who seeks out of the family social and emotional support, in an attempt to acquire greater independence and new individuality (Geldard, Geldard, 2009). In the adolescent who stutter the difficulty of language can strongly affect his growth process and threaten

the affective development; for example, social avoidance behavior, being convinced not to be able to adequately express with the group of peers, or in the fear to be refused because of his own disturbance.

Moreover, for some adolescents who stutter participation in school activities can be associated with feelings of distress and anxiety; many young people are convinced that teachers and classmates have negative attitudes and behaviours towards their disorder (Croatto et al., 2008). This could be consistent with the study by Davis and co-workers (2002), who report that children and adolescents with stuttering can experience a significant degree of rejection from classmates, which can increase the difficulties of communication with peers. The negative impact of derision and mistreatment on the self-esteem that the adolescent can develop in himself, is a reason for worsening stuttering, negative emotions, reinforcing the use of avoidance strategies, and slowing progress in therapy (Croatto and collaborators, 2008).

If not helped in this phase of growth, difficult in itself, the teenager who stutter is at great risk of developing in adulthood a compromise of the emotional and relational set-up; this emerges from the numerous studies in which adults with stuttering seem to show higher levels of trait and state anxiety compared to non-fluent peers (Kraaimaat et al., 2002; Ezrati-Vinacour, Levin, 2004; Menzies, 2008).

The assessment of anxiety in stuttering in adolescence requires, therefore, a methodological investigation integrated with the characteristics of the individual, that considers a multiple vision of the problem and that focuses on the adolescent as an evolving person to be valued in the its originality and uniqueness, to be promoted in its complete growth.

The study of the relationship between anxiety and stuttering in adolescents began as a result of numerous experimental evidence in the field of adults in favour of the aforementioned association.

Early research has used anxiety assessment in adolescents as a predictive index of poor treatment outcome and relapse (Hancock and Craig, 1998; Kraaimaat et al., 1988). For example, Hancock and Craig (1998) reported that in a group of adolescents, the only measurement of the percentage of pre-treatment stuttered syllables and, the self-assessment of the post-treatment anxiety level, were factors able to predict the subsequent frequency of stuttering one year after therapy. In a previous study, Craig in Hancock (1996), using state anxiety measures, found that children and adolescents aged 8 to 14, with a moderate or severe level of stuttering, were not more anxious than basic compared to peers who are not stutterers. Thereafter, Hancock and co-workers (1998) examined the long-term effects on state and trait anxiety of three treatments (anxiety was assessed from initiation to two to six years post-treatment) for stuttering in a large sample of children and adolescents aged between 11 and 18. The results showed no significant difference in state or trait anxiety between the two groups at any stage of their assessment.

Following the development of a new conception of anxiety, a contemporary model of this emotional variable believes that state and trait measurements include key components such as anxiety for *social evaluation situations,* for *ambiguous situations and daily routine (Endler, Magnusson, Ekehammar, & Okada, 1976); in the case of people who stutter, communicative apprehension in social situations is relevant,* construct considered central in experience and in the detection of anxiety

in stuttering (Menzies, 1999, 2011). These variables were also evaluated among adolescents who stutter.

Blood and collaborators (2001) examined the fear of communication and the self-perception of communicative competence in a group of fluent adolescents and peers. Overall, the stuttering boys showed a higher degree of concern about communication and lower scores in the perception of their communicative competence. In particular, it turned out that the greatest difference in relation to the fear was related to group discussion situations or to two-party conversation, rather than to public speaking or during a meeting; on the other hand, the latter condition can be anxiogenic even for non-stuttering boys. In the same study there was also a difference between the two groups in the way of perceiving in relation to the ability to speak with strangers, and a significant relationship emerged between the severity of the stuttering, on the one hand, and the high communicative concern and low self-perceived competence, on the other. It is reasonable to think that during adolescence to mediate part of the discomfort due to the disorder intervene a decrease in self-esteem (D'Ambrosio, 2005).

In another study, Davis and others, (2007) investigated state and trait anxiety in a sample of children and adolescents aged 10 to 17 years, including participants with persistent stuttering, other participants who were healed from stuttering and normal-fluent controls. To assess trait anxiety, participants completed the STAI-C (Spielberger, 1973). State anxiety was assessed on a scale that measured fear in four different language situations, such as asking for help in a store, talking on the phone to a friend, talking with a group of friends, and answering a question in class. Overall, trait anxiety was not found to be significantly different between groups, although the

persistent stuttering sample showed higher state anxiety in the three out of four situations than the participants in remission of the disorder, and in the control group.

In the research of Mulcahy et al., (2008), the sample of adolescent stutterers exhibited significantly greater trait and state anxiety and a fear of clinically higher negative evaluations than non-fluent controls. Furthermore, since the state and trait anxiety for the stuttering group clearly correlated with the perception of difficulties in communicative functioning, it was hypothesized that high levels of anxiety may derive from a generalization of negative emotions associated with language situations. As a result, adolescent stutterers are considered more at risk of developing greater levels of anxiety than their fluent peers. This suggests that the increase in anxiety and fear of a negative assessment for people who stutter has the potential to start during "socially difficult adolescent years" (Huber et al., 2004).

As suggested by Menzies and collaborators (1999), through the use of multidimensional measures of anxiety in adolescents who stutter, more consistent results can be obtained than the relationship between anxiety and stuttering. Blood and Blood (2007) used a multidimensional scale of manifest anxiety, RCMAS (Reynolds & Richmond, 2000), in their investigations on anxiety and vulnerability to bullying in stuttering youth and in normal-fluent controls, aged 11 and 12 years. Compared to the controls, the stutterer group showed a significantly higher total anxiety score, and a significantly high score on the scale of social concerns, indicating an increased anxiety about the expectations of others.

Blood and collaborators, (2007), have also investigated the relationship between anxiety and self-esteem in a sample of adolescents with stuttering and fluent peers. Although the scores obtained at RCMAS were within a normal range for the vast

majority of participants in both groups, young people with stuttering, when compared with controls, showed significantly higher levels of total anxiety, but without differentiating themselves from this in other trait anxiety variables, such as social, physiological, and concern variables.

A contribution to the study of psychopathological variables associated with stuttering comes from Gunn and collaborators (2014). Their research has shown that individuals who stutter can manifest psychological problems as early as adolescence. Using a battery of diagnostic tools compatible with the DSM-IV criteria, it was found that 38% of adolescents satisfy at least one diagnosis of mental disorder, a prevalence that is double compared to 19% of normal-fluent adolescents. Furthermore, most of the mental disorders identified in the sample of those who stutter belong significantly more to the category of anxiety disorders, such as social anxiety disorder or separation anxiety disorder. In line with the result of this study is the research carried out by Iverach, O'Brian and colleagues (2009) within the adult population. They found that in a sample of 92 adult stutterers 27% met criteria for a diagnosis of anxiety disorder, compared to only 5.3% of the controls.

Turning instead to the study of the repercussions of stuttering on the adolescent and the consequences of the disturbance of the talk on the family, interesting data come from the recent study by Erickson & Block (2013). The researchers investigated a social and communicative impact of stuttering in a sample of 36 adolescents and their families. Consistent with what emerged in previous studies, most adolescents who stutter (63%) try to hide the disturbance from their interlocutors, experience greater communication apprehension, and finally declare to have been victims of bullying. In addition, 69% of parents report that stuttering has had an impact on the family that

can be classified as moderate, with high levels of emotional tension, family conflicts and difficulties in managing the child's feelings of frustration and sadness due to disfluency. nternal and external behavior was analyzed in preschoolers children who stutter with the aim to investigate anxiety. (see: van der Merwe, Robb, Lewis, & Ormond, 2011), (McAllister 2016). The Participants involved in the experiment were from the Millennium Cohort Study. SDQ was completed by parents for children with age 3 years (n = 173), 5 years (n = 194) and 11 years (n = 170) and it was compared with age-matched non- stuttering controls. Where possible, covariates (gender, maternal education, socio-economic status and verbal and non-verbal ability) in the statistical analyses mirrored those used by Reilly et al. (2013b) in the Early language in Victoria Study (ELVS) (see 2.1), the only other community based study of early stuttering to facilitate comparison across both studies.The analysis of collected data demonstrated clear evidence that the risk of anxiety in stuttering increases with age. Infact, once adjusted for covariates, a significant difference between groups for the SDQ total difficulties scores at age 3 years has been shown. At 5 years of age, an equivalent score of the groups was found for emotional subscale, which is associated with symptoms of anxiety while at 11 years of age, the two groups differed except for the pro-social subscale, a measure of positive behaviours such as being considerate of others and sharing (Goodman, 1998). These findings suggests an earlier onset of emotional and behavioural difficulties associated with stuttering than previously considered. 75 children who stutter (7-12 years) have been compared with 150 gender-matched non-stuttering controls by Iverach et al. (2016) to evaluate anxiety disorders and associate symptoms. Previously, all children who stutter were either receiving treatment for stuttering (80%), or at least once in the past (20%). Online

survey done by children and their parents included: the YODA; the SDQ, the SCAS-C and SCAS-P, the PECK and the SMFQ. According to YODA results, children who stutter received a diagnosis of social anxiety disorder (24% compared with 4%) or they were significantly more likely to have subclinical generalized anxiety disorder (13% compared with 2%) and a diagnosis of any anxiety disorder (32% compared with 11%).While scores on all symptom measures (i.e. SCAS-C, SCAS-P, SDQ, SMFQ, and PECK) fell within the normal range, children who stutter demonstrated significantly higher social anxiety, total anxiety, and internalizing and externalizing problems, compared with non-stuttering controls. As with adults who seek treatment for stuttering, these findings show that clinical samples of children who stutter have a significantly increased risk of social anxiety disorder compared with their non-stuttering peers.A sample of 73 young people 6–18 years was studied by Messenger et al. (2015) to examine social anxiety symptoms. To investigate the impact of age and gender on anxiety, participants were divided into four groups: school-age group (6-11 years) including 18 boys and 5 girls; and adolescent group (13-18 years) including 41 boys and 9 girls. All groups completed the RCMAS. Mean scores on the four RCMAS subscales and total anxiety scores for all groups were within normal limits. However, Lie Scale scores for school-age and adolescent boys were significantly higher than scores on the other three subscales. The authors hypothesized that this was due to the boys attempting to present themselves in a positive light and to conceal their true levels of anxiety, thereby casting doubt on the validity of other responses on the test. The use of multiple respondents when assessing child anxiety, and interpreting findings based solely on child report is

suggested with caution from the authors given high RCMAS Lie Scales scores among children who stutter. Messenger et al. (2015) (Gunn et al., 2013; Iverach et al., 2017)

The correlation between stuttering severity, psychological functioning, and overall impact of stuttering in a clinical sample of 102 adolescents who stutter (11–17 years) was analyxed by Iverach et al (2017). Comparisons were made separately for girls (n = 16) and boys (n = 86), and for younger adolescents (11-14 years, n = 57) and older adolescents (15-17 years, n = 45). Participants completed a battery of speech and psychological measures, including self-reported stuttering severity; Speech Satisfaction Scale (SSAS); RCMAS; CDI, YSR, CBCL and ACES. Scores on these measures were compared with normative data where possible.

Although scores on all measures of anxiety (i.e. RCMAS) and depression (i.e. CDI) were within normal limits, higher self-reported stuttering severity predicted higher anxiety and internalizing problems independently by the age. Emotional functioning was different according to the gender: boys had externalizing problems in the clinical range, and girls had total problems in the borderline-clinical range. Further, in the same vein as findings reported by Gunn et al. (2013) and Messenger et al. (2015), higher Social Desirability score on the RCMAS (Lie Scale) predicted lower anxiety. The analysis of all the data clearly showed the influence of several psychological variables in adolescent that stutter according to the authors' opinion (Iverach et al., 2017 p. 34). In a study designed to investigate anxiety and cognitive bias associated with stuttering, McAllister et al. (2015) administered the SCARED to a clinical sample of sixty-eight children and adolescents (aged 8-18) who stutter and their parents. Participants also completed a computerised measure of attentional bias for angry, happy and sad emotion faces. Authors described cognitive bias as manifesting

in a number of ways, including individuals allocating their attention towards negative stimuli, or selecting a negative interpretation of ambiguous stimuli or events. These biases are believed to maintain anxiety (McAllister et al., 2015).

35 children and 33 adolescents were analyzed separately. Both of groups had inflated rates of anxiety on all subscales of the SCARED, with the exception of generalized anxiety disorder. Particularly 39.4% of adolescents met screening criteria on the panic/somatic subscale, 36.4% with general anxiety disorder subscale, 36.4 % with social phobia subscale that were also significantly biased towards negative (sad) facial expressions. According to McAllister et al. (2015), findings suggest that children and adolescents who stutter may experience a range of anxiety symptoms, not just social anxiety and that anxiety may increase with age. Further, those with social anxiety symptoms are using cognitive bias which may serve to maintain their social anxiety.

Blood and Blood (2015) assessed the psychological health and coping strategies via CISS-A and SDQ, considering a clinical sample of 35 adolescent males (age 14-17 years) who stutter and compared outcomes with 35 non-stuttering controls. Results showed that mean scores on the SDQ were all within normal limits for adolescents who stutter, except for the peer relationship and pro-social behaviors subscales. Further, results across the SDQ subscales were similar for adolescents from both groups, again, except for the peer relationships and pro-social subscales for which the adolescents who stutter received sores indicating greater difficulties. Only differences on the peer relationships were statistically significant. All scores on the CISS-A were within the normal range however there were differences between adolescents who did and did not stutter for the emotion-oriented coping strategy.

In conclusion stuttering in adolescent seems to be not affected by experience psychological health distress although they may be more vulnerable to peer relationships difficulties and poor pro-social behaviors than those who do not stutter.

Recent studies suggest that social anxiety disorder can affect school-age children who stutter (Iverach, Jones et al., 2016). In particular, 24% of school-age children (7–12 years) seeking treatment for stuttering met criteria for social anxiety disorder, compared to only 4% of non-stuttering control children (Iverach, Jones et al., 2016). This suggests that social anxiety disorder in stuttering may develop earlier than previously thought. However, it should be noted that other studies have failed to find heightened anxiety scores in school age children who stutter (Messenger, Packman, Onslow, Menzies, & O'Brian, 2015; Smith et al., 2017).

In the light of these studies, adolescents with stuttering do not seem to be predisposed to express trait anxiety, rather they show high levels of state anxiety, circumscribed to speech situations and the fear of receiving a negative evaluation. While being clear that the state of stuttering does not automatically result in high anxiety, it is equally evident that the stuttering people are more exposed to adverse interactions, and sometimes to hostility, precisely because of their language (D'Ambrosio, 2005). It is not surprising, therefore, that in a phase of growth so delicate for every individual, young people with stuttering can develop anxiety and insecurities with respect to their verbality. Although the presence of concerns about stuttering does not inevitably lead to the presence of anxiety, it is important to evaluate and know how to manage the presence of this emotional condition in adolescents that stutter, and possibly evaluate the presence of a comorbidity between the disorders.

At the end of this review on the research carried out in the context of the relationship between anxiety and stuttering it would be useful and interesting, to deepen through further studies this relationship in the pre-adolescent development phase. At this stage of growth, discomfort only reaches clinical relevance in a part of the cases, but, much more frequently, it manifests itself in the form of simple worries or low self-esteem and / or social self-efficacy, not related to a real psychopathology, but which however affect the quality of life of the pre-adolescent and if not considered in treatment, may be precursors of possible developmental disorders.

CHAPTER THREE

STUTTERING AND ANXIETY: A MULTIPLE PERSPECTIVE ON THE PSYCHOLOGICAL FUNCTIONING OF PREADOLESCENTS WITH STUTTERING

3.1 Abstract

The general aim of this study is to examine if the presence of a chronic disorder such as stuttering is associated with an increased risk for development of psychopathological symptoms during the adolescence and to evaluate the emotional and behavioral functioning of preadolescents who stutter. Specifically, the following study aims to investigate the presence of anxiety symptoms, emotional problems and behavioral disturbances in a sample of pre-adolescents who stutter and compared these to data from non-stuttering controls and from normative data.

Participants were 19 preadolescents who stutter and 19 pre-adolescents who do not stutter aged 11-14 years (% 26 girls) and their parents. A combination of self and parent-report questionnaires was used. Regression analyses indicated that pre-adolescents who stutter exhibit higher levels of negative attitude toward speech, higher level of emotional reaction in communication situations, and higher scores on withdrawn behaviors than their non-stuttering peers. No differences were found between other variables. Stuttering was not associated with higher levels of anxiety. Moreover, results indicate that preadolescents who stutter with high level of attentional problems and low levels of causal attribution to effort were more likely to

show higher levels of anxiety symptoms than their non-stuttering peers. According to parents' report, pre-adolescents who stutter manifest more social difficulties in social situations, affective domain and showed higher post-traumatic stress and symptoms than pre-adolescents who do not stutter.

The nature of correlations was consistent with the finding that in in these two groups psychological differences exceeded similarities. Specifically, among pre-adolescents who do not stutter higher levels of emotional reaction toward speech situations and higher levels of negative communication attitude were found associated with greater number of emotional and behavioral problems. Conversely, among pre-adolescents who stutter higher levels of negative communication attitude and emotional reaction toward speech have strong and positive association only with poorer levels of social self-efficacy and self-esteem.

Moreover, examining possible differences in parent-child disagreement on youth emotional and behavioral problems, our results suggest that the largest differences in parent-child self-report were found for children with stuttering.

The findings highlight the importance of psychological assessment of different components of psychopathology for people who stutter in early adolescence and underscore the complex processes involved in the relationship between anxiety and stuttering, which seems results from an intricate reality made of cognitive factors and personal characteristics.

3.2 Background

In recent years, it has been increasingly clear that stuttering is a multidimensional syndrome that involves affective, behavioral and cognitive components; speech disruption is, therefore, one component of the disorder (Guitar, 2013). Developmental stuttering may be associated with social and emotional consequences across the lifespan such as negative mood states, distress, reduced feelings of self-efficacy, impairments in social interactions and lower quality of life (Craig, Blumgart, & Tran 2009). In this regard, a growing body of research has demonstrated a higher rate of anxiety disorders, particularly, social anxiety disorder among adults who seek treatment for stuttering (Craig et al., 2014; Menzies et al., 2008;). Furthermore, a dramatical increase odds of a range of psychiatric disorders was found among people who stutter, in comparison to healthy controls (Blumgart, Tran, & Craig, 2010). Despite the evidence of social anxiety disorder among stuttering adults, studies on the relationship between anxiety and stuttering in early age have produced mixed findings and discrepancies on levels of anxiety found in children who stutter when compared to non-stuttering peers (Blood & Blood, 2007; Craig et al., 1996; Iverach et al., 2016). Furthermore, we still know very little about the onset of anxiety disorders in children and adolescents who stutter, although this identification would lead to a clinical implication for the management of both disorders across the lifespan. Smith et al. (2014, 2017) tried to fill this gap by publishing an important review of the research evidence relating to anxiety for children and adolescents who stutter. Specifically, research on pre-school children who stutter did not found a consistent pattern of evidence that pre-school children who stutter manifest temperament markers of anxiety disorder. However, a recent study by McAllister (2016) showed that

preschoolers, as young as three years of age, report significantly more difficulties compared to non-stuttering controls. It suggests that onset of emotional and behavioral difficulties associated with stuttering may start sooner than previously considered. As regard to childhood and adolescence, research evidence indicates that stuttering may expose children and adolescents who stutter to higher risk to experience negative consequences such as bullying, teasing, social rejection, and low self-esteem, making them more vulnerable to anxiety disorders (Blood et al., 2011; Hearne, Packman, Onslow, & Quine, 2008; Smith, Iverach, O' Brian, Kefalianos, & Reilly, 2014). In 2007 Blood, et al. administered to 18 stuttering young people and 18 non-stuttering controls (aged from 12 to 18 years) the RCMAS scale. A significant discrepancy was found between the groups. The stuttering group presented anxiety within normal limits but higher than age-matched, non-stuttering controls. One year later Mulcahy et al. (2008) investigated social anxiety in 19 stuttering adolescents and 18 age-matched, non-stuttering controls (aged from 11 to 18 years), using the State-Trait Anxiety Inventory for Children (Spielberger & Edwards, 1973). Results showed that stuttering group had state, trait and social anxiety significantly higher, when compared with non-stuttering controls but the anxiety levels where in the average range. Subsequently, Gunn, et al. (2013) investigated anxiety in 37 stuttering adolescents (aged from 12 to 17 years) using a battery of assessments including the RCMAS-2. The 38% of stuttering adolescents received at least one diagnosis of a mental disorder, with the majority of these diagnoses involving anxiety. More recently, Messenger et al. (2015) administered the RCMAS to 23 school-age boys and girls and to 50 adolescent who were seeking treatment for their stuttering. The participants ranging in age from 6 to 18 years. The authors found that all mean scaled scores on the four RCMAS subscales

and Total Anxiety scores were within normal limits. Only the scores on the Lie Scale were significantly higher than scores on the other three subscales. The adverse impact of stuttering on the youth's psychosocial functioning was confirmed by the inflated diagnosis of any anxiety disorder among children who stutter compared with non-stuttering controls (Iverach, 2016). Furthermore, significantly elevated anxiety symptoms were found in youths who stutter than non-stuttering peers (Blood & Blood, 2007; Davis, Shisca, & Howell, 2007, Mulcahy, Hennessey, Beilby, & Byrnes, 2008) or than normative data (Mc Allister, 2015). However, other studies found no significant differences between stuttering and controls participants (Craig et al., 1996), or at least stuttering groups' anxiety scores fall within normal limits (Blood & Blood, 2015; Iverach et al., 2017; Messenger, Packman, Onslow, Menzies, & O'Brian, 2015). In this connection, an important issue was the presence of high RCMAS Defensiveness scale scores among children and pre-adolescents who stutter with a low level of anxiety (Gunn et al., 2013; Iverach et al., 2017; Messenger et al., 2015). This evidence emphasizes the importance of utilizing multiple informants and interpreting findings based solely on child report with caution. In summary, as suggests by Smith et al., (2014) anxiety tend to increase over time until it exceeds normal limits until adulthood in which the risk of chronic anxiety has a high likelihood of occurring. At the same time the authors concluded that the conflicting findings among existing studies limits to date conclusions being drawn with this population, and it follows that more research is needed to fully understand the nature of the relationship between anxiety and stuttering in early age.

