**INSTITUTO DE NEUROCIENCIAS "FEDERICO OLORIZ"**

FACULTAD DE MEDICINA

**UNIVERSIDAD DE GRANADA**

**TESIS DOCTORAL**

# "Valoración de actitudes hacia el tratamiento en adolescentes con trastornos psiquiátricos; desarrollo de la escala QATT para adolescentes con Trastorno por Déficit de Atención e Hiperactividad (TDAH)"

……..

# "Attitudes towards treatments in adolescents with psychiatric disorders: QATT questionnaire for the evaluation of the attitudes towards treatment in adolescents with ADHD (Attention Deficit Hyperactivity Disorder)"

**MAITE FERRÍN ERDOZAIN**

**INSTITUTO DE NEUROCIENCIAS "FEDERICO OLORIZ"**
**FACULTAD DE MEDICINA**
**UNIVERSIDAD DE GRANADA**

TESIS DOCTORAL

# "Valoración de actitudes hacia el tratamiento en adolescentes con trastornos psiquiátricos; desarrollo de la escala QATT para adolescentes con Trastorno por Déficit de Atención e Hiperactividad (TDAH)"

# "Attitudes towards treatments in adolescents with psychiatric disorders: QATT questionnaire for the evaluation of the attitudes towards treatment in adolescents with ADHD (Attention Deficit Hyperactivity Disorder)"

Memoria presentada por:

**MAITE FERRÍN ERDOZAIN**

Para optar al grado de Doctor Europeo por la Universidad de Granada

Directores de Tesis:

●Prof. Eric Taylor
(King's College London, University of London)

●Prof. Jorge Cervilla Ballesteros
(Universidad de Granada)

●Dr. Miguel Ruiz-Veguilla
(Universidad de Granada)

Editor: Editorial de la Universidad de Granada
Autor: Maite Ferrín Erdozain
D.L.: GR 762-2011
ISBN: 978-84-694-0150-7

Conflictos de interés:

Ayudas a la investigación Fundación Alicia Koplowitz (2007-2009)
Beca Evaluación Tecnologías Sanitarias Instituto de Salud Carlos III (ETS 07/90902)
Beca de Ampliación de Estudios Ministerio Ciencia e Innovación (BAE 09/90988)

**A mis padres,**

que me dejaron la educación como legado

**Al Profesor Eric Taylor,**

quien me enseñó psiquiatría infantil,

por su honestidad e integridad

**A Miguel,**

por su apoyo constante

***Acknowledgements:***

I am truly grateful to Prof. Ian Wong, Prof. Philip Asherson, Dr. Brian Jacobs, Dr Helen Sammons and Mrs. Andrea Bilbow for their contribution during the face validity phase and to Daniel Stahl for statistical help. Dr. El Abd,Dr. Lax-Pericall, Maxine Sinclair -and especially Dr. Blanc-Betes- contributed by recruiting patients at the Bloomfield Clinic, the Belgrave Psychiatric Clinic and the Michael Rutter Centre.

Especial thanks and akcnoledgement to all the patients and families who contributed to the study.

Finally, I want to thank all my colleagues -and friends- at the NPD Unit for the fantastic and tough times spent together.

**INDEX**

# 1. BACKGROUND

## 1.1. Attention Deficit Hyperactivity Disorder (ADHD)

### 1.1.1. Definition, impact and epidemiology

Attention Deficit Hyperactivity Disorder (ADHD) is a highly disabling condition with onset in early childhood. It is characterized by marked and pervasive *inattention*, *overactivity* and *impulsiveness* (E. Taylor et al., 2004). Attention Deficit Hyperactivity Disorder is one of the most important disorders that child and adolescents treat. Firstly, because ADHD is a *highly prevalent condition*. As defined by the American DSM-IV criteria, prevalence found ranges from 3-5% (Shaffer et al. 1996) to 8-12% (Biederman & Faraone 2005) of school-aged children, with most recent meta-analysis showing 5,7% prevalence world-wide (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007). When using the more strict European ICD-10 based criteria *"hyperkinetic disorder"* (HKD) point prevalence rate found is 1-2% (Danckaerts & Taylor 1995). ADHD usually accounts for up to 50% of child referrals to mental health services (Popper 1988).

Secondly, ADHD is relevant since it is considered a persistent problem that *changes its manifestation throughout development*, from preschool to adult years, and it persists into adult life (E. Taylor, 2009). Thirdly, the disoder *interferes with many areas of functioning* such as academic, social and family life. Lastly, untreated ADHD predisposes the child to *later psychiatric pathology and functional impairment in adult life* (Hechtman, 1996).

Although both DSM-IV and CIE-10 classification schemes provide well structured and criterion based diagnosis, slightly discrepancies between them may account for the differences observed in the frequency the disorder is recognized **(Table 1).** Both diagnoses include children presenting developmentally inappropriate levels of *inattention*, *impulsivity* and *hyperactivity* that begin in childhood and cause impairments in different areas (namely academic achievement, intellectual, social and occupational skills).

| | **ICD-10** | **DSM-IV** |
|---|---|---|
| **Case definition** | Hyperkinetic Disorder (HKD) | Attention Deficit Hyperactivity Disorder (ADHD) |
| **Impairment** | *Criteria* are met in more than one setting | *Some impairment* in more than one setting |
| **Comorbidity** | Comorbid disorders exclude HKD | Comorbid disorders possible |
| **Symptoms** | All the three key behavioural symptoms should be present | ADHD inattentive, hyperactive-impulsive or combined subtypes |

**Table 1:** ICD-10 and DSM-IV diagnostic criteria (from Biederman & Faraone 2005).

The ICD-10 definition of "hyperkinetic disorder" is based upon the simultaneous presence of all three core symptoms (attention deficit, overactivity and impulsiveness) at a higher level than expected for the development age for that child. These symptoms need to be present in more than one situation or setting, they need to have been present from an early age (by definition before the age of 7 years, however symptoms are often perceived earlier). ICD-10 also describes a number of exclusion criteria (other disorders that may be causes of hyperactive behaviours). Unlike ICD-10, DSM-IV does not require that all three key behavioural difficulties should be present. Rather, the system describes three sub-divisions within the ADHD criteria (namely "inattentive"

"impulsive/overactive" and "combined" subtypes). For DSM-IV the requirements for pervasiveness and the exclusion criteria are also less stringent. The direct consequence of these differences in definitions is that "hyperkinetic disorder" using ICD-10 criteria is usually considered a severe and combined sub group of ADHD. Clinicians might therefore consider both schemes for the screening, detection of cases and clinical management (Hill & Taylor, 2001; Biederman & Faraone 2005).

**Table 2-** DSM-IV Criteria for ADHD

I. Either A or B:

A- Six or more of the following symptoms of inattention have been present for at least 6 months to a point that is inappropriate for developmental level:

Inattention

1. Often does not give close attention to details or makes careless mistakes in schoolwork, work, or other activities.
2. Often has trouble keeping attention on tasks or play activities.
3. Often does not seem to listen when spoken to directly.
4. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions).
5. Often has trouble organizing activities.
6. Often avoids, dislikes, or doesn't want to do things that take a lot of mental effort for a long period of time (such as schoolwork or homework).
7. Often loses things needed for tasks and activities (e.g. toys, school assignments, pencils, books, or tools).
8. Is often easily distracted.
9. Is often forgetful in daily activities.

B- Six or more of the following symptoms of hyperactivity-impulsivity have been present for at least 6 months to an extent that is disruptive and inappropriate for developmental level:

Hyperactivity

1. Often fidgets with hands or feet or squirms in seat when sitting still is expected.
2. Often gets up from seat when remaining in seat is expected.
3. Often excessively runs about or climbs when and where it is not appropriate (adolescents or adults may feel very restless).
4. Often has trouble playing or doing leisure activities quietly.
5. Is often "on the go" or often acts as if "driven by a motor".
6. Often talks excessively.

Impulsivity

7. Often blurts out answers before questions have been finished.
8. Often has trouble waiting one's turn.
9. Often interrupts or intrudes on others (e.g., butts into conversations or games).

II. Some symptoms that cause impairment were present before age 7 years.

III. Some impairment from the symptoms is present in two or more settings (e.g. at school/work and at home).

IV. There must be clear evidence of clinically significant impairment in social, school, or work functioning.

V. The symptoms do not happen only during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder. The symptoms are not better accounted for by another mental disorder (e.g. Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

Based on these criteria, three types of ADHD are identified:

IA. ADHD, Combined Type: if both criteria IA and IB are met for the past 6 months

IB. ADHD, Predominantly Inattentive Type: if criterion IA is met but criterion IB is not met for the past six months

IC. ADHD, Predominantly Hyperactive-Impulsive Type: if Criterion IB is met but Criterion IA is not met for the past six months.

*American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision. Washington, DC, American Psychiatric Association, 2000.*

Epidemiological studies have shown prevalence for the ADHD primarily inattentive subtype, primarily hyperactive and combined DSM-IV subtypes of 4.7-9%, 3.4-3.9% and 4.4-4.8% respectively (Baumgaertel, Wolraich, & Dietrich, 1995; Wolraich, Hannah, Pinnock, Baumgaertel, & Brown, 1996) . The male-to-female sex ratio is approximately 3:1 for community studies, whereas is 10:1 in clinical samples (Szatmari et al. 1989). This means not only that girls have some protection against the development of hyperkinetic disorder but also that the female subjects are less likely to be referred for services, probably because of the less disruptive presentation and the different phenotypic expression in this group (Biederman et al. 20002).

### 1.1.2 Diagnostic instruments and assessment

Apart from establishing the primary diagnosis of ADHD, a comprehensive baseline assessment should go beyond and include the problems that led to referral and impairments of functioning which follow or are associated with ADHD. The baseline must also include an assessment of possible comorbidities (Hill & Taylor, 2001). For this purpose, a combination of history taking, individual examination, and correspondence will be required. Information has to be obtained directly from both caregivers and schools.

Ideally, the procedure for establishing a baseline assessment comprises:

- Questionnaires and scales: There are many different scales and questionnaires specifically for ADHD to be completed by parents and teachers (see Table 3). The *sensitivity* and *specificity* and test-retest reliability of such instruments appear to be very good yet the classification obtained can be inadequate. However, these questionnaires depend largely on the evaluator who fills in the items (the variability among different persons answering the questionnaire can be important) as well as the degree of development of the child, and the specific situation. Thus, these rating scales are not suitable on their own for the diagnostic identification of an individual child and must be seen as a tool for *screening,* during the *course of treatment* and for research purposes.

***Table 3: Rating scales for ADHD***

Conners' Parent Rating Scale (CPRS) (Conners 1989)

Conners' Teacher Rating Scale (CTRS) (Conners 1989)

- Child Behaviour Checklist (CBCL) (Achenbach 1991)
- Strength and Difficulties Questionnaire (SDQ) (Goodman 1997)
- SNAP-IV Rating Scale (Swanson 1992)

- The clinical interview: In order to establish an adequate baseline assessment, we need to gather information from several areas including home, and school. First of all, parents need to give permission to contact schools. The interview with parents/caregivers and the school (teachers and advisors) will allow us to go beyond the information provided by the questionnaires, to determine and define specifically whether the behaviours of the child are in the range of normality or not. To this end, parents and teachers are asked about the child´s behaviour and performance as compared with other children of the same age. Some diagnostic psychiatric interviews including the Parental Account of Children Symptoms PACS (E. Taylor et al., 1986; E. Taylor, Schachar, Thorley, & Wieselberg, 1986), the DISC Diagnostic Interview schedule for Children (Shaffer et al., 1996), the K-SADS Schedule for Affective Disorders and Schizophrenia (Ambrosini, 2000), or the Child and Adolescent psychiatric Assessment CAPA (Angold & Costello, 2000) and may be useful in detailed and specialist practice and for research purposes.

Information is usually gathered in the first visits, and includes the following observations (Hill & Taylor, 2001; E. Taylor et al., 2004):

-Behaviour of the child to be evaluated: where the problem resides, how it is described, how they (parents, teachers) react when the child behaves that way.

-When the problems began and how long they have been manifest.

-Evolution of symptoms over time (factors that may have increased or decreased such behaviours).

-If the problem occurs only at school, or only at home, or with friends, or in other settings. That is, if the problems affect family life, academics, social life, or several areas. The existence of problems in just one of the settings does not totally exclude the diagnosis, but it may provide information about factors that come to augment or diminish symptoms.

-Discard aspects that may cause similar symptoms.

-Assess the existence of comorbid disorders (such as depression, tics, etc.).

-Evaluate and record inter-personal relationships with peers, parents, and teachers

-Evaluate and record parental attitudes to child.

-Gathering information about family antecedents, records of pregnancy, delivery, early development, and the acquisition of developmental milestones. This information should be very precise and detailed, because it give us information about risk factors that may have contributed to the disorder.

- Medical history (including illnesses, and head injuries)

-Medication history (including responses and adverse reactions to the different trials of medication).

- Direct observation of the child´s behaviour: the behaviour of the child when visiting the doctor/specialist may be unlike their habitual behaviour at home or at school, as the child may be more nervous and excited, or on the contrary, frightened and perhaps apparently laidback. For this reason, it is advisable to make observations of the child´s behaviours in situations that would be more natural for him/her (basically, at school or home), which would be noted in the interview with the parents and school staff. This usually takes the specialist quite a bit of time, but it may provide key information about the nature of the problem. However, the exploration at the doctor´s office is also useful for appreciating possible difficulties with language, comprehension or cognition. It is likewise important to carry out a psychopathological evaluation, as well as to obtain information about how the child perceives the problem, and determine the repercussions it has (above all in children over 6 years of age).

- Psychometric or neuropsychological tests: current classifications (DSM-IV or ICD-10) do not consider necessary this type of test as a diagnostic element. According to these classifications, diagnosis is purely behavioural and not cognitive, and performance below normal in a test does not exclude or confirm diagnosis. Such evaluations are held to be very useful, since they can provide information of interest about certain characteristics of the disorder in the specific child (for example, problems with sustained attention, reading or learning disabilities of difficulties for response inhibition). They may also suggest which

parts can be reinforced, or the child´s "strong points". Nonetheless, there are no justified grounds for systematically putting all children through a series of such tests. When the possibility of learning disabilities comorbid with ADHD is considered an IQ test measuring both verbal and non-verbal IQ might be really helpful (Hill & Taylor, 2001)

- Other evaluations: even when the diagnosis of ADHD is already clear, it is still necessary to evaluate a number of other variables:

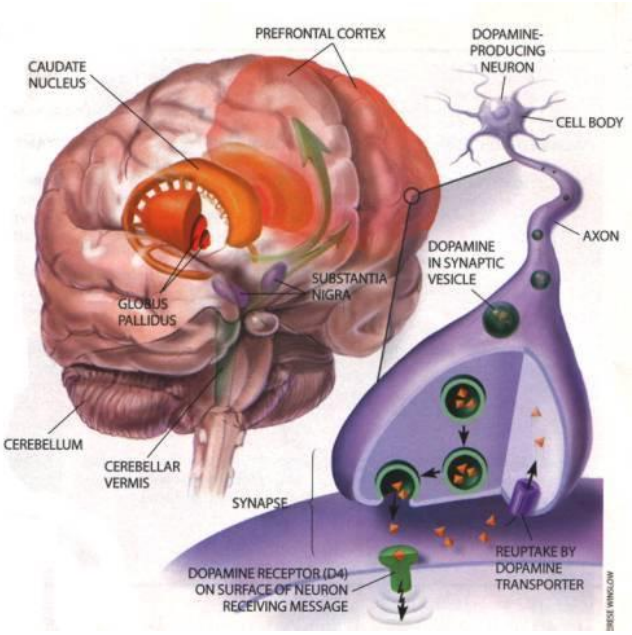
  - A *physical examination* has to be performed (weight, height on growth chart, cephalic perimeter) *and must include inspection of* face, ears, and skin, in order to exclude different syndromes (alcohol syndrome, fragile X, neurocutaneous dysplasias). Cardiovascular examination must include heart rate and blood pressure. *Neurological examination* (if this has not already been done by the GP or paediatrician who referred the child) is important to discard other possible problems including epilepsy and motor coordination and/or to determine whether another neurological condition exists that would explain the problems of motor hyperactivity.
  - *Hearing problems*. Poor attention is also characteristic of children with hearing problems that are not evident.
  - *Electroencephalogram*: it is not required, unless the possibility of epilepsy or some neurological disorder is suspected.
  - Other types of neurological information, such as the *neuroimaging* (brain scanner or magnetic resonance) or *genetic screening* are not routinely called for unless the child´s history or some other factor suggests the existence of a cerebral or genetic condition.

### 1.1.3 Etiology, the causes of ADHD

The etiology of ADHD remains unknown, and it is unlikely that one single etiological factor leads to all cases of ADHD. Most likely there is a interplay of both *genetic* and *environmental* factors that may lead to a final common pathway of the syndrome **(Table 3)**.

ADHD as a clinical disorder appears to be highly heritable. Heritability estimated by twin and adoption studies is approximately 0.76, ranging from 0.39 to 0.91 depending on studies (Thapar et al. 1999). Concordance in monozygotiz and dizigotic twins is 51 and 33% respectively (Goodman & Stevenson, 1989). Despite genes with moderately large effects are unlikely to exist, molecular genetic studies have shown a number of candidate genes in relationship with the disorder. This includes genes involved in the dopaminergic function, such as the dopamine transporter gene (DAT1) (Cook et al. 1995; Waldman et al. 1998), the dopamine receptor gene D-4 (DRD-4) (Swanson et al. 1998; Thapar et al. 1999), and the dopamine receptor gene D-5 (DRD-5) (Daly et al. 1999; Barr 2000), and also genes involved in other systems (serotonin transporter gene SLC6A4, serotonin receptor gene HTR1B, among others) (Thapar 2005). Dysregulation in dopamine and norepinephine circuits was initially suggested as etiopathogenesis because of the patients' response to stimulants. Different neuropsychological theories have focused on the executive dysfunction of the frontal-subcortical circuits. Neurocognitive models proposed for ADHD have included a failure to inhibitory control (Barkley, 1997), effects of reward and response cost (Oosterlaan & Sergeant, 1998), a delay aversion model (Sonuga-

Barke, Taylor, & Heptinstall, 1992; Sonuga-Barke, Taylor, Sembi, & Smith, 1992) and the cognitive-energetic model (Sergeant, 2000), amongst others. Neuroimaging studies have resulted in a good understanding of the neurobiological basis of deficits in cognitive control in this disorder. Neuroimaging of ADHD is pointing toward disruption of FSTC circuitry and the cerebellum as being central to the cognitive and motor abnormalities seen in the disorder. Thus patients with ADHD have shown to present with smaller brain regional volumes, particularly in caudate nucleus, cerebellum and frontal lobe. Except for the caudate, these findings are fixed and non-progressive and unrelated to stimulant treatment (Castellanos et al., 2002). More recent fMRI studies using tasks of inhibitory control have shown evidence for inferior prefrontal cortex underactivation in patients with ADHD, which appears to be a disorder specific finding (Rubia et al., 2010). Finally, recent imaging genetic studies combining both neuroimaging and genetic approaches have shown that neuroimaging of cognitive control may be useful as an endophenotype in investigating dopamine gene effects in ADHD (Durston, de Zeeuw, & Staal, 2009).




A number of environmental risk factors, including both *biological* and *psychosocial* factors, have been proposed for ADHD. *Biological factors* include pregnancy and delivery complications, in particular toxaemia or eclampsia, poor maternal health, advanced maternal age, long duration of labour, fetal distress and ante-partum haemorrhage (Biederman & Faraone 2005). Prematurity and maternal expose to alcohol (Mick et al. 2002) and smoking (Thapar 2003) have been also associated with the disorder. However it has been recently shown that alcohol consumption during pregnancy is not related to ADHD symptoms in the child once social adversity and smoking are taken into account (Rodriguez et al. 2009).

Rutter's indicators of *psychosocial adversity* in association with childhood mental disorders (i.e., low social class, large family size, paternal criminality, maternal mental disorder, marital discord and foster placement) have also been demonstrated as risk factors for ADHD (Biederman et al. 1995). Maternal depression and disruptive early experiences (Haddad & Garralda 1992; Biederman et al. 1995), family dysfunction (Offord et al. 1992), low maternal

education and single parenthood (Palfrey et al. 1985) have also been described. As mentioned earlier, it is generally accepted that different environmental factors may interact with a genetic predisposition to produce the clinical syndrome (Thapar 2005).