3.2.1 The present study

The age range of preadolescence is not clearly defined in the literature and vary from one research to another, usually ranging from 9 to 13 years of age. Nevertheless, preadolescence is accepted as a unique and crucial developmental stage in developmental psychology (Hershel, 1983). In the present study we focused on early adolescents aged between 11 and 14 years of age all attending public middle schools in Italy. As young adolescents are changing from an elementary to a middle school environment, they are also changing hormonally, mentally, and physically. Indeed, the onset of puberty brings many changes at the physical, neurological, cognitive, emotional and behavioral levels (Dahl, 2004). In addition, due to the growing importance of peers and social interactions, early adolescence is considered a crucial time to form new peer groups, gain acceptance and develop social competence skills (Andersen & Teicher, 2008). These developmental processes during preadolescence may be even more complicated for youths affected by stuttering. Indeed, in addition to the emotional turmoil typical of preadolescence, youths with stuttering may have additional obstacles posed by their verbal limitations. Such significant changes and the new challenges can have an impact on future mental health, and evidence points to preadolescence as a critical time for the onset and development of internalizing and externalizing problems (Andersen & Teicher, 2008). Thus, the study of risk and protective factors to socio-emotional adjustment becomes crucial at this developmental stage with preadolescent who stutter, since it represents a very sensitive developmental time when to implement potential prevention and intervention programs to promote psychological well-being.

Hence, the main purpose of this current study was to investigate if the presence of a chronic disorder such as stuttering is associated with an increased risk for development of psychopathological symptoms during the childhood. Specifically, we examined the following specific aims:

1) To investigate whether the presence of a chronic disorder such as stuttering is associated with an increased risk for development of psychopathological symptoms during the preadolescence.

Specifically, it was examined if there is a differential effect of stuttering on anxiety levels and psychopathological symptoms in pre-adolescents with and without stuttering. We compared anxiety symptoms, emotional and behavioral functioning, as well as variables related to speech, between preadolescents with persistent stuttering aged 11 to 14 years and non-stuttering peers. On the basis of theory and empirical research (McAllister, 2016), we expected that differences in psychopathological symptoms between preadolescents who do and do not stutter may emerge. However, stuttering preadolescents' symptoms, though more elevated, could score in the normal range. Additionally, we predicted that the presence of stuttering would be positively associated with increased difficulties related to communication and social contexts, due to the significantly increased risk for stuttering youths of developing social anxiety disorder (Iverach, et al., 2016).

2) To explore which potential emotional and socio-cognitive variables contribute to modulate the anxiety response among preadolescents who stutter and non-stuttering controls. Specifically, we examined the possible associations between risk (psychopathological symptoms, negative reactions towards speech) and protective factors (self-concept, attributional style) with youths' socio-emotional functioning. We

hypothesized that high rates of self-concept, and the presence of internal attributions would be associated to low levels of psychological distress, especially among preadolescents who stutter, who are generally more vulnerable to the negative effects of stuttering (Chun, Mendes, Yaruss, & Quesal, 2010) and could benefit the most from the advantages of being empowered youths.

3) To investigate the inter-rater agreement between parents and preadolescents reports on youths' psychological functioning using cross-informant scales, for stuttering and non-stuttering group.

It was considered important to address this issue because of several research evidences on both stuttering (Gunn et al., 2014; Messenger et al., 2015) and non-stuttering youths (Logan, Claar and Scharff, 2008), that adolescents are likely to provide a more positive view of themselves, giving socially desirable responses. Furthermore, the reliability of children's self-reported symptoms via questionnaires tends to vary widely, influenced by such factors as the child's age, gender, cognitive ability (Schniering, Hudson, & Rapee, 2000). For these reasons, youths' self-report measures were supplemented with information from multiple informants (parents) in order to avoid that the comprehensive understanding preadolescent's psychological status have less inaccurate or misleading responses. We examined whether the patterns of association among youths and their parents are similar or varied across the group membership (experimental vs control). Specifically, we hypothesized that the differences between youths' and their parents' responses would be greater in the stuttering group than control group, due to evidence that adolescents who stutter may be reticent to provide an honest account of symptoms relating to their psychological status (Blood et al., 2003; Erickson & Block, 2013).

4) To investigate the perception of stuttering severity and the impact of this perception on both the preadolescents and their parents. This was considered important because not only the preadolescents but also the parents may experience stuttering as upsetting and distressing. Some feel anxious, worried, frustrated, helpless, or guilty and reported affective reactions, which are typical of parents who have a child with difficulties (Langevin et al., 2010; Plexico & Burrus, 2012). Although there has not been a study evaluating quality of life in parents of preadolescents who stutter, it is clear that having a child who stutter can be a challenging experience that requires increased attention, effort, and patience (Plexico & Burrus, 2012). Parents may experience negative emotional reactions associated to stuttering such as anxiety and worries because of its high variability, persistent nature, and increasing complexity over time.

3.3 Method:

3.3.1 Participants and recruitment

Preadolescents with stuttering

Preadolescent who stutter and their parents were recruited in the north-eastern region and south region of Italy. They were selected via non-probability, convenience sampling techniques, where subjects are selected because of their convenient accessibility and proximity to the researcher (Bryman, 2004). In the first phase of recruitment, the research project was presented to speech-language pathologists and psychologists who work with clients who stutter. Various strategies had been used to recruit professionals: direct contact by phone call, text message, email advertisements; presentation of the study during speech therapy courses and by word-of-mouth.

Professionals were required to analyze their clinical patient data to determine if there were potential families to enroll in the study.

The interested families gave consent to be contacted by researcher who clarify them study's purpose, method of investigation and criteria for eligibility. Then, families confirmed by e-mail or via phone their willingness to participate and successively research sessions were scheduled. Parental consent forms and participant assent forms were completed prior to the beginning of the study.

Participants were required to meet the following eligibility criteria before being accepted to the study: (1) to be pre-adolescent between 11 and 14 years old, inclusive, attending secondary education (grades 6-8);

(2) to be Italian and have functional written and spoken Italian, in order to minimize the misinterpretation of the questionnaires;

(3) to have e diagnosis of early onset disfluency disorder already confirmed by a speech-language pathologist or measured through a specific psychometric test for stuttering during a face to face assessment;

(4) to present developmental stuttering before 12 years of age (because stuttering typically onsets before age 12);

(5) onset of stuttering was not due to known psychological or neurological causes;

(6) to indicate no previous speech or psychological treatments for stuttering in the 6 months prior to commencement in the present study;

(7) to have no current and past psychiatric disorders. Specifically, participants were excluded if they had organic brain damage, mental retardation, pervasive developmental disorder or psychosis, Tourette's syndrome, exposure to severe trauma, suicidal ideation, psychosis;

(8) no current use of psychotropic medications.

Of the seventh participants initially contacted 12 (17%) were ineligible because they recovered from stuttering, were outside the target age range or attended a treatment; and 58 (82%) were eligible as persistent stuttering. Among those eligible, 38 (54%) refused participation and 19 (27%) were enrolled.

The sample consisted 14 (73) male and 5 (26%) females. Youths ranged in age from 11 to 14 years with a mean age of 12.15 years (S.D. = .95). The ratio of preadolescents who stutter males to females was 2.8:1 (males n° = 14, females n° = 5) which is consistent with the ratios typically seen in the two populations of school-aged children (Mansson, 2000; Yairy & Ambrose, 2013). The mean onset of stuttering was reported to be 4.6 years of age (S.D. = 2.5).

The majority of participants 16 (84%) were enrolled in previous treatment for their stuttering but not within the past 6 months, while 3 (16%) did not receive any treatment for stuttering before the study.

For preadolescents who stutter, diagnosis of stuttering was confirmed through the Stuttering Severity Instrument-4th Edition (SSI-4; 2009). According to SSI-4, N 10 (53 %) participants presented very mild stuttering, N 6 (32 %) were mild, N 3 (15 %) were moderate.

Among parents, 19 mothers (100 %) and 17 fathers (89 %) completed the questionnaire. The majority 16 (84 %) of adolescents were from two-parent families, whereas 3 (15%) were from single-parent (including persons permanently separated from a spouse, divorced, or widowed) families.

Preadolescents without stuttering

Preadolescents who do not stutter and their families were recruited in the north-eastern region of Italy. Children were recruited from one of the public middle schools in Veneto contacted to request their participation in the research project. For this purpose, firstly, a letter was sent to the headmasters of randomly selected middle schools (urban and suburban) located in Padua city, requesting their collaboration.

Among the various schools contacted, one school principal indicated willingness to have his school involved in the research project. A meeting was then organized with the teaching staff in order to present the project and plan the days of data collection.

Successively, a cover letter and consent form were sent to parents via the students informing them about the research protocol. Parents who expressed an interest in the study were asked for a signed informed consent, and preadolescents were asked for additional verbal consent prior to the beginning of the study.

Controls participants were eligible to be included in this studio if they met the following criteria:

(1) to be pre-adolescent between 11 and 14 years old, inclusive, attending secondary education (grades 6-8);

(2) to be Italian and have functional written and spoken Italian, in order to minimize the misinterpretation of the questionnaires;

(3) to have no history of learning, language or speech disorder at any point in their development;

(4) no previous speech or psychological treatment in the 6 months prior to commencement in the present study;

(5) to have no current and past psychiatric disorders. Specifically, participants were excluded if they had organic brain damage, mental retardation, pervasive

developmental disorder or psychosis, Tourette's syndrome, exposure to severe trauma, suicidal ideation, psychosis;

(6) no current use of psychotropic medications.

Thus, following the above criteria, a total of 23 cases (16.5%) were eliminated, and the final analyses were conducted with 73 (63%) early adolescents and 60 (57%) parents. Successively, 19 participants were randomly selected from this larger group and matched by grade, gender, ethnicity (all Caucasian) and approximate age with the 19 participants who stutter. Preadolescents without stuttering ranged in age from 11 to 14 years with a mean age 12.31 (SD = 1.10); no significant difference was observed between the two age groups U = (166), z = -.427, p > .05. Among non-stuttering groups' parents, 19 mothers (100 %) and 17 fathers (89 %) completed the questionnaire. The majority (of adolescents were from two-parent families, whereas (were from single-parent (including persons permanently separated from a spouse, divorced, or widowed) families.

Information on socioeconomic status (SES) of all the participants was collected using Hollingshead Four Factor Index of Social Status (1975). Hollingshead Index raw scores range from 8 to 66, with higher scores reflecting higher SES. Significant difference in SES was found between stuttering [(Mdn = 40,1 (moderate category) range 13,5-58)], and non-stuttering group [Mdn = 26 (low category), range 11-48)] suggesting that preadolescents with stuttering were more likely to report medium-high SES than preadolescents without stuttering U = (91,50), z = -2.599, p < .05, r = - 0.42.

3.3.2 Procedure

This study met the ethical values required in research with human beings, respecting the fundamental principles (informed consent and right to information, protection of personal data and guarantees of confidentiality, non-discrimination, and freedom to leave the study at any stage). The study protocol and procedures were approved by the Ethical Committee for the Psychological Research of the University of Padova (protocol n° 1934, 5-25-2016). The research carried out followed the phases described below.

Data were collected between November 2016 and January 2018. Participants in the stuttering group were assessed individually in a silent room (preadolescent and researcher) in the Department of Developmental Psychology and Socialization on the Padua University's campus or in a quiet therapy room of a speech therapy center. Participants who stutter were tested in two separate sessions approximately 90 minutes each within a week-time distance. In the first session, participants who stutter were audio and video recorded while completing a reading and a conversation task. Each participant was audio- and video-recorded during an oral reading task according to his or her grade level ("Nuove Prove di lettura MT"; Cornoldi & Colpo, 1998) and during a spontaneous conversation-speaking task. To minimize possible familiarity effects, stuttering severity was measured during the first session, before the entire administration. As regards reading task, the following texts were assigned: sixth grade, "Sogni a Hiroshima" ("*Dreams in Hiroshima*,"); seventh grade", Immigrati dal terzo mondo (*Immigrants from the third world*)" eighth grade, "Città da salvare" ("*Cities to save*,"). For the spontaneous speaking task, participants were informed that they should speak for at least 8 min (about school, holiday, friends, family), at a

normal rate and loudness without using any fluency enhancing technique. A spontaneous speech sample of at least 300-syllables and a reading of a standard 300-syllable text were collected for each participant using a camera phone. The camera was positioned approximately 2 m from each participant and situated to obtain a clear video image of the participant's body movements. Recordings were conducted with only the researcher and the preadolescent present in the room. Preadolescents completed then a series of self-report measures. During the second session, participants completed a task on a laptop computer and successively they compiled a series of self-report questionnaires. Participants in the non-stuttering group were tested in two sessions on different days, approximately 90 minutes each within a week-time distance. Participants were informed that their involvement was voluntary and that their responses would be confidential. In the second session, students were individually assessed in a quiet room outside the classroom setting where they completed a computer task and then a second set of questionnaires. The investigator remained in the room while participants completed their questionnaires to monitor their activity and reply questions. Parents of both groups were asked to complete a questionnaire packet at home. The administration method of questionnaires was conducted in the same order for two groups with the only exception of Stuttering Severity Instruments (SSI-4; Riley, 2009) targets stuttering group.

3.3.3 Measures

Preadolescents Questionnaires

Objective measure of Stuttering Severity

To examine the relationship between stuttering severity and psychological measures in preadolescents who stutter, the SSI-4 (Riley,2009) was administered only to youth with stuttering. This standardized instrument calculates stuttering severity across three parameters: stuttering frequency (as measured by percentage of syllables stuttered), stuttering duration and the amount of physical concomitants. According to the instructions for the SSI-4, percent stuttered syllables were recorded for pre-adolescents who stutter via a reading and speaking task and converted to the scale scores of 2-18. Higher stuttering frequencies correspond to higher task scores. Duration of stuttering were evaluated by averaging the three longest stuttering events timed to the nearest 1/10th of a second and converted to scale scores of 2-18. Longer average durations correspond to a higher scaled score. The physical concomitant score of the SSI-4 is measured by clinical judgments of physical and audible signs of struggle during speech. It is comprised of four categories: distracting sounds, facial grimaces, head movements, and movements of the extremities. All of these four categories is classified in terms of "levels of distraction" on a scale of 0 (none) to 5 (severe and painful looking). Each subcomponent is then added together for a total physical concomitant score ranging from 0 to 20. These three parameters are summed to provide a total overall score, which is then converted to a final severity rating (very mild, mild, moderate, severe, and very severe).

Subjective measure of Stuttering Severity and Its Impact

The use of self-rating scale of stuttering severity was explored in order to investigate the association between the subjective assessment of stuttering rate (PSS) with the objective measurement of stuttering and psychological measures.

Specifically, preadolescents who stutter received a score sheet where they were asked to self-assess their stuttering rate. Furthermore, they were asked to self-evaluate worries associated to their stuttering rate (WSS). These two judgments were based on a 5-point Likert scale ranging from 0 (Not at all) to 4 (Extremely).

Cognitive and affective domains of speech

The Behaviour Assessment Battery (BAB; Brutten and Vanryckeghem, 2007), is a multidimensional collection of self-report measures that highlight the affective, behavioral, and cognitive reactions of children and adolescents toward speech. Specifically, it includes three subscale which are addressed to specific dimensions of speech: the Speech Situation Checklist for affective dimension (Emotional Reaction and Speech Disruption), Behavior Checklist for behavioral, and Communication Attitude Test for cognitive. This evidence-based battery showed to differentiate individuals who stutter from those who do not, underlining the utility of this instrument during diagnostic and therapeutic determinations for people who stutter. The BAB has been internationally investigated and has shown to be a reliable and valid test procedure (Gačnik, 2014; Johannisson et al., 2009; Kawai et al., 2012). For the Italian context, normative data were provided for population from 6 to 16 years, showing good psychometric properties (Bernardini, Cocco, Zmarich, 2017). In the present study we focused only on the cognitive (CAT) and affective (ER) dimension of speech.

The Communication Attitude Test (CAT) uses 30 items, with a yes/no answer format, investigating what children and adolescents think about their speech abilities (e.g., I do not talk right) and how they perceive themselves as a good/bad oral communicator

(e.g., I am not a good talker). Of the 30 CAT test items, the responses indicative of a negative attitude are scored as 1 point. Those reflecting a positive attitude toward speech are scored 0. The total possible score on the CAT ranges from 0, indicating an absence of negative attitude, to 30, suggesting presence of negative attitude towards communication.

The Speech Situation Checklist-Emotional Reaction (SSC-ER) is a 40-item questionnaire designed to measure the amount to which specific speech situations are associated with negative emotional response. Communication contexts under survey include those in which the speaker has relatively flexibility in word choice (e.g., talking with parents, arguing with friend) and others in which the speaker has restricted word choice (e.g., giving one's name, spelling word). The ER is a five-point scale anchored with 1= not afraid, and 5 = very much afraid. The score can range from a low of 40 to a maximum of 200. High scores indicate strong emotional reactions toward speech situations. According to the normative data, for both CAT and ER, a score of two or more standard deviations above the mean of the general population is considered to be atypical. In the current study CAT demonstrated good internal consistency, (α = .87; CI: .83-.90), whereas the Emotional Reaction obtained an excellent reliability (α=.92; CI: .90-.94).

Anxiety

The Italian version of the Revised Children's Manifest Anxiety Scale-Second Edition (RCMAS-2; Reynolds and Richmond, 2008; Italian version by Scozzari, Sella, & Di Pietro, 2012) was administered to assess the level and nature of anxiety symptoms experienced by preadolescents. The RCMAS-2 is a 49-item self-report inventory that

uses a dichotomous (yes/no) response format, suitable for young people aged between 6 and 19 years. It includes two validity scales, (Inconsistent Responding Index, Defensiveness) and three subscales (Physiological Anxiety, Worry, and Social Anxiety), as well as a Total Anxiety scale. The Inconsistent Responding Index (9 items), assesses inconsistency in responses to nine pairs of similar items. High scores on this scale suggest greater likelihood that the child or adolescent are responding in a careless, random manner or without pay close attention to the item's content. The Defensiveness Scale (9 items) assesses individual's tendency to respond to questionnaire in a defensive manner (e.g., "I am always good") and thus to present himself in a favourable light (as an indicator of social desirability). High scores on this scale suggest a high level of psychological defensiveness. The RCMAS-2 provides scores for three separate subscales: The Physiological Anxiety subscale (12 items), investigates somatic manifestations of anxiety such as nausea, sleep problems, tiredness and headaches (e.g., "Often I have trouble getting my breath"). The Worry subscale (16 items) measures obsessive concerns, negative affects about ill-defined environmental threats/pressure as well as fears of being emotionally isolated (e.g., "I often worry about something bad happening"). Finally, the Social Anxiety subscale (12 items) assesses children's concerns regarding academic and social performances ("I worry about making mistakes in front of people"). The Total Anxiety scale is obtained by summing the scores of the last three subscales, higher scores indicate more severe symptoms. A T-scores one standard deviation above the mean on the clinical scales ($T > 60$) suggests clinically-significant levels of anxiety. The RCMAS-2 has shown satisfactory psychometric properties amongst both international countries (Bidjerano, 2006; Gorayeb & Gorayeb, 2008; Turgeon & Chartrand, 2003;)

and Italian context. Specifically, further information about Italian version, with sample characteristic, scoring, reliability and convergent validity can be found in Scozzari, Sella, and Di Pietro (2012). In the present study, Cronbach Alphas for the RCMAS-2 Total Anxiety scale was good (α=.89; CI: .85-.92), as well as for the Worry (α=.81; CI: .76-.87) and the Social Anxiety subscales (α =.80; CI: .71 -.86). Defensiveness (α=.40; CI: .20-.58) and the Physiological anxiety subscales (α=.62; CI: .48-.74) showed instead a weaker internal consistency.