# Table 3: ADHD etiology; gene and environment contribution

ENVIRONMENT 30%

interaction

GENES 70%

**ENVIRONMENTAL FACTORS RELATED TO ADHD; most recent evidence:**

- Maternal exposure to nicotine during pregnancy (Langley 2005, Thapar 2009)
- Maternal alcohol consumption during pregnancy -mediated by social adversity? (Rodriguez et al. 2009; Landgren et al. 2010)
- Pre-term born children and low birth weight children (Linnet et al. 2006)
- Paternal smoking –mediated by genetic risk? (Altink et al. 2009)
- Blood lead levels (Cho 2010, Nigg 2010).
- Traumatic brain injuries (McKinlay et al. 2009)
- Institutionalized children (Colvert et al. 2008, Ghera et al. 2009)
- Low maternal educational level (Hjern et al. 2010)
- Single parenthood (Rydell 2010)
- Depression of the mother during/after pregnancy (Rice et al. 2010)
- Low socio-economic level- social disadvantage- (Bernfort et al. 2008)

**CANDIDATE GENES INVOLVED IN ADHD; most recent evidence:**

***Candidate genes involving the dopamine system:***

**1.1. Dopamine transporter gene 1 (DAT1) at chromosome 5p15.3** (Daly et al. 1999; Ilott et al. 2009)

**1.2. Dopamine receptor D4 (DRD4) at chromosome 11p15.5** (Faraone et al. 2001; Nikolaidis et al. 2009; Boonstra et al. 2008)

**1.3. DRD5 at chromosome 4p16.1** (Hawi et al. 2003; Kim et al. 2009; Langley et al. 2009)

**1.4. Dopamine ß-hidroxilase (DBH) at chromosome 9q34.2** (Hawi et al. 2003; Bhaduri et al. 2009; Kebir et al. 2009)

**1.5. Dihidroxifenalanine (dopa) decarboxilase at chromosome 7p11.** (Ernst et al. 1999; Hawi et al. 2001)

***2. Candidate genes involving the serotonin system:***

**2.1. Serotonine transporter 5-HTT at chromosome 17q11.2** (Roessner et al. 2009; Heiser et al. 2007)

**2.2. Serotonine receptor gene *(5-HT1B)* at chromosome 6q13** (Kent et al. 2002; Quist et al. 2003).

***Candidate genes involving the adrenalin system:***

**3.1. Adrenergic alpha2A receptor gene (ADRA2A) at chromosome 10q25.2** (Cheon et al. 2009)

***4. Candidate genes involving enzimes for the inactivation of dopamine, norepinephrine and other cathecolamines:***

**4.1. Monoamine oxidase A (MAO-A) at chromosome Xp11.23** (Lawson et al. 2003; Fowler et al. 2009)

**4.2. Catecol *O*-metiltransferasa *(COMT)* at chromosome 22q11.2** (Eisenberg et al.1999; Barr et al. 2000).

***5. Candidate genes codifying for the regulation of various neurotransmitters (including dopamine and nor epinephrine):***

**5.1. SNAP-25 at chromosome 20p11.2 or 20p12.3** (Mill et al. 2004; Gizer et al. 2009; Kim et al. 2007)

**5.2. Glutamate receptor *N*-methil-d-aspartate 2A (*GRIN2A*) at chromosome 16p13** (Adams et al. 2004; Turic et al. 2004).

### 1.1.4 Comorbidities in ADHD

Comorbidity is a major problem in children, adolescents and adults with ADHD(T. E. Brown, 2009). At least two thirds of referred school-age children with ADHD have at least one other psychiatric disorder **(Table 4).** Co-morbid condition may go underecognised when evaluating a child or and adolescent with ADHD. The contrary can be also the case, and co-morbid conditions may affect clinical presentation of ADHD core symptoms, thus increasing inattentiveness or activity levels for instance. Comorbidity complicated the diagnostic process and can have an important impact on the management and outcome (Connors 2003). For these reasons, detecting a possible comorbidity in ADHD children or adolescents is particularly important.

*i) ADHD and affective disorders:* children, adolescents and adults with ADHD present more affective symptoms than the rest of the population, although the contrary (more ADD or ADHD symptoms in persons with depressive symptoms) is also true (T. E. Brown, 2009). The figures for these disorders vary considerable, from 4% according to the Multimodal Treatment Study, which is one of the broadest studies of ADHD to date, to the 11% of teenage girls and up to 72% of adult women with ADHD reported by Biederman (2004). Data from longitudinal studies suggest that whereas the nuclear symptoms of the disorder decrease over time, the depressive symptoms increase (Costello 2003).

Longitudinal studies indicate that the depressive symptomatology of children with ADHD may not be only reactive to the disorder, as earlier believed, but also

due to shared physio-pathological pathways. The presence of a depressive disorder entails a greater risk for other disorders, such as conduct disorders, anxiety, and a lower performance at all levels (academic, social and family) (T. E. Brown, 2009).

**Table 4:** Key comorbid conditions related to ADHD

| CONDITION | REPORTED FREQUENCY COMORBID WITH ADHD | MAIN CHARACTERISTICS |
|---|---|---|
| Anxiety disorders | 25-35% | Different manifestations in ADHD including **separation anxiety, obsessive-compulsive disorder, generalized anxiety** and **specific phobia**.<br>Children with ADHD and comorbid anxiety disorder described as "worriers" (worries about their academic, social or athletic performance, or about future events), more fearful than normal, have lower self-esteem, psychosomatic symptoms (headaches, vomiting, stomach-aches).<br>These children might present with more symptoms of inattention and aggressiveness, lower academic and social achievement. |
| Affective disorders | 4%-33% | **Depressive symptoms** (sadness, irritability above the normal level)**, major depressive disorder** (impairing symptoms persisting for at least two weeks); **dysthymic disorder** (intermittent presentation of depressive symptoms for at least one year).<br>Affective symptoms might manifest as conduct problems in the ADHD child<br>**Bipolar Disorder:** some authors speaking of a broad phenotype ADHD-BD, since both disorders sharing certain symptoms at a transversal level (irritability, a low tolerance to frustration, labile mood, dysphoria, low self-estem). However current diagnostic criteria for childhood BD requiring elevated self-esteem, grandiosity, decreased need of sleep, expansiveness or marked hypersexuality, and presented as a change with respect to the previous functions. |
| Conduct problems (ODD and CD) | ODD: 15-60%<br>CD: 15-25% | **ODD** is a pattern of negativistic, hostile, and defiant behaviour lasting at least 6 months, and occurring more frequently than the typically observed behaviour in individuals of comparable age and developmental level. It causes significant impairment in social, academic, or occupational functioning.<br>**CD** is a repetitive and persistent pattern of behaviour in the past 12 months in which the basic rights of others or social rules are violated. It includes aggression to people and animals, destruction of property, deceitfulness or theft, and other serious violations of rules.<br>The presence of a comorbid CD increases the risk of a poor evolution of ADHD in adult life, especially when early onset of aggression. However a number of environmental factors (including social functioning and family factors) might also contribute to the poor outcome observed.<br>ODD might be a prodrome of CD in some cases, however over 50% of children with ODD will not develop CD during adolescence. |
| Specific learning problems | 20-40% | Difficulties with **reading, writing**, and/or **mathematics** which cannot be explained by the child's IQ.<br>Children present lower academic achievement, and get lower grades than expected in view of their age and IQ.<br>Neuropsychological assessments show values under the 30th centile according to their age and school level; family history of learning difficulties or important obstetric/perinatal complications |

| | | |
|---|---|---|
| Autistic Spectrum disorders (ASD) and Pervasive Developmental Disorders (PDD). | ¿?<br>Up to 60-70% (isolated symptoms) | Characterized by the triad of social problems, communication problems (verbal and non-verbal) and stereotyped and restricted conducts, which are manifest before the age of 3. ASD does not refer only to what we know as autism, but includes other variants of a lesser degree of repercussion or intensity under the denomination **Pervasive Developmental Disorders (PDD)**.<br>ASD comorbid with ADHD children generally present with poorer executive function and motor coordination.<br>About 60-75% of the individuals diagnosed with ASD/PDD also present characteristics compatible with a diagnosis of ADHD |
| Tics disorders | 50% | Tics are sudden, purposeless, repetitive movements of certain parts of the body, which may vary in localization, number, frequency or intensity. **Transient** if presented for more than two weeks but less than a year; **chronic** when they are present for more than a year.<br>Tics are common in childhood, especially in boys, but tend to diminish during adolescence.<br>**Tourette Syndrome**: multiple motor tics and at least one phonatory tic persisting for at least a year. |
| Substance Use disorders (SUD) | ¿? | ADHD may be a risk factor for SUD, although the existence of behavioural disorders such as an antisocial disorder or affective disorder would add a greater risk when they are comorbidly present with ADHD<br>Adults with substance abuse and ADHD had begun the substance use much earlier, the use was more severe, and they had less possibility of abstinence. |

BD: Bipolar Disorder; ODD: Oppositional Defiant Disorder; CD: Conduct Disorder; IQ: Intelligence Quotient

*ii) ADHD and Bipolar Disorder:* BD in childhood is not frequent, and more generally appears after puberty. There may be some differences of criteria for the diagnosis of paediatric BD when compared to BD in adulthood, and some authors speak of a broad phenotype characterised by episodic irritability (Biederman et al., 2003). In addition, both disorders —ADHD and BD— could share certain symptoms such as irritability, low tolerance to frustration, labile mood, dysphoria, or low self-esteem at a transversal level. However, for other authors a diagnosis of paediatric BD requires the presence other symptoms, including elevated self-esteem and grandiosity, decreased need of sleep, expansiveness or marked hypersexuality (Geller & DelBello, 2003). In addition, it has to represent a change with respect to the previous situation and produce an important change in anterior global functioning.

*iii) ADHD and anxiety disorders:* According to epidemiological data, approximately 25%-35% of the children with ADHD (that is, one out of three or four) suffer from some comorbid anxiety disorder (Biederman et al. 1991; Jensen et al. 2001), a figure much higher than that expected for children or adolescents overall. The anxiety presented by children with ADHD shows certain specific characteristics. Children with ADHD who present comorbid anxiety disorder are generally described as "worriers", they are often more fearful than normal, they have lower self-esteem, and tend to present psychosomatic alterations such as headaches or stomachaches. Different authors have suggested that these children present more symptoms of inattention and aggressiveness, aside from lower academic and social achievement (Brown 2009).

*iv) ADHD and conduct disorders:* problems with conduct, including oppositional conduct, and aggressive or delinquent behaviour, represent the most frequent comorbidity with ADHD. According to studies, anywhere from 40% to 70% of the children presenting ADHD also have what is known as an Oppositional Defiant Disorder (ODD) or a Conduct Disorder (CD) (Szatmari 1989, Maughan 2004). Nonetheless, this percentage varies from one study to another; there are figures indicating the existence of ODD in 30%-60% of children with ADHD, whereas 25%-35% of adolescents would present antisocial conducts or antisocial personality disorders (Barkley 1999). There are many questions surrounding the comorbidity of the two disorders, such as why they appear in association with such a high frequency, what makes children with ADHD

present associated ODD or CD, if ADHD with ODD/CD might be a specific subtype of ADHD, or if different treatments are necessary when the comorbidity is present, amonst others. There are different studies indicating that environmental factors such as family criticism and social relationships can have a substantial influence on the development of conduct problems in children and adolescents with ADHD (Barkley 1999; Taylor 2006). What is most generally accepted if that the presence of a comorbid CD increases the risk of a poor evolution of ADHD in adult life. Hence, the need to consider the presence of comorbid conduct problems and treat them as early on as possible.

**Table 5:** DSM-IV Diagnostic criteria for ODD and CD

**DSM-IV Diagnostic criteria for Oppositional Defiant Disorder**

A. A pattern of negativistic, hostile, and defiant behaviour lasting at least 6 months, during which four (or more) of the following are present:
(1) often loses temper
(2) often argues with adults
(3) often actively defies or refuses to comply with adults' requests or rules
(4) often deliberately annoys people
(5) often blames others for his or her mistakes or misbehaviour
(6) is often touchy or easily annoyed by others
(7) is often angry and resentful
(8) is often spiteful or vindictive
**Note:** Consider a criterion met only if the behaviour occurs more frequently than is typically observed in individuals of comparable age and developmental level.
B. The disturbance in behaviour causes clinically significant impairment in social, academic, or occupational functioning.
C. The behaviours do not occur exclusively during the course of a Psychotic or Mood Disorder.
D. Criteria are not met for Conduct Disorder, and, if the individual is age 18 years or older, criteria are not met for Antisocial Personality Disorder.

**DSM-IV Diagnostic criteria for Conduct Disorder**

A. A repetitive and persistent pattern of behaviour in which the basic rights of others or major age-appropriate societal norms or rules are violated, as manifested by the presence of three (or more) of the following criteria in the past 12 months, with at least one criterion present in the past 6 months:

***Aggression to people and animals***

(1) often bullies, threatens, or intimidates others

(2) often initiates physical fights

(3) has used a weapon that can cause serious physical harm to others (e.g., a bat, brick, broken bottle, knife, gun)

(4) has been physically cruel to people

(5) has been physically cruel to animals

(6) has stolen while confronting a victim (e.g., mugging, purse snatching, extortion, armed robbery)

(7) has forced someone into sexual activity

***Destruction of property***

(8) has deliberately engaged in fire setting with the intention of causing serious damage

(9) has deliberately destroyed others' property (other than by fire setting)

***Deceitfulness or theft***

(10) has broken into someone else's house, building, or car

(11) often lies to obtain goods or favours or to avoid obligations (i.e., "cons" others)

(12) has stolen items of nontrivial value without confronting a victim (e.g., shoplifting, but without breaking and entering; forgery)

***Serious violations of rules***

(13) often stays out at night despite parental prohibitions, beginning before age 13 years

(14) has run away from home overnight at least twice while living in parental or parental surrogate home (or once without returning for a lengthy period)

(15) is often truant from school, beginning before age 13 years

B. The disturbance in behaviour causes clinically significant impairment in social, academic, or occupational functioning.

C. If the individual is age 18 years or older, criteria are not met for Antisocial Personality Disorder.

*Specify* type based on age at onset: **Childhood-Onset Type:** onset of at least one criterion characteristic of Conduct Disorder prior to age 10 years . **Adolescent-Onset Type:** absence of any criteria characteristic of Conduct Disorder prior to age 10 years

*Specify* severity: **Mild:** few if any conduct problems in excess of those required to make the diagnosis, and conduct problems cause only minor harm to others **Moderate:** number of conduct problems and effect on others intermediate between "mild" and "severe" **Severe:** many conduct problems in excess of those required to make the diagnosis or conduct problems cause considerable harm to others

*v) ADHD and learning disabilities:* Between 20% and 30% of patients with ADHD suffer learning disorders, above all in areas such as reading, writing or mathematics. Some experts hypothesize that these disorders have common genetic mechanisms. ADHD has also been associated with a delay in the acquisition of speech in toddlers, as well as with problems of fluent verbal expression. The Intelligence Quotient (IQ) of these children is believed to represent the full spectrum, with studies suggesting an IQ from 7 to 10 points below that expected. In any case, we do not know if such a difference truly reflects intelligence, or if it might be caused by a poorer performance in the neuro-psychological evaluative tests, due to the intrinsic characteristics of ADHD (inattention, impulsiveness). Children with ADHD generally present lower academic achievement, do not work as hard, and get lower grades than expected in view of their age and IQ. Indeed, 40% of these children need academic assistance, and an estimated 35% must repeat at least one year of schooling before the end of high school (Barkley 1999).

*vi) ADHD and Autistic Spectrum Disorders (ASD):* Several studies have found that up to 60% of the individuals diagnosed with autism, and between 75% and 85% of children with Asperger´s syndrome also present characteristics compatible with a diagnosis of ADHD (Goldstein & Schwebach 2004, Uchiyama 2004). According to Goldstein (2004), some 26% of children with ASD also present symptoms of combined ADHD, and 33% present symptoms of inattentive-type ADHD. These children tend to “not listen” and show “difficulty shifting focus” more than excessive distractibility and short attention span. The Autistic Spectrum Disorders, or ASD, are characterized by the triad of social

problems, communication problems (verbal and non-verbal) and stereotyped and restricted conducts (APA 2000), which are manifest before the age of three. A significant percentage of subjects with ADHD have problems with social interaction (Taylor 1986; Taylor et al. 2004), generally in terms of problems of impulsiveness, inattention or executive dysfunction. However, a lesser percentage of subjects with ADHD will present, additionally, isolated symptoms or clinical characteristics of ASD. Individuals with ADHD and associated ASD tend to present more problems of motor coordination.

*vii) ADHD, tics and Gilles de la Tourette:* Among children with ADHD, roughly 50% of the boys present transient or chronic tics. It is also more frequent to find family antecedents of tics among boys with ADHD. There has been much controversy as to possible relations between specific treatments for ADHD (stimulants) and tics (Brown 2009); however, well designed and reliable studies, have found these treatments to be safe and effective for most children with ADHD and tics, not making them worse (Tourette's Syndrome Group 2002). Tourette Syndrome is a relatively infrequent syndrome, about 60%-90% of children with Tourette syndrome also have ADHD (Coffey 2000, Spencer 2001).

*viii) ADHD and Substance Use Disorders:* Substance use and abuse is currently common in young people. In studies of adolescents with Substance Use Disorders (SUD), between 20% and 30% are seen to also have associated ADHD. Of these, from 60% to 90% had depressive disorders or associated conduct disorders (Milin 1991). In studies of adults with SUD, somewhere from 35% to 70% also had ADHD in childhood that persisted until adulthood (Willens

1995). Adults with substance abuse and ADHD had begun the substance use much earlier, the use was more severe, and they had less possibility of abstinence. We can thus consider that ADHD may be a risk factor for SUD, although the existence of behavioural disorders such as an antisocial disorder or affective disorder would add a greater risk when they are comorbidly present with ADHD. Furthermore, substance use contributes to the development of the difficulties with attention and impulsiveness, aside from additional behavioural problems, and family, social, academic or occupational problems**.** Genetic studies suggest that there is a greater risk for the use of substances in family members of children with ADHD. Likewise, alcohol use on the part of the mother during pregnancy is associated with greater impulsiveness, aggressiveness, hyperactivity and inattention, and a greater rate of ADHD. The theory of "self-medication" is also contemplated as a mediating mechanism between ADHD and substance use. Some studies have shown a reduced substance use in ADHD subject when they initiated treatment at an earlier stage (Wilens 2003).

### 1.1.5 Outcomes; do they grow out of it?

At present we know that ADHD is not a disorder exclusive to childhood, but that it usually persists in adolescence and adulthood. According to studies, approximately 80% of children with ADHD will continue to present the disorder in adolescence and adulthood (Hart et al. 1995; Barkley 2006). As adults, 30%-65% will still present some symptoms, according to follow-up studies of these children (Weiss & Hetchman 1993). A recent meta-analysis of 32 publications concluded that the rate of persistence was approximately 15% at age 25 years for those who met full diagnostic criteria for ADHD, while the rate was much higher (up to 65%) when considering the persistence of some symptoms associated with clinical impairment (Faraone, Biederman, & Mick, 2006). Evidence for the validity of adult ADHD and descriptions of its clinical diagnosis and management have been described in detail (Asherson, Chen, Craddock, & Taylor, 2007; Weiss, Murray, & Weiss, 2002). Although there is evidence that ADHD symptoms show an age-dependent decline, it has been also proved that phenotypic expression of symptoms changes over time and that these symptoms are frequently associated with clinical and psychosocial impairments.