Psychological difficulties

Preadolescents' behavioral and social competency profiles were collected through the Italian adaptation of Achenbach System of Empirically Based Assessment-School Age Forms (ASEBA-SCH; Achenbach & Rescorla, 2001; Frigerio, Cozzi, Pastore, Molteni, Borgatti, & Montirosso, R. 2006). The ASEBA-SCH is the most commonly-used scale for rating juvenile behaviour, widely used both in clinical and research settings, also during adolescence (Gatta, Dal Santo, Rago, Spoto, & Battistella, 2016; Van Meter, Youngstrom, Youngstrom, Ollendick, Demeter & Findling, 2014). This is an assessment for students aged 6-18 years. In the present study we considered the youths form completed by the adolescents (Youth Self-Report; YSR, 11-18 age), and the parents forms filled by the preadolescent's parents (Child Behavior Checklist; CBCL). Both questionnaires are organized into similar scales and comprise two different sections.

The first unit assesses social competences and adaptive functioning. Specifically, it includes 20 items scored from zero to four which provide information about preadolescents' participation in general activities (sports, hobbies), social interaction

patterns (friendships, family relationships, ability to play and work alone) and school functioning (performance in academic subjects and school problems). Lower scores in this section indicate greater degrees of adaptive functioning problems.

The second one is composed of 112 items for YSR and 113 items for CBCL investigating social, emotional and behavioral difficulties over the previous 6 months. Answers can be scored on a three-point scale ranged 0 (not true), 1 (somewhat or sometimes true), 2 (very true or often true). The items provide scores for eight syndromes subscale (Anxious/Depressed, Withdrawn/Depressed, Somatic Complaints, Social Problems, Thought Problems, Attention Problems, Rule-Breaking Behavior, and Aggressive Behavior). These are empirically derived syndromes, originally obtained through factor analysis, however, not earmarked for psychiatric diagnoses. Furthermore, items from the subscales were grouped to form three broad-band scales: Internalizing Behavior (anxiety, depression, withdrawal, somatization), Externalizing Behavior (aggressive and rule-breaking behaviour) and Total Behavior Problems by summing the Internalizing and Externalizing Scales. The battery items can also be coded into rationally derived DSM-oriented scales which are consistent with specific diagnostic categories from the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV). The DSM-oriented scales derived are: Affective Problems (items rated as very consistent with Dysthymia and Major Depressive Disorder); Anxiety Problems (items rated as very consistent with Generalized Anxiety Disorder, Separation Anxiety and Specific Phobia); Attention Deficit/Hyperactivity problems (items rated as very consistent with Inattentive and Hyperactive-Impulsive types of ADHD); Conduct Problems; Oppositional Defiant Problems; and Somatic Problems (items rated as very consistent with Somatization Disorder and Somatoform

Disorder) 5. Even scores in the clinical range for specific DSM-oriented scales are not directly equivalent to a DSM diagnosis, high scores in specific DSM-oriented scales suggest problems in specific areas and identify children that deserve further mental health evaluation to confirm the need of psychiatric and/or psychological assistance. Scores on the scales are reported as T-scores having a mean of 50 and a standard deviation of 10 with T-score of greater than 60 to indicate clinical impairment. As far as the psychometric qualities of the questionnaire were concerned, the results regarding the internal consistency- Cronbach' Alpha- showed, overall, suitable values.

Self-cognition

Social Self-efficacy

Social self-efficacy was measured using the Children Perceived Self-Efficacy (CPSE; Bandura, 1990), a scale developed to measure different domains relevant to children and preadolescents from 9 to 17 years. This 37-item scales contains three subscales: Perceived Academic Efficacy, Perceived Social Efficacy, Self-Regulatory Efficacy. In the present study we focused only on the Perceived Social Efficacy (PSE) of preadolescents. This scale assesses participant's ability to perform in groups situations, to produce successful social interactions and manage interpersonal conflicts. It includes 13 items (e.g., "How well can you ...": "express your opinions when other classmates disagree with you" and "stand up for yourself when you feel you are being treated unfairly?") on a 5-point Likert scale from 1 (= not at all well) to 5 (= very well). A sum of all scores yields a total score that ranges from 25 to 125 with higher scores indicate higher levels of social self-efficacy. The Italian validation of PSE has been devised by Pastorelli and Picconi (2001), confirming the good psychometrics

quality of the instrument. According to the classification scheme used by authors, self-efficacy score ranges were classified in very low (13-48), low (49-53), medium (54-56), high (57-59) and very high (60-65) ranges. In the present study, a good Cronbach alpha coefficient was found (α=.87; CI: .83-.90).

Attributional Style

The attributional style questionnaire (ASQ; De Beni and Moè, 1995) was used to assess participants' attribution style, targeting the causes of success or failure in cognitive tasks. ASQ was designed for participants from 6 to 18 years, and includes 24 hypothetical situations of daily or school life which children and adolescents may have encountered. Half the situations presented are related to successful outcomes (e.g., "Your speech was been appreciated by your friends: why? a. I was lucky; b. I applied myself; c. it was easy; d. I am good at this; e. someone helped me") while the other half describes failures (e.g., "You have made many mistakes in your homework: why? a. I did not apply myself; b. nobody helped; c. it was too difficult; d. I usually have bad luck; e. I am not good at this"). For each of the 24 everyday situations described on the questionnaire, participants are asked to choose three of five possible causes (effort, ability, task, luck and external help), ranking them in order of importance. The nature of answers was based on three dichotomous conceptual dimensions of causes: internal vs external to the person; stable vs instable over time and controllable vs uncontrollable by the subject. Specifically, the possible events of success and failure could be attributed to internal, controllable, unstable cause (personal effort or lack of effort); to internal, uncontrollable, stable cause (ability or non-ability); to external, uncontrollable stable cause (the easiness or difficulty of the

task), to external, uncontrollable, unstable cause (good luck or bad luck); and to external, unstable, controllable cause (presence of help or lack of help). A dimensional scoring is obtained by the sum of scores across the five scales (effort, ability, task, luck and external help) for both successful and unsuccessful situations. The attributional questionnaire manual described the scales as good psychometrics properties, both regarding reliability and validity. The present study has revealed good Cronbach's alpha reliability results for personal effort = .81 (CI: .75 -.86), lack of effort = .70 (CI: .40 -.78), ability = .73 (CI: .65 -.80), inability =. 72 (CI: .63-.80), good luck = .82, (CI: .77 -.87) and bad luck = .74 (CI: .67-.81) scales. Fair values were obtained for easy task = .44 (CI: .30 -.60), difficult task = .48 (CI: .30-.62), presence of help = .61 and lack of help = .55 (CI: .40 -.67) scales. According to the authors' ASQ, low levels of reliability are due to the low number of items considered to measure the internal consistency of each scale, equal to n° = 12.

Self-esteem

Participants' self-esteem was measured using the Multidimensional Self-Concept Scale (MSCS; Bracken 1992) in its Italian adaptation (Bergamini and Pedrabissi, 2003). MSCS consists in 150-items, constructed as statements (74 positive and 76 negative), for children and adolescents between the age of 9 and 19. Participants are asked to rate their agreement with the items on a 4-point Likert scale ranging from 4 (absolutely true') to 1 (absolutely not true') for items of positive valence (e.g. "I feel confident in myself") and ranging from 1 to 4 for items of negative valence (e.g. "I feel like a failure"). High scores indicate a more positive self-concept for all scales. The MSCS covers six specific areas of self-concept (Social, Competence, Affect,

Family, Academic and Physical) which summed provide a global score of self-esteem. In detail, the Social scale investigates self-perceptions related to the interpersonal interaction and the level in which such relationships occur in a positive manner (e.g.: "I receive a lot of phone calls from my friends". The Competence scale gives information about the amount to which subjects are confident to manage different situations in their own environment (e.g.: "I don't seem to have any control of my life"). The Affect scale examines the self-evaluation about the ability to describe and regulate one's own emotional reactions (e.g.: "I'm not as happy as I seem"); the Academic scale surveys students' self-confidence within the academic context and with respect to different situations connected to it (e.g.: "I'm not very good at organizing my study"); The Family scale assesses subject's self-image within the family context, where support, safety and education should be provide (e.g.: "My family is one of the most important things in my life"). The Physical scale indicates the perception confidence of self-image of one's own body and includes comparison with the physical characteristics of pairs (e.g.: "I would change my appearance if I could"). Global Self-Concept scale provide information on the overall subjects' self-perception. A dimensional scoring is obtained summarizing of scores across the six scales (Social, Competence, Affect, Family, Academic and Physical). The reliability and validity structure of the MSCS scores are widely confirmed by data from large and diverse samples obtained from communities with different languages and cultures (Bracken, 1992; Kausar, and Rashid, 2010; Arip, Saad, Rahman, Salim, and Bistaman, 2013). In the current study, analysis of reliability of the overall scale was excellent with Cronbach $\alpha = .97$ (CI: .96-.98), and excellent to good values for each sub-scale: social = .89 (CI: .85-.92); ability: 0.85 (CI: .81-.94); affective = .90 (CI= .87- .93);

family = 0.92 (CI: .89-.94); academic = .89 (CI: .86-.92); and physical = 0.90 (CI: .87-.92).

Parents questionnaire

Sociodemographic and Developmental History Questionnaire

Preadolescents' parents were asked to complete a questionnaire providing information on family sociodemographic variables (components, age, gender, marital and socioeconomic status) and youths' characteristics (medical history, developmental milestones, life time treatment history, previous diagnosis of learning disabilities, emotional, behavioral, languages or speech disorders).

Socio-Economic Status (SES)

The Hollingshead Four-Factor Index of Social Status (Hollingshead, 1975) was used to determine the student's status socioeconomic position based on the education and job descriptions of caregivers. It assigns numeric values to parental education and occupation and considers the marital status of family system to quantify the SES value. Hollingshead Education scores ranged from 1 (less than seventh grade) to 7 (graduate professional training), and it was measured based on the highest successfully completed qualification. Hollingshead Occupation codes ranged from 1 (farm labourers/menial service workers) to 9 (higher executives and major professionals). Wherever possible, the scales have been keyed to the educational and occupational titles used by Italian classification of occupations and qualifications carried out by the Italian Institute of Statistics (ISTAT; 2013). Values assigned to education levels and occupation prestige were multiplied by 3 and 5, respectively, and summed for a composite score representing SES level, with higher scores reflecting higher SES. The

total social status index ranged from 8 to 66 and was categorized as high (48 to 66), moderate (28 to 47), and low (8 to 27). Cross-national studies have established a good validity and reliability of this instrument across countries, including the Italian context (Blood & Blood, 2007; Cirino, 2002; Norba, 2007)

Subjective measure of Stuttering Severity and Its Impact

To assess parenting subjective responses regarding preadolescents' stuttering severity, both mothers (MPS-MWS) and fathers (FPS-FWS) were invited to assess through a 5-point Likert scale the preadolescent's stuttering rate as well as their personal worries about the stuttering. These two judgments were based on a 5-point Likert scale ranging from 0 (Not at all) to 4 (Extremely), and from 0 (Not at all worried) to 4 (Extremely worried) respectively.

Anxiety and Depression Symptoms

Preadolescent's anxiety and depression symptoms were measured using the parent rating version of the Depression Anxiety in Youth Scale (DAYS; Newcomer, Barenbaum and Bryant, 1994). The DAYS is a brief battery for depression and anxiety screening in children and adolescents from 6 to 19 years. It includes 26 items with three subscales: 13-items measures of Depression (e.g. "seems lonely"); 8-items measures of Anxiety (e.g. "is frightened") and 7-items measures of Social Maladjustment (thinks others dislike him/her". Some items were phrased as positive behaviours others as negative behaviours, with a yes/no dichotomous response format. A sum score for each scale was calculated by summing the responses to the items. Using the normative tables provided in the DAYS manual, standard scores were classified into three levels of severity of symptoms. Scores between 1 and 2 SD above

the mean (115 -129) indicate mild severity. Scores between 2 and 3 SD above the mean (130-144) designate moderate severity. Finally, standard scores greater than 3 SD above the mean (> 145) denote severe severity. In the present study, we used the Italian version of the DAYS which demonstrated good psychometric properties (Ianes et al, 1995). Internal consistency reliability coefficient (alpha Cronbach) for Depression subscale was acceptable = .73 (CI: .66-.73), whereas for Anxiety = .60 (CI: .46-.67) and for Social Maladjustment = .30; (CI: .25-.36) resulted to be questionable and poor, respectively.

Emotional and Behavioral problems

Similarly to the YSR form for youths, the Child Behavior Checklist (CBCL) is an informant-report questionnaire used to detect behavioral and emotional problems in children and adolescents (ages 6-18). It includes competence scales for activities, social relations, school and total competence. Additionally, it is composed of 113 items rated on a 3-point likert scale: 0-not true, 1-Somewhat or sometimes true, 2-Very true or often true. The CBCL allows the score in eight different behavioral domains (anxious/depressed, withdrawn/depressed, somatic complains, social problems, thought problems, rule-breaking behavior, and aggressive behavior); three broad-band scores (Internalizing, Externalizing and Total Problems). These group are also classified into three broad-band factor, Internalizing, Externalizing and Total problems. In addition, the following DSM-oriented scales are assessed consistent with DSM diagnostic categories: affective problems, anxiety problems, somatic problems, attention deficit/hyperactivity problems, oppositional defiant problems, and conduct problems. In 2001, options for multicultural norms were added allowing scale scores

to be displayed in relation to different sets of cultural norms. Scales were also added for obsessive compulsive disorder (OCD) and posttraumatic stress disorder (PTSD).

3.3.4 Data analysis

Cases were eliminated when 20% or more of the items of one questionnaire did not receive an answer. The remaining missing values were imputed for each subject based upon each subject's mean score on the considered measure. Control variables included preadolescents characteristics that were considered potential confounders since they have been found to influence anxiety outcomes in youths (Rapee et al., 2009; McAllister., 2016). Specifically, we included in analyses age and gender as potential covariates. Pre-adolescents' and parents' characteristics were compared for the two groups using descriptive statistics, linear regression models and correlation analysis. Descriptive information for the sample was summarized using means and standard deviations for continuous variables.

At the multivariate level, preliminary linear model analysis considering Group (PWS and PWNS) as predictor was performed to compare scores on self-reports (both preadolescents and parents) between groups. Bayes factor analysis was run to quantify the predictive success of linear models with Group predictor relative to an intercept-only model (R package: BayesFactor) (Morey et al., 2018). Furthermore, a series of linear regression models were conducted to investigate the relationship between stuttering and anxiety. We relied on an exploratory rather than confirmatory model selection approach, based on the assumption that anxiety outcomes are a very complex phenomenon that can hardly be captured in a single confirmatory model.

Specifically, a series of linear regression models were conducted, with total anxiety score (RCMAS-2) as the dependent variable. Group membership (stuttering, non-stuttering) and one protective or risk factor (we selected for each model one socio-emotional/cognitive variable from the questionnaires described above: CAT, SSC-ER, YSR, MSCS, PSSE, ASQ) were considered as independent variables. To assess the potential moderating effects of Group membership and the socio-emotional/cognitive variable on anxiety levels (RCMAS-2), a two-way interaction between the independent variables was included in the model. Therefore, we started from the null model (M0) with no predictor variables other than the intercept, and adding one predictor to each subsequent model, until the two-way interaction model (full model). In all models we controlled for age and gender. (See in Appendix A). The Information Criterion for model selection was adopted using the AICc functions (Hurvich and Tsai, 1989; Richard et al., 2018) of the R packages "bbmle" (Bolker, 2017). Results were interpreted in terms of significance, size of coefficients (p-value, η^2_p) and explained variance (R^2). Furthermore, given the well-known limitations of the p-value significance test (Burnham & Anderson, 2002), an information-criterion approach was also used (AIC_c, WAIC). Specifically, a comparative measure of fit such as the Akaike information criterion (AIC_c), was used to compare the hypothesized models in this study. Model with the lowest AIC value reflected a balance between goodness of fit and parsimony, and so it was considered the best fitting model (Akaike, 1973). In addition, AIC values were easily transformed to so-called Akaike weights (WAIC, Burnham & Anderson, 2002), which may be directly interpreted as the probability that a given model is the best approximating model describing the data, given the candidate set of models considered. Consequently, the model with highest AIC weight is

considered as the most appropriate model for reproducing the observed data. We subsequently selected the best models, on the basis of the criteria specified above. Finally, given the small sample size, we described the interactions which got close to significance (Wood & Nazareth, 2014), due to their interesting and clinically meaningful hints on the relationship between anxiety and stuttering. Furthermore, evidence ratio based on the Akaike weights was used to quantify the evidence in favour of the existence of this interactions. The evidence ratio was calculated as $\exp((AIC_1-AIC_2)/2)$, following the procedure suggested by Wagenmakers and Farrell (2004). In the present case, evidence ratio indicates how many times a model that includes a certain effect is more likely to be the best model compared to the corresponding model that excludes that effect.

At the bivariate level, associations among variables related to speech and individual characteristic were assessed using Pearson's correlations separately for the for the sample who stutter and who do not stutter. Furthermore, cross-informant agreement on the self-report versus the parent-report was examined using both correlations and YSR-CBCL score discrepancies. Specifically, correlations between the YSR and the CBCL scores were computed to examine the degree to which youths who report many problems are also reported by their parents to have many problems. In addition, comparisons of mean scores based on self-reports and parents' reports were measured to investigate if one type of informant reports more problems.

3.4 Results

3.4.2 Comparison Between Groups

All analyses were performed using R software (R Core Team, 2018). Graphical effects were obtained using the package "effects" (Fox, 2003). Means and standard deviations for study variables are reported in Table 1, separately for pre-adolescents who stutter and pre-adolescents who do not stutter. As regards preadolescents questionnaires, linear model analysis revealed higher scorings in the PWS than the PWNS Group in the following scales (Table 1): the Communication Attitude ($F(4,33) = 30.23$, $p < .001$, $R2 = .45$, $BF = 4310.528 \pm 0\%$) and the Speech Situation Checklist-Emotional Reaction of BAB battery ($F(1,36) = 5.38$, $p < .05$, $R2 = .13$, $BF = 2.43 \pm 0\%$). Additionally, a significant difference between two groups emerged on the Youth Self Report 's Withdrawn-Depressed Scale ($F(1,36) = 5.48$, $p < .05$, $R2 = .13$ $BF = 2.52 \pm 0\%$), which evaluates social closure, tendency to isolate, shyness, and discretion. However, in these scales, stuttering group scores were within the normal range. No other between-group differences on psychopathological symptoms were detected in YSR. For Attributional Style, no significant main effect of Group was found, although a tendency emerged on Easy task Success subscale ($F(1,36) = 3.89$, $p < .056$, $R2 = .09$ $BF = 1.40 \pm 0\%$). Specifically, the PWNS group showed slightly higher levels of attribution to easiness of the task in successful situations than PWS. Finally, no significant main effects of Group emerged on total and subscales of anxiety scores (RCMAS-2), neither on total self-esteem and self-efficacy scale.