There is a general agreement that many young people treated with stimulants, together with those who were not diagnosed during childhood, might need treatment as adults, and that treatment (stimulants and atomoxetine) are effective for reducing ADHD symptoms at all ages (Banaschewski et al., 2006; Banaschewski et al., 2008; Asherson et al., 2007; NICE 2008)

*i) ADHD in the adolescent:* Throughout adolescence the levels of hyperactivity tend to diminish, whereas the problems of impulsiveness and inattention are more persistent (Brown 2009). As mentioned earlier, the symptoms of ADHD in adolescence and adulthood usually have a slightly different clinical expression than seen in children, making clinical diagnosis somewhat complicated. For example, in adolescence motor activity may be manifested as restlessness (incapacity to remain seated without doing anything, difficulty relaxing, or a subjective feeling of restlessness and dysforia when inactive); impulsivity manifested as a low tolerance to frustration, instability at work or in personal relationships (frequently changing jobs, or partners), abuse of alcohol and other substances, and problems of attention as difficulty on focusing on details ,losing things, the need to re-read things over and over again, carelessness, forgetting appointments or activities, flighty thought, and loosing the thread of conversation (Asherson et al., 2007; Weiss et al., 2002; Weiss & Murray, 2003)

There may also be sudden changes in mood (rapid shifts from depression to excitement, irritability and temper outbursts) which can interfere with personal relations (Asherson et al., 2007; Faraone et al. 2007). Disorganization and executive dysfunction may be very important (tasks are not completed, a lack of problem-solving strategy, problems with time management) and constitute a

In parallel, and as these children advance at school, their needs evolve in a more strict way (they need to maintain their attention focused for longer, their behaviour must be more and more adequate and less impulsive).

Difficulties normally encountered by any adolescent (developmental and body changes, identity issues, being accepted by the group, first boyfriend/girlfriend, taking on responsibility for oneself, etc.) emerge as an additional source of demands and stress. The adolescent with ADHD who has problems with self-esteem, with social relations, or difficulties in academic performance is likely to experience a more trying period of transition and adaptation than others. Troubles managing the executive function make the adolescent with ADHD have a poorer performance at school, and they tend to fail, or feel unmotivated academically, and may even drop out of school. At home, the adolescents with ADHD tend to create problems and they present more difficulty communicating with their parents. Socially, they also have a greater tendency to get involved in risky behaviour (reckless driving, a greater rate of unwanted pregnancies) and use tobacco or other toxic substances earlier on in life (Barkley and Gordon 2002).

*ii)ADHD in adulthood; clinical manifestations and comorbid psychiatric disorders*: Not long ago it was understood that ADHD was only a childhood and adolescent disorder, and that symptoms disappeared when one reached adulthood. However, despite the fact that the full clinical presentation is seen in just a small proportion of cases (between 15% and 30%, according to some studies), other studies indicate that as many as 70%-80% of children with ADHD will continue to have symptoms as adults (Weiss and Hetchman 1993; Barkley 2001; Faraone et al. 2000). For this reason ADHD is now understood to be a chronic disorder.

It is believed that approximately 4% of the general adult population has ADHD, most of these individuals going undiagnosed. The symptoms, sometimes unperceived in the person´s setting, can however be the source of multiple problems for the adult with ADHD. In a review study 60% of those studied presented some problem of social adaptation, academic or emotional troubles that were clinically significant (Goldstein & Ellison, 2002).

Follow up studies show significant differences in academic performance with respect to subjects not diagnosed with ADHD. The patients tend to achieve a lower grade of education as compared with control groups, even with similar levels of intelligence. Young adults with ADHD present more problems of adaptation and discipline in the school setting.

Studies have also reported that adults with ADHD show a poorer adaptation to the job environment than individuals not having the disorder. The work problems may stem from inattention and difficulties in controlling impulsiveness.

Finally, there are many descriptions of the poorer social adjustment of children and adolescents with ADHD as compared with control groups. These problems may persist in adults with ADHD, or even become worse, in view of the growing social demands to be faced in adulthood. Studies report greater difficulties in interpersonal relationships and, more specifically, in couples.

The diagnostic criteria for ADHD in adolescents and adults are the same as for children, according to the DSM-IV. There are specific scales for the screening in

adults, such as the ASRS Attention Deficit Hyperactivity Disorder Adult Screening Scale (Ramos-Quiroga et al., 2009), although the retrospective diagnosis of ADHD in an adult requires a detailed clinical interview to gather details about symptoms in childhood and adolescence.

**Table 6:** Evolution of the symptoms of ADHD according to various authors:

| Symptoms of inattention in the child with ADHD | Symptoms of inattention in the adolescent/adult with ADHD |
|---|---|
| Difficulty maintaining attention<br>Seems not to listen, "lost in space"<br>Does not complete tasks after starting them<br>Disorganized<br>Avoids tasks that call for sustained mental effort<br>Often loses important objects<br>Easily distracted<br>Forgetful<br>Frequently draws a blank | Difficulties with attention, reading or paperwork<br>Easily distracted (for example, during a meeting), forgetful<br>Trouble concentrating (especially on subjects that he/she is not interested in)<br>Difficulties organizing time (always late, tries to do too many things at the same time)<br>Trouble finishing tasks (leaves things halfway done, does the main part but neglects the details)<br>Loses things often (wallet or purse, mobile phone, papers, etc) |

| Hyperactive symptoms in the child with ADHD | Hyperactive symptoms in adolescent/adult with ADHD |
|---|---|
| Subjective restlessness, uneasiness<br>Taps feet or fidgets with hands<br>Gets up from seat in class<br>Does everything hurriedly<br>Changes quickly from one game to another<br>Seems to be “motorized”<br>Speaks excessively | Restlessness or subjective restlessness (always doing something)<br>Incapacity to sit down without doing anything (trouble relaxing and a sensation of movement inside)<br>Selects active types of work<br>Speaks in excess (at social encounters, wants to get the attention of the entire group)<br>Moves around when seated (wiggles in their seat or moves hands or legs) |

| Symptoms of impulsiveness in the child with ADHD | Symptoms of impulsiveness in adolescent/adult with ADHD |
|---|---|
| First to answer<br>Does not wait for their turn<br>Interrupts others<br>Nosey, a busy-body<br>Does not think about the consequences of their actions<br>“Accidents” happen frequently | Impulsive changes in jobs (without planning or apparent reason)<br>Frequent changes of romantic partners or groups of friends<br>Reckless driving, traffic accidents (tends not to see danger, always in “full speed”)<br>Easily angered (affective lability, explosive in the expression of feeling, quickly goes from being happy to angry, tendency to view things in “black and white” extremes) |

Three main different *outcome* groups have been described for ADHD subjects (Hechtman, 1996). The first is composed of ADHD subjects with normal function in adulthood. The second includes adolescents and adults that continue presenting significant problems with concentration and impulsiveness. Finally, the third group is composed of subjects without ADHD features but presenting other comorbidities. ADHD increases risk for substance abuse, delinquency or

antisocial behaviour and emotional problems in adulthood (Biederman et al., 1996).

Studies exploring specific factors associated with positive or negative outcomes suggest there is a result of interacting factors (Hechtman 1996). Some authors have suggested mental illness of family members, low IQ, low socioeconomic status and the coexistence of aggressiveness or conduct disorder as predictors of negative outcome (Barkley, Fischer, Edelbrock, & Smallish, 1990). Because ADHD typically starts during early childhood, clinicians may prevent negative outcomes by screening for these conditions, monitoring treatment and adjusting for different interventions that are effective at optimising social functioning (E. Taylor et al., 2004).

### 1.1.6 Management; pharmacological and non-pharmacological approaches in ADHD

During the past 40 years treatment for ADHD has been intensively studied (Faraone & Wilens 2003). A very large literature has documented the beneficial effects of medication, psychosocial treatments behavioural therapy and their combination.

The European Clinical Guidelines for ADHD have focused on the importance of using drugs (mainly *stimulants*, but also *antidepressants*, *α-2 agonists* or *neuroleptics* as second choice) in the most severe cases and when psychotherapy fails (E. Taylor et al., 2004). According to clinical guidelines, once diagnosis is made parents have to receive advice about basic handling practices including appropriate expectations, household rules, positive parenting practices, effective communication with the child, time out and contingency management (praises, reward or point schemes); if this is insufficient it is important to consider the use of medication (Hill & Taylor, 2001; E. Taylor et al., 2004). The most recent European and NICE guidelines have recommended *methylphenidate*, *atomoxetine* or *dexamfetamine* as first line option treatments for children and adolescents with ADHD depending on the presence of comorbid conditions, the different adverse effects, the potential for diversion or misuse and the preferences of the patient and/or parents. In addition, specific issues regarding treatment compliance are also contemplated when making decisions (NICE 2008).

The short-term efficacy of methylphenidate and other stimulants for children and adolescents has been amply documented, not only to manage the core symptoms of ADHD (inattentiveness, hyperactivity and impulsive behaviour), but also to improve social behaviour and academic performance (Klein 1993).

Less controlled studies have examined efficacy and side effects of stimulants in the *long-term*. The McMaster University Evidence-Based Practice Centre in association with the American Academy of Paediatricians (AAP) reviewed 14 studies examining the long-term intervention (12 weeks or more) for ADHD, This review found an overall trend for improvement over time as long as treatment was continued, highlighting the importance of treatment adherence (McMaster 1999). A posterior review of therapeutic trials with a follow-up duration of more than 12 months by Jensen found 6 different studies. Two of them also suggested that stimulant effects may persist when the medication is taken faithfully (Hechtman & Abikoff 1995; Gillberg et al. 1997).

Long-term benefits in psychosocial, academic and family functioning have not been clearly documented (Charach et al. 2004). As mentioned before, approximately 80% of ADHD children have some academic, social and emotional problems in adolescence, and stimulant treatment does not appear to significantly reduce this outcome (Hechtman 1996; Charach et al 2004). Poor treatment adherence has been suggested as a plausible explanation for sub-optimal long-term outcome in this group (Hechtman 1996).

The Multimodal Treatment Study of children with ADHD (MTA) was the largest randomized multisite trial and the first attempt to evaluate and compare the relative effectiveness of different treatments in the long-term. 579 children were randomly allocated into one of four treatment groups: *medication only, behavioural management, combination of medication and behavioural treatment* and a *community comparison group* (MTA Cooperative Group 1999 a, b). When considering the core symptoms of ADHD, all treatment groups showed improvements over time, with *medication* management and the *combined* intervention showing greater improvement than the other two groups (MTA Cooperative Group 1999 a, b). However, when considering other domains (disruptive behaviour, social skills or parent-child relationship), the *combined* group seemed to benefit more than the others. *Combined* group also had more benefits when measuring outcomes by internalising (anxiety, depression) and externalising (opposition, aggression) symptoms. When taking into account different comorbidities, children with anxiety comorbid to ADHD responded well to both *combined* and *behavioural* approaches, whereas for children with CD or ODD co-morbid with ADHD, only *medication* and *combined* therapies resulted effective (MTA Cooperative Group, 1999b). Treatment adherence was considered one of the possible factors influencing these results (MTA Cooperative Group 1999 a, b; Jensen 2002).

The MTA study cited above has reported a number of observational follows-up for several years after the end of the 14-month trial. This finding implies that children with behavioral and sociodemographic advantage, with the best response to any treatment, will have the best long-term prognosis (Molina et al.,

2009). Conclusions from the MTA follows-up have been a motive of intense debate (Banaschewski et al., 2009; Hazell, 2009). The end of the 14-month trial was also the end of randomization and after that point subjects selected their own treatment, this self-selection obviously made it improbable that participants selected the best treatment for them. Treatment adherence (subjects who continued on medication) was below one third(Molina et al., 2009). Results showed that all groups presented fewer symptoms than before the treatment started, thus it is quite possible that the beneficial effects of the intensive treatment in the three active arms of the trial waned -but not disappeared- once the subjects reverted to usual treatment (Banaschewski et al., 2009). Either way, there is no reason to regard the pharmacotherapy of ADHD as short-term only. It makes better sense to encourage subjects to find and adopt the regime that best suits them, accepting that there is a considerable range of individual responsiveness.

## 1.2 Treatment compliance and adherence

### 1.2.1 Treatment Adherence; definition and measurement

Failing to complete a complete a simple prescription of antibiotics, or forgetting to take medication exactly as prescribe by the doctor is a common scenario. For people with chronic conditions, and particularly in mental health disorder non compliance to medication might have a more important impact in the long-term outcome of their condition.

Oxford dictionary defines *compliance* as "the action or fact of *complying*", that is, "act in accordance with a wish or command" or "meet specified standards". To physicians, *compliance* with a medication regimen is defined as the extent to which patients take medications as prescribed by their health providers (Osterberg & Blaschke, 2005). The term *adherence* (from the verb *adhere* "to stick fast to" or "remain faithful to") is commonly used alternatively. However, the word "*adherence*" is preferred as it refers to a therapeutic alliance between the patient and the physician, whereas "*compliance*" suggests the patient is passively following the doctor's instructions (Osterberg & Blaschke, 2005)

Adherence can be measured by direct or indirect methods. *Direct methods* include blood or urine levels of drugs, markers or metabolites (Buchanan 1996). *Indirect methods* use the impression of the treating physician, direct questioning to patients and families, pill counting, and microelectronic monitoring of the medication bottle (MEMS) (Hack & Chow 2001). These indirect methods have

been commonly used in psychiatric studies when measuring adherence (Buchanan 1996). While blood and urine levels are preferable in most of the cases, these methods are expensive, invasive and sometimes reflect recent adherence more than consistent adherence (Cramer & Rosenheck 1998). Pill counting and MEMS are also simple methods and give an accurate mean; however they tend to overestimate rates of adherence as these methods are not infallible (Hack & Chow 2001). Direct questioning or clinical impression have the advantage of being simple, inexpensive and time efficient, though they tend to overestimate adherence rates by 30% (Thompson et al. 2000). Questionnaires that have been used for adult psychiatric population with psychoses include the Medication Adherence Rating scale (MARS)(Thompson, Kulkarni, & Sergejew, 2000), the Medication Adherence Questionnaire (MAQ) (Morisky, Green, & Levine, 1986), and the Drug Attitude Inventory (DAI) (Hogan, Awad, & Eastwood, 1983)(Morisky et al., 1986). More recently, the Brief Adherence Rating Scale (BARS) has been validated against electronic monitoring in assessing medication adherence of adult patients on antipsychotic medication (Byerly, Nakonezny, & Rush, 2008)

Rates of adherence for individual patients are reported as the *percentage of the prescribed doses of medication actually taken by the patient over a specified period* (Osterberg et al. 2005). For instance, previous studies have measured treatment adherence in schizophrenic patients by using two different variables: i) patient's adherence to the follow-up appointments; and ii) patient's adherence to drugs. Authors have rated adherence as "good", "average" and "poor" according to whether the patient had attended he appointments and received

the medication prescribed *more than 75%*, between *75% and 25%*, or *less than 25%* of the times respectively (Buchanan 1992). Other studies have estimated the level of patients' adherence according to the physicians' reports as "good" or "bad" by using 75% adherence as cut-off point (Kampman et al. 2000).

Adherence rates are lower for *chronic* conditions when compared with those seen in *acute* illnesses; adherence drops dramatically after the six first months of therapy (Osterberg & Blaschke, 2005). There has been controversy about whether *psychiatric patients* present with poorer adherence rates when compared to patients with other medical conditions. A study showed similar adherence rates in psychotic patients when comparing with other chronic medical illness (only two third of patients remained adherent to medication at 2 years follow-up) (Buchanan 1992), whereas a posterior study did report differences (Cramer & Rosenheck 1998). Most recently, the Clinical Antipsychotic Trial of Intervention Effectiveness study (CATIE) showed 3 out of 4 patients with psychotic illness discontinued medication before 18 months (Lieberman et al., 2005). These results suggest medication non-adherence is a major problem when considering psychiatric disorders.

In the population of *children and adolescents*, adherence rates reported for severe medical conditions such as asthma, leukaemia, renal transplant, or epilepsy have also been poor: about 50%, 57%, 58% and 72% respectively at one year follow-up (Hack and Chow 2001).

A number of different studies have reported on treatment adherence in children and adolescents with ADHD **(Table 7)**. Reported levels of adherence ranged from 35 to 91%, depending on the method used for assessing it. The follow-up period of the first studies did not go beyond a few weeks or months, and only three of them went beyond that (MTA group 1999a; Thiruchelvam et al. 2001; Charach et al. 2004; Dreyer, O'Laughlin, Moore, & Milam, 2010). A recent review on treatment adherence in children and adults with ADHD has reported discontinuation rates of 13-64% of the patients, more frequently associated to immediate-release v medications (Adler & Nierenberg, 2010).

Despite these low rates of adherence reported for children and adolescents with ADHD, little is known about specific factors associated with this. A qualitative study examining Cessation of treatment in Adolescents with ADHD (CADDY) found a rate of treatment discontinuation exceeding the rate of persistence. The reduction was especially remarkable between 16 and 17 year-old patients, and the decision to stop the treatment was their own, even when they continued presenting residual symptoms (Wong et al., 2009). Of those under 15 year-olds who discontinued medication, only 18% restarted treatment after that.

| Study | N | Study design | Follow-up | Medication | Adherence (how was measured)) | Main observations of the study | Limitations of the study |
|---|---|---|---|---|---|---|---|
| ***Kauffman et al. 1981*** | 12 | Double-blind triple crossover | 18 weeks | MPH, DXF | 67% MPH, 60% DXF (Urine testing & pill counts) | -First attempt to study compliance in ADHD | -Pill counts overestimate compliance |
| ***Firestone et al. 1982*** | 76 | Randomized to MPH/MPH+ BT | 10 months | MPH ± BT | 80% at 4 month 56% at 10 month (Parent report) | -No differences between groups<br>Parents' personality not associated with compliance<br>-<10% of parents discussed discontinuation with doctors | -Sample combined children who did not start treatment with children who discontinued |
| ***Sleator et al. 1982*** | 52 | Non-randomized | 12 months | Stimulants | 60% (Child report),<br>35% (Parent & teacher report) | -42% of children disliked medication<br>-65% admitted they had attempted to avoid taking their medication | -Unclear definitions of "noncompliance"<br>-Compliance only measured by interview |
| ***Brown et al. 1985*** | 30 | Randomized to MPH/placebo* | 3 months | MPH | 77% ( Pill counts) | -25% of adherent children missed 2-10 doses/week<br>-50% of dropouts were premature<br>-More psychopathology in non-adherent children families | -Very small sample after drop-out |
| ***Brown et al. 1987*** | 58 | Randomized to MPH/placebo* | 3 months | MPH | 75% (Pill count)<br>80% (Parent report) | -Parent report overestimate pill counts<br>-Better compliance associated with being White, married, higher patient IQ (higher socioeconomic status) | -Socioeconomic status not directly measured<br>-Unspecific subjects inclusion criteria |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ***Brown et al. 1988*** | 71 | Randomized to MPH/placebo* | 3 months | MPH | MPH > placebo<br>-% not reported-<br>(Pill counts) | -Better compliance associated with higher patient IQ, milder symptoms & higher perceived self-control | -% compliance not reported |
| ***Johnstone & Fine 1993*** | 24 | Double-blind randomized to titration/typical clinical practice | 3 months | MPH | 80% (Urine test)<br>67-91% (Verbal reports)<br>% not reported (Pill counts) | -No differences in compliance between treatments<br>-Compliance unrelated to satisfaction, acceptability, treatment response, child's age or SES,<br>-Compliance related with mothers' IQ | -Very small sample after drop-out |
| ***MTA Cooperative Group 1999*** | 579 | Randomized to *MedMgt/Beh/ Comb/CC* ** | 14 months | *MedMgt, Beh, Comb, CC*** | 85% *** | -The largest, most methodologically sophisticated randomized multisite trial conducted to date.<br>-Focused on long-term outcomes for different treatments | -Factors in relationship with compliance not explicitly studied |
| ***Thiruchelvam et al. 2001*** | 71 | MPH | 3 years | MPH | 52% (Questionnaires completed by children, parents and teachers)[1] | -The study identifies moderators and mediators of long-term adherence to stimulant medication | -Questionnaires overestimate compliance |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ***Charach et al. 2004*** | 79 | Double-blind randomized to MPH/placebo | 5 years | MPH | 36% (Questionnaires completed by children, parents and teachers) [1] | -The study demonstrates that psychostimulants improve ADHD symptoms for up to 5 years | -Factors in relationship with compliance not explicitly studied |
| ***Deyer et al. 2010*** | 95 | Non randomized | 4-6 weeks | -- | 81.5% (reported by parents by Telephone interview ATIF) | Adherence to clinical recommendations and to engage in active self-help seeking | -Higher estress in families predicting higher adherence rates |

**Table 7.** Summary of previous studies examining adherence in children with ADHD

N: number of patients; MPH: methylphenidate; DXF: dexanfetamine; BT: behavioural therapy * All of them received adjunctive behavioural treatment or attention control **A small minority refused treatment randomization. Placebo group is not included*** *MedMgt:* medication management treatment (methylphenidate, dextroanfetamine, pemolide, imipramine, bupropion, haloperidol); *Beh:* behavioural therapy-only treatment; *Comb:* combined treatment; CC: community comparison group (community providers). [1] Treatment Monitoring Questionnaire (Corkum et al 1997) and the Child Satisfaction Survey (Corkum et al. 1997)

### 1.2.2 Factors related to Treatment Adherence in mental health.

Factors related to treatment adherence have been traditionally divided into *patient-related*, *medication-related* and *environmental factors* (Feyton et al. 1997) (see **Table 8**). In the specific case of children, environmental factors need also to include parental factors, as some studies have demonstrated they have an outstanding influence in their children's health beliefs and behaviour (McNeal et al. 2000). Factors in relationship with treatment adherence in mental health have been extrapolated from *adult psychiatric studies*. The majority of them have been especially focused on psychotic patients **(Table 9a)**. Some authors have also differentiated between *moderator* factors (*baseline characteristics* of the patient which influence treatment adherence) and *mediator factors* (arising *after* initiation of treatment) (Thiruchelvam et al. 2001).

It is very important to differentiate a *"non-intentional non-adherence"*, when the patient fails taking the medication as a result of forgetting or misunderstanding instructions about the drug schedule, from an *"intentional non-adherence",* when the patient makes a specific decision not to take the prescribed medication (Atkins & Fallowfield 2006). Previous literature on treatment adherence has focused on the *"non-intentional"* factors while minimizing the important influences of the *attitudes* and *perceptions* of the patients who actually take the medication (Baxley & Turner 1978). However, it is complex to

measure attitudinal factors as a number of different dimensions need to be covered. This concept is important if we consider that the "*intentional" factors* may be enhanced or modified by education programs about the disorder and its treatment. Sometimes it might be difficult to disentangle the specific *"intentional"* and "*non-intentional"* factors. For instance, comorbidities may affect adherence as a *"non-intentional"* factor, but also as *"intentional"* factors by modifying subject's perceptions and attitudes towards treatment. The *"intentional"* factors are shown in bold.

*Age*, *gender* and *socioeconomic status* have been associated with compliance in some studies, whereas other studies could not find this association (Buchanan 1992). However, there is a general agreement that a *lack of insight*, more *severity of symptoms*, *complexity of drug regimen* and *side effects* are associated with poorer adherence (Buchanan 1996) (see **Table 9a**). Other characteristics described in association with attitudes towards treatment in adult psychiatric studies include *patient's insight* (David 1990; Buchanan 1996), and the *patient-doctor relationship* (Hogan et al.83).

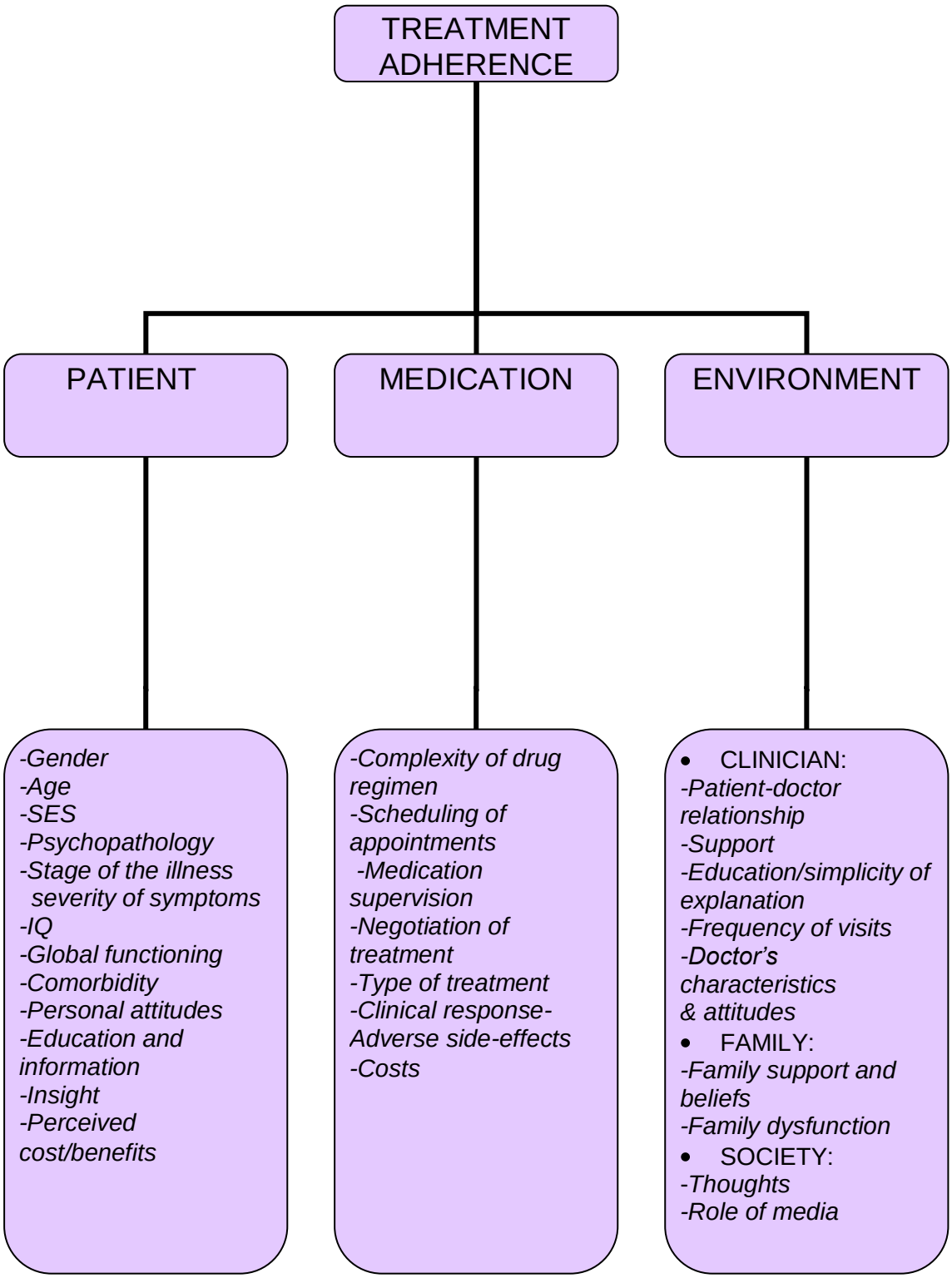



**Table 8** Factors associated to treatment adherence

**Table 9a. Summary of factors affecting treatment adherence in adult psychiatric population.** *"Intentional-non adherence"* factors in bold

| ***1. MODERATORS*** | |
|---|---|
| ***Patient-related factors*** | |
| • ***Gender*** | -Males worse adherence *(Tunnicliffe et al. 1992; Kampman et al. 2002) Vs.*<br>-No association with adherence *(Baekeland & Lundwall 1975; Buchanan 1992)* |
| ▪ ***Age*** | -Younger age worse adherence *(Tunnicliffe et al. 1992, Kampman et al. 2002 ) Vs.*<br>-No association with adherence *(Baekeland & Lundwall 1975; Buchanan 1992)* |
| • ***Socioeconomic status (SES)*** | -Low SES associated with poor adherence (Winkelman 1964; *Baekeland & Lundwall 1975*) *Vs.*<br>-No association SES-adherence *(Buchanan 1992)* |
| • ***Psychopathology*** | -More severe symptoms worse adherence *(Kasper et al. 199;, Hoge et al. 1990; Kampman et al. 2002)*<br>-Bipolar or psychotic disorders worse adherence than personality disorders *(Centorrino et al. 2001)* |
| • ***Stage of the illness*** | Chronically ill patients worse adherence than acutely ill *(Centorrino et al. 2001)* |
| • ***Comorbidity*** | Sociopathic personality and impulsiveness associated with poor adherence *(Altman et al. 1972)* |
| • ***IQ*** | IQ related to better insight and adherence *(Buchanan et al. 1992)* |
| • ***Global functioning*** | -Lower global functioning predicted poorer adherence *(Grunebaum et al. 2001)*<br>-Lack of social activities associated with non-adherence *(Kampman et al. 2002)* |
| • ***Personal attitudes*** | **-Negative attitudes associated with non-adherence *(Hoge et al. 1990; Buchanan 1992; Grunebaum et al. 2001)***<br>**-Psychological reactance* associated with non-adherence *(Moore et al 2000)*** |
| • ***Education-information*** | **Higher levels of education improved adherence *(Falloon 1984, Centorrino et al. 2001 )*** |
| • ***Insight*** | **Poor insight associated with non- adherence *(Bartko et al. 1988; Buchanan 1992)*** |

| | |
|---|---|
| ***Treatment-related factors*** | |
| • ***Complexity of drug regimen*** | **-Complexity of treatment regimen associated with poorer adherence *(Davis 1966)*.<br>-Dose frequency more important than number of drugs prescribed *(Davis 1966)*** |
| ▪ ***Scheduling of appointments*** | **Routinely scheduled visits, with one week or less time between appointments enhanced adherence *(Centorrino et al. 2001)*** |
| • ***Medication supervision*** | **Lack of direct supervision associated with poor adherence *(Grunebaum et al. 2001)*** |
| • ***Negotiation of treatment*** | **Atmosphere of negotiation associated with improved adherence *(Eisenthal et al. 1979)*** |
| • ***Type of treatment*** | **Psychotherapy showed improved adherence than pharmacotherapy only *(Centorrino et al. 2001)*** |
| ***Environmental factors*** | |
| ▪ ***Family dysfunction*** | **High expressed emotion in families related to poor adherence *(Sellwood et al. 2003)*** |
| • ***Doctor's characteristics & attitudes*** | **Ability of "inspire trust", positive attitude associated with better adherence *(Howard 1970)*** |
| ▪ ***Voluntary admission to hospital*** | **Worse adherence when admission to hospital was compulsory *(Buchanan 1992)*** |

| ***2. MEDIATORS*** | |
|---|---|
| ▪ ***Clinical response*** | **Subjective response to treatment predicting good adherence *(Awad 1993; Moore et al. 2000*** |
| • ***Adverse side-effects*** | **Experienced side effects reduced adherence *(Buchanan 1992; Kampman et al. 2002)*** |

**Table 9a.** Summary of factors affecting treatment adherence in adult psychiatric population

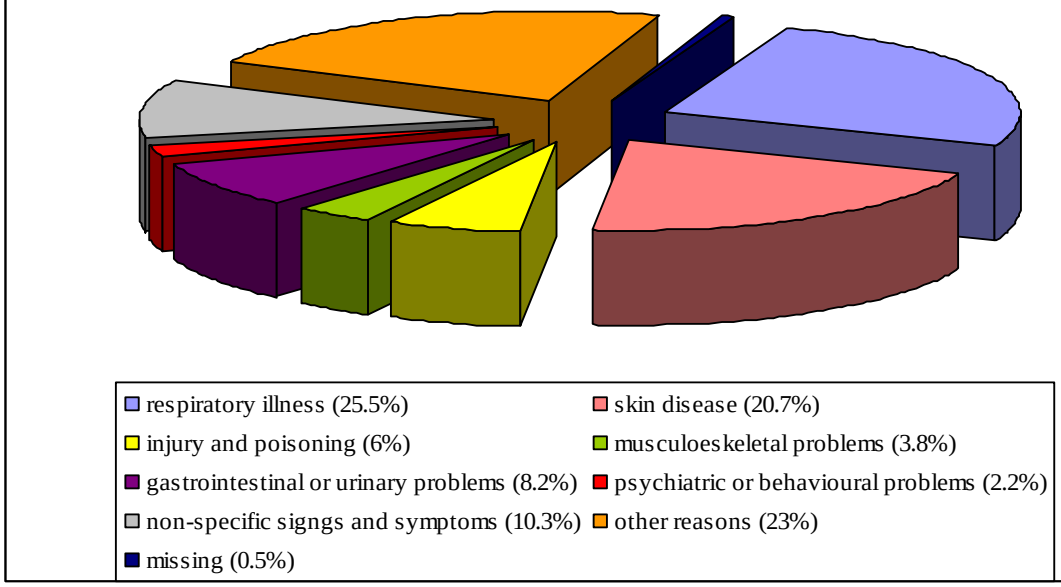
*Vs.* refers to different results shown in different studies
**Reactance* is defined as a motivational state that can develop when a person perceives that there is a threat to his or her personal freedom

### 1.2.3 *Attitudes* towards treatment in child and adolescent psychiatry and ADHD

Approximately, 15% of children (Campbell 1995; Verhulst 1995) and one-fifth of adolescents in the general population have identifiable psychiatric disorders (Offord et al. 1987; Costello et al. 1996), yet only a minority receive specialist psychiatric care. High rates of psychopathology -up to 75% according some studies- have been described amongst adolescents attending primary care (Burns et al. 2004; Kramer et al. 1998; Yates et al. 2004). Psychiatric problems include both internalizing and externalizing symptoms, however general practitioner identification of these problems is especially low and made more difficult by the fact that children and adolescents almost exclusively present with physical health complaints **(Figure 1)** so comorbid psychiatric problems are frequently unrecognized (Gledhill et al. 2003; Zuckerbrot et al. 2006). A study that took place in one urban central area in London serving a population with a broad ethnic and socioeconomic mix concluded that *attitudes* of adolescents with depressive symptoms were a strong predictor of attendance to medical services (Ferrin, Gledhill, Kramer, & Elena Garralda, 2009). These attitudes were associated with ethnicity and the *adolescents' perceptions of the role of the GP* with regard to their physical *and* psychological well-being, and were totally independent of the depressive and physical symptoms they presented. *Familial dysfunction* and *poor parent-child communication* (Bender et al. 1998), *adverse side effects* from treatment (Cromer 1989), had been previously

described in relationship with treatment adherence in adolescents (Asadi-Pooya 2005). For a further review on the topic see **Appendix-1**

**Figure 1. Reasons for adolescents to attend general pracice in the study according to the Read Codes (Read, 1990)**




Theoretical social cognitive models of health behaviour and medication attitudes include the Health Belief of Model for Children (HBM), the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB) and the Self Regulation Model (SRM). These models are based on the assumption that attitudes and beliefs are strong determinants of health related behaviours and thus treatment adherence. While the TRA includes the importance of significant others influencing health behaviours (Fishbein, 1980), the TPB highlights normative beliefs and the influence of social pressure influencing behaviour intention and has been used to explain attitudes to treatment adherence in depression (Schomerus, Matschinger, & Angermeyer, 2009) and psychosis (Compton & Esterberg, 2005). The SRM by Leventhal and Nerenz (1985) is a more dynamic

model that conceptualise the patient as a problem solver person who evaluates the illness and develops an action plan to deal with the problem. This model also proposes both cognitive and emotional factors influencing the action.

When considering the *Health Belief of Model* specifically for children (Bush & Iannotti, 1990), three main dimensions have been described; i) *perceived illness threat* (*vulnerability* and *severity* of illness); ii) *perceived benefits of medication;* and ii) *motivations* (or *illness concerns)*. A fourth domain, called the *cognitive-affective factor*, would be indirectly contributing to these three factors. In the *cognitive-affective* factors, the authors highlighted the *"health locus of control".* This refers to a person's basic belief that they determine what happens to them (internal locus of control) or that circumstances determine what happens to them (external locus of control) (Hack & Chow 2001). Some authors have observed higher perceived internal locus of control in children with better treatment adherence (Brown et al. 1988), see **Figure 2**.

Qualitative research studies of adherence and attitudes towards treatment have demonstrated that adherence to medication is a *dynamic process* shaped by personal, cultural and family attitudes, beliefs and emotions (Wrubel et al., 2005).

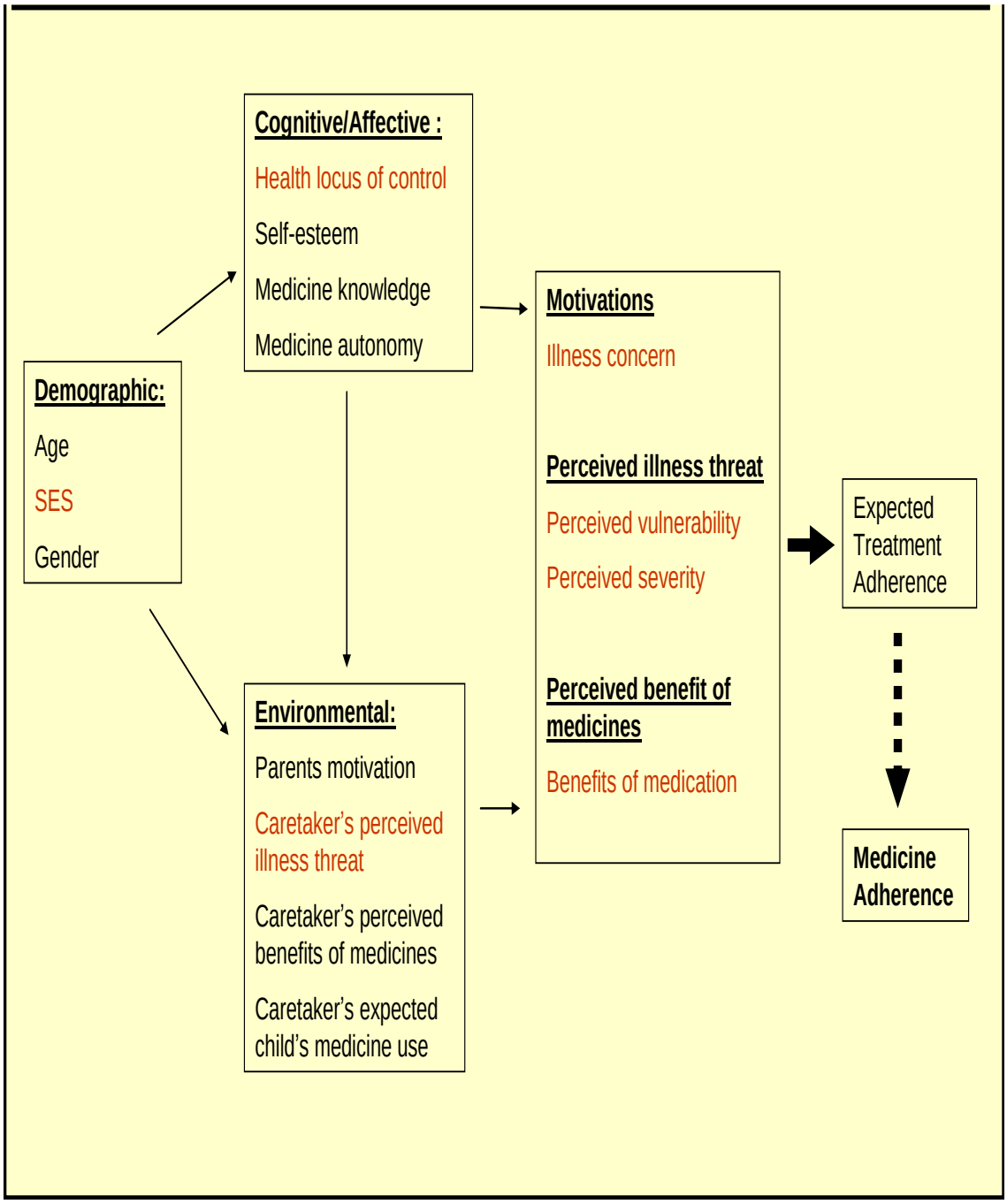



**Figure 2.** The Health Belief Model for Children (adapted from Bush & Iannotti 1990)

To date, a limited number of different factors have been described in association with adherence on the specific child and adolescent *ADHD population* **(Table 9b)**. The majority of them (*IQ*, presence of *comorbidity* disorders, *complexity of drug regimen*, *external treatment supervision,* or presence of *side effects*) go in line with results obtained from both adult psychiatric and paediatric populations. However, there are opposite findings in relationship with different factors. For instance, *older age* has been shown to be a protective factor for poor adherence in some studies (Firestone 1982), whereas it has been shown to be a risk factor in others (Brown et al. 1985, Thiruchelvam et al. 2001). Similarly, *severity of symptoms* has been linked to better adherence in a study (Thiruchelvam et al. 2001), while other study has showed opposite results (Johnstone & Fine 1993).