As regards parents reports, differences were observed for stuttering and non-stuttering group (Table 2). Specifically, the parents' of PWS scorings were found higher than the parents' of PWNS in the following CBCL subscales: the Social Problems ($F(1,36) = 4.49$, $p < .05$, $R^2 = .11$, $BF = 1.75 \pm 0.01\%$), the Affective Problems, ($F(1,36) = 4.22$ $p < .05$, $R^2 = .10$, $BF = 1.59 \pm 0.01\%$) and the *Post* Traumatic Stress Problems ($F(1,36)$

= 4.98, $p < .05$, $R2 = .12$, BF = 2.10 ±0.01). Parents' scores of preadolescents who stutter were within the borderline range on the Anxiety Problems scale (T=60), but the remaining scales were in the normal range. In contrast, all parents' scores of preadolescent who do not stutter were within normal range. No other significant differences were identified for the CBCL or DAYS scores among groups.

Table 1. Descriptive statistics of study variables for preadolescents who stutter (n = 19) and preadolescents who do not stutter (n = 19). Significant differences between groups are highlighted in bold type.

Variable	*Stuttering Group (n = 19)*		*Control Group (n = 19)*	
	M(SD)	*Range*	*M(SD)*	*Range*
RCMAS-2 Total Anxiety	46.79 (9.50)	33-68	43.58 (7.01)	33-57
RCMAS-2 Physiological	48.68 (11.4)	35-68	46.26 (6.9)	35-60
RCMAS-2 Worry	47.16 (9.50)	32-65	44.53 (9.12)	32-62
RCMAS-2 Social Anxiety	46.00 (8.96)	36-65	42.47 (5.76)	36-52
RCMAS-2 Defensiveness	51.05 (10.3)	34-71	49.58 (9.38)	34-67
BAB Communication Attitude	**12.32 (7)**	**4-27**	**3.11 (2.09)**	**1-8**
BAB Emotional Reaction	**71.26 (19.60)**	**43-118**	**59.58 (9.89)**	**40-81**
MSCS Total Self-esteem	105.05 (11.6)	80-128	104.79(13.85)	86-126
MSCS Interpersonal Self-esteem	102.37 (18.93)	46-132	111.21(17.49)	90-143
MSCS Competence Self-esteem	102.63 (15.09)	80-127	101.63(12.65)	83-124
MSCS Affective Self-esteem	99.42 (14.06)	78-131	106.63 (14.01)	86-137
MSCS School Self-esteem	104.74 (13.57)	80-127	103.79 (14.99)	85-131
MSCS Family Self-esteem	102.74 (10.55)	81-120	100.37 (10.90)	75-118
MSCS Body Self-esteem	102.68 (13.73)	73-123	100.79 (14.47)	86-126
PSE Social Self-efficacy	51.11 (8.10)	39-65	53.42 (6.85)	38-62
YSR Anxious/Depressed	55.63 (5.89)	50-70	53.95 (3.40)	50-60
YSR Withdrawn/Depressed	**54.42 (4.75)**	**50-64**	**51.47 (2.73)**	**50-60**
YSR Somatic Complaints	54.00 (51.7)	50-67	54.21 (5.62)	50-70
YSR Social Problems	54.37 (4.19)	50-63	53.47 (4.92)	50-63
YSR Thought Problems	53.63 (4.94)	50-68	53.26 (3.52)	50-62
YSR Attention Problems	53.89 (4.73)	50-63	53.74 (5.55)	50-65
YSR Rule-Breaking Behavior	50.47 (1.38)	50-56	52.21 (4.6)	50-60
YSR Aggressive Behavior	53.16 (4.10)	50-66	54.11 (7.01)	50-67
YSR Internalizing Problems	51.95 (9.09)	35-65	49.00 (8.49)	35-65
YSR Externalizing Problems	47.37 (5.52)	40-59	50.95 (9.80)	34-66
YSR Total Problems	49.37 (7.20)	38-61	50.00 (8.26)	32-61
YSR Affective Problems	52.68 (3.78)	50-65	53.00 (3.84)	50-65
YSR Anxiety Problems	56.58 (5.75)	50-68	54.63 (4.89)	50-64
YSR Somatic Problems	53.68 (5.03)	50-65	54.84 (5.40)	50-65
YSR Attention Deficit Hyperactivity	53.26 (4.31)	50-63	54.74 (6.05)	50-75
YSR Conduct Problems	50.32 (0.58)	50-52	51.63 (5.30)	50-66
YSR Oppositional Defiant Problems	55.26 (4.64)	50-65	56.42 (6.93)	50-73
YSR Obsessive Compulsive Problems	55.32 (5.47)	50-65	53.26 (3.75)	50-61
YSR Post Traumatic Stress Problems	56.00 (5.71)	50-67	54.42 (4.53)	50-67
YSR Positive Qualities	50.21 (9.15)	33-64	46.26 (8.49)	21-57
ASQ Ability Success	19.00 (5.52)	1-27	20.32 (5.3)	10-28
ASQ Effort Success	28.53 (5.10)	13-34	26.42 (6.97)	8-35
ASQ Easy Task Success	11.74 (4.16)	5-20	14.37 (4.05)	6-21
ASQ Good Luck Success	5.00 (3.91)	1-30	5,79 (6.35)	0-26
ASQ Help Success	6.21 (4.49)	0-16	4,95 (3.25)	0-13
ASQ Inability Failure	17.58 (7.46)	6-34	14.79 (6.61)	4-25
ASQ Lack of Effort Failure	23.95 (6.33)	12-34	24.58 (7.83)	1-34
ASQ Difficult Task Failure	19.32 (3.4)	13-26	19.74 (4.24)	13-28
ASQ Bad Luck Failure	5,00 (3,91)	0-14	7.47 (5.92)	0-26
ASQ Lack of Help Failure	6.21 (4.49)	0-16	5.42 (3.84)	1-14

Note: RCMAS-2 Revised Children Manifest Anxiety Scale-Revised; BAB, Behavior Assessment Battery, MSCS, Multidimensional Self-Concept Scale; PSE, Perceived Social Efficacy; YSR, Youth Self-Report; ASQ, Attributional Style Questionnaire.

Table 2. Descriptive statistics of study variables for parents of preadolescents who stutter (n = 19) and parents of preadolescents who do not stutter (n = 19). Significant differences between groups are highlighted in bold type.

Variable	*Parents of PWS (n = 19)*		*Parents of PWNS (n = 19)*	
	M(SD)	*Range*	*M(SD)*	*Range*
CBCL Anxious/Depressed	58 (6.16)	50-72	54.37 (4.99)	50-66
CBCL Withdrawn/Depressed	57.26 (7.2)	50-75	55.53 (6.94)	50-73
CBCL Somatic Complaints	56.32(3.91)	50-64	54.26 (5.34)	50-64
CBCL **Social Problems**	**58.47 (6.14)**	**51-67**	**54.47 (5.47)**	**50-67**
CBCL Thought Problems	54.68 (4.63)	50- 66	52.74 (4.24)	50-66
CBCL Attention Problems	54.11 (4.81)	50-65	55.32 (6.48)	50-71
CBCL Rule-Breaking Behavior	52.11 (3.79)	50-66	53.63 (3.25)	50-60
CBCL Aggressive Behavior	55.42 (5.57)	50-69	54.26 (5.48)	50-67
CBCL Internalizing Problems	56.58 (8.40)	40-72	51.11 (10.23)	33-70
CBCL Externalizing Problems	50.68 (8.73)	34-64	49.89 (8.66)	34-66
CBCL Total Problems	53.16 (8.30)	34-67	49.74 (10.39)	24-64
CBCL Affective Problems	56.37 (5.37)	50-63	53.26 (3.79)	50-63
CBCL Anxiety Problems	60.37 (6.67)	50-70	57.21 (7.18)	50-70
CBCL Somatic Problems	55.84 (4.11)	50-61	53.63 (5.55)	50-65
CBCL Attention Deficit Hyperactivity	53.47 (4.59)	50-65	54.84 (6.21)	50-70
CBCL Conduct Problems	52.16 (3.62)	50-63	53.00 (3.41)	50-61
CBCL Oppositional Defiant Problems	56.21 (5.68)	50-69	54.37 (5.22)	50-66
CBCL Obsessive Compulsive Problems	55.42 (5.35)	50-67	52.89 (3.63)	50-62
CBCL Post Traumatic Stress Problems	59.32 (6.17)	50-74	54.79 (6.32)	50-22
CBCL Sluggish Cognitive Tempo	56.37 (6.29)	50-69	54.68 (5.86)	50-66
DAYS Anxiety by Mother	101.05 (13.80)	85-125	99.74 (11.72)	85-120
DAYS Depression by Mother	101.32 (12.23)	90-130	101.32 (10.52)	90-115
DAYS Maladjustment by Mother	103.95 (7.74)	85-115	101.32 (10.90)	85-120
DAYS Anxiety by Father	104.41 (11.57)	85-125	105.00 (13.46)	85-135
DAYS Depression by Father	103.53 (8.24)	90-115	101,76 (10.74)	90-115
DAYS Maladjustment by Father	102.94 (9.02)	85-115	100.00 (9.52)	85-115

Note: CBCL, Child Behavior Checklist; DAYS, Depression Anxiety in Youth Scale

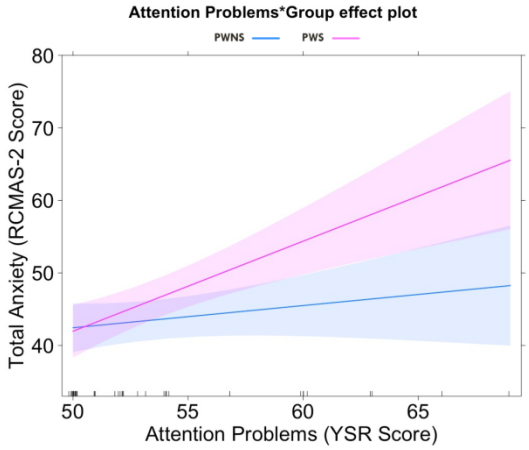
Successively, to investigate if the relationship between stuttering and anxiety was modulated by potential protective or risk factors, the AIC and Akaike weights of all estimated models for Total Anxiety (RCMAS-2) were computed (Appendix A). The most plausible model was the 9.4th, (Total Anxiety ~ Age + Gender + Group * Attention Problems) with a probability of being the best of .71, largely superior to all other models (<.15) (Appendix A). This model explained 27% of the variance. The two-way interaction effect for Group membership and Attention Problems (Figure 3.1) included in the model is reported in detail in Table 3 and in Figure 1.

Table 3. Final linear regression model with Total Anxiety as dependent variable

Variable	*B (SE)*	*Omnibus F (df)*	η^2_p
Age	3.93(0.95)	4.125 (5,32) **	.34
Gender (female)	5.9939 (2.21)	2.704 (5,32) *	.18
Group (PWS)	- 47.2543 (20.88)	-2.263 (5,32) *	.07
Attention Problems	.3061(0.25)	1.220 (5,32)	.29
Group*Attention Problems	.9355 (0.38)	2.422 (5,32) *	.15

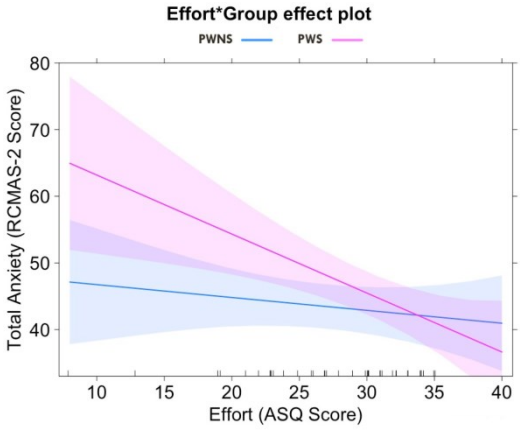
N = 38 Baseline category for Group was PWNS. Baseline category for Gender was male. R^2 = .71.
*p < .05; ** p < .01; ***p < .001

Figure 1. Graphic representation of the significant interaction effect found between the Group (PWNS and PWS) and Problem Attention (YSR) on RCMAS-2 Total Anxiety score. Shaded areas represent 95% confidence bands.



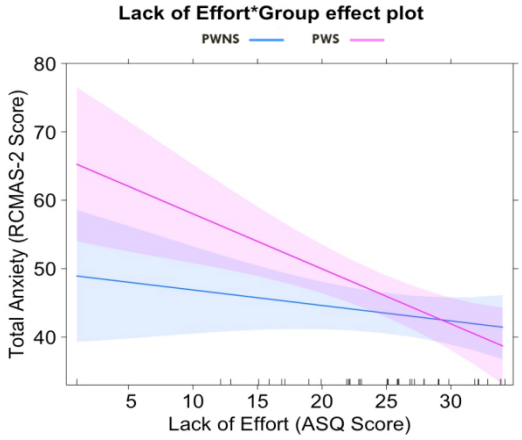
Although accompanied by a very weak degree of evidence, a two-way interaction effect for group membership and causal attributions to effort (in successful events) on Total Anxiety scores (RCMAS-2) approached to significance [B= -.69, SE= .38, p= .06, η^2_p= .09, R^2= .18; model without interaction: AIC_c = 262.3, model with interaction: AIC_c= 261.6, evidence ratio= 1.41]. See the figure 2 for detailed information on the model.

Figure 2. Graphic representation of the significant interaction effect found between the Group (PWNS and PWS) and Effort (ASQ) on RCMAS-2 Total Anxiety score. Shaded areas represent 95% confidence bands.



Similarly, an almost significant two-way interaction effect was found for group membership and causal attributions to lack of effort (in unsuccessful events) on Total Anxiety scores (RCMAS-2) [B= -.57, SE= .29, p= .07, η^2_p= .10, R^2= .23; model without interaction: AIC_c = 259.3, model with interaction: AIC_c = 258.1, evidence ratio= 1.82]. See the figure 3 for detailed information on the model.

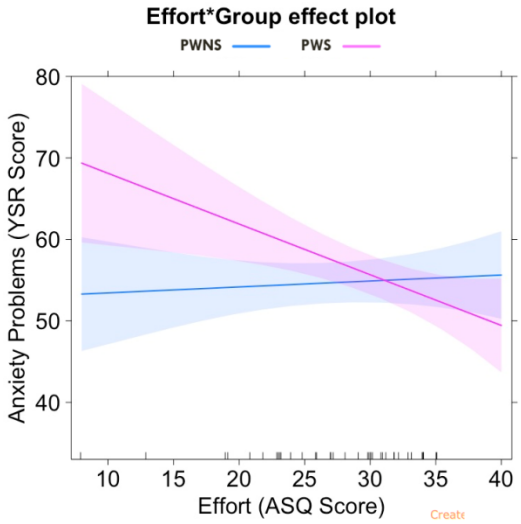
Figure 3. Graphic representation of the significant interaction effect found between the Group (PWNS and PWS) and Lack of Effort (ASQ) on RCMAS-2 Total Anxiety score. Shaded areas represent 95% confidence bands.



To investigate if the weak degree of evidence of effort on the anxiety levels was stable across the anxiety construct, a statistical analysis was conducted similarly as above, changing the dependent variable Total Anxiety Scale of RCMAS-2 with the Anxiety Problems Scale of Youth Self-Report. Specifically, it was found a two-way interaction effect for group membership and causal attributions to effort (in successful events) on Anxiety Problems scores (YSR) [B= -.69, SE= .28, p= .02, η^2_p= .15, R^2= .21; model without interaction: AIC_c = 240.4, model with interaction: AIC_c= 236.0, evidence ratio= 9]. See the figure 3 for detailed information on the model. Furthermore, a significant two-way interaction effect was found for group membership and causal attributions to lack of effort (in

unsuccessful events) on Anxiety Problems scores (YSR) [B= -.57, SE= .23, p= .01, η^2_p= .15, R^2= .21; model without interaction: AIC_c = 240.2, model with interaction: AIC_c = 235.7, evidence ratio= 9.48]. See the figure 4 for detailed information on the model.

Figure 4. Graphic representation of the significant interaction effect found between the Group (PWNS and PWS) and Lack of Effort (ASQ) on Anxiety Problems score (YSR). Shaded areas represent 95% confidence bands.



Finally, given the small sample size, we performed an influence analysis using Cook's distance (Cook & Weisberg, 1982) to evaluate the influence of an observation on the regression models. This analysis revealed that all observations had values of Cook's distance lower than the suggested cut-off score (i.e., <1), thus allowing to conclude that the results were not influenced by any particular observation.

3.4.2 Correlation Analysis

To examine similarities and differences on the interaction of risk and protective factors with specific psychopathological manifestations, we investigated the correlation between speech-associated variables (SSCER, CAT) social-cognitive factors (self-

esteem and attributional style) and variables related to emotional and behavioral difficulties (RCMAS-2, YSR).

Additionally, we considered specifically to preadolescents who stutter other variables related to speech: the objective measure of stuttering severity (SSI-4), the Stuttering Severity Perceived (by pre-adolescents and by their parents) and Worries on Stuttering Severity Perceived (by pre-adolescents and by their parents). Finally, we included caregiver reports (CBCL, DAYS) to compare parents–preadolescents agreement in stuttering sample relative to findings in control sample. Parents–preadolescents agreement has been measured in two main ways. Correlations between self-report and parent-report scores were computed to examine the degree to which youths who report many problems are also reported by their parents to have many problems. In contrast, comparisons of mean scores based on self-reports and parents' reports will indicate if one type of informant reports more problems. Analyses of variance of repeated measures with Bonferroni correction for multiple comparisons were applied to assess these differences in CBCL and YSR scores.

Correlations between speech-associated factors and psychopathological symptoms

The nature of the Pearson's correlations was consistent with the finding that in PWNS and PWS psychological differences exceeded similarities. For both groups, pre-adolescents with higher levels of communication attitude (CAT) and anxiety related to speech situation (SSC-ER) were more likely to display lower Self-Esteem on MSCS, lower Positive Qualities in YSR and lower Social Self-efficacy values. However, among children who do not stutter moderate and strong significant correlations were found between SSC-ER and CAT score with four RCMAS-2 subscales such as total, worry, social anxiety and defensiveness. Moderate and strong significant correlations were also

found between SSC-ER and CAT with six YSR scales such as thought problems, attention problems, affective problems, obsessive compulsive problems and aggressive behaviour. Conversely, preadolescents who stutter showed only one significant and moderate correlations between SSC-ER and CAT scores with RCMAS-2 Social Anxiety, and no other significant correlations with YSR psychopathological symptoms. Particularly to variables related to speech in experimental group, to our surprise, higher levels of stuttering severity were associated to lower Withdraw/Depressed symptoms.

We conducted a regression analysis to test the mediating role of attributional style in the unusual and negative relationship between stuttering severity and withdrawn symptoms. Results revealed a two-way interaction between stuttering severity and causal attributions to help on withdrawn symptoms [B= 27.22, SE= 9.59, p= .03, η^2_p= .15, R^2= .24; model without interaction: AIC_c = 111.4, model with interaction: AIC_c= 110.1, evidence ratio= 1.3]. To explore the interaction effect, we performed tests of the simple slopes (Aiken & West, 1991). As can be seen in Figure, having a mild stuttering was linked to higher withdrawn symptoms for stuttering pre-adolescents who could count on high levels of attribution of success to help (B = -.56, SE = .16, p = .001). At low levels of attribution of success to help, having a severe or mild stuttering did not seem to impact on Withdrawn Symptoms (B = .02, SE = .16, p = .88).

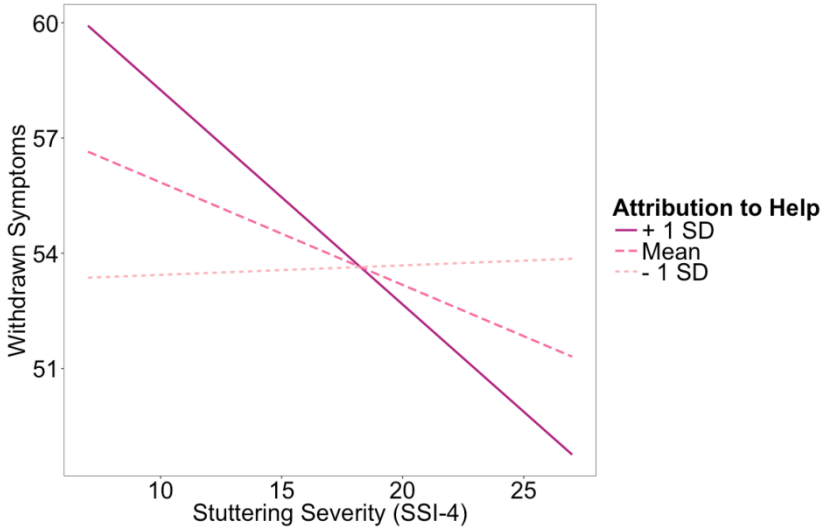
However, our reservation in drawing conclusion comes from the issue of reduced sample size and the presence of preadolescents' personal characteristics (gender, age, stuttering severity) which were not uniformly distributed across the variables investigated.