Whereas the majority of factors mentioned before would represent the *"non-intentional non-adherence"* (for instance, *low IQ* is related to poor adherence, as these children will be less prone to follow up a proper regimen), *attitudes towards treatment* presented by both ADHD subjects and their families would reflect the *"intentional non-adherence".* A limited number of studies have specifically considered attitudinal factors in ADHD subjects (Baxley & Turner 1978; Efron et al. 1998; McNeal et al. 2000). According to the CADDY study mentioned earlier (Wong et al., 2009), some factors associated with the discontinuation were directly linked to the poor development of services for adults with ADHD and the poor training of adult psychiatrists in the diagnosis and management of ADHD. Again, these results go in line with previous results found for adolescents with other psychiatric disorders (Ferrin et al., 2009), and highlight the important role of the clinician in the long-term management of the disorder. Other aspects related to the decision of ADHD adolescents to withdraw treatment included the self perception of the adolescents

that they could cope adequately without the need of medication (even if residual symptoms persisted) and other factors related to schooling and academic performance (Wong et al., 2009). Perceptions towards treatment have been measured in both ADHD children and their parents, not only because the parental perception has been found to contribute meaningfully to the children's attitudes (Firestone 1982; Johnstone & Fine 1993), but also because of the discrepancies in attitudes reported by both groups (Efron et al. 1998; McNeal et al. 2000).

*Perceived cost and barriers* (including difficulties in swallowing tablets, treatment expensiveness, etc) has also been described in possible relationship with the attitudes towards treatment (McNeal et al. 2000).

In order to improve long-term outcomes and enhance therapeutic benefits from medication while minimizing adverse effects, it would be essential to investigate which conditions contribute to treatment adherence in ADHD. Special interest must be placed on those factors associated to attitudes or intentional factors that might be modifiable. To the best of our knowledge only one study has specifically evaluated attitudes towards treatment in ADHD adolescents using a questionnaire on attitudes towards treatment (the *Southampton ADHD Medication Behaviour and Attitudes scale*) (Harpur, Thompson, Daley, Abikoff, & Sonuga-Barke, 2008). The questionnaire especially focused on the benefits and costs perceived from medications in association to attitudes, though it also evaluated patient stigma and resistance to treatment.

**Table 9b. Summary of factors affecting treatment adherence in ADHD**
*"Intentional-non adherence"* factors in bold
*Vs.* refers to different results shown in different studies.
CD: conduct disorder; LD: learning disabilities; ODD: oppositional defiant disorder

| ***1. MODERATORS*** | |
|---|---|
| ***Child's factors*** | |
| • ***Gender*** | Males more likely to non-adherence *(Firestone 1982)* |
| • ***IQ*** | Low IQ associated with poor adherence *(Firestone 1982, Brown et at. 1985; Brown et al. 1987)* |
| ▪ ***Age*** | -Younger children less likely to adhere treatment *(Firestone 1982), Vs.*<br>-Older children more prone to miss doses *(Brown et at. 1985; Thiruchelvam et al. 2001)* |
| • ***Socioeconomic status (SES)*** | -Low SES probably related with poor adherence *(Brown 1987)* |
| • ***ADHD related factors*** | |
| ○ ***Severity of symptoms*** | -Severe symptoms related to worse adherence *(Johnstone & Fine 1993), Vs*<br>-Less teacher-rated ADHD symptoms related to non-adherence *(Thiruchelvam et al. 2001)* |
| ○ ***Distractibility*** | Greater attention difficulties associated with non-adherence *(Brown et at. 1985; Firestone 1982)* |
| ○ ***Self-regulation*** | Lower self-control perceived rates associated with poor adherence *(Brown et al. 1988)* |
| • ***Comorbidity*** | |
| ○ ***Anxiety, emotional problems*** | More anxiety levels and emotional problems associated with worse adherence *(Stine 1994; Firestone 1982)* |
| ○ ***CD,LD,ODD*** | Presence of ODD comorbid symptoms predicted poor adherence *(Thiruchelvam et al. 2001)* |
| ***Treatment-related factors*** | |
| • ***Multiple daily dosing*** | **Difficult treatment regimen associated with non-adherence *(Swanson 2003; Adler 2010)*** |
| ▪ ***Social stigma*** | **Children's feelings about "being different" related to poor adherence *(Sleator et al. 1982; Swanson 2003)*** |
| • ***Safety & long-term effects*** | **Concerns related to poor adherence *(Swanson 2003)*** |
| ▪ ***Individual attitudes to medication*** | **Children "disliking" taking medication more prone to non-adherence *(Sleator et al. 1982),* adolescents considering they don't need medication *(Wong et al. 2009)*** |
| ***Environmental factors*** | |
| ▪ ***Family dysfunction*** | Family dysfunction and psychopathology related to non-adherence *(Brown et al. 1988)* |
| • ***Parents' age and IQ*** | Younger parents or those with lower IQ more likely to be non-adherents *(Firestone 1982; Johnstone & Fine 1993 )* |

| | |
|---|---|
| ▪ ***Parents' personality*** | -Parents' personality not associated with adherence (Firestone et al. 1982), *Vs*<br>-Mothers' personality influencing adherence *(Firestone & Witt 1982)* |
| ▪ ***Parental attitudes*** | **Parents' attitude against putting their children on medication associated with poor adherence *(Brown et al. 1987)*** |
| • ***Treatment supervision*** | **Inadequate supervision at home/school related to delay or missed doses *(Swanson 2003)*** |
| • ***Clinician*** | **Inadequate diagnosis or supervision, inadequacy of services (Wong *et al.* 2009)** |

| ***2. MEDIATORS*** | |
|---|---|
| ▪ ***Clinical response*** | **-Better adherence in children showing improved functioning with treatment *(Charach 2004), Vs***<br>**-Treatment response not associated with adherence *(Johnstone & Fine 1993)*** |
| ▪ ***Adverse side-effects*** | **-Decision to drop-out not in association with side effects *(Firestone et al. 1982), Vs***<br>**-15% children stopped treatment because of side effects *(Schachar 1999)*** |

**Table 9b. Summary of factors affecting treatment adherence in ADHD**

*Vs.* refers to different results shown in different studies
CD: conduct disorder; LD: learning disabilities; ODD: oppositional defiant disorder

In summary, ADHD is a common, highly impairing condition with variable outcomes, but important repercussions in adult life. Drug treatment has shown clear effectiveness in short-term and most probably in long-term outcomes. Despite treatment adherence being important, adherence rates seem to be particularly low for this group. Little is known about factors contributing to treatment adherence, particularly the *"intentional"* or *attitudinal* factors. Furthermore, there is a lack of studies that have analysed all these attitudinal factors in a comprehensive way. A feasible, reliable and valid measure of attitude towards treatment, usable in both clinical and research settings is required.

## 2. OBJECTIVE

The present study aims to develop a new comprehensible questionnaire in which all possible factors contributing to the attitudes towards treatment in ADHD are covered (QATT).

### HYPOTHESIS

**1.** Questions and scores measured by the QATT are related to treatment adherence and benefits/side-effects of the medication perceived by adolescents with ADHD and their respective caregivers;

**2.** The QATT is a *valid* and *reliable* scale for measuring attitudinal factors in the specific ADHD population of adolescents and their parents (adequate *validity* and *reliability* of both QATT-young version and QATT-parents version scales).

# 3. METHODS

The present study consists of a *cross-sectional survey* to measure *attitudes towards treatment adherence* in ADHD subjects and their parents.

## 3.1 Sample

Study subjects were 120 adolescents (over 12 years of age) with ADHD (DSM-IV-TR criteria, any subtype) who consecutively attended three different outpatient Child and Adolescent Mental Health Services in the South London and Maudsley area during the recruitment phase (1st August 2006-1st December 2008). Diagnosis of ADHD and co-morbid disorders was established using a semi-structured diagnostic interview (PACS) (E. Taylor, Schachar et al., 1986). When a diagnosis was difficult to obtain the particular case was discussed in clinical sessions attended by a clinical psychologist and one or two consultant child and adolescent psychiatrists and diagnosis was decided upon consensus.

In order to achieve good external validity, all patients diagnosed with ADHD were eligible, with most of their co-morbidity represented, regardless of treatment prescribed (*inclusion criteria*). *Exclusion criteria* were severe ASD and severe learning disabilities, as these posed added problems for understanding or answering the questions. Diagnosis of ADHD was made by the respective clinician (child psychiatrist or clinical psychologist) according to DSM-IV criteria (Choi, 1998). Comorbidities and demographic factors (gender, age, ethnicty and family composition) were extracted from the files. Factors related to treatment adherence according to previous authors —such as years in treatment, type of medication

currently used, combination of treatments, and dosage (once daily/more than once), and number of previous medications— were also explored (Bohning, Bohning, & Holling, 2008). Treatment adherence was estimated by direct questioning to participants about pills missing during the previous week, and according to clinical attendance recorded in their files.

Ethical approval for the study was granted by the Joint South London and Maudsley Ethics Committee and the Institute of Psychiatry NHS Research Ethics Committee, on 28th July 2006. Patients' and parents' information sheets and consent forms are shown on **Appendix-2**.

### *3.2* Questionnaire development

The QATT was constructed using a systematic multistage process based on the theory of measurement and scale development (DeVellis, 1991, **Table 9**).

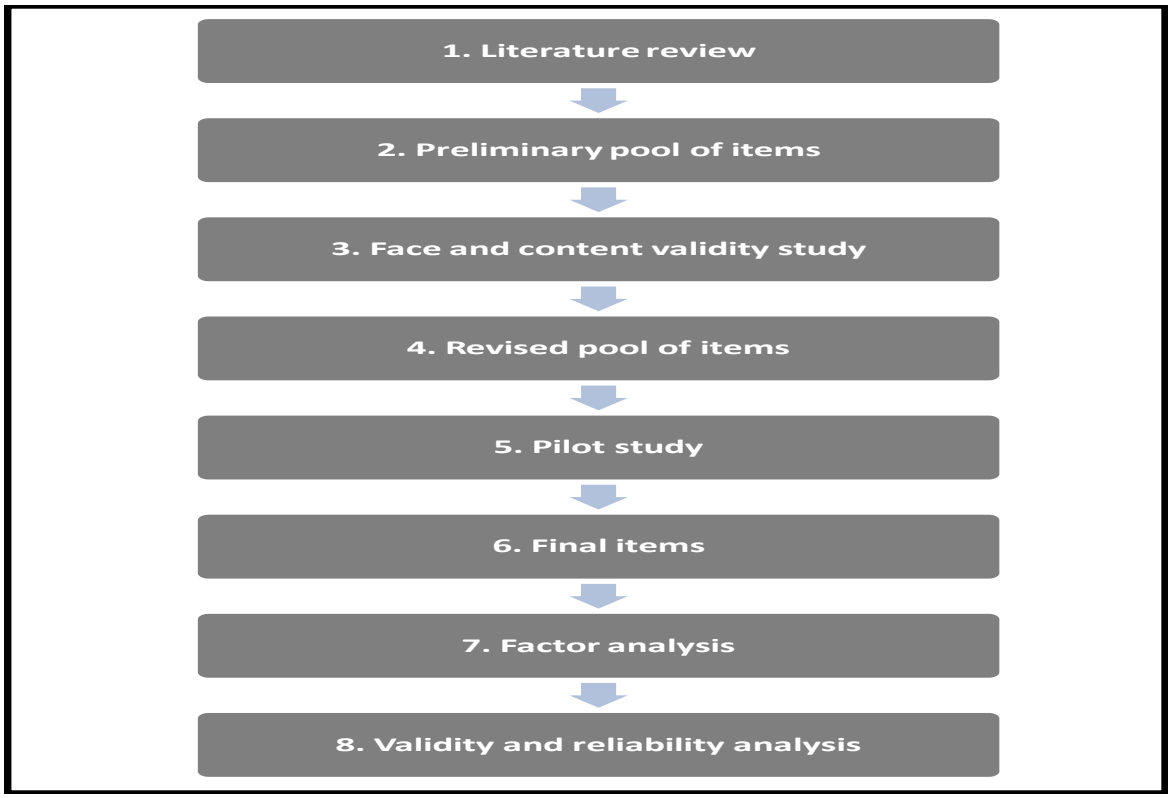



**Table 9. Development of the Questionnaire on Attitudes Towards Treatment for ADHD.** First, a literature review of items exploring attitudes towards treatment in ADHD children and adolescents was developed (Ferrin, 2006). Due to the scarce literature on the topic, previous questionnaires on attitudes towards treatment and factors related to treatment adherence in adult psychiatric populations and in adolescents with any other kind of chronic medical condition were used as a guide to generate an initial pool item list. An initial questionnaire was sent to a panel of 6 clinical and non-clinical experts on the topic for *face-content validity*. The experts gave their opinion on the appropriateness of the items selected and contributed with new items and amendments. Finally, a total of 33 items were selected. Perceived benefits and side effects of medication were also explored using a parallel list of perceived side effects and beneficial effects of the medication. The questionnaire was piloted in 20 adolescents with ADHD and their respective parents. The final questionnaire was administered to a total of 120 adolescents and their respective parents. Validity and reliability of the questionnaire was finally obtained.

### 3.3. Preliminary item selection

Preliminary items were obtained from previous studies assessing *attitudes* towards treatment for both paediatric and psychiatric populations. Because of the lack of definition between *"treatment compliance"* and *"treatment adherence"* mentioned before, all studies investigating these terms were taken into account. A literature search in *PsycINFO* and *Medline* for the period between 1996 and 2006 using the following keywords was performed: ATTITUDES *and* TREATMENT *and* ADHD; TREATMENT ADHERENCE *and* ADHD; TREATMENT COMPLIANCE *and* ADHD; ATTITUDES *and* TREATMENT *and* PAEDIATRIC; TREATMENT ADHERENCE *and* PAEDIARTRIC; TREATMENT COMPLIANCE *and* PAEDIATRIC; TREATMENT ADHERENCE *and* PSYCHOSIS; TREATMENT COMPLIANCE *and* PSYCHOSIS; TREATMENT ADHERENCE *and* ASTHMA; TREATMENT ADHERENCE *and* DIABETES; and TREATMENT ADHERENCE *and* ADOLECENTS. Cross-references from the articles identified were also examined.

Few studies comprehensively assessing attitudes towards treatment were found. Questionnaires used for assessing knowledge, perceptions and attitudes concerning drug treatment in hyperactive children and their parents (Baxley & Turner 1978; McNeal et al. 2000) were used as a guide for generating an initial pool item list. In addition, questionnaires focusing on attitudes towards neuroleptic treatment in schizophrenic patients such as the Medication Adherence Rating scale (MARS)(Thompson et al., 2000), the Medication Adherence Questionnaire (MAQ) (Morisky et al., 1986), and the Drug Attitude Inventory (DAI) (Hogan et al., 1983)(Morisky et al., 1986) were also used as models by simplifying and adapting the items for a younger population. Further additional items were designed by the author

according to previous literature search on the topic and suggestions from experts in the field. Finally, perceived benefits and side of the medication (Hill & Taylor 2001) were also added to the original questionnaire.

Preliminary item selection included a total of 34 items (see **Appendix 3**). The main aim of the initial pool list was to include as many items as possible so that all attitudes towards treatment for this group of people were covered (Stahl 2006). The items reflected 8 dimensions demonstrated in relationship with attitudes towards treatment: 1) general beliefs towards medicines, 2) education and information about the illness and treatment prescribed, 3) concerns, 4) "locus of control", 5) insight, 6) barriers towards medication, 7) self-concept and self-esteem, and 8) relationship with the physician. Perceived benefits and side effects of medication were also explored using a parallel list of perceived side effects (Dickstein et al., 2005) and beneficial effects of the medication. In order to facilitate reading, items were grouped into two different sections; a) "express your personal views towards treatment"; and b) "benefits and adverse effects suffered since you started on medication". The second part was not applicable when the youth had not started treatment. **Table 10** shows a list of how the items where grouped into the different dimensions, and includes its references from the literature.

**Table 10**. Initial items and dimensions included in the questionnaire

| |
|---|
| 1. ***General beliefs towards medicines:*** |
| -*"I prefer natural remedies (for instance, herbs) rather than medicines"* (Buchanan 1996; Horne et al. 1999) |
| -*"I prefer speaking with someone about my problems rather than taking medicines"* (Buchanan 1996; Kampman et al. 2000) |
| -*"I think medicines are only for very ill people"* (Hogan 1983; Buchanan 1996; McNeal 2000) |
| ***2. Education and information:*** |
| -*"I know everything about this treatment" (*Buchanan 1996; Horne et al. 1999) |
| -*"I have to take this medication only for a short period of time"* (Hogan 1983; Buchanan 1996; Horne et al. 1999; McNeal 2000) |
| -*"I would stop medication if I wanted to consume alcohol or drugs"* |
| -*"I will stop this treatment as soon as I feel better"* (Hogan 1983; Buchanan 1996; Thompson 2000) |
| ***3. Concerns:*** |
| -*"I am worried about having to take medicines"* (Buchanan 1996; Horne et al. 1999;McNeal 2000) |
| -*"I am worried about the future side effects of this medication"* (Hogan 1983; Horne et al. 1999; McNeal 2000) |
| -*"I think this medication can be addictive"* (Hogan 1983; Buchanan 1996; Horne et al. 1999) |
| -*"I am worried that this medication can change my personality negatively"* (Buchanan 1996; Kampman et al. 2000 |
| ***4. Locus of control:*** |
| -*"I have to take this treatment exactly as doctor has prescribed"* (Hogan 1983) |
| -*"I will tell someone if I decide to stop this treatment"* (Hogan 1983) |
| -*"I am the only person controlling for my treatment"* (Buchanan 1996) |
| -*"I take this medication against my will"* (Hogan 1983; Buchanan 1996) |
| -*"I can prevent getting sick by staying on this medication"* (Hogan 1983; Horne et al. 1999; Thompson 2000; McNeal 2000) –tested in only 3 adolescents- |
| ***5. Insight:*** |
| -*"I have mental or psychological problems that require medication"* (Buchanan 1996; Kampman et al. 2000) |
| -*"I think I need professional help to deal with my problems"* (Kampman et al. 2000) |
| -*"I think this medication is necessary for me"* (Buchanan 1996) |
| ***6. Cost-barriers:*** |
| -*" I think this treatment is too expensive"* (McNeal 2000) |
| -*"I prefer to take only one pill a day"* (Buchanan 1996) |
| -*"I need someone to remind me to take my medication"* (Hogan 1983) |
| -*"I feel embarrassed when I take medication in front of my peers"* (McNeal 2000; Kampman et al. 2000) |
| - *"I think my parents or friends do not like me to be on this treatment"* (Hogan 1983) |
| -*"I have difficulties in swallowing pills"* (McNeal 2000) |
| -*"I usually forget about taking the pills"* (Thompson 2000; McNeal 2000) |
| ***7. Self-concept & esteem:*** |
| -*"I am happy with the way I am and the way I look"* (Offer et al. 1972; Kampman et al. 2000) |
| -*"I am happy with my performance or productivity at school or work"* (Offer et al. 1972; Kampman et al. 2000) |
| -*"I feel different because I am on this medication"* (Buchanan 1996; McNeal 2000) |

### *8. Patient-Doctor relationship:*

-*"I think doctors prescribe drugs for everything"* (Horne et al. 1999)

-*" I trust doctors and nurses a lot "*(Buchanan 1996)

-*"I get on well with my doctor"* (Hogan 1983)

-*"I feel motivated and ready to follow this treatment"* (Hogan 1983; Buchanan 1996; Kampman et al. 2000)

### *9. Side effects:*

-*"I feel dizzy, like a zombie"* (Hogan 1983; Thompson 2000)

-*"I feel more angry "*(Hill & Taylor 1998; Horne et al. 1999; Kampman et al 2000)

-*"I have had headaches or tummy aches"* (Hill & Taylor 1998; Horne et al. 1999; Kampman et al 2000)

-*"I have had problems with my height or weight "*(Hill & Taylor 1998; Kampman et al 2000)

-*"I feel miserable or unhappy"* (Hill & Taylor 1998; Horne et al. 1999; Kampman et al 2000)

-*"I feel nervous and overexcited"* (Hill & Taylor 1998; Horne et al. 1999; Kampman et al 2000)

-*"I feel tired or sleepy"* (Hogan 1983; Thompson 2000)

-*"I have had movements or twitches I can not control "*(Hill & Taylor 1998; Horne et al. 1999; Kampman et al 2000)

-*"I have had less of an appetite"* (Hill & Taylor 1998; Kampman et al 2000)

-*"I have had sleeping problems"* (Hill & Taylor 1998; Horne et al. 1999; Kampman et al 2000)

-*"I feel grumpy or irritable"* (Hill & Taylor 1998; Kampman et al 2000)

### *10. Benefits from medication*: (Hogan 1983; Buchanan 1996; Kampman et al. 2000)

-*"I feel less fidgety"* (McNeal 2000)

-*"I can start and complete tasks better"*

-*"I feel better in myself "*(Hogan 1983)

-*"I can concentrate better"*

-*"I enjoy my friends more"* (Hogan 1983; McNeal 2000)

-*"I feel my mind is much clearer"* (Hogan 1983; Thompson 2000)

-*"I feel more in control of my actions"* (Hogan 1983)

-*"I feel I am a better person"* (McNeal 2000)

-*"I have had fewer problems at home, at school, or with my friends"*

-*"I am more organized in my school work or daily routines"*

-*"I can work better at school, etc"*

-*"I can remember things more easily"*

-*"I feel my mood and feelings are more stable"*

-*"I can cope better with my problems"*

The scale was a self-administered questionnaire with closed response format. Because of the important discrepancies found when using different informants (Goodman 2001), two similar versions were administered to both young people and their parents. Following the structure used in already developed and validated questionnaires such as the *Mood and Feeling Questionnaire*, or the *Strengths and Difficulties Questionnaire* (Angold et al. 1987; Goodman 1997), questions for the youths were formulated in first person *("I know everything about this treatment"*). Unclear, ambiguous or confusing questions and abbreviations were avoided (PRP1992). Questions were kept as simple and short as possible and negative questions were also excluded in order to avoid "double-negative" answers (PRP1992). Embarrassing or sensitive issues were covered with care and asked in a hypothetical way (for instance, *"I would stop medication if I wanted to consume alcohol or drugs"*, see **Appendix 3**). At the same time, parallel questions were asked to every parent to elicit their own personal opinions and perceptions towards medicines and, in particular, their own children's treatment.