Table 4. Bivariate correlations between Speech-related variables and Psychological Variables

	Stuttering Group (n = 19) Speech-related variables					*Control Group (n = 19)* Speech-related variables	
	SSI-4	*PSS*	*WSS*	*CAT*	*SSC-ER*	*CAT*	*SSC-ER*
1 Stuttering Severity SSI-4	1						
2 Perceived Stuttering Severity (PS)	.28	1					
3 Worry for Stuttering Severity (WSS)	.19	.55	1				
4 Communication Attitude Test (CAT)	.18	.73	.73**	1		1	
5 Speech Situation Checklist (SSCER)	.20	.17	**.60****	**.48***	1	.36	1
6 RCMAS-2 Total Anxiety (TOT)	-.09	.32	.19	.39	.45	**.60****	**.59****
7 RCMAS-2 Physiological Anxiety (PHY)	-.04	.11	-.05	.08	.19	.45	.21
8 RCMAS-2 Worry (WOR)	-.11	.31	.23	.31	.43	**.46***	**.62****
9 RCMAS-2 Social Anxiety (SOC)	-.14	.26	.22	**.50***	**.52***	**.62***	**.53***
10 RCMAS-2 Defensiveness (DEF)	.19	-.25	-.03	-.25	.002	**-.46***	-.19
11 MSCS Total Self-esteem	.15	-.28	**-.51***	**-.54***	**-.59****	**-.50***	**-.53***
12 MSCS Interpersonal Self-esteem	-.12	-.28	-.21	-.42	-.39	-.25	**-.47***
13 MSCS Competence Self-esteem	-.01	-.30	-.25	**-.48***	**-.46***	**-.57***	-.31
14 MSCS Affective Self-esteem	.22	-.18	-.45	-.40	**-.76****	**-.51***	**-.51***
15 MSCS Academic Self-esteem	.25	-.24	**-.49***	-.38	-.24	**-.70***	-.41
16 MSCS Family Self-esteem	.01	-.42	.42	**-.56***	**-.49***	-.20	-.28
17 MSCS Body Self-esteem	.06	-.04	**-.54***	-.44	**-.72****	-.24	**-.56***
18 PSSE Social Self-efficacy	-.17	-.28	-.52	-.44	**-.65****	-.05	**-.60****
19 YSR Anxious/Depressed	-.36	-.02	-.11	-.01	.20	-.02	-.10
20 YSR Withdrawn/Depressed	**-.58****	.07	.04	.14	.23	.25	-.02
21 YSR Somatic Complaints	-.10	.48	.18	.25	.13	.13	.18
22 YSR Social Problems	-.45	.03	-.04	.07	.14	.25	.30
23 YSR Thought Problems	-.21	.02	-.05	.04	.17	**.49***	-.06
24 YSR Attention Problems	-.40	.10	.01	.19	.09	**.67***	**.47***
25 YSR Rule-Breaking Behavior	-.27	-.24	.16	-.08	.05	.17	-.001
26 YSR Aggressive Behavior	-.23	.15	.08	.02	-.08	**.48***	-.12
27 YSR Internalizing Problems	-.35	.20	.04	.17	.32	.08	.22
28 YSR Externalizing Problems	-.30	.11	.07	.02	-.07	.33	-.06
29 YSR Total Problems	-.43	.15	.04	.14	.17	.45	.12
30 YSR Affective Problems	-.30	-.02	-.26	-.08	.30	.41	**.51***
31 YSR Anxiety Problems	-.09	.21	.003	.18	.15	-.08	.06
32 YSR Somatic Problems	-.05	.47	.21	.25	.06	.25	.14
33 YSR Attention Deficit Hyperactivity	-.30	.04	.07	.18	.02	.36	.04
34 YSR Conduct Problems	-.16	.05	.16	.28	-.15	.25	-.08
35 YSR Oppositional Defiant Problems	-.10	.12	-.007	-.12	-.08	.32	-.24
36 YSR Obsessive Compulsive Problems	-.30	-.04	-.06	.14	.10	.42	.06
37 YSR Post Traumatic Stress Problems	-.27	.24	.07	.21	.39	**.52***	.12
38 YSR Positive Qualities	-.30	-.29	**-.50***	-.45	**-.54***	-.07	**-.46***
39 ASQ Ability Success	.06	.40	-.04	.06	-.42	-.04	-.32
40 ASQ Effort Success	.25	-.06	-.17	-.42	-.32	-.09	.003
41 ASQ Easy Task Success	-.24	.27	.30	.59	-.02	-.13	.13
42 ASQ Good Luck Success	-.15	-.10	-.02	.001	.30	.20	.10
43 ASQ Help Success	-.08	-.37	-.39	-.11	.17	-.11	.37
44 ASQ Inability Failure	.06	.22	.20	.05	.42	.37	.27
45 ASQ Lack of Effort Failure	.38	-.06	.07	-.20	-.09	-.09	-.40
46 ASQ Difficult Task Failure	-.03	-.10	-.02	-.07	-.38	-.21	-.22
47 ASQ Bad Luck Failure	-.12	.15	-.02	.33	.05	.34	.17
48 ASQ Lack of Help Failure	-.07	-.03	-.12	.23	-.23	-.30	.20

Note: RCMAS-2 Revised Children Manifest Anxiety Scale-Revised; CAT, Communication Attitude Test; SSC-ER, Speech Situation Checlist MSCS, Multidimensional Self-Concept Scale; PSE, Perceived Social Efficacy; YSR, Youth Self-Report; ASQ, Attributional Style Questionnaire.

Figure 5. The interaction effect of Stuttering Severity (SSI-4) and Attribution to Help (ASQ) on Withdrawn Symptoms (YSR)



Furthermore, the measure of Worry for Stuttering Severity (WSS) was found to show positive correlation with reactions towards speech situations (SSC-ER) and negative correlation with the levels of self-esteem. Conversely, the Perceived Stuttering Severity (PSS) was not significantly related to any psychological variables.

Successively, associations between self-esteem and attributional style with anxiety symptoms and its possible comorbid conditions (e.g. depression symptoms) (APA, 2013) were investigated separately across two groups (see table).

For both groups, preadolescents with higher levels of self-esteem (MSCS) were more likely to display lower psychopathological symptoms on RCMAS-2 and YSR scale. However, differences emerged on the nature of correlations between self-esteem and psychopathological symptoms in two groups. Indeed, the stuttering group showed positive and negative correlations between self-esteem and psychopathological symptoms with a range of association from r = ±.47 to r = - .70, whereas control group showed only negative correlations with a range of association from r = - .47 to r = -.89. This difference was due to the positive association in the stuttering group between the Defensiveness

subscale (DEF) of RCMAS-2 with Social (r =.51*) and Competence (r=.47) subscales of MSCS. It suggests that preadolescents who stutter with higher level of self-esteem in social situations and controllability of the environment, were more likely to manifest social desirability response. In contrast, no association was found between specific psychological variables and socially desirable behaviours in control group.

In general, regarding attributional style to luck, preadolescents with higher levels of attributions to good or bad luck (MSCS) were more likely to display higher psychopathological symptoms on YSR subscales, however, differences emerged across groups. Specifically to the control group, higher levels of attributions to good or bad luck were positively associated to higher psychopathological symptoms, of both an internalizing and externalizing nature (e.g. social problems, conduct problems, somatic problems, PTSD problems). Conversely, as regards the stuttering group, higher levels of attributions to good or bad luck (MSCS) were associated to higher psychopathological symptoms of only internalizing nature. Similarly, as regards attributional style to effort, for control groups, preadolescents with higher levels of attributions to effort (MSCS) were more likely to show lower psychopathological symptoms of externalizing nature (aggressive behaviour, conduct problems subscale). Conversely, as regards the stuttering group, higher levels of attributions to both effort and lack of effort (AQS) were associated to lower psychopathological symptoms of only internalizing natu

Table 5. Bivariate correlations between Attributional Style and Self-Esteem with Psychopathological Variables in Stuttering Group

	Stuttering Group (n = 19)																
Psychopathological Variables	*MSCS Self-Esteem*							*ASQ Attributional Style Questionnaire*									
								Attribution to Success					Attribution to Failure				
	Total SE	Social	Competence	Affective	Academic	Family	Physical	Ability	Effort	Easy task	Luck	Help	Lack Ability	Lack Effort	Difficult Task	Bad Luck	Lack Help
RCMAS-2 Total Anxiety	**-.48***	-.36	**-.64****	**-.48***	-.32	**-.55***	-.42	-.20	**-.47***	.09	**.58****	.09	.15	**-.50***	-.33	**.67****	.03
RCMAS-2 Physiological Anxiety	-.36	-.20	-.42	-.14	-.18	-.30	-.20	-.20	-.26	.17	.27	.19	-.06	-.43	.07	.44	.19
RCMAS-2 Worry	-.32	-.21	**-50***	-.44	-.23	**-51***	-.42	-.27	-.39	.02	**.60***	-.007	.17	**-.48***	-.36	**.66****	-.01
RCMAS-2 Social Anxiety	**-.57***	**-.55***	**-.66****	**-.62****	-.32	**-70****	**-.52***	-.07	**-.59****	.003	**.50***	.13	.17	-.30	-.41	**.53***	-.10
10 RCMAS-2 Defensiveness	**.46***	**51***	**47***	.16	-.28	.42	.10	-.28	.15	-.14	.06	.17	.16	.10	-.16	-.23	-.03
YSR Anxious/Depressed	-.05	.11	-.12	-.42	.15	-.33	-.13	-.25	**-.55***	.007	**.60****	.33	.38	**-.71****	**-.50***	**.52***	.19
YSR Withdrawn/Depressed	-.45	-.26	**-49***	**-55***	-.45	-.25	-.39	-.20	.01	.006	.26	.05	.09	-.33	-.14	.27	.006
YSR Somatic Complaints	-.22	.06	-.14	-.23	-.30	-.02	.16	.35	-.17	.13	.21	-.06	-.001	.19	.005	.20	.14
YSR Social Problems	-.30	-.05	-.26	-.45	-.26	-.06	-.06	.06	-.21	-.02	.39	.19	.09	-.31	-.27	.14	.24
YSR Thought Problems	-.16	-.03	-.29	-.26	**-.47***	.15	-.03	.18	-.10	-.07	.33	.15	-.04	-.04	-.15	.20	-.003
YSR Attention Problems	**-.50***	**-.44**	**-.62****	-.35	**-.48***	-.36	-.17	.04	-.25	.15	.27	-.04	.000	-.42	-.02	.33	.13
YSR Aggressive Behavior	-.04	-.08	-.19	-.07	-.26	-.20	-.06	.08	-.22	.01	.07	.06	.07	-.38	.001	.40	.02
YSR Internalizing Problems	-.26	-.03	-.31	**-.55***	-.14	-.30	-.16	-.09	-.34	.006	**.54***	.18	.26	**-.55***	-.38	.43	.17
YSR Externalizing Problems	-.17	-.15	-.26	-.12	-.39	-.25	-.11	.12	-.25	.003	.07	.05	.03	-.34	.04	.37	.005
YSR Affective Problems	-.16	.05	-.22	**-.50***	.03	-.05	-.06	-.12	-.30	-.11	**.53***	.35	.28	-.42	-.37	.36	-.06
YSR Anxiety Problems	.03	.27	-.04	-.21	.17	-.02	.01	-.09	**-.48***	.23	.43	.28	.20	**-.51***	-.32	**.48***	.26
YSR Somatic Problems	-.04	-.05	.008	-.20	-.26	.02	.30	**.72****	-.23	-.17	.13	-.12	.08	.23	-.28	-.02	-.20
YSR Conduct Problems	-.21	-.42	-.24	.006	-.33	-.08	.09	.35	-.44	.25	.10	-.08	-.16	-.06	-.02	.13	.18
YSR Obsessive Compulsive Pb.	-.06	.04	-.27	-.35	-.21	-.15	-.08	-.08	-.42	-.04	**56***	.31	.10	**-.56***	-.27	**.50***	.33
YSR Post Traumatic Stress Pb.	-.26	-.11	-.38	**-.62****	-.10	-.31	-.18	-.13	-.36	.007	**.48***	.25	.43	**-.64****	-.44	.42	.11

Note:RCMAS-2 Revised Children Manifest Anxiety Scale-Revised; MSCS, Multidimensional Self-Concept Scale; YSR, Youth Self-Report; ASQ, Attributional Style Questionnaire. The following systems have been adopted to describe Pearson's correlation coefficients: r ≥ .50 = "large association"; .50 N r ≥ .30 = "medium association"; r <.30 = "small association". * p < .05; ** p < .01; ***p < .001

Table 6. Bivariate Correlations between Self-Esteem and Attributional Style with Communicative and Psychopatological Variables in Control Group

Control Group (n = 19)

Psychopathological Variables	*MSCS Self-Esteem*							*ASQ Attributional Style Questionnaire*									
								Attribution to Success					Attribution to Failure				
	Total SE	Social	Competence	Affective	Academic	Family	Physical	Ability	Effort	Easy task	Luck	Help	Lack Ability	Lack Effort	Difficult Task	Bad Luck	Lack Help
RCMAS-2 Total Anxiety	**-.83*** **	**-.73*** **	**-.69** **	**-.87*** **	**-.74*** **	-.23	**-.47***	-.25	.14	-.27	.35	-.001	-.02	-.10	-.27	.39	.03
RCMAS-2 Physiological Anxiety	**-.50***	-.44	**-.65** **	**-.47***	-.42	-.11	-.13	.22	-.34	-.08	.39	-.22	-.16	-.09	-.04	.45	.08
RCMAS-2 Worry	**-.77*** **	**-.70** **	**-.56***	**-.82** **	**-.62** **	-.19	-.42	**-.49***	.36	-.32	.27	.15	-.01	-.02	-.34	.24	.11
RCMAS-2 Social Anxiety	**-.70***	**-.57***	**-.55***	**-.73*** **	**-.76*** **	-.25	**-.52***	-.13	.06	-.21	.33	-.03	.19	-.27	-.21	.32	-.10
RCMAS-2 Defensiveness	.39	.36	-.40	.23	.35	**-.54***	.11	-.13	.17	-.14	-.08	.06	-.01	.08	-.13	-.29	.42
YSR Anxious/Depressed	**-.52***	**-.60** **	-.32	-.44	-.30	**-.47***	**-.46***	-.18	-.21	-.15	.28	.37	-.29	-.11	.10	.26	.22
YSR Withdrawn/Depressed	-.34	-.30	-.01	-.29	-.45	-.15	-.26	.22	-.10	-.03	-.001	-.07	-.17	-.20	.24	.25	.07
YSR Somatic Complaints	**-.71** **	**-.75*** **	**-.56***	**-.70** **	**-.47***	**-52***	-.37	-.34	.12	-.35	.38	.21	-.21	-.14	-.02	.28	.16
YSR Social Problems	**-.87*** **	**-.89*** **	**-.65** **	**-.83*** **	**-.58** **	**-.54***	**-.53***	-.29	-.16	**-.50***	**.64** **	.43	-.36	.001	-.06	**52***	.25
YSR Thought Problems	-.44	-.37	**-.67** **	-.41	-.43	-.39	-.23	.06	-.08	-.19	.36	-.26	-.09	.02	.006	.40	-.24
YSR Attention Problems	**-.57***	**-.47***	**-.70** **	**-.47***	**-.58** **	-.42	-.26	-.22	-.13	-.22	.34	.35	-.01	-.003	-.032	**57***	-.30
YSR Aggressive Behavior	-.30	-.27	-.40	-.18	-.34	-.26	-.05	.29	**-.49***	-.17	.41	.01	-.44	-.02	-.02	**62** **	-.11
YSR Internalizing Problems	**-.70** **	**-.73*** **	-.42	**-.63** **	**-.51***	**-.50***	-.45	-.25	-.04	-.30	.30	.41	-.28	-.16	-.005	.36	.22
YSR Externalizing Problems	-.34	-.34	-.40	-.14	-.37	-.27	-.02	.28	**-.51***	-.18	.42	.13	-.42	-.02	.13	**.63** **	-.08
YSR Affective Problems	**-.58** **	**-.49***	**-.52** **	-.37	**.50***	**-.50***	-.27	-.04	-.35	-.002	.23	.35	.06	-.24	-.19	.33	.17
YSR Anxiety Problems	**-.55***	**-.64** **	-.27	**-.49***	-.38	-.44	-.27	-.29	-.03	-.35	.36	.44	-.37	-.02	.03	.30	.005
YSR Somatic Problems	**-.53***	**-.52***	-.44	**-.58***	-.39	**-.50***	-.28	-.26	.15	-.20	.21	.10	-.11	-.17	.06	.22	.05
YSR Conduct Problems	-.30	-.28	-.33	-.11	-.34	-.06	-.03	.24	**-.50***	-.16	.45	.07	**-.49***	-.02	.06	**64** **	.07
YSR Obsessive Compulsive Pb.	**-.75*** **	**-.68** **	**-.80*** **	**-.73*** **	**-.70** **	-.36	-.44	-.01	-.16	**-.47***	**.74*** **	.05	-.37	-.07	.01	**59** **	-.08
YSR Post Traumatic Stress Pb.	**-.80*** **	**-.70** **	**-.67** **	**-.70** **	**-.70** **	-.35	-.36	.01	-.31	**-.47***	**.63** **	.22	-.32	-.09	-.04	**62** **	.15

Note:RCMAS-2 Revised Children Manifest Anxiety Scale-Revised; MSCS, Multidimensional Self-Concept Scale; YSR, Youth Self-Report; ASQ, Attributional Style Questionnaire. The following systems have been adopted to describe Pearson's correlation coefficients: r ≥ .50 = "large association"; .50 N r ≥ .30 = "medium association"; r <.30 = "small association". * p < .05; ** p < .01; ***p < .001

Table 7 presents Pearson's correlation coefficients between preadolescents (FPS, FWS, CAT, SSCER, YSR) and parents (MPS, MWS, FPS, FWS, CBCL, DAYS) reports of stuttering and control group. Considering the stuttering group, Pearson's correlation coefficients suggest inconclusive evidence about the significant association between the equivalent CBCL and YSR scales. However, two indirect associations between CBCL and YSR not equivalent scales reached the significance. Specifically, one association was a negative and strong correlation between the Youth Self-Report Affective problems scores and CBCL Conduct Problems scores ($r=-.67^{**}$ $p<0.01$); the other one was a positive and moderate correlation between Youth Self-Report Attention Deficit Hyperactivity problems scores and CBCL Externalizing Problems scores ($r=.46^{*}$, $p<0.05$). Furthermore, as regards correlations between parents' speech-related variables (MPS, FPS, MWS, FWS) and psychopathological variables (CBCL and DAYS), higher rate of perceived stuttering severity and higher worries for stuttering rate were found positively correlated to higher score of Internalizing problems (CBCL). Conversely, in the control group, several moderate and positive correlations were found between the CBCL and YSR scores in the range of 0.45 and 0.68. Furthermore, two direct, positive and moderate associations were found between the equivalent YSR and CBCL on Internalizing Problems score ($r=.47^{*}$, $p<0.05$) and Attention Deficit Hyperactivity Problems score ($r=.47^{*}$, $p<0.05$). Finally, no significant associations emerged between preadolescents' speech-associated variable and parent psychological report for both groups.

Table 9 and 10 presents the scores of each emotional and behavioral problems of the CBCL and YSR scale, for stuttering and non-stuttering group. Overall, parents

reported higher symptom scores than preadolescents, regardless of the group membership. However, differences emerged in the number of CBCL-YSR significant than preadolescents score on only Withdrawn Scale.