In order to avoid information bias when answering the questions resulting from attention difficulties, both parts appeared randomly in the questionnaires (that is, firstly section a) and then b); or *vice versa*) (Danckaerts & Taylor 1995). The structure of the questionnaire was designed in an attractive format so that young people could feel motivated to complete it. It used coloured headings, and avoided cramped appearance. Youths were cheered up to answer it by adding some short sentences of positive reinforcement at the end of each page.

Every subject had to tick a line and choose between the following answers: *Always true, Mostly true, Not sure, Mostly false,* and *Always false*. The 5 point Likert scale format was selected in order to enhance reliability of the scale (Ebrahim 2001; Stahl 2006) and after assuming the average is seen in the middle. For those items coding in different conceptual direction, data were recoded into same conceptual direction.

To minimize the possibility of acquiescence bias, the item pool was arranged to contain a comparable number of items to be scored "always true" and "always false" (Hogan et al. 1983). Social desirability bias was minimized by using "true"-"false" as response format instead of "I agree"-"I disagree" (Ebrahim 2001; Stahl 2006).

Two kinds of *validity* based on subjective judgements of experts on the topic were used. Firstly, f*ace validity* was obtained from 8 expert and non-expert clinicians, who assessed if the instrument appeared to measure the underlying concept, and if the structure of questions made common sense. Secondly, *content validity* was obtained from a panel of 4 experts in Child Psychiatry, Child Pharmacology and Paediatrics who independently examined the instrument's content, question format, and the sequencing and clarity of the questionnaire as a whole. The experts gave their opinions about the appropriateness of every item on the questionnaire by expressing if they considered them applicable or not, and giving alternative suggestions for the scale. Following experts' recommendations, more items were formulated in a positive view towards the medication in order to obtain a 50/50% of the items scoring towards positive and negative answers. Items which did not pass face or content validity were removed from the questionnaire.

### 3.4 Pilot questionnaire

The initial questionnaire was piloted in a random sample of 20 subjects with ADHD consecutively attending three different Child and Adolescents Mental Health services during the period of 1st August to 15th September 2006; the *Neuropsychiatric Clinic at the Michael Rutter Centre, the Bloomfield Clinic* and the *Belgrave Department for Children and Families.* The former is a national reference centre for children and adolescents with ADHD and other neurodevelopmental disorders. The *Bloomfield* and the *Belgrave* clinics are outpatient centres for children with psychiatric and neuro-developmental disorders and for their respective families.

To ensure confidentiality, every patient recruited received a successive number so that their names would not be linked to their responses. The patients' names were kept on a separate sheet.

Each youngster and his father, mother or carer completed the questionnaire in privacy. The questionnaire took approximately 10-15 minutes to complete and it was preceded by a brief conversation where the interviewer introduced herself to the young people and family, explained the nature and purpose of the interview and described the procedure to be followed. The interviewer also explained that the questionnaire was related to their opinions about the medication, and that it was only for research purposes as results were not going to interfere with their personal treatment. The subjects were also told they could refuse to take part or not to answer any question if their preferred to, and that their responses were not going to be shared with others. All this information was written in detail in an *information letter*. Further details may be seen on **Appendix-2** and **Appendix-3.**

A total of 20 young people and parents completed the questionnaire separately in order to avoid answers could be shared. The same person conducting the study was interviewing both children and their respective families. The researcher waited outside the rooms and gave explicit instructions that she was available to be consulted if anything was unclear. This way the researcher could not only check for ambiguities, but also she could elicit more detailed responses and check for motivation to answer. For patients who declined to fill in the scale, data from their files was obtained (Kampman et al. 2000).

After initial statistical evaluation of responses, 33 items were kept for further analysis and only one item was removed "*I think this treatment is expensive*", since it was thought as non- applicable within the NHS.

### 3.5 Final questionnaire

The final questionnaire **(QATT-young people's version)** was administered to a sample of 120 adolescents over 12 years of age with a diagnosis of ADHD (DSM-IV criteria, any subtype, any comorbidity and any treatment prescribed) who attended the same three different outpatient Child and Adolescent Mental Health clinics (CAMHS) in the South London and Maudsley area. Inclusion and exclusion criteria were similar to those used for the piloting phase **(Table 11)**. Parents of these 120 adolescents completed a parallel version of the questionnaire **(QATT-parents version).**

| |
|---|
| ***Inclusion criteria*:**<br>(1) diagnosis of Attention Deficit and Hyperactivity Disorder ADHD (DSM-IV criteria);<br>(2) above 12 years of age;<br>(3) informed consent from both the youth and one of the parents. |
| ***Exclusion criteria*:**<br>(1) severe learning disabilities (IQ below 70);<br>(2) severe autistic spectrum disorder;<br>(3) severe reading disabilities or inability to understand written English. |

**Table 11.** Inclusion and exclusion criteria

### 3.6 Statistical analysis

Descriptive statistics were generated to evaluate the characteristics of the sample, score distributions and missing items. All QATT scale items were transformed linearly to be coded in the same conceptual direction, from 0 (most positive attitudes) to 4 (most negative attitudes towards treatment). A global score for the total questionnaire was calculated with the sum of all the items. The result was a continuous variable, the lowest scores representing the most favourable attitudes to treatment.

The minimum sample size was decided previous recruitment using “the rule of 100” (Gorsuch, 1974; Kline, 1998), which recommends that sample should not be less than 100 even though the number of variables is less than 20. We also took into account the number of items included using a subjects-to-variables (STV) ratio of 2 (Preacher & MacCallum, 2002). According to this rule “there should be at least twice as many subjects as variables in factor-analytic investigations; this means that in any large study on this account alone, one should have to use more than the minimum 100 subjects" (Kline, 1998).

Explorative factor analysis of the initial 33 items of the scale was performed using SPSS™ (version 15.0). Since our aim was to explore dimensions in the questionnaire and not to test or confirm the statistical fit of previous theoretical or empirical models, we applied exploratory factor analysis (EFA) using the iterative principal axis factoring extraction method to fit the common factor model to our data. Unrotated factors were subjected to orthogonal rotation using the Varimax method in order to simplify and clarify the data structure as it yields uncorrelated factors. Only items with loadings greater than 0.4 were used to construct significant dimensions, and items that loaded

heavily on more than one dimension were excluded. For each patient, a total score for each dimension was calculated by summing up the scores of items within the dimension.

For the appropriateness of the factorial analysis, The Kaiser-Meyer-Olkin (KMO) and Bartlett's Test were explored. Kaiser-Meyer-Olkin measure of sampling adequacy was used as an index for comparing the magnitudes of the observed correlation coefficients to the magnitudes of the partial correlation coefficients. Large values for the KMO measure indicate that a factor analysis of the variables is a good idea. The KMO measures the sampling adequacy which should be greater than 0.5 for a satisfactory factor analysis to proceed (Kaiser 1974). Bartlett's test of sphericity tests whether the correlation matrix is an identity matrix, which would indicate that the factor model is inappropriate. Another indicator of the strength of the relationship among variables is Bartlett's test of sphericity. Bartlett's test of sphericity is used to test the null hypothesis that the variables in the population correlation matrix are uncorrelated. When the observed significance level is <0.05 the level is small enough to reject the hypothesis, and thus it is concluded that the strength of the relationship among variables is strong and it is a good idea to proceed a factor analysis for the data (Barlett 1954; http://www.ncl.ac.uk/ucs/statistics/common/specialisttopics/factor_analysis/factoranalysis.html)

For the missing data we used single conditional imputation with estimates, using expectation maximization algorithms as implemented in the SPSS module “Missing Value Analysis 15.0”. This method imputes missing data with asymptotically unbiased estimates by using information from the available data, assuming that the pattern of missingness is related to the observed data only (Dempster, Laird, and Rubin, 1977).

This assumption of missing at random is less strict than the assumptions of a complete case analysis, which assumes missing completely at random (Allison, 2002).

The internal consistency reliability of the multi-item scales was assessed using Cronbach's coefficient. A value of 0.60 or greater was considered as adequate for the purpose of group comparisons (R. T. Brown, Borden, Wynne, Spunt, & Clingerman, 1987) . We performed test-retest reliability to measure the stability after an interval of time. The questionnaire was repeated to a sample of 34 participants between 2 weeks and one month after clompleting the first questionnaire, and the intraclass correlation coefficient at the second time point was noted.

Known groups validity is a form of construct validation in which the validity is determined by the degree to which an instrument can demonstrate different scores for groups know to vary on the variables being measured. Known groups method is a typical method to support construct validity and is provided when a test can discriminate between a group of individuals known to have a particular trait and a group who do not have the trait (Portney & Watkins, 2009). Similarly, known groups may be studied using groups of individuals with differing levels/severities of a trait. Again the known groups methods will evaluate the test's ability to discriminate between the groups based on the groups demonstrating different mean scores on the test (Portney & Watkins, 2009). *Known-groups validity in this study* was evaluated by comparing subgroups of patients known to differ in relevant background variables, namely adherence to treatment, perception of side effects and perception of benefits obtained from the medication. We hypothesized that those patients presenting good adherence rates to clinical attendance and

medication intake, and those who perceived more benefits of the medication and fewer side effects, would present better attitudes to treatment on the questionnaire and thus would score lower on the questionnaire. For measuring *treatment adherence* clinicians independently rated the level of adherence to both *follow-up appointments* and *drug prescriptions* during the last year on a 4-point Likert scale. This way, patients scored adhering 100-75% of the times, 74%-50% of the times, 49%-25% of the times, or less than 24% of the times. Following previous studies (Kampman 2000), adolescents scoring more than 75% in both follow-up and drug prescriptions were classified in the *Adherent* group, while the rest were grouped in the *Non-Adherents* (Kampman 2000). Following previous studies, we considered good adherence when subjects adhere to both follow-up and drug prescriptions more than 75% of the time, whereas poor adherence was defined as below 75% (Bohning et al., 2008; Firestone, 1982). For perceived benefits and side effects we used the questions from Hill and Taylor (Hill & Taylor, 2001) (see **Appendix-3**) For this purpose, QATT total score and each of the factors of the questionnaire were explored using differences of means, and effect sizes were compared between the groups.

Finally, because of the limitations reported for the inter-class correlation (usually the Pearson's product-moment correlation) we used an intra-class correlation approach in order to assess test-retest reliability. This approach has shown to be more sensitive to the detection of systematic errors (Weir, 2005; Yen & Lo, 2002).

# 4. RESULTS

## 4.1 Sample characteristics

Demographic characteristics are presented on **Table 12**. A total sample of 120 adolescents diagnosed with ADHD completed questionnaires; 99 of them (82%) were men, their mean age being 14.72. Overall, 66% of the adolescents presented one or more co morbidity, conduct problems being the most common one (55%). An important proportion of subjects (55%) had taken medical treatment for at least four years at the time of completing the questionnaire. They had also previously tried at least two different treatments (either two different classes of treatments or two different medications within the same class) before the current treatment was prescribed. The sample was considered representative of the ADHD adolescent population attending clinical services (N. Taylor, Fauset, & Harpin, 2010; Wong et al., 2009).

Only 10 patients refused to complete the questionnaire saying they had no time. These patients did not differ in terms of demographic data, diagnosis or co-morbidity from those who did respond. Missing data was below 10%; this made the single conditional imputation estimation described above possible.

**TABLE 12.** Demographic and clinical data

| |
|---|
| Age in years: mean (sd): 14.72 (1.54) |
| Male gender: N (%): 99 (82.5%) |
| White ethnicity: N (%): 110 (91.7%) |
| *Family compositition:* |
| -both natural parents 69 (57.5%) |
| -only mother or father 29 (24.1%) |
| -mother/father + stepmother/stepfather 10 (8.3%) |
| -other 10 (8.3%) |
| -foster family 2 (1.6%) |
| *Psychopathology in parents:* |
| -ADHD in parents: 12 (10.0%) |
| -Other psychiatric problems in parents: 42 (35.0%) |
| *Comorbidity:* |
| -Conduct problems (ODD/CD) 66 (55.0%) |
| -PDD 37 (30.8%) |
| -Reading/spelling problems: 29 (24.1%) |
| -Tics/Tourette 25 (20.8%) |
| -Anxiety 25 (20.8%) |
| -Deliberate Self Harm 12 (10%) |
| -Drug abuse 8 (6.6%) |
| -Enuresis-encopresis 9 (7.5 %) |

*Medical treatment:*

-Dosage:

-once daily: 75 (62.5%);

-more than once a day: 45 (37.5%)

-Number of different treatments previously used:

-none: 27 (22.5%);

-one treatment: 33 (27.5%);

-more than two treatments: 20/44 (50.0%)

-Months on medical treatment:

-<12 months: 20 (16.6%);

-12 to 24 months: 8 (6.6%);

-24 to 48 months: 25 (20.8%),

->48 months: 67 (55.8%)

-Type of treatment:

-metylphenidate: 45 (37.5%);

-dexamphetamine: 5 (4.1%);

-atomoxetine: 20 (16.6%);

-SSRI: 5 (4.1%);

-combinations of different treatments: 45 (37.5%)

**TABLE 12.** Demographic and clinical data

## 4.2. Results from the pilot study

A total of 21 adolescents and their respective mothers of fathers were requested to fill in the questionnaire. Only one patient refused to complete the questionnaire arguing he did not have enough time. Fifteen adolescents from the *Neuropsychiatric Clinic at the Michael Rutter Centre* and five patients from the *Belgrave Clinic* finally completed the questionnaire. Only one family could not answer the questionnaire as the young person attended the questionnaire on his own.

The scale was globally well accepted, and respondents presented few difficulties in understanding the items and they pointed out those items considered ambiguous and the words they could not easily understand. 16 of the respondents (80%) did not consider the questionnaire too long. However, 15 of them (75%) found some difficulties when selecting the appropriate box.

The Internal Consistency of the item was calculated using *Cronbach's alpha* when *item deleted*. All the items seemed to contribute similarly at the Internal Consistency. Tthe item *"this treatment is too expensive",* was excluded as a big proportion of families was not directly paying for the treatment.

Because factor analysis was not possible to perform during the pilot phase, adherents and non-adherents were compared between them using the 33 items and the 8 initial dimensions. This way, non-parametrical test (Mann Whitney) test was used for every item to compare the responses of the *adherent* with the *non-adherent* group **(Table 13)**. For the young people 6 items differentiated between the adherent and the non-

adherent group. They were; *"I enjoy more with my friends", "I am more organized in my daily routines", and "I work better at school", "I am happy with the way I am and I look", "I will stop treatment when I feel better", "I concentrate better with treatment".* Only the first three reached statistical significance, while the other three showed a statistical trend. This way, adolescents who adhered to medication presented worse self-esteem levels, but seemed to perceive more benefits from their treatment in four domains: concentration, enjoying with peers, organizing their works and routines, and performing at school. More adolescents in the *Non-adherents* agreed with stopping the medication when they feel clinically better. Interestingly, no differences were found in adverse effects perceived by *Adherents* and *Non-adherents*.

Only two items showed to differentiate *Adherents* from *Non-adherents* using parental questionnaires; *"my child enjoys more with his friends", and "my child dislikes this medication"* with statistical significance **(Table 13).** Parents from the *Adherent* group perceived their children enjoyed more with their friends since started on medication, while more parents in the Non-adherent group believe their children disliked their treatment.

When similar analysis was performed for the different 8 initial domains, only one domains was found to differentiate between both groups (*"locus of control"), also "benefits from medication"*, was found to differentiate between both groups **(Table 14).** Surprisingly during this pilot phase there was a tendency for both the adherents group and their parents to present worse general beliefs, worse relationship with their doctors and lower levels of self-esteem. However, they presented with more adequate education and information background and better insight towards the illness and the necessity of treatment. Finally, there was a trend for non-adherents to

report more side-effects when comparing to the non-adherents, however this difference was not statistically significant.

Effect sizes were calculated for all the dimensions and expressed on **Table 14** as Cohen's d. The items with medium and big size in adolescents were *locus of control, insight, self-esteem* and *benefits perceived from medication*. For parents' questionnaire, items with medium-high effect size were self-*esteem* and *benefits from medication.*

Correlations between the different items showed a number of different correlations between them **(Tables 15a-c)**. When comparing the different dimensions using the QATT-young people **(Table 15a)**, the domain referring to *insight* was positively correlated with *education and information*, *locus of control* and *benefits perceive from the medication*. Perception towards doctor measured as *doctor-patient relationship* domain was found positively correlated with *general beliefs and cost and barriers*. *Negative effects of medication* strongly correlated with *concerns* and less strongly with benefits *from medication*.

In the QATT-parents version **(Table 15b)** fewer correlations were found at a significant level. The most interesting was *concerns* about illness and medication, which was strongly correlated with *general beliefs*, *education and information* and *doctor-patient relationship*. *Benefits perceived from the medication* was strongly correlated with *general beliefs* and *self-esteem* perceived in their children.

Finally, **Table 15c** shows correlations between the QATT-young version and the QATT-parents version. At a level of significance p=.05, a positive correlation between

adolescents and their parents was found in three of the dimensions: *general beliefs, relationship with the doctor* and *benefits from the medication.* The other seven dimensions did not correlate positively at a significance level. Furthermore, some negative correlations between youngsters' and parents' attitudes were found in a number of domains, none of them were of statistical significance. Interestingly, side effects perceived by parents did not strongly correlate with the side effects reported by adolescents.

**Table 13.** Differences between Adherents and Non-adherents

¶ Statistical trend; * Statistical significance at p=.05; ** Statistical significance at p=.01

| *Dimension* | *ITEMS IN YOUNG PEOPLE* | *p value Mann-Whitney test* | *ITEMS IN PARENTS* | *p value Mann-Whitney test* |
|---|---|---|---|---|
| 1.GENERAL | naturalremedy | 0,57 | naturalremedy | 0,26 |
| BELIEFS | speakingtherapy | 0,24 | speakingtherapy | 0,29 |
| | medicinesforill | 0,69 | medicinesill | 0,26 |
| 2.EDUCATION | knowtreatment | 0,75 | knowtreatment | 0,65 |
| AND | shorttime | 1,00 | shorttime | 0,88 |
| INFORMATION | **stopwhenbetter** | **0,10¶** | stopwhenbetter | 0,24 |
| | stopifdrugs | 0,42 | stopifdrugs | 0,36 |
| 3.CONCERNS | futuresideeffects | 0,77 | futuresideeffects | 0,59 |
| | worriedmedication | 0,13 | worriedmedication | 0,96 |
| | medicationadditive | 0,81 | medicationadditive | 0,29 |
| | changepersonality | 0,81 | changepersonality | 0,96 |
| 4.LOCUS OF | asprescribed | 0,27 | asprescribed | 0,71 |
| CONTROL | discusswithdr | 0,48 | discusswithdr | 0,96 |
| | childcontrol | 0,64 | childcontrol | 0,53 |
| | againstwill | 1,00 | againstwill | 0,79 |
| 5.INSIGHT | mentalproblems | 0,39 | mentalproblems | 0,38 |
| | professionalhelp | 0,58 | professionalhelp | 0,96 |
| | treatmentnecessary | 0,43 | treatmentnecessary | 0,96 |
| 6.COSTS AND | embarrasedpeers | 0,96 | embarrasedpeers | 0,48 |
| BARRIERS | swallowingdif | 0,38 | swallowingdif | 0,90 |
| | onetablet | 1,00 | onetablet | 0,59 |
| | treatexpens | 0,22 | treatexpens | 0,36 |
| | sbodyremind | 0,43 | sbodyremind | 1,00 |
| | forgetpills | 0,48 | forgetpills | 0,96 |
| | dislikemed | 0,48 | **dislikemed** | **0,04*** |
| 7.SELF-ESTEEM | **happylook** | **0,08¶** | happylook | 0,48 |
| | productivityschool | 0,35 | productivityschool | 0,38 |
| | medifferent | 0,43 | medifferent | 0,48 |
| 8.DOCTOR | drugseverything | 0,35 | drugseverything | 0,89 |
| PACIENT | trustdoctors | 0,93 | trustdoctors | 1,00 |
| RELATIONSHIP | getonwelldr | 0,64 | getonwelldr | 0,65 |
| | motivatedready | 0,58 | motivatedready | 0,73 |
| 9.SIDE-EFFECTS | unhappy | 0,59 | unhappy | 0,12 |
| OF | nervousexcited | 0,53 | nervousexcited | 0,60 |
| MEDICATION | tiredsleepy | 0,90 | tiredsleepy | 1,00 |
| | tics | 0,34 | tics | 0,65 |
| | appetite | 0,04 | appetite | 0,72 |
| | sleeping | 0,77 | sleeping | 0,53 |
| | grumpy | 0,96 | grumpy | 0,17 |
| | dizzy | 0,96 | dizzy | 0,42 |
| | angry | 0,90 | angry | 0,32 |
| | headachestummy | 0,90 | headachestummy | 0,79 |
| | physicaldif | 0,90 | physicaldif | 0,65 |
| 10. BENEFITS | **concentration** | **0,10¶** | concentration | 0,36 |
| FROM | **enjoysmore** | **0,05*** | **enjoysmore** | **0,06¶** |
| MEDICATION | lessfidgety | 0,90 | lessfidgety | 0,79 |
| | clearmind | 1,00 | clearmind | 1,00 |
| | controlbetter | 0,43 | controlbetter | 0,65 |
| | better | 0,65 | better | 0,93 |
| | behaviour | 0,90 | behaviour | 0,28 |
| | fewerproblems | 0,29 | fewerproblems | 0,15 |
| | **organizedroutines** | **0,01**** | organizedroutines | 0,28 |
| | startfinish | 0,48 | startfinish | 0,32 |
| | **workbetter** | **0,01**** | workbetter | 0,79 |
| | memory | 0,22 | memory | 0,42 |
| | moodstable | 0,71 | moodstable | 0,86 |
| | copeproblems | 0,26 | copeproblems | 0,37 |

| SUBESCALES | ADHERENTS (N=13) Median (quartiles) | NON-ADHERENTS (N=7) Median (quartiles) | TOTAL (ADH+NON-ADH) (N=20) Median (quartiles) | STATISTICS (Mann Whitney) | Effect size (Cohens' d)(2) |
|---|---|---|---|---|---|
| 1.General beliefs | 1,66(1,00-2,00) | **2,00(0,00-2,33)** | 1,66(1,00-2,00) | p=1,00 | 0.28 |
| Parental general beliefs | 1,33(1,00-2,50) | 1,33(1,00-2,33) | 1,33(1,00-2,33) | p=0,71 | 0.14 |
| 2.Education & information | 1,50(0,50-2,25) | **1,75(1,00-2,25)** | 1,50(0,93-2,25) | p=0,68 | 0.06 |
| Parental Education & information | 1,50(0,50-2,37) | **1,62(0,50-2,00)** | 1,50(0,50-2,00) | p=0,90 | 0.15 |
| 3.Concerns | **1,87(0,25-2,43)** | 1,00(0,75-2,25) | 1,75(0,25-2,25) | p=0,83 | 0.08 |
| Parental Concerns | 2,37(1,81-2,93) | **2,50(1,93-3,06)** | 2,837(1,93-3,00) | p=0,74 | 0.27 |
| 4.Locus of control | 1,00(0,62-1,12) | **1,75(1,00-2,00)** | 1,00(0,75-1,68) | p=0,06¶ | **1.08** |
| Parental locus of control | **0,87(0,56-1,00)** | 0,75(0,25-1,50) | 0,75(0,50-1,00) | p=0,90 | 0.38 |
| 5.Insight | 1,33(0,33-2,00) | **2,00(1,00-2,33)** | 1,33(0,41-2,00) | p=0,27 | **0.57** |
| Parental Insight | 0,33(0,00-0,91) | **0,33(0,33-1,33)** | 0,33(0,00-1,00) | p=0,48 | 0.09 |
| 6. Cost & Barriers | **1,71(1,42-2,28)** | 1,42(1,00-2,14) | 1,71(1,32-2,14) | p=0,53 | 0.24 |
| Parental cost & barriers | **2,28(1,71-2,64)** | 2,14(1,42-3,00) | 2,28(1,71-2,71) | p=0,96 | 0.11 |
| 7.Doctor-patient relationship | **1,00(0,50-1,50)** | 1,00(0,25-1,50) | 1,00(0,37-1,50) | p=0,93 | 0.04 |
| Parents doctor-patient relationship | **1,00(0,43-1,18)** | 0,50(0,50-1,50) | 1,00(0,50-1,25) | p=0,77 | 0.16 |
| 8.Self-esteem & self-concept | **1,66(0,33-2,50)** | 1,00(0,00-1,66) | 1,33(0,00-1,33) | p=0,27 | **0.54** |
| Parents Self-esteem & self-concept | **1,66(1,41-2,58)** | 1,42(1,00-1,71) | 1,66(1,33-2,66) | p=0,08 | **0.71** |
| 9.Benefits from medication | 1,10(0,82-1,41) | **1,57(1,21-2,07)** | 1,21(0,92-1,71) | p=0,02* | **1.13** |
| Parental benefits from medication | 0,92(0,57-1,57) | **1,42(1,00-1,71)** | 1,07(0,76-1,66) | p=0,21 | 0.56 |
| 10. Negative effects of medication | 1,90(0,97-2,27) | **2,00(0,81-2,45)** | 2,00(0,90-2,36) | p=0,96 | 0.02 |
| Parents' negative effects of med. | 1,54(1,18-1,81) | **1,72(1,27-2,36)** | 1,72(1,25-1,97) | p=0,32 | **0.52** |

**Table 14:** Differences between Adherents and Non-Adherents for dimensions

**(1)** The total score in each dimension is divided into the number of items contributing for this dimension, so that the mean effect can be compared for all the dimensions scoring from 0 (total adherence) to 4 (total non-adherence)

***(2)*** Effect size is conveniently considered small=0.20; medium=0.50; large=0.70 (Cohen 1969)

¶ Statistical trend; * Statistical significance at p=.05; ** Statistical significance at p=.01

| SUBESCALE | 1.General beliefs | 2.Education & information | 3.Concerns | 4.Locus of control | 5.Insight | 6. Cost & Barriers | 7.Doctor-patient relationship | 8.Self-esteem & self-concept | 9.Benefits from medication | 10. Negative effects of medication |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.General beliefs | | | | | | | | | | |
| 2.Education & information | .263 | | | | | | | | | |
| 3.Concerns | **.654**** | .442 | | | | | | | | |
| 4.Locus of control | .227 | .403 | .367 | | | | | | | |
| 5.Insight | .123 | **.605**** | .426 | **.626**** | | | | | | |
| 6. Cost & Barriers | .437 | .319 | .413 | -.018 | .195 | | | | | |
| 7.Doctor-patient relationship | **.463*** | .451 | .671 | .299 | .409 | **.605**** | | | | |
| 8.Self-esteem & self-concept | .258 | -.095 | .111 | -.280 | -.335 | .129 | .360 | | | |
| 9.Benefits from medication | .032 | .388 | .340 | .413 | **.480*** | -.034 | .319 | .089 | | |
| 10. Negative effects of medication | .295 | .115 | **.719**** | .219 | .157 | -.058 | .421 | .353 | **.491*** | |

**Table 15a. Young people's questionnaire: Spearman's correlations between domains**

* Statistical significance at p=.05;** Statistical significance at p=.01

**Table 15b. Parents' questionnaire: Spearman's correlations between domains**

| SUBESCALE | 1.General beliefs | 2.Education & information | 3.Concerns | 4.Locus of control | 5.Insight | 6. Cost & Barriers | 7.Doctor-patient relationship | 8.Self-esteem & self-concept | 9.Benefits from medication | 10. Negative effects of medication |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.General beliefs | | | | | | | | | | |
| 2.Education & information | .459 | | | | | | | | , | |
| 3.Concerns | **.771**** | **.600*** | | | | | | | | |
| 4.Locus of control | .182 | .267 | .205 | | | | | | | |
| 5.Insight | -.070 | .039 | -.294 | .206 | | | | | | |
| 6. Cost & Barriers | .348 | .477 | .225 | .384 | -.146 | | | | | |
| 7.Doctor-patient relationship | .374 | .182 | **.543*** | .403 | -.054 | .331 | | | | |
| 8.Self-esteem & self-concept | .419 | .382 | .244 | .308 | .286 | .096 | .295 | | | |
| 9.Benefits from medication | **.702**** | .314 | .404 | .033 | .208 | -.074 | .072 | **.599**** | | |
| 10. Negative effects of medication | .322 | -.012 | .117 | .245 | .203 | .125 | -.018 | .337 | .385 | |

* Statistical significance at p=.05 ** Statistical significance at p=.01

**Table 15c. Parents' and young questionnaire: Spearman's correlations between domains * p<0.05; ** p<0.01**

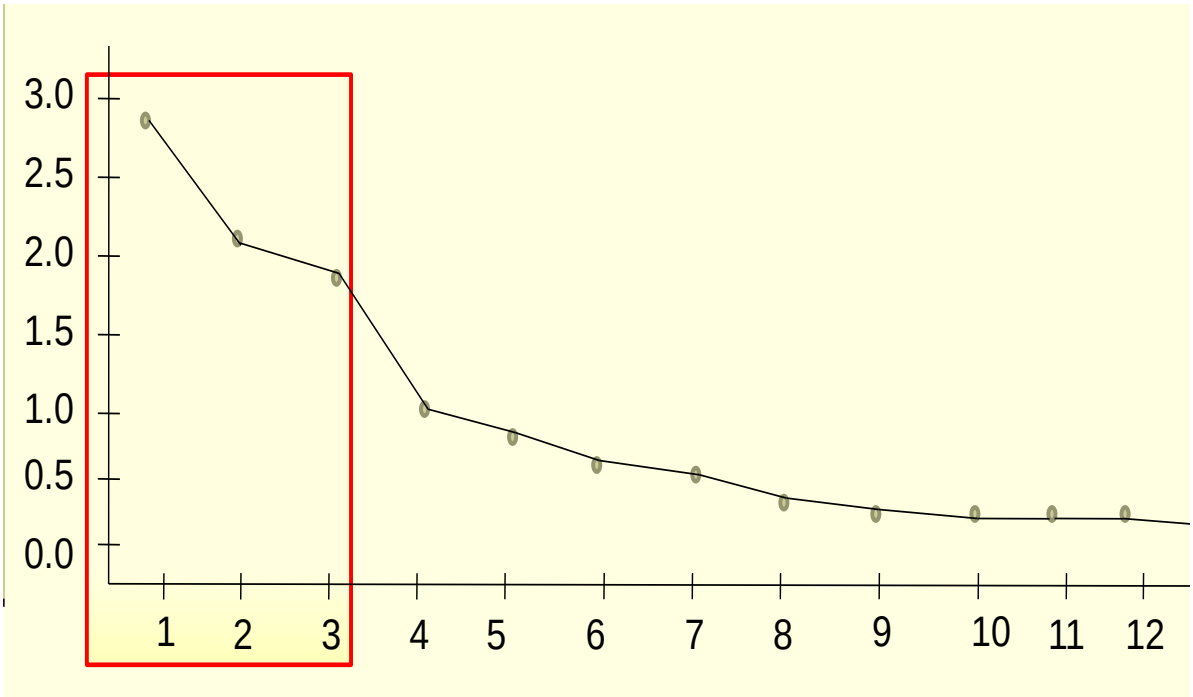
| PARENTS / YOUNG PEOPLE | 1.Parental general beliefs | 2.Parental education & information | 3.Parental concerns | 4. Parental locus of control | 5. Parental insight | 6. Parental cost & Barriers | 7. Parental Doctor-patient relationship | 8. Parental self-esteem & self-concept | 9. Parental benefits of med | 10. Parental negative effects of med |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.General beliefs | **.563*** | -.015 | .257 | .256 | -.097 | .194 | **.501*** | **.474*** | **.501*** | -.078 |
| 2.Education & information | .164 | .371 | .467 | -.094 | -.182 | -.168 | .331 | -.039 | .321 | -.339 |
| 3.Concerns | .290 | -.044 | .157 | .409 | .243 | .207 | **.696**** | .318 | .328 | .024 |
| 4.Locus of control | .213 | .002 | .262 | .194 | -.029 | .138 | .183 | -.072 | .322 | .073 |
| 5.Insight | -.116 | -0.80 | .040 | .104 | .162 | -.209 | .281 | -.098 | .197 | -.156 |
| 6. Cost & Barriers | -.075 | -,148 | -.064 | .059 | -.422 | .222 | .390 | -.085 | -.241 | -.451 |
| 7.Doctor-patient relationship | .380 | .236 | .436 | **.522*** | -.130 | .333 | **.547*** | .152 | .203 | .017 |
| 8.Self-esteem & self-concept | .359 | .056 | .195 | .225 | -.065 | -.035 | -.066 | .233 | .300 | .244 |
| 9.Benefits from medication | .182 | .353 | .426 | .291 | .332 | -.194 | .304 | **.496*** | **.474*** | .357 |
| 10. Negative effects of medication | .351 | .368 | .263 | **.510*** | .417 | .311 | **.488*** | **.521*** | .348 | .306 |

## 4.3 Young people's version

### *4.3.1 Young people's version: Factor analysis*

Principal factor analysis revealed that a 3- or possibly 4-factor solution best fit the data. Both solutions were composed of the same 13 items. Visual inspection of the scree plots for the factor solutions discussed is presented in **Figure 2**. According to the scree test, factor extraction should stop when the values of the eigenvalues ''plateau'' (Cattell, 1966). Inspection of the 3-factor solution suggested that it made more clinical sense. In terms of the statistical discussion, the 3-factor analysis comprised items with eigenvalues >1.5 and accounted for 37.1% of the total variance. Rotated item-factor loadings suggested that three main dimensions were represented: *worries regarding current and future side effects of treatments* (factor 1, explained variance for this factor: 17.20%), *insight into illness and the need of medical treatment* (factor 2; explained variance for this factor: 10.72%), and *self perception and patient-doctor relationship* (factor 3; explained variance for this factor: 9.11%). Adequacy of factor analysis was provided by Kaiser-Meyer-Olkin measure of sampling adequacy and Barlett's test of sphericity significance.

**FIGURE 2:** Factor analysis: scree plot for QATT-young people's version




Five items loaded on the first factor, reflecting adolescents' general worries and preoccupations towards the treatment prescribed, and contributing with the following factors: *current worries about medication, worries about future side effects of medicines in the long term, possibility of drugs to change one's personality, doctors prescribing medicines for everything, medicines only need to be taken when you are very ill*. Another five items loaded on the second factor, reflecting adolescents' perceptions towards the necessity of professional help and medical treatment or insight: *I have psychological problems, I need professional help, I need treatment, medicines have to be taken as prescribed by doctors,* and *I feel motivated to follow a treatment*. Finally, three items loaded for factor 3, these items reflecting self-esteem and the patient-doctor relationship: *I am happy with my productivity at school, I am happy with my how I look, I get on well with my doctor* (see **Table 16**).

**TABLE 16:** Results of the factor analysis showing factor loading *

| *ITEM* | *Factor 1* | *Factor 2* | *Factor 3* |
|---|---|---|---|
| I am worried about medication | 0.617 | | |
| Medicines are only for when you are very ill | 0.589 | | |
| I am worried about future side effects of meds | 0.663 | | |
| Meds can change my personality | 0.551 | | |
| Doctors prescribe drugs for everything | 0.513 | | |
| I need medical treatment | | 0.605 | |
| I have psychological problems | | 0.581 | |
| Treatment to be taken as prescribed | | 0.428 | |
| I need professional help | | 0.499 | |
| I feel motivated to follow treatment | | 0.602 | |
| I get on well with doctor | | | 0.505 |
| I am happy with my productivity at school | | | 0.677 |
| I am happy with how I look | | | 0.559 |

*Kaiser-Meyer-Oklin= 0.66 (>0.5); Barlett's sphericity test=0.000 (<0.05)*

. *Factor loadings with an absolute value of less than 0.4 are not shown

*4.3.2 Young people's version: Internal consistency and test-retest reliability*

We assessed the consistency of the results for different items for the same construct. For each of the factors previously obtained from the factor analysis, internal consistency reliability was determined using Cronbach's alpha test. Alphas were also calculated with each item deleted. Cronbach's alpha proved adequate for the two first factors (>0.60) (**Table 17**). Only the third factor showed internal consistency among the items slightly below adequacy; this was attributed to the scarce number of factors contributing to the third factor more than a inadequate reliability of the factor itself. Correlation of an item within each of the factors was also assessed by comparing item-total-correlations. Because none of the factors showed a very low item-total-correlation (<0.30) none were discharged. Test-retest reliability was assessed using the intraclass correlation coefficient (ICC) (Stahl 2006). This was calculated using a one-way analysis of variance random effects parallel model. The ICC at the second time point was 0.60, 0.58 and 0.55 for any of the three factors of the questionnaire respectively, similar to that found in the first exercise.

**TABLE 17.** Internal Consistency for QATT-young people's version: Cronbach's alpha

| |
|---|
| **Factor 1: worries regarding current side effects and side effects in the long term**: |
| *Cronbach's Alpha: 0.72 (Tukey's test of additivity >0.05)* |
| -"worried about medicines" ITC=0.49 |
| -"medicines only for very ill people" ITC=0.47 |
| -"worries regarding future side effects" ITC=0.53 |
| -"medicines might change my personality" ITC=0.47 |
| -"doctors are always prescribing pills" ITC=0.44 |
| **Factor 2: insight into illness and the need of medical treatment**: |
| *Cronbach's Alpha: 0.66 (Tukey's test of additivity >0.05)* |
| -"treatment is necessary" ITC=0.49 |
| -"I have psychological problems" ITC=0.42 |
| -"I need professional help" ITC=0.36 |
| -"ready for the treatment" ITC=0.47 |
| -"treatment as prescribed" ITC=0.34 |
| **Factor 3: self perception and patient-doctor relationship:** |
| *Cronbach's Alpha: 0.58 (Tukey's test of additivity <0.05)* |
| -"happy with the way I am" ITC=0.38 |
| -" happy with my school results" ITC=0.42 |
| -"I get on well with my doctor" ITC=0.32 |

*ITC: item total correlation*

*4.3.3. Young people's version: Construct Validity*

A comparison of ratings on the QATT between adolescents presenting with good adherence levels (>75%) and adolescents with adherence levels considered as poor (≤75%) provided information pertaining to the scale's discriminant validity. Results are shown in **Tables 18a-d**. The mean QATT total scores were 16.66 (sd 7.34) and 17.07 (sd 7.02) for those who presented with good adherence rates to clinical appointments and drugs, respectively; for those who presented with low adherence rates the mean QATT total scores were 20.18 (sd 5.61) and 19.75 (sd 6.06) for clinical appointments and drugs, respectively. These differences in means were significant at the 0.05 level. The three individual factors did not differentiate between good and bad adherents. However, when exploring for simultaneous perceived benefits and perceived side effects of medication, we found QATT total scores and factors 1 (worries about medication) and 3 (self-perception and patient-doctor relationship) in association with perceived side effects of the medication, whereas QATT total scores and factors 2 (insight) and 3 (self-perception and patient-doctor relationship) in association with perceived side effects of the medication. Factor 2 (insight) did not seem to differentiate those who reported few side effects of medication from those who reported a great proportion of side effects. Factor 1 (worries about medication side effects) did not distinguish between those perceiving substantial benefits from medications and those who did not.