Table 7. Bivariate correlations between Communicative Factors and Psychological Variables in Stuttering group and their Parents

Stuttering Group

Parental Report					*Preadolescents Report*																								
Child Behavior Checklist (CBCL) Depression Anxiety in Youth Scale (DAYS)	Parents' Speech-related variables				Preadolescents' Speech-related variables					Youth Self Report (YSR)																			
	MPS	MWS	FPS	FWS	SSI-4	PS	WSS	CAT	SSCE R	1 YSR	2 YSR	3 YSR	4 YSR	5 YSR	6 YSR	7 YSR	8 YSR	9 YSR	10 YSR	11 YSR	12 YSR	13 YSR	14 YSR	15 YSR	16 YSR	17 YSR	18 YSR	19 YSR
Mother's Perceived Stuttering Severity (MPS)	1	**.63****	**.60***	.30	.40	.43	.13	.07	-.10	-.43	-.29	.04	**-.54***	-.30	**-.63***	**-.52***	-.19	-.35	-.27	**-.52***	-.18	-21	.26	**-.64***	-.005	**-.47***	**-.49***	-.35
Mother's Worry Stuttering Severity (MWS)	**.63****	1	**54***	**65****	**.61****	.32	.19	.26	.12	-.45	-.29	-.22	**-.62***	-.27	-.38	-.23	-.03	-.41	-.17	**-.53***	-.39	-.35	.17	-.44	-.03	-.15	-.37	-.26
Father's Perceived Stuttering Severity (FPS)	**.59***	**.57***	1	**69****	.44	**.52***	.28	.44	-.003	-.06	-.09	.12	-.27	-.35	-.25	-.24	.12	-.08	.10	-.13	-.18	-.02	.06	-.11	.12	-.24	-.16	.02
Father's Worry Stuttering Severity (FWS)	.30	**.65****	**.69****	1	.43	.12	.03	.20	-.08	-.38	-.09	-.22	-.38	-.42	-.16	-.07	.08	-.33	.04	-.29	-.43	-.39	-.22	-.09	.01	-.15	-.48	-.28
1 CBCL Anxious/Depressed	.32	.35	**.70****	**.54***	.24	.19	.15	.19	.05	-.10	.12	.16	.12	.25	.30	.09	-.08	.06	-.02	.06	-.12	.08	.28	.20	-.15	.12	.03	.17
2 CBCL Withdrawn/Depressed	.44	.11	.33	.13	-.33	.10	.11	.11	-.03	.19	.34	-11	-.06	.07	.41	.37	.001	.22	.11	.15	.07	.29	-.08	.23	.04	.33	.18	.03
3 CBCL Somatic Complaints	.07	-.03	.18	.17	.09	-.26	-.22	-.33	-.09	.24	.12	.09	.16	.21	.03	-.03	.01	.20	.02	.05	.01	.43	-.09	.08	.05	.05	.12	.13
4 CBCL Social Problems	**60****	**.49***	**.75****	.44	.40	.32	-.01	.19	.01	-.11	-.03	-.12	-.30	-.12	.07	.07	-.29	-.08	-.19	-.23	-.37	.10	-.03	.02	-.27	.18	-.20	-.19
5 CBCL Thought Probl.	.22	.10	**.58***	.30	.16	.27	-.11	.11	.11	.05	-.01	.09	-.27	-.11	-.03	-.13	-.08	-.01	-.15	-.16	-.27	.21	.12	.02	-.10	.05	-.03	-.16
6 CBCL Attention Probl.	-.08	-.03	.07	.14	-.30	.24	.07	.20	.11	.16	-.15	.09	-.20	.13	.42	.43	-.004	.13	.11	.03	-.36	.23	-.09	.30	-.03	.33	-.004	.07
7 CBCL Rule-Breaking Behavior	-.14	-.10	-.21	-.35	-.33	-.15	-.18	-.06	-.33	.06	-.24	.25	-.42	-.15	.26	.20	.01	.06	.02	-.02	-.31	.005	.04	.31	-.10	.23	-.22	-.09
8 CBCL Aggressive Behavior	-.37	-.26	.20	.22	-.09	.08	-.11	.02	-.28	.15	-.10	.17	.14	.17	.40	.20	.08	.12	.07	.13	-.13	.28	.05	.41	-.09	-.01	.05	.21
9 CBCL Internalizing Probl.	.30	.19	.60	.43	-.01	.09	.11	.08	-.06	.04	.17	.04	.09	.22	.30	.11	-.09	.11	-.01	.05	-.09	.28	.05	.19	-.09	.18	.10	.10
10 CBCL Externalizing Probl.	.30	.18	.26	.24	-.14	.06	-.12	.03	-.28	.21	-.11	.23	.09	.21	.44	.26	.10	.18	.10	.17	-.13	.35	.06	**.46***	-.05	.09	.07	.21
11 CBCL Total Probl.	.40.	.26	**.53***	.40	-.05	.14	.05	.08	-.04	.15	-.04	.17	-.10	.19	.34	.21	-.08	.13	-.01	.02	-.28	.36	.06	.29	-.12	.21	.04	.07
12 CBCL Affective Probl.	**.68****	.30	**.50***	.23	-.01	.16	.07	-.10	-.03	.05	.16	.25	.11	.29	.15	-.02	-.08	.08	-.04	.05	-.02	.16	.29	.10	-.09	.06	.10	.08
13 CBCL Anxiety Probl.	.16	.11	**.60***	.28	.25	.38	.41	.36	.24	-.13	.07	.19	.08	.15	-.01	-.18	-.16	.003	-.18	-.09	-.28	.10	.29	.005	-.23	-.17	-.05	.15
14 CBCL Somatic Probl.	.01	-.25	-.19	-.17	-.19	-.42	**-.56***	**-.59****	-.43	-.05	-.06	-.22	.04	-.15	.08	-.30	.13	-.17	.05	-.06	-.10	.05	-.16	.26	.02	-.05	-.21	-.18
15 CBCL Attention Deficit Hyperactivity	.05	.04	.02	.10	-.18	.20	.08	.11	-.01	.20	-.30	.17	-.22	.21	.22	.34	-.12	.12	-.02	-.05	-.37	.27	-.12	.10	-.12	.18	.05	.09
16 CBCL Conduct Probl.	-.12	-.04	.25	.31	-.04	.09	-.02	.05	-.23	.23	-.20	.19	.27	.38	.25	.05	.05	.10	.01	.13	.10	.39	-.04	.26	-.04	-.15	.25	.17
17 CBCL Oppositional Defiant Prob.	.40	.20	.24	.18	-.15	-.19	-.16	-.03	-.21	-.19	-.38	-.16	-.41	-.38	.04	.07	-.01	-.23	-.01	-.26	**-.67****	-.18	-.14	.15	-.12	.09	**-.51***	-.21
18 CBCL Obsessive Compulsive Probl.	.30	.16	**.56***	.27	.18	.27	.07	.13	.12	.02	-.01	-.02	.00	.005	.04	.11	-.07	.02	-.03	-.07	-.30	.24	.08	-.02	-.05	.28	.02	.05
19 CBCL Post Traumatic Stress Probl.	.28	.13	**.60***	.38	.07	.18	.03	.10	-.15	.08	.07	.04	.11	.27	.28	.07	-.21	.08	-.12	-.01	-.15	.28	-.02	.11	-.25	.07	.14	.09
20 DAYS Anxiety by Mother	**.54***	**51***	**.71****	.46	.40	.42	-.10	.02	-.26	-.002	-.22	-.001	**-.49***	-.32	-.12	-.25	.39	-.12	.28	-.15	-.09	.05	-.04	-.05	**.47***	-.27	-.20	.03
21 DAYS Depression by Mother	**.51***	**.49***	.40	.19	.10	.40	.36	.42	.20	-.001	-.02	.21	-.32	-.06	-.17	-.27	.07	.06	-.002	-.16	-.02	.04	.15	-.24	.12	-.24	.01	.02
22DAYS Maladjustment by Mother	.10	-.01	-.13	.04	-.35	-.12	.23	.02	.19	.02	.30	.19	.06	-.01	.05	.09	.08	.15	.14	.09	.07	-.21	.01	-.08	.17	-.19	-.05	-.06
23 DAYS Anxiety by Father	.42	.47	**74****	.41	-28	.31	-.10	.04	-.03	.22	.08	.13	-.21	-.08	.003	-.14	.30	.15	.25	.06	.20	.12	-.08	.05	.34	-.39	.05	.31
24 DAYS Depression by Father	.12	.20	.07	-.07	-.17	.12	.18	.03	.08	.25	.33	.32	.12	**.49***	.19	.22	.17	.35	.21	.23	.16	.02	.22	.001	.14	-.12	.44	.25
25 DAYS Maladjustment by Father	-.20	-.15	-.28	-.19	-.10	.08	.12	-.09	.01	.16	.35	.24	.29	.30	.27	.001	.19	.34	.22	.26	.06	-.08	-.02	.13	.33	-.13	.35	.15

Note: YSR, Youth Self-Report; CBCL, Children Behavior Checklist The following systems have been adopted to describe Pearson's correlation coefficients: r ≥ .50 = "large association"; .50 N r ≥ .30 = "medium association"; r b .3 = "small association".

* p < .05; ** p < .01; ***p < .001

Table 8. Bivariate correlations between Communicative Factors and Psychological Variables in Control Group and their Parents

Control Group

Parental Report	*Preadolescents Report*																				
Child Behavior Checklist (CBCL) Depression Anxiety in Youth Scale (DAYS)	Speech-related variables		Youth Self Report (YSR)																		
	CAT	SSCER	1 YSR	2 YSR	3 YSR	4 YSR	5 YSR	6 YSR	7 YSR	8 YSR	9 YSR	10 YSR	11 YSR	12 YSR	13 YSR	14 YSR	15 YSR	16 YSR	17 YSR	18 YSR	19 YSR
1 CBCL Anxious/Depressed	-.17	.11	.05	**.60****	.38	.17	.03	.10	.01	.07	**.48***	.13	.21	.43	.12	.03	.30	.25	.003	-.12	.35
2 CBCL Withdrawn	.25	-.02	.31	.33	.40	.43	.15	.43	**.47***	**.60***	.45	**.56***	**.51***	.22	.44	.40	.42	**.49***	**47***	.28	**.68****
3 CBCL Somatic Complaints	.13	.19	.03	.31	.27	**.45***	.03	.04	-.15	.24	.27	.14	.15	.08	.27	.08	.19	.34	-.10	.01	.31
4 CBCL Social Problems	.25	.30	-.26	.18	.22	.27	-.03	.28	.17	.13	.09	.17	.15	.14	-.02	-.10	.40	.34	.17	-.26	.19
5 CBCL Thought Probl.	**.49***	-.06	-.36	-.09	.04	.34	-.04	.02	.19	.11	-.19	.11	.02	-.19	-.29	.01	.08	15	.31	-.12	-.06
6 CBCL Attention Probl.	**.67****	**.47***	-.15	-.02	.17	.28	.02	.43	.25	.39	-.13	.39	.34	.07	-.15	-.05	**.56***	**.46***	.33	-.07	.18
7 CBCL Rule-Breaking Behavior	.18	-.001	-.27	.06	.29	.18	-.19	.32	.13	.13	-.02	.13	.15	-.08	-.28	-.01	.36	.41	.27	-.21	.20
8 CBCL Aggressive Behavior	**.48***	-.12	-.10	-.01	.40	.26	.17	.26	.25	.34	.04	.35	.34	.04	.00	.27	.40	.31	.40	-.01	.18
9 CBCL Internalizing Probl.	.08	.22	-.11	**.50***	.38	**.51***	.05	.31	.15	.39	**.47***	.37	.37	.33	.33	.11	.44	**.55***	.15	.03	**.55***
10 CBCL Externalizing Probl.	.33	-.07	-.20	.08	.39	.21	.01	.36	.33	.31	.05	.34	.32	.10	-.14	.15	**.48***	.39	.45	-.10	.20
11 CBCL Total Probl.	.45	.12	-.21	.15	.41	.36	-.03	.37	.27	.36	.10	.37	.34	.12	-.04	.12	**54***	**.47***	.38	-.14	.29
12 CBCL Affective Probl.	.41	**.51***	-.44	-.05	.19	.19	-.15	**.48***	.24	.16	.16	.23	.18	-.21	-.19	-.15	**56***	.35	.33	**-.46***	.22
13 CBCL Anxiety Probl.	-.08	.07	.21	.44	.34	.22	-.03	.09	-.10	.35	.40	.23	.24	.30	.29	.15	.23	.42	-.10	.22	.38
14 CBCL Somatic Probl.	.25	.14	.22	.31	.31	**.54***	.21	.06	-.03	.41	.33	.32	.31	.11	.39	.26	.21	.37	.03	.21	.39
15 CBCL Attention Deficit Hyperactivity	.36	.04	-.23	-.003	.27	.03	.03	.32	.28	.25	-.05	.33	.27	.16	-.23	.07	**.47***	.28	.37	-.13	.08
16 CBCL Conduct Probl.	.32	-.25	-.02	.05	.56	.21	.31	.35	.33	.42	.15	.44	.43	.20	-.01	**.52***	**.46***	.33	**.47***	.07	.24
17 CBCL Oppositional Defiant Prob.	.25	-.08	-.19	-.07	.24	.13	-.16	.35	.23	.24	-.06	.23	.19	.05	-.24	.06	.39	.25	.33	-.14	.13
18 CBCL Obsessive Compulsive Probl.	.42	.07	-.23	-.03	.25	.19	-.06	.26	.23	.19	-.04	.20	.15	-.05	-.12	.07	.35	.26	.30	-.10	.19
19 CBCL Post Traumatic Stress Probl.	**.52***	.12	-.29	.03	.25	.25	-.10	.38	.29	.28	-.01	.29	.22	.08	-.12	.03	**.50***	.37	.35	-.30	.26
20 DAYS Anxiety by Mother	.04	-.14	-.07	.31	.03	-.23	-.11	.001	-.06	-.03	.03	-.09	-.07	-.30	.19	.22	-.18	.14	-.03	-.03	-.15
21 DAYS Depression by Mother	.12	-.29	.20	**.64****	.19	.15	.21	.15	.21	.28	.40	.31	.32	.03	.32	.31	.14	.33	.20	.22	.26
22 DAYS Maladjustment by Mother	.15	-.21	.09	**.67****	.13	-.01	.20	-.03	.06	.16	.26	.12	.14	-.05	.18	.26	-.09	.21	-.01	.08	.09
23 DAYS Anxiety by Father	-.10	-.34	-.12	.41	.21	-.32	.03	-.05	-.16	-.07	.21	-.14	-.15	-.36	.20	.41	-.26	-.03	-.23	-.29	-.27
24 DAYS Depression by Father	.07	-.09	.14	.41	-.06	-.05	.05	.26	.31	.41	.15	.45	.30	.14	.19	.01	.38	**.55***	.31	.02	.08
25 DAYS Maladjustment by Father	.01	.17	.10	**.56***	-.07	-.05	-.17	.04	-.01	-.09	.24	.02	-.04	.08	.14	-.02	-.01	-.01	-.08	-.12	-.04

Table Parent-preadolescent report of emotional and behavioral problem scale.
The following systems have been adopted to describe Pearson's correlation coefficients: r ≥ .50 = "large association"; .50 N r ≥ .30 = "medium association"; r < .3 = "small association".
* p < .05; ** p < .01; ***p < .001

Tab. 9 Descriptive statistics (Means and Standard Deviations) of YSR and CBCL report for control group

	Preadolescents (YSR) M (SD)	*Parent (CBCL) M (SD)*	*P-value*	*Cohen's d*
Anxious/Depressed	53.95 (3.41)	54.37 (4.99)	.767	-0.098
Withdrawn	**51.47 (2.74)**	**55.53 (6.95)**	**.019**	**-0.769**
Somatic Complaints	54.21 (5.62)	54.26 (5.34)	.969	-0.009
Social Problems	53.47 (4.93)	54.47 (5.47)	.467	-0.192
Thought Problems	53.26 (3.57)	52.74 (4.24)	.691	0.133
Attention Problems	53.74 (5.56)	55.32 (6.48)	.367	-0.262
Rule-Breaking Behavior	53.21 (4.61)	52.63 (3.25)	.649	0.145
Aggressive Behavior	56.11 (7.02)	54.26 (5.49)	.216	0.294
Internalizing Problems	49.00 (8.50)	51.11 (10.23)	.419	-0.224
Externalizing Problems	50.95 (9.80)	49.89 (8.67)	.671	0.115
Total Problems	50.00 (8.27)	49.74 (10.40)	.919	0.028
Affective Problems	53.00 (3.84)	53.26 (3.80)	.855	-0.068
Anxiety Problems	54.63 (4.89)	57.21 (7.19)	.140	-0.419
Somatic Problems	54.84 (5.41)	53.63 (5.55)	.388	0.221
Attention Deficit/Hyperactivity Problems	54.74 (6.05)	54.84 (6.21)	.952	-0.016
Oppositional Defiant Problems	56.42 (6.93)	54.37 (5.22)	.212	0.334
Conduct Problems	53.63 (5.30)	53.00 (3.42)	.617	0.141
Obsessive-Compulsive Problems	53.26 (3.75)	52.89 (3.64)	.774	0.100
Post-traumatic Stress Problems	54.42 (4.54)	54.79 (6.32)	.797	-0.067

Tab. 10 Descriptive statistics (Means and Standard Deviations) of YSR and CBCL report for stuttering group

	Preadolescents (YSR) M (SD)	*Parents (CBCL) M (SD)*	*P-value*	*Cohen's d*
Anxious/Depressed	55.63 (5.89)	58.00 (6.16)	.278	-0.393
Withdrawn	54.42 (4.75)	57.26 (7.27)	.157	-0.462
Somatic Complaints	54.00 (5.18)	56.32 (3.92)	.147	-0.506
Social Problems	**54.37 (4.19)**	**58.47 (6.14)**	**.041**	**-0.779**
Thought Problems	53.63 (4.95)	54.68 (4.63)	.523	-0.219
Attention Problems	53.89 (4.74)	54.11 (4.82)	.883	-0.046
Rule-Breaking Behavior	50.47 (1.39)	52.11 (3.80)	.068	-0.573
Aggressive Behavior	53.16 (4.10)	55.42 (5.57)	.173	-0.462
Internalizing Problems	51.95 (9.10)	56.58 (8.41)	.080	-0.529
Externalizing Problems	47.37 (5.52)	50.68 (8.73)	.168	-0.453
Total Problems	49.37 (7.21)	53.16 (8.30)	.117	-0.488
Affective Problems	**52.68 (3.79)**	**56.37 (5.38)**	**.033**	**-0.793**
Anxiety Problems	**56.58 (5.76)**	**60.37 (6.68)**	**.050**	**-0.608**
Somatic Problems	53.68 (5.03)	55.84 (4.11)	.179	-0.469
AttentionDeficit/Hyperactivity Problems	53.26 (4.32)	53.47 (4.60)	.883	-0.047
Oppositional Defiant Problems	55.26 (4.64)	56.21 (5.68)	.597	-0.183
Conduct Problems	**50.32 (0.58)**	**52.16 (3.63)**	**.035**	**-0.709**
Obsessive-Compulsive Problems	55.32 (5.48)	55.42 (5.36)	.953	-0.018
Post-traumatic Stress Problems	56.00 (5.72)	59.32 (6.17)	.101	-0.558

CHAPTER FOUR
GENERAL DISCUSSION

The problematic and the complexity of the stuttering is evidently due to its multifactorial nature and the extreme variability with which the clinical picture presents itself: intra-individual, family and environmental factors seem to interact with a basic biological vulnerability, giving rise to a heterogeneous symptomatic constellation.

If the nuclear symptoms of the disorder are clearly delineated (arrests, repetitions, prolongations), the more complicated the definition of the psychological and behavioral profiles that compose it, which can lead in the growth process to the manifestation of multiple problems.

The development of a negative communication attitude, the feelings of frustration at the time of blockages, the lability of emotional control in communicative contexts, the establishment of relational difficulties and the impairment of school and work functioning are some of the significant limits that accompany stuttering and that maintenance of post-treatment fluency is rather critical (Healey, 2004; Troutman, 2008; Menzies, 2010). The difficulties typically associated with stuttering may be particularly relevant and amplified during the years of preadolescence. Early adolescence represents a critical developmental period involving changes not only at the physical level, but also in the emotional, social and psychological domains. Such

developmental processes are even more complicated for stuttering youths, who additionally need to face the challenges linked to managing their "fluency failure". Indeed, physical changes, the development of cognitive complexity, the acquisition of independence and autonomy, and the growth of relationships, typical of this period, added to verbal disfluency, can create strong insecurities, increase stress and anxiety levels in the preadolescent who stutter. It leads to the development of important psychological implications, which strongly influence the personality of future adults.

It is difficult in the developmental age to fully understand the role of anxiety within stuttering, states of fear or apprehension are part of the normal emotional development of the child and their presence is not necessarily a sign of disease. Similarly, in adulthood, when personality characteristics have stabilized and stuttering becomes chronic, it is even more difficult to understand if anxiety is a previous phenomenon or concomitant with the syndrome; preadolescence can therefore represent an era of crucial passage for the study of anxiety and stuttering whose relationship is still today ambiguous and a source of debate (Smith et al., 2014). The theoretical framework in which this study is to be considered is provided by a multidimensional and dynamic concept of the phenomena anxiety and stuttering, whose cognitive, affective and behavioral components may play an important role not only in the development, but also in the maintenance of the disorder. Therefore, they deserve further studies in order to plan more effective and multidisciplinary combined treatments for their management. The general objective of this research was to preliminarily verify the existence of a relationship between anxiety disorders and stuttering in pre-adolescents by investigating the presence of a possible significant difference in scores between youths who stutter and fluent peers. Hence,

we compared anxiety symptoms, cognitive, emotional and behavioral functioning as well as variables related to speech, between preadolescents with persistent stuttering aged 11 to 14 years and non-stuttering peers. Then, we investigated if the presence of a chronic disorder such as stuttering is associated with an increased risk for development of psychopathological symptoms during the preadolescence. The results confirm the hypothesis of the present study that preadolescents who stutter, as a group, experienced higher levels of emotional reactions in communicative situations (SSC-ER) and reported higher negative speech-associated attitude (CAT) than non-stuttering group. These results are consistent with several international and national studies (Blood et al., 2001; Vanryckeghem & Brutten, 2004, 2012; Bernardini et al., 2010) indicating that people who stutter reported greater communicative apprehension and more negative speech-related attitudes than fluent speakers.

In contrast with previous studies, our stuttering sample showed communication attitude and emotional reactions scores under the clinical cut-off. Based upon the previous research studies being conducted, it has been established that stuttering therapy can be effective in reducing both speech disfluencies as well as reducing the psychological issues such stress, anxiety and negative attitude with a long-term effectiveness (Andrews et al., 1980; Brian et al., 2003).

In light of this evidence, it might be hypothesized that the participants' previous treatment history (in which stuttering modification, cognitive restructuring and desensitization strategies were integrated) positively impacted on their personal functioning, minimizing negative cognitive and emotional reactions to the speech, with long-term benefits.

Comparison between the clinical group and the control group on anxiety symptoms showed that anxiety (RCMAS-2) it is not a preferential mode of response in preadolescents with stuttering. These evidences are in accordance with the past researches by Craig & Hancock (1996), Hancock et al., (1998) and Messenger et al., (2015) in which there was no significant difference in anxiety between the group with persistent stuttering and the control group. In addition, the mean preadolescents scores on the anxiety scales are within normal limits, providing evidence that at this age, the relationship between stuttering and anxiety may be not meet the criteria of clinical concern. This results it is in line with the studies of Blood et al., (2001; 2007), Craig et al., (1996), and Iverach et al., (2017) where the sample of adolescents with stuttering report mean anxiety scores within the normative range.

Similarly, this result is in line with a previous Italian study where children and adolescents who stutter reported anxiety levels under the clinical range (Bernardini et al., 2015). It may be useful to investigate in subsequent studies if communicative apprehension constitutes in people who stutter a dynamic element, age dependent, which tends to evolve in the course of development, and verify, as suggested by Mulcahy (2008), if this circumscribed phenomenon has potential implications for other components of anxiety regarding extra-communicative contexts, especially, to social ones. In the current study, between-group comparison of psychopathological symptoms scores, assessed through YSR scale, indicated that preadolescents who stutter report higher withdrawal behavior problems compared control group, even if within normal range. Although Withdrawn Behavior subscale does not directly overlap with any specific DSM-5 diagnostic entity, neither is a clinically defined disorder, elevations in the Withdrawn Behavior scale may be consistent with

depression and inhibition symptoms (Achenbach & Rescorla, 2001). These include anhedonia, decreased energy, negative self-regard and sad mood. Others reflect the social function of withdrawn behavior, including shyness, loneliness, avoidance of social interaction and peer rejection (Achenbach & Rescorla, 2001). Specifically to stuttering preadolescents, those who reported high withdrawn behaviors were found also to have higher levels of total anxiety, social problems and lower levels of social self-efficacy. This pattern is consistent with previous researches reporting that children with withdrawn profile during the mid-to-late childhood and early adolescent years may be an at-risk population for negative outcomes (Boivin, Hymel, & Bukowski, 1995; Ollendick, Greene, Weist, & Oswald, 1990; Rubin, 1993), poorer social adjustment (Robins, 1966) and for later internalizing disorders (Goodwin, Fergusson and Horwood, 2004). This negative outcomes can begin early, with evidence of children who stutter are particularly vulnerable respect to for a wide range of negative adjustment outcomes in adolescence and adulthood, including socio-emotional difficulties (e.g., anxiety, low self-esteem, depressive symptoms, and internalizing problems), peer difficulties (e.g., rejection, victimization, poor friendship quality), and school difficulties (e.g., poor-quality teacher-child relationships, academic difficulties, school avoidance) (Blood et al., 2011; Blood & Blood, 2004, 2007; Davis et al., 2002; Langevin et al., 2009). Specifically to early adolescence, it is perhaps the most difficult stage within the whole adolescent period because during this period that peer interactions arguably hold the greatest importance for individuals' social and behavioral functioning (Gifford-Smith & Brownell, 2003). Hence, as a result of these negative social consequences it is not surprising that children and preadolescents who stutter are at higher risk of anxiety

and social phobia in adolescence and adulthood (Iverach & Rapee, 2014). In addition, given that stuttering adults who have anxiety disorders are less likely to have long-term success with speech therapy (Iverach et al., 2009), it becomes crucial to investigate if all or some children with stuttering are at risk of anxiety disorders and their anxiety onset time. Especially since the presence of anxiety disorders among people who stutter has been reported as one of the negative prognostic indicators for stuttering relapse. Last, late childhood may be the last chance to treat stuttering more effectively before it becomes less tractable and chronic in adulthood. (Hancock & Craig, 1998, Iverach et al., 2009). For this reason, it would be important to investigate through longitudinal studies the trajectory of withdrawal behavior in preadolescents through progress from late childhood into adulthood. This investigation will enhance knowledge regarding the developmental pathways in the etiology of internalizing problems. It will also provide insight into the effectiveness of a treatment to curtail the development of anxiety disorders before they become chronic in adulthood and to improve outcomes for speech-restructuring treatment for those who stutter. Second aim of this study was to examine how risk and protective factors may potentially moderate the relationship between stuttering and anxiety. Results indicate that preadolescents who stutter with high level of attentional problems were more likely to show higher levels of anxiety symptoms than their non-stuttering peers. This finding may be consistent with other data in stuttering literature which found a significant tendency toward higher anxiety levels in individuals reporting attention deficits (Alm & Risberg 2007; Blood et al., 2007). Theoretical views on this associations (Eysenck et al., 2007) proposed that conditions where the individual's cognitive resources are hypothesized to have diminished or be depleted,

such anxiety, are often associated with lower executive attention control related to inhibition of processing task-irrelevant information and attention shifting. Empirical research supports this notion and has shown that self-reported anxiety levels were negatively correlated with self-reported attention control not only in children with disabilities but also in healthy pediatric samples (Muris, de Jong, and Engelen, 2004) and adults (Derryberry & Reed, 2000). This association may reflect a reciprocal relationship, as poor attention control may increase tendency to experience anxiety (Rothbart et al., 2004) anxiety may also result in impaired attention control (Eysenck et al., 2007). These evidences suggest that the relationship among attention ability and psychological well-being is a critical aspect of children and adolescent's development, in the field of stuttering as it is in other clinical fields. Further research needs to investigate if it is possible that preadolescents who stutter with difficulties in attentional control may also be at a higher risk for increased anxiety levels than peers who stutter without co-occuring disorders. Such finding has potential clinical implications and would suggest the importance of monitoring and treating both affective and cognitive symptoms in children and adolescents with stuttering. Identification of risk factors may assist speech-language pathologists in determining which youths require more monitoring and intervention for affective symptoms. It follows the need for health care providers to work as a team in developing appropriate and successful treatment interventions for this age group. Another cognitive factor evidenced as a potential moderator of the relationship between anxiety and stuttering was the attributional style. Causal attribution concerns how people understand the reasons for their successes and failures. According to Weiner's (1971) Attribution Theory causal attributions (effort, ability, ease/difficulty

of task, luck and help) are factors which noticeably influence an individual's thoughts and affective state and are widely recognized to act as behavioral pattern mediators. Our study provides evidence that the effect of attributions of success to effort on anxiety levels may differ across stuttering and non-stuttering preadolescents. Indeed, at high levels of attributions to effort in success situations, there was no a significant difference between preadolescents with stuttering than preadolescents without stuttering in anxiety levels. That is, preadolescents with high attribution to effort do not experience much anxiety, independent of their group membership. In contrast, as decreases the attribution of success to effort, the gap between preadolescents with and without stuttering gets clearer due, hypothetically, to the less positive impact of external (luck, help, easy task) and uncontrollable attributions (ability) on stuttering preadolescents' anxiety levels. Similarly, at low causal attributions to lack of effort in failure events, preadolescents who stutter do not experience higher anxiety symptoms than preadolescents who do not stutter. However, as decreases the attribution of unsuccess to lack of effort, the difference between preadolescents with and without stuttering become significant. Although speculative in nature, a possible explanation is that preadolescents who stutter may be more exposed to the negative effect of external and uncontrollable attributions (e.g. lack ability, unlucky, lack of help, difficult task) on anxiety than their non-stutter counterparts. Taken as a whole, these findings seem to suggest that, if preadolescents who stutter attribute their successes and failures to less controllable and unstable causes, and thus not characteristic of the self, they may be more vulnerable to experience anxiety than non-stuttering peers do. In other words, as the perception of control on events diminishes, a higher risk for anxiety development emerges in pre-adolescents who stutter. Furthermore, the

finding that increased attributions on effort were related to reduced internalizing symptoms highlight the possible contribution of a sense of perceived control to internalizing symptomatology. To date, to our best knowledge, there are no studies about causal attributions for performance in children and adolescents who stutter. As regards adult age, our results may be in line with the Boyle' study (2015) who investigated causal attributions for stuttering in adults who stutter (AWS) and their potential links to well-being. The author found that AWS who made more external causal attributions for stuttering behaviors (e.g. reflect an aspect of the situation, it cannot be controlled) reported higher levels of anxiety, independent of their self-rated speech disruption. On the other hand, adults who stutter who believed that the moment of stuttering was under their personal control (e.g. reflect an aspect of self, it can be regulated) were more likely to experience lower levels of anxiety. This evidence, although related to a different context than our study, seems to suggest that the perception of personal control on achievement outcomes is a crucial issue for adults who stutter's psychological well-being (Tichenor & Yaruss, 2018). In this regard, as for adults the same issue may be important for youths who stutter. This may certainly be true considering that stuttering is a medical condition where the speaker experiences an involuntary speech disruption with feelings of "loss of control" and helplessness since the early age (Bloodstein, 1987; Perkins, 1983; VanRiper 1937). This sensation of losing control may be also related, in conversational and pragmatic terms, to a lack of sense of agency to move forward in the conversation. It follows that this sensation can occur independently from the production of observable speech disfluencies. Thus, it represents a life time episodes of non-contingency that could lead to the perception that control of life events lies

outside of the individual, leading to an external perception of control. Evidences to the hypothesis that perceptions of control may be generalized from the physical to the personal sphere comes from studies in which adults who stutter were found to be significantly more external with regard to general locus of control than fluent adults (Craig et al., 1984; Kumbhar & Gupta, 2016). In this regards, locus of control refers to the beliefs that positive or negative strengthening result are directly from own actions (internal locus of control) or depend on external forces (external locus of control) (Rotter 1966). It is considered tight related to the construct of attributional styles since they are both cognitive dispositions through which people attempt to make sense of their world. Although further exploration on causal attribution is advisable in youth population who stutter for understanding its role in the anxiety disorders, it could be relevant during assessment with youth clients to investigate the perceptions of personal control regarding the ability to manipulate their speech mechanism. Recognizing that effort, more than innate abilities or luck, is the main factor explaining successes or failures in fluency, may imply a sense of increased control in children and adolescents who stutter not only in the psychological domain but also in the speech context. In conclusion, fostering attributions to effort could be implemented in preventive programs for preadolescents aimed at supporting the achievement of fluency and in reducing the development of psychopathological symptoms.

Examining another protective factor suggested to provide a protective role in anxiety problems, results of this study support previous studies regarding the general positive self-esteem of adolescents who stutter (Blood et al., 2003; 2004; 2007; Yovetich, Leschied, & Flicht, 2000). Our results suggest that preadolescents who stutter and

who do not stutter report similar levels of self-esteem. In particular, both groups reported negative associations between self-esteem's and internalizing symptoms, providing the hypothesis, in line with our expectations, that self-esteem may be to be a protective buffer for a wide range of anxiety-related symptoms. Previous investigation into this area found no evidence of low self- esteem in adolescents who stutter as compared to normative data and non-stuttering peers self-esteem is not affected in children who stutter until adolescence (Blood, Blood, Maloney, Meyer, & Qualls, 2007; Yovetich, Leschied, & Flicht, 2000). Furthermore, preadolescents who stutter group seems to differ from control group in this associations for several reasons. First, preadolescents who stutter reported smaller and lower associations between self-esteem and psychopathological variables, as though in this group self-esteem may be not a strong protective factor for anxiety-related symptoms as evidenced in control group. In addition, higher levels of self-esteem (total, social and competence) in preadolescents who stutter were more likely associated to higher socially desirable answers. Socially desirable responses are described as an indicator of social desirability (Dadds, Perrin, & Yule, 1998) and/or defensiveness (Joiner, & Barnett, 1996), reflecting a tendency to present oneself in a favourable light, and/or deny flaws and weaknesses that others are usually willing to admit (Reynolds & Richmond, 2009). This finding may be in line with previous evidences of socially desirable responding among youths who stutter when completing measures of anxiety symptoms (Gunn et al., 2014; Messenger et al., 2015; Iverach et al., 2017). Further research is required to determine whether this defensive response is limited to stuttering and anxiety experiences as evidenced in previous studies (Blood et al., 2003; Erickson & Block, 2013 Gunn et al., 2014; Messenger et al., 2015; Iverach et

al., 2017) or additionally may be associated to other constructs as emerged in our study. Moreover, it could be important understand if this generalized reticence to provide personal experiences may reflect the desire to be accepted, and be associated to feelings of social isolation or rejection, which are themes of interest for children and adolescents with stuttering (Blood & Blood, 2004; 2007; Blood et al., 2011). Investigating the association between psychopathological symptoms and speech related variables, we did not find any significant relationships between anxiety and stuttering severity in line with prior findings (Craig & Hancock, 1996; Gunn et al., 2014; Mulcahy et al., 2008). However, with our surprise, we found that higher withdrawn behaviours were associated to lower grade of stuttering severity. This relationship was modulated by the attributional style which emerged once more as an important factor for stuttering youths' adjustment. In particular, a mild stuttering was linked to higher withdrawn symptoms for stuttering pre-adolescents who could count on high levels of attribution of success to help. Conversely, at low levels of attribution of success to help, the stuttering severity did not seem to impact on withdrawn symptoms. This finding of variation in levels of withdrawn behaviour can be read in light of the possible interaction between stuttering severity and personal attribution of success to others' help. However, such finding made us reflect upon the specific psychological features of our group of preadolescents who stutter, whose age, gender, and stuttering severity, were not uniformly distributed. Consequently, a larger sample size and a homogeneous distribution of all variables considered might help to analyse the associations between stuttering severity and psychopathological variables more efficiently from a statistical point of view.

As regards subjective speech-related variables differences emerged across preadolescents who stutter and who do not stutter. Specifically, in preadolescents who stutter higher worries for self-reported stuttering severity were found to be associate with lower self-esteem, social self-efficacy and higher negative emotional reactions toward speech. A higher mal-attitude toward speech and a heightened communication apprehension were found to be negatively associated with lower self-esteem levels and higher social anxiety symptoms. These results suggest that at preadolescence age worries and negative attitudes about stuttering may be limited to speech and interpersonal domains and not be necessarily synonymous of psychopathology. Conversely, as regards control group, higher mal-attitude and more negative reactions toward speech were found to be synonymous of less general well-being widespread in several contexts. We were not surprised not to find any significant associations between measure of stuttering severity and anxiety symptoms. Prior research with these same variables demonstrated that levels of anxiety are not directly associated to both subjective and objective measure of stuttering severity.

Exploring differences among preadolescents in parent reports (CBCL) of emotional and behavioral problems, both groups reported the majority of scores within the normal range for the exception of anxiety subscales which was within borderline range according to parents report of preadolescents who stutter. These finding are in line with previous researches (Gunn., 2014; Iverach et al., 2016) where the majority CBCL scores of youths who stutter fell within the normal range. As regards differences with control group, parents of preadolescents who stutter reported higher social problems, affective problems and post-traumatic stress symptoms than parents

of preadolescents without stuttering. This finding is similar with past research (Giorgetti, 2015) where parents of children and adolescents who stutter reported higher frequency of symptoms like anxiety/depression, social problems and withdrawn behaviour than fluent controls.

Besides difference scores between parents and youths, we also looked at correlations between parents and preadolescents reports. Additionally, we investigated specifically to group with stuttering, the associations between speech related variables such as the objective measure of stuttering, the subjective measure of stuttering and worries related to this perceptions by parents and preadolescents. In general, analysing parent-youth agreement through CBCL and YSR scale (Achenbach, 2001), low associations between pre-adolescents and parents' reports were found for both groups. This result is supported from previous research showing often discrepant information among multiple informants about a youth's symptoms and level of functioning (Achenbach, McConaughy, & Howell, 1987; De Los Reyes & Kazdin, 2005; Kolko & Kazdin, 1993; Mesman & Koot, 2000). However, differences seem to emerge in the nature of associations between parent-preadolescents reports. Indeed, considering the group with stuttering, no correlation between the YSR subscale scores with the equivalent subscale scores of the CBCL were found (e.g. YSR-Anxiety Symptoms and CBCL-Anxiety Symptoms). Conversely, as regards group without stuttering, parents-youths reports evidenced positive associations not only between the equivalent YSR-CBCL subscales (e.g. YSR-Anxiety Symptoms and CBCL-Anxiety Symptoms) but also between the not equivalent YSR-CBCL subscales (e.g. YSR-Internalizing Symptoms and CBCL Anxious-Depressed). Moreover, an intragroup comparison showed that, on average,

parents of stuttering group reported consistently more internalizing and externalizing symptomatology than their offspring. In contrast, parents of control group report only one score higher than their youths. Overall, examining differences in parent-child disagreement of emotional and behavioral problems, our results suggest that the largest differences in parent-child self-report were found for children with stuttering. To our best knowledge, there are not studies which investigate quantitative discrepancies between parents-youth informants in population with stuttering. Regarding general populations, inconsistent answer between parents and youths may be associated to several factors such as family conflict, parental dysfunction, or related to youths (younger age, male gender, and low IQ, lack of insight) (Guion, Mrug, & Windle, 2009). Consequently, we carried out a reasoning for hypothesis, examining these factors in light of research literature on stuttering. Previous research reported that youth who stutter do not discussed openly with parents, other family members or friends about their feelings and emotions related to stuttering (Corcoran & Stewart, 1995, Erickson & Block 1998; Hearne, et al., 2008; Hughes et al., 2011., Hearne et al., 2008). Furthermore, Erikson and Block's (2013) study shows that the 69% of parents of adolescents who stutter reported to discuss about stuttering with low frequency with their child. These evidences bring up the question of whether or not this low associations between scores may be the reflection of generalization of a poor communication between preadolescents who stutter and their parents to other contexts. Further studies are needed to investigate if this poor communication exist, if it is limited to the psychosocial aspects of stuttering, or in contrast to be a reflection of an overall difficulty to communicate emotional expression in the family or peer's context. Youth who prefer socially desirable response are more likely to underreport

anxiety symptoms (Rapee, Barret, Dadd & Evans, 1994), whereas parents with anxiety disorders are more likely to overreport anxious symptomatology in their children (Frick, Silverthorn & Evans, 1994).