**TABLE 18.** Well-known-groups Validity:

**18a.** Well-known-groups validity of the questionnaire for *adherence to appointments* (according to clinical files):

| | ***Adherence>75% (N= 39)*** | | ***Adherence≤75% (N=81)*** | | | | |
|---|---|---|---|---|---|---|---|
| | **Mean** | **sd** | **Mean** | **Sd** | **Difference in means** | **p value** | **Effect Size *** |
| **TOTAL QATT** | **16.66** | **7.34** | **20.18** | **5.61** | **3.52** | **0.011** | **0.54** |
| **FACTOR 1 worries about side effects** | 7.19 | 4.16 | 9.02 | 4.00 | 1.83 | 0.022 | 0.44 |
| **FACTOR 2 insight into illness and medical treatment** | 6.96 | 4.53 | 7.79 | 3.00 | 0.83 | 0.304 | 0.22 |
| **FACTOR 3 self perception patient-doctor relationship** | 2.50 | 2.47 | 3.36 | 2.21 | 0.86 | 0.060 | 0.36 |

*Effect Size (Cohen's d): small (>0.20), medium (>0.50) or large (>0.70).

**18b.** Well-known-groups validity of the questionnaire for *adherence to drugs* (as reported by participants):

| | ***Adherence>75% (N= 32)*** | | ***Adherence≤75% (N=88)*** | | | | |
|---|---|---|---|---|---|---|---|
| | **Mean** | **sd** | **Mean** | **Sd** | **Difference in means** | **p value** | **Effect Size *** |
| **TOTAL QATT** | **17.07** | **7.02** | **19.75** | **6.06** | **2.68** | **0.043** | **0.40** |
| **FACTOR 1 worries about side effects** | 7.51 | 4.02 | 8.75 | 4.13 | 1.24 | 0.143 | 0.30 |
| **FACTOR 2 insight into illness and medical treatment** | 6.67 | 4.39 | 7.78 | 3.20 | 1.11 | 0.179 | 0.29 |
| **FACTOR 3 self perception patient-doctor relationship** | 2.88 | 2.57 | 3.15 | 2.24 | 0.27 | 0.576 | 0.11 |

* Effect Size (Cohen's d): small (>0.20), medium (>0.50) or large (>0.70).

**18c.** Well-known-groups validity of the questionnaire for *side effects of the medication* as perceived by respondent:

| | ***Few side effects perceived * (N=57)*** | | ***High side effects perceived ** (N=63)*** | | | | |
|---|---|---|---|---|---|---|---|
| | **Mean** | **sd** | **Mean** | **sd** | **Difference in means** | **p value** | **Effect Size *** |
| **TOTAL QATT** | **17.44** | **7.97** | **20.49** | **5.04** | **3.05** | **0.015** | **0.46** |
| **FACTOR 1 worries about side effects** | **6.81** | **4.13** | **9.76** | **3.89** | **2.95** | **0.000** | **0.73** |
| **FACTOR 2 insight into illness and medical treatment** | 8.19 | 4.64 | 7.19 | 2.76 | 1.00 | 0.152 | 0.27 |
| **FACTOR 3 self perception patient-doctor relationship** | **2.47** | **2.56** | **3.50** | **2.11** | **1.03** | **0.017** | **0.44** |

Effect Size (Cohen's d): small (>0.20), medium (>0.50) or large (>0.70).

* Side effects below median (1.64); ** Side effects equals or above median (1.64)

**18d.** Well-known-groups validity of the questionnaire for *benefits of the medication* as perceived by respondent:

| | ***Lot of/great benefits perceived* (N= 59)*** | | ***Few benefits perceived** (N=61)*** | | | | |
|---|---|---|---|---|---|---|---|
| | **Mean** | **sd** | **Mean** | **sd** | **Difference in means** | **p value** | **Effect Size *** |
| **TOTAL QATT** | **16.24** | **7.18** | **21.76** | **5.01** | **5.52** | **0.000** | **0.90** |
| **FACTOR 1 worries about side effects** | 7.75 | 4.64 | 8.95 | 3.79 | 1.20 | 0.126 | 0.28 |
| **FACTOR 2 insight into illness and medical treatment** | **6.33** | **3.90** | **8.96** | **3.21** | **2.63** | **0.000** | **0.74** |
| **FACTOR 3 self perception patient-doctor relationship** | **2.15** | **2.12** | **3.85** | **2.33** | **1.70** | **0.000** | **0.76** |

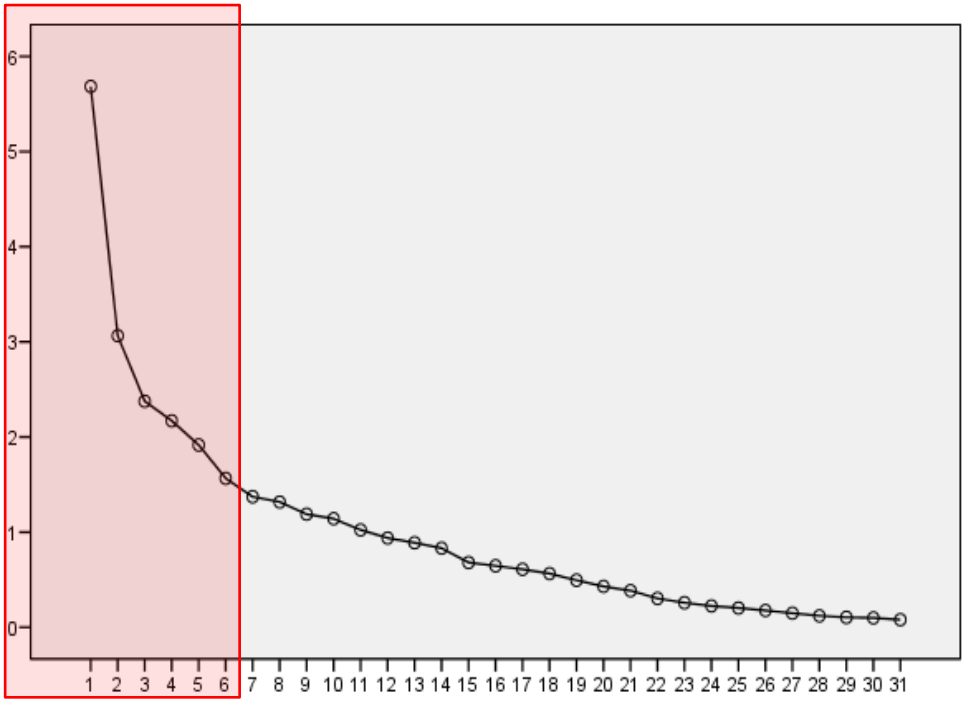
Effect Size (Cohen's d): small (>0.20), medium (>0.50) or large (>0.70).

* Benefits scoring below median (1.52); ** Benefits scoring equals or above median (1.52);

## 4.4. Results parents' version

### *4.4.1 Parents version: factor analysis*

**Figure 3.** Forest plot for QATT (parent version)




We repeated factor analysis (principal axis method) to analyze the parents' version. Analysis using eigenvalues >1.5 and after visual inspection of the scree plot for the factor solution **(Figure 3)** revealed a 6-factor solution that accounted for 44,0 % of the total variance, and was composed of a total of 13 items. Varimax rotated item-factor loadings suggested six main factors: *child's personal attitudes and predisposition for treatment* (factor 1; explained variance for this factor= *10.25%*), *worries about treatments and alternative treatments for ADHD* (factor 2; explained variance for this factor= *10.00%*), *social stigma* (factor 3; explained variance for this factor= *6.62 %*), *insight into*

*illness and the need of medical treatment* (factor 4; explained variance for this factor= *6.29 %*), *worries regarding future side effects of treatments and patient-doctor relationship (factor 5;* explained variance for this factor= *5.89%), and perception of knowledge on ADHD and treatments (factor 6,* explained variance for this factor= *4.93 %)*. Adequacy of factor analysis was provided by Kaiser-Meyer-Olkin measure of sampling adequacy (0. 57) and Barlett's test of sphericity significance (p=0.000). **Table 19** shows the specific items for each of the six dimensions

**TABLE 19.** Results of the factor analysis showing factor loading for parents' version*

| *ITEM* | *Factor 1* | *Factor 2* | *Factor 3* | *Factor 4* | *Factor 5* | *Factor 6* |
|---|---|---|---|---|---|---|
| Child is motivated to follow a treatment | 0.692 | | | | | |
| Child likes this medication | 0.644 | | | | | |
| Child happy with functioning at school | 0.555 | | | | | |
| Child prefers only one pill | 0.535 | | | | | |
| Child happy with the way he is | 0.509 | | | | | |
| Child on meds against his will | 0.452 | | | | | |
| Drugs for everything | | 0.612 | | | | |
| Stop treatment when better | | 0.594 | | | | |
| Meds can change personality | | 0.578 | | | | |
| Meds for the very ill | | 0.569 | | | | |
| Meds only for a short term | | 0.563 | | | | |
| Worries about Meds | | 0.524 | | | | |
| Speaking therapy | | 0.499 | | | | |
| Natural Remedies for ADHD | | 0.469 | | | | |
| Child feels different | | | 0.754 | | | |
| Child feels embarrassed in front of peers | | | 0.551 | | | |
| Child having control of Meds | | | 0.492 | | | |
| Child has psychological problems | | | | 0.681 | | |
| Treatment as prescribed | | | | 0.589 | | |
| Child need professional help | | | | 0.542 | | |
| This treatment is necessary | | | | 0.507 | | |
| Meds can be additive | | | | | 0.761 | |
| Future side effects | | | | | 0.513 | |
| Trust Doctors | | | | | 0.467 | |
| Knowledge treatment | | | | | | 0.577 |
| Knowledge disorder | | | | | | 0.542 |
| Discuss with Doctor | | | | | | 0.511 |

*Kaiser-Meyer-Oklin= 0.57 (>0.5); Barlett's sphericity test=0.000 (<0.05)*

*Factor loadings with an absolute value of less than 0.4 are not shown

*4.4.2 Parents' version: Internal consistency*

We repeated the analysis to assess internal consistency for the parents' version of the questionnaire. Again for each of the factors previously obtained from the factor analysis, internal consistency reliability was determined using Cronbach's alpha test. Alphas were also calculated with each item deleted. Correlation of an item within each of the factors was again assessed by comparing item-total-correlations (ITC). Those factors showing a very low item-total-correlation (<0.30) were discharged, and Cronbach's alphas were therefore calculated for each of the factors (**Table 20**). Cronbach's alphas were adequate (>0.60); only for the third factor Cronbach's alpha was below expected (0.50). The internal consistency slightly below adequacy was again attributed to the scarce number of factors contributing to the third factor.

**TABLE 20.** Internal Consistency for QATT-parents' version: Cronbach's alpha

**Factor 1: child's personal attitudes and predisposition for treatment**

*Cronbach's Alpha*= 0.73 (Tukey's test of additivity >0.05)*

-" Child is motivated to follow a treatment" ITC=0.56 (ITC*=0.57)

-" Child likes this medication" ITC=0.47 (ITC*=0.50)

-" Child happy with functioning at school" ITC=0.48 (ITC*=0.55)

-" Child happy with the way he looks" ITC=0.43 (ITC*=0.47)

[-" Child prefers only one pill" ITC=0.17]

[-"Child on meds against his will" ITC=0.30]

**Factor 2: worries about treatments and alternative treatments for ADHD**

*Cronbach's Alpha= 0.79 (Tukey's test of additivity >0.05)*

-" Drugs for everything" ITC=0.51

-" Stop treatment when better" ITC=0.40

-" Meds can change personality" ITC=0.60

-" Meds for the very ill" ITC=0.55

-" Meds only for a short term" ITC=0.44

-"Worries about Meds" ITC=0.54

-"Speaking therapy" ITC=0.49

-"Natural Remedies for ADHD" ITC=0.45

**Factor 3: social stigma**

*Cronbach's Alpha*= 0.50 (Tukey's test of additivity >0.05)*

-"child embarrassed peers" ITC=0.33 (ITC*=0.33)

-" child feels different" ITC=0.39 (ITC*=0.33)

[-"child in control" ITC=0.28]

**Factor 4: insight into illness and the need of medical treatment:**

*Cronbach's Alpha= 0.63 (Tukey's test of additivity >0.05)*

-"professional help" ITC=0.41

-"treatment necessary" ITC=0.36

-"mental problems" ITC=0.48

-"treatment as prescribed" ITC=0.38

**Factor 5: worries regarding future side effects of treatments and patient-doctor relationship:** *Cronbach's Alpha*= 0.60 (Tukey's test of additivity <0.05)*

-"future side effects" ITC=0.41 (ITC*=0.44)

-" medication addictive" ITC=0.41 (ITC*=0.44)

-["trust doctors" ITC=0,14]

**Factor 6: perception of knowledge on ADHD and treatments:**

*Cronbach's Alpha*= 0.68 (Turkey's test of additivity >0.05)*

-"know treatment" ITC=0.50 (ITC*=0.52)

-" know illness" ITC=0.48 (ITC*=0.52)

[-"discuss with my doctor" ITC=0.26]*

**TABLE 20.** Internal Consistency for QATT-parents' version: Cronbach's alpha

*ITC: item total correlation*

** after item deleted*

*4.4.3. Parents version: Construct Validity*

A comparison of ratings on the QATT-parent version between those presenting with good adherence levels (>75%) and those with adherence levels considered as poor (≤75%) was used to provide information for the discriminant validity of the QATT-parents version. Results are summarized in **Tables 21a-d**. The mean QATT total scores for this version were 34.09 (sd 9.54) and 33.01 (sd 10.21) for those who presented with good adherence rates to clinical appointments and drugs, respectively. For those who presented with low adherence rates the mean QATT total scores were 37.10 (sd11.12) and 37.27 (sd 10.69) for clinical appointments and drugs, respectively. These differences in means were significant at the 0.05 level only for adherence as reported by the families, while we found a statistical trend towards significance for adherence according to attendance to the clinic. Only the first factor (*child's predisposition and attitudes towards treatment*) could differentiate between good and bad adherents, whereas there was a statistical trend towards significance for the last factor (*knowledge*). Effect sizes were small to medium. When exploring for simultaneous perceived benefits and perceived side effects of medication, we found QATT-parents version total score and factor 1 (*child's attitudes*), factor 2 (*worries about medication and possibilities of alternative therapies*) and factor 5 (*worries about future*) in association with perceived side effects of the medication, with medium to large effect sizes. QATT-parents version total score and factor 1 (*child's attitudes*), factor 2 (*worries about medication and possibilities of alternative therapies*), factor 3 (social stigma) and factor 5 (*worries about*

*future*) were found in association with perceived benefits of the medication. Again effect sizes were medium to large.

**TABLE 21.** Well-known-groups Validity: QATT-parents version

**21a.** Well-known-groups validity of the questionnaire for *adherence to appointments* according to clinical files (QATT-parent version):

| | ***Adherence>75% (N= 39)*** | | ***Adherence≤75% (N=81)*** | | | | |
|---|---|---|---|---|---|---|---|
| | **Mean** | **sd** | **Mean** | **Sd** | **Difference in means** | **p value** | **Effect Size *** |
| **TOTAL QATT** | **34.09** | **9.54** | **37.10** | **11.12** | **3.01** | **0.150** | **0.29** |
| **FACTOR 1 Child's attitudes** | **5.88** | **3.33** | **7.65** | **3.44** | **1.77** | **0.009** | **0.52** |
| **FACTOR 2 Worries about medication and alternative therapies** | 13.00 | 5.55 | 14.18 | 6.28 | 1.18 | 0.319 | 0.20 |
| **FACTOR 3 Social stigma** | 5.35 | 1.69 | 5.30 | 2.14 | 0.05 | 0.890 | 0.02 |
| **FACTOR 4 Insight** | 2.89 | 2.97 | 2.54 | 2.12 | 0.35 | 0.471 | 0.13 |
| **FACTOR 5 Worries about future** | 5.10 | 1.75 | 5.13 | 2.01 | 0.03 | 0.945 | 0.01 |
| **FACTOR 6 Knowledge** | **1.84** | **1.67** | **2.29** | **1.63** | **0.45** | **0.173** | **0.27** |

*Effect Size (Cohen's d): small (>0.20), medium (>0.50) or large (>0.70).

**21b.** Well-known-groups validity of the questionnaire for *adherence to drugs* as reported by participants (QATT-parent version):

| | ***Adherence>75% (N= 32)*** | | ***Adherence≤75% (N=88)*** | | | | |
|---|---|---|---|---|---|---|---|
| | **Mean** | **sd** | **Mean** | **Sd** | **Difference in means** | **p value** | **Effect Size *** |
| **TOTAL QATT** | **33.01** | **10.21** | **37.26** | **10.69** | **4.25** | **0.050** | **0.40** |
| **FACTOR 1 Child's attitudes** | **5.62** | **3.51** | **7.60** | **3.35** | **1.58** | **0.006** | **0.46** |
| **FACTOR 2 Worries about medication and alternative therapies** | **12.54** | **5.82** | **14.25** | **6.10** | **1.71** | **0.172** | **0.30** |
| **FACTOR 3 Social stigma** | 5.50 | 1.68 | 5.25 | 2.10 | 0.25 | 0.548 | 0.11 |
| **FACTOR 4 Insight** | 2.68 | 3.10 | 2.65 | 2.14 | 0.03 | 0.972 | 0.01 |
| **FACTOR 5 Worries about future** | 4.87 | 1.82 | 5.21 | 1.96 | 0.34 | 0.404 | 0.20 |
| **FACTOR 6 Knowledge** | **1.78** | **1.77** | **2.27** | **1.60** | **0.49** | **0.150** | **0.29** |

Effect Size (Cohen's d): small (>0.20), medium (>0.50) or large (>0.70).

**21c.** Well-known-groups validity of the questionnaire for *side effects of the medication* as perceived by respondent (QATT-parent version):

| | ***Few side effects perceived * (N=53)*** | | ***High side effects perceived ** (N=67)*** | | | | |
|---|---|---|---|---|---|---|---|
| | **Mean** | **sd** | **Mean** | **sd** | **Difference in means** | **p value** | **Effect Size *** |
| **TOTAL QATT** | **31.96** | **9.47** | **39.42** | **10.51** | **7.46** | **0.000** | **0.77** |
| **FACTOR 1 Child's attitudes** | **5.71** | **3.05** | **8.15** | **3.45** | **2.44** | **0.000** | **0.75** |
| **FACTOR 2 Worries about medication and alternative therapies** | **11.45** | **5.13** | **15.65** | **6.12** | **4.20** | **0.000** | **0.74** |
| **FACTOR 3 Social stigma** | 4.97 | 2.18 | 5.58 | 1.81 | 0.61 | 0.096 | 0.30 |
| **FACTOR 4 Insight** | 3.01 | 2.98 | 2.38 | 1.84 | 0.63 | 0.161 | 0.26 |
| **FACTOR 5 Worries about future** | **4.47** | **1.88** | **5.63** | **1.81** | **1.16** | **0.001** | **0.63** |
| **FACTOR 6 Knowledge** | 2.33 | 1.58 | 2.00 | 1.71 | 0.33 | 0.277 | 0.20 |

Effect Size (Cohen's d): small (>0.20), medium (>0.50) or large (>0.70).

* Side effects below median (1.67); ** Side effects equals or above median (1.67)

**21d.** Well-known-groups validity of the questionnaire for *benefits of the medication* as perceived by respondent (QATT-parent version):

| | ***Lot of/great benefits perceived* (N= 59)*** | | ***Few benefits perceived** (N=61)*** | | | | |
|---|---|---|---|---|---|---|---|
| | **Mean** | **sd** | **Mean** | **sd** | **Difference in means** | **p value** | **Effect Size *** |
| **TOTAL QATT** | **32.54** | **10.26** | **39.59** | **10.00** | **7.05** | **0.000** | **0.69** |
| **FACTOR 1 Child's attitudes** | **5.90** | **3.11** | **8.21** | **3.48** | **2.31** | **0.000** | **