Moreover, evidences of higher frequency of social desirability responses in youth who stutter suggest the hypothesis that preadolescent who stutter might denies, or do not recognize certain problems, or not consider them as problematic (Smith., 2014). In addition, low child-parent agreement could be ascribed to high parents concern about adolescent's wellbeing. Indeed, stuttering placed an emotional strain on many of the families, and most of this distress has come as a result of the realisation of the impact stuttering has had on their child and of the concerns about child's ability to perform at school (Erickson & Block, 2013). Hypothetically, these factors might change the way parents and youth perceive their child's behaviours/emotions. In this regards, a theoretical model of informant discrepancies (De Los Reyes & Kazdin, 2005), the Attribution Bias Context (ABC) suggests that these disagreements may be due to each informant's unique perspective and the personal attributions that parent and youth provide about youths' emotional and behavioral functioning. It follows that, when findings are inconsistent, assessment and diagnosis of youth psychopathology should include more than trying to determine which informant is "right" and which is "wrong" (Kramer et al. 2004; De Los Reyes Alfano et al. 2011). This is because information from one kind of informant may be most relevant when information from the other kind of informant is taken into account. For example, for our group with stuttering, an awareness of social withdrawal behavior in preadolescents added to a report by parents of an anxious manifestation within

normal limits, could be an additional value during the diagnostic process about the presence of difficulties in the social and emotional domains.

Furthermore, different discrepancies between informants might be predictive of different outcomes and be important signs of a poor prognosis. It becomes clearer the need for information from different informants in clinical practice (Ferdinand et al., 2004).

Limitations and strength of the research

Like any study, the present research must be interpreted within the context of its methodological limitations which are recommended to be overcome in future studies. First, it should be noted that a small sample size limited a fully clarifying the complex links between the variables in our study, as well as the generalizability of our results. Some statistical biases related to small sample sizes, as for example under-powered results, false-positive results, or overestimation of the magnitude of associations (Friston, 2012) limited the generalizability of our results to other preadolescents who stutter as well as a fully clarifying the complex links between anxiety and stuttering. Furthermore, the sampling strategy (participants who stutter were both from community and seeking a treatment) may have led to measure anxiety related to the clinical status of youth. Indeed, preadolescents who were seeking a treatment would have higher levels of anxiety than preadolescents from community as evidenced in past research (Blumgart et al., 2010; Iverach et al., 2009; Mc Allister et al., 2013). Lastly, the sample was drawn mainly from cities in Northern Italy which may further limit the generalizability of our findings to other Italian regions.

Secondly, this was a cross-sectional study with data collected at only one time-point, this prevents us from drawing conclusions about causality. Longitudinal designs (covering one or more years) may allow better assessment and understanding developmental trajectories of anxiety across the life span in people who stutter.

Third, the present study utilized self-report measure, which did not allow us to draw conclusions regarding the presence anxiety disorder diagnosis in youths who stutter. Indeed, self-reported screening tools can help to investigate a "dimensional" construct rather a "categorical" diagnostic decision. Furthermore, this study measured the perceptions of emotional and behavior adjustment in preadolescents than their actual psychological adjustment. For example, youth with difficulties in peer relationship might also have deficits in their self-evaluation skills or social perceptions and they may wish to present themselves in a more desirable way (Van Hasselt & Hersen, 1995).

Fourth, mothers and fathers may differ in their reports on youth's emotional-behavioral adjustment. Although this aspect was not the main focus of the present work, future studies involving both parents would inform on the specific perspective of maternal and paternal on psychological adjustment in early adolescents who stutter.

Fifth, although a method to assess the effects of a moderating variable is computing interaction analyses, may be hard to detect and replicate the interaction effects which also tend to have small effect sizes (McClelland & Judd, 1993). Thus, our exploratory intent was to test a complex and plausible model of reality able to provide new

insights and hints for future research and discussion about the relationship between anxiety and stuttering. Therefore, interaction results have to be interpreted with caution, and to be replicated in future research. As stated by Box and Draper (1987, p. 424) “Essentially, all models are wrong, but some are useful”. In spite of these limitations, our study uniquely contributes to advancing research by providing evidence of similarities and differences in early adolescents with and without stuttering. Moreover, although results of this study cannot be generalized to the entire population, our research produced a depth investigation related to stuttering in early adolescence and how it impacted on preadolescents daily life.

In addition, we adopted an integrative and multi-method approach which allowed us to investigate the complex interplay of external and individual influences on psychological outcomes in early adolescence. The main value of this research may be the decomposition of anxiety, self-esteem and attributional style variables in different components; this allowed us to verify the presence or absence of different psychological components involved in the stuttering syndrome. Additionally, it emphasizes the relevance of targeting possible protective factors to reduce the possible negative impact of stuttering on psychological adjustment. A further merit concerns the participants of the clinical sample and was to exclude from the research the preadolescents who had previously received a psychological or speech treatment thus avoiding to measure possible manifestations of anxiety mediated by the effect of a therapy. The combined use of self-report and parent-report measures is another strength of the present study, as it allows to integrate reports from all informants, with discrepancies interpreted as informative and not problematic, thus suggesting intervention and treatment targeted to the preadolescents' psychopathology. If results

of the present study will be replicated and extended, clinical implications may be possible.

Psychoeducation about the potentially harmful cognitive and behavior patterns may offer preadolescents and understanding of both onset and maintenance of anxiety in their lives. Further, clinicians may provide preadolescents with more adaptive alternatives to better manage stress and anxiety related to stuttering, which may reduce the short- and long-term negative consequences.

Moreover, interventions aimed to improve parental knowledge of preadolescents' feelings and emotions may be useful to reduce the negative outcomes in preadolescents who stutter.

Conclusions

Early adolescence represents a critical developmental period involving changes not only at the physical level, but also in the emotional, social and psychological domains. Such developmental processes are even more complicated for stuttering youths, who additionally need to face the challenges linked to managing their "fractured fluency". Previous work has suggested that middle childhood is a developmental period during which signs of anxiety begin to emerge, but are not yet clinically diagnosed (Costello et al., 2011). Although evidence suggests that most cases of childhood anxiety do not persist into adulthood, it might be not the case for people with stuttering who are exposed to higher risk of chronic cases of anxiety than people without stuttering (Iverach., 2017). It signified the need to identify the conditions which are involved in the development of anxiety symptoms in this population. The clinical implications of our results suggest that, as a group,

preadolescents who stutter between 11 and 14 years, may not be more anxious than non-stuttering peers, however manifest higher withdrawn behaviors than control group which may expose them to an increased risk of developing internalizing problems. According to these results, it is possible to conclude that stuttering at preadolescence age is a syndrome associated with high levels of emotional reactivity in communicative situations, that does not present specific co-morbidities with anxiety disorders, but rather that anxiety represents a contingent phenomenon to situations of speech. Hence, one might think that all stuttering preadolescents might generally be at higher risk of socio-emotional difficulties. However, this is not always the case, and the existence of modulating protective factors suggests that youngsters who stutter may manage to move adaptively across their fluency, coping without undue stress with these important developmental issues. Specifically to our study, self-esteem and attribution of success to stable and controllable causes appeared to provide a protection against a negative trajectory of anxiety in preadolescents who stutter.

Findings highlighted the importance of integrating different perspectives when describing the relationship between anxiety and stuttering. In fact, only when considering the interdependence of potential predictors their effect on anxiety levels significantly emerges.

Although this observation needs to be supported by further cross-sectional researches, interventions designed to increase and promote attributions to more stable and controllable causes like effort might carry to an additional benefit of positive health outcomes in both speech and psychological domains. Additionally, screening for early emotional vulnerability might help in tailoring interventions to prevent

stuttering from affecting preadolescents' psychological development. Finally, it has been noted that children and adolescents with stuttering compared to fluent peers have a tendency to provide a more positive view of themselves than is the reality by denying minor flaws and weaknesses. This result, emerged also in our study, could suggest the presence of a greater need in the former to give a socially desirable view of oneself. Consequently, for early identification and treatment of internalizing problems in preadolescent children, is therefore recommended to include reports from multiple informants to facilitate a complete picture of a youth's psychological adjustment and as part of routine health examinations in preventive youth health care.

Our findings tried to overcome some common limitations in research adopting a multiple perspective, focusing in deep way across several construct and considering a small range of ages within each group. In addition, we adopted an integrative and multi-method approach which allowed us to investigate the complex interplay of external and individual influences on psychological outcomes in early adolescence.

The main value of this research has been the decomposition of the variable anxiety, self-esteem and attributional style in different components; this allowed us to verify the presence or absence of specific different psychological components involved in the stuttering syndrome. A further merit concerns strategy sample and was to exclude from the research the preadolescents who had previously received a psychological or speech therapy thus avoiding to measure possible manifestations of anxiety mediated by the effect of a therapy. Despite the exploratory nature of the present study, the current doctoral dissertation tried not only answer to relevant (even if few) questions, but it also raised new and countless interrogations. Broadening our understanding of how different individual and environmental factors interact to reduce or increase the

negative impact of stuttering on youth's adaptation is crucial as to implement interventions in a prevention-oriented effort. To conclude, given the limited national scientific literature present in the field of youth with stuttering, this preliminary study hopes to be a starting point for a detailed study of preadolescence, as a crucial development phase for physical and mental health of the future adult, which therefore deserves special attention, and specifically for youth who stutter it should become double.

Appendix A

Linear regression models: AIC_c and AIC_{weight} and $R^2_{adjusted}$ of all models analyzed for total anxiety as dependent variable (n=38). The selected model are highlighted in bold type.

Protective Factors

1 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	264.8	26%	.24
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	19%	.26
Model 2: Total Anxiety ~ Age + Gender + Communication Attitude	**264.0**	**40%**	**.29**
Model 3: Total Anxiety ~ Age + Gender + Group + Communication Attitude	266.8	9%	.27
Model 4: Total Anxiety ~ Age + Gender + Group * Communication Attitude	268.9	3%	.26

2 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	264.8	9%	.24
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	6%	.26
Model 2: Total Anxiety ~ Age + Gender + Emotional Reaction	**261.0**	**60%**	**.34**
Model 3: Total Anxiety ~ Age + Gender + Group + Emotional Reaction	263.6	17%	.33
Model 4: Total Anxiety ~ Age + Gender + Group * Emotional Reaction	265.4	6%	.33

3 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	264.8	<.01	.24
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	<.01	.26
Model 2: Total Anxiety ~ Age + Gender + Total Self-esteem	255.2	39%	.44
Model 3: Total Anxiety ~ Age + Gender + Group + Total Self-esteem	**254.7**	**49%**	**.47**
Model 4: Total Anxiety ~ Age + Gender + Group * Total Self-esteem	257.7	10%	.45

4 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	**264.8**	**43%**	**.24**
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	32%	.26
Model 2: Total Anxiety ~ Age + Gender + Total Self-efficacy	267.1	13%	.23
Model 3: Total Anxiety ~ Age + Gender + Group + Total Self-efficacy	268.1	8%	.24
Model 4: Total Anxiety ~ Age + Gender + Group * Total Self-efficacy	271.0	2%	.22

5 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	**264.8**	**41%**	**.24**
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	30%	.26
Model 2: Total Anxiety ~ Age + Gender + Positive Qualities	267.1	13%	.23
Model 3: Total Anxiety ~ Age + Gender + Group + Positive Qualities	267.3	11%	.26
Model 4: Total Anxiety ~ Age + Gender + Group * Positive Qualities	270.0	3%	.24

Risk Factors

6 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	264.8	< 0.01%	.24
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	< 0.01%	.26
Model 2: Total Anxiety ~ Age + Gender + Affective Problems	256.6	23%	.41
Model 3: Total Anxiety ~ Age + Gender + Group + Affective Problems	256.1	30%	.45
Model 4: Total Anxiety ~ Age + Gender + Group * Affective Problems	**255.3**	**45%**	**.48**

7 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	264.8	<0.01%	.24
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	<0.01%	.26
Model 2: Total Anxiety ~ Age + Gender + Withdrawn	**255.6**	**75%**	**.43**
Model 3: Total Anxiety ~ Age + Gender + Group + Withdrawn	258.4	18%	.41
Model 5: Total Anxiety ~ Age + Gender + Group * Withdrawn	261.4	4%	.39

8 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	264.8	12%	.24
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	9%	.26
Model 2: Total Anxiety ~ Age + Gender + Thought Problems	**262.4**	**41%**	**.32**
Model 3: Total Anxiety ~ Age + Gender + Group + Thought Problems	263.2	27%	.33
Model 4: Total Anxiety ~ Age + Gender + Group * Thought Problems	265.5	9%	.33

9 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	264.8	<0.01%	.24
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	<0.01%	.26
Model 2: Total Anxiety ~ Age + Gender + Attention Problems	256.7	15%	.41
Model 3: Total Anxiety ~ Age + Gender + Group + Attention Problems	256.9	13%	.43
Model 4: Total Anxiety ~ Age + Gender + Group * Attention Problems	**253.5**	**71%**	**.51**

10 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	264.8	23%	.24
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	17%	.26
Model 2: Total Anxiety ~ Age + Gender + Attention Deficit Hyperactivity	264.9	22%	.27
Model 3: Total Anxiety ~ Age + Gender + Group + Attention Deficit Hyperactivity	**264.7**	**24%**	**.31**
Model 4: Total Anxiety ~ Age + Gender + Group * Attention Deficit Hyperactivity	265.9	14%	.32

11 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	**264.8**	**32%**	**.24**

Model 1: Total Anxiety ~ Age + Gender + Group	265.4	24%	.26
Model 2: Total Anxiety ~ Age + Gender + Aggressive Behavior	266.3	16%	24
Model 3: Total Anxiety ~ Age + Gender + Group + Aggressive Behavior	266.3	16%	24
Model 4: Total Anxiety ~ Age + Gender + Group * Aggressive Behavior	266.7	12%	30

12 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	**264.8**	**43%**	**.24**
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	31%	.26
Model 2: Total Anxiety ~ Age + Gender + Rule-Breaking Behavior	267.5	11%	.22
Model 3: Total Anxiety ~ Age + Gender + Group + Rule-Breaking Behavior	267.5	11%	.22
Model 4: Total Anxiety ~ Age + Gender + Group * Rule-Breaking Behavior	270.7	2%	.23

13 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	**264.8**	**44%**	**.24**
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	32%	.26
Model 2: Total Anxiety ~ Age + Gender + Conduct Problems	267.1	13%	.23
Model 3: Total Anxiety ~ Age + Gender + Group + Conduct Problems	268.2	7%	.24
Model 4: Total Anxiety ~ Age + Gender + Group * Conduct Problems	271.2	1%	.22

14 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	**264.8**	**40%**	**.24**
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	30%	.26
Model 2: Total Anxiety ~ Age + Gender + Oppositional Defiant Problems	266.9	14%	.23
Model 3: Total Anxiety ~ Age + Gender + Group + Oppositional Defiant Problems	267.4	11%	.26
Model 4: Total Anxiety ~ Age + Gender + Group * Oppositional Defiant Problems	269.4	4%	.25

15 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	**264.8**	**44%**	**.24**
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	44%	.26
Model 2: Total Anxiety ~ Age + Gender + Social Problems	244.9	12%	.57
Model 3: Total Anxiety ~ Age + Gender + Group + Social Problems	244.9	<0.001%	.57
Model 4: Total Anxiety ~ Age + Gender + Group * Social Problems	247.5	<0.001%	.58

16 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	**264.8**	**48%**	**.24**
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	48%	.26
Model 2: Total Anxiety ~ Age + Gender + Obsessive Compulsive Problems	244.4	3%	.57
Model 3: Total Anxiety ~ Age + Gender + Group + Obsessive Compulsive Problems	244.4	<0.001%	.57
Model 4: Total Anxiety ~ Age + Gender + Group * Obsessive Compulsive Problems	249.9	<0.001%	.55

17 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	**264.8**	**<0.001%**	**.24**
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	<0.001%	.26
Model 2: Total Anxiety ~ Age + Gender + Post Traumatic Stress Problems	232.4	46%	.69
Model 3: Total Anxiety ~ Age + Gender + Group + Post Traumatic Stress Problems	232.4	46%	.69

Model 4: Total Anxiety ~ Age + Gender + Group * Post Traumatic Stress Problems	236.0	7%	.69

18 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	**264.8**	**<0.001%**	**.24**
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	<0.001%	.26
Model 2: Total Anxiety ~ Age + Gender + Somatic Complaints	252.5	33%	.47
Model 3: Total Anxiety ~ Age + Gender + Group + Somatic Complaints	252.5	33%	.47
Model 4: Total Anxiety ~ Age + Gender + Group * Somatic Complaints	252.5	33%	.47

19 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	264.8	9%	.24
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	6%	.26
Model 2: Total Anxiety ~ Age + Gender + Somatic Problems	262.4	31%	.32
Model 3: Total Anxiety ~ Age + Gender + Group + Somatic Problems	**261.8**	**42%**	**.36**
Model 4: Total Anxiety ~ Age + Gender + Group * Somatic Problems	264.7	10%	.34

Attributional Style

20 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	264.8	24%	.24
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	18%	.26
Model 2: Total Anxiety ~ Age + Gender + Ability Success	**264.1**	**34%**	**.29**
Model 3: Total Anxiety ~ Age + Gender + Group + Ability Success	265.3	18%	.30
Model 4: Total Anxiety ~ Age + Gender + Group * Ability Success	268.3	4%	.27

21 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	264.8	8%	.24
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	6%	.26
Model 2: Total Anxiety ~ Age + Gender + Effort Success	263.3	17%	.30
Model 3: Total Anxiety ~ Age + Gender + Group + Effort Success	262.3	28%	.35
Model 4: Total Anxiety ~ Age + Gender + Group * Effort Success	**261.6**	**40%**	**.39**

22 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	**264.8**	**44%**	**.24**
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	32%	.26
Model 2: Total Anxiety ~ Age + Gender + Easy Task Success	267.4	12%	.22
Model 3: Total Anxiety ~ Age + Gender + Group + Easy Task Success	268.2	8%	.24
Model 4: Total Anxiety ~ Age + Gender + Group * Easy Task Success	270.2	3%	.24

23 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	264.8	1%	.24
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	1%	.26
Model 2: Total Anxiety ~ Age + Gender + Good Luck Success	**257.5**	**53%**	**.40**
Model 3: Total Anxiety ~ Age + Gender + Group + Good Luck Success	258.3	35%	.41
Model 4: Total Anxiety ~ Age + Gender + Group * Good Luck Success	261.1	9%	.40

24 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	**264.8**	**39%**	**.24**
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	28%	.26
Model 2: Total Anxiety ~ Age + Gender + Help Success	266.2	19%	.25
Model 3: Total Anxiety ~ Age + Gender + Group + Help Success	267.4	10%	.25
Model 4: Total Anxiety ~ Age + Gender + Group * Help Success	270.4	2%	.23

25 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	**264.8**	**43%**	**.24**
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	31%	.26
Model 2: Total Anxiety ~ Age + Gender + Inability Failure	267.2	12%	.23
Model 3: Total Anxiety ~ Age + Gender + Group + Inability Failure	268.2	7%	.24
Model 4: Total Anxiety ~ Age + Gender + Group * Inability Failure	269.2	4%	.26

26 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	264.8	1%	.24
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	1%	.26
Model 2: Total Anxiety ~ Age + Gender + Lack Effort Failure	258.6	32%	.38
Model 3: Total Anxiety ~ Age + Gender + Group + Lack Effort Failure	259.3	23%	.40
Model 4: Total Anxiety ~ Age + Gender + Group * Lack Effort Failure	**258.1**	**41%**	**.44**

27 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	**264.8**	**35%**	**.24**
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	26%	.26
Model 2: Total Anxiety ~ Age + Gender + Difficult Task Failure	265.9	20%	.25
Model 3: Total Anxiety ~ Age + Gender + Group + Difficult Task Failure	266.8	13%	.27
Model 4: Total Anxiety ~ Age + Gender + Group * Difficult Task Failure	269.2	3%	.26

28 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	264.8	3%	.24
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	2%	.26
Model 2: Total Anxiety ~ Age + Gender + Bad Luck Failure	261.8	13%	.33
Model 3: Total Anxiety ~ Age + Gender + Group + Bad Luck Failure	**259.5**	**44%**	**.39**
Model 4: Total Anxiety ~ Age + Gender + Group * Bad Luck Failure	259.9	36%	.42

29 Models	AIC_c	AIC_{weight}	R^2_{adj}
Model 0: Total Anxiety ~ Age + Gender	264.8	6%	.24
Model 1: Total Anxiety ~ Age + Gender + Group	265.4	4%	.26
Model 2: Total Anxiety ~ Age + Gender + Lack Help Failure	**261.1**	**39%**	**.37**
Model 3: Total Anxiety ~ Age + Gender + Group + Lack Help Failure	261.1	39%	.37
Model 4: Total Anxiety ~ Age + Gender + Group * Lack Help Failure	263.8	10%	.35

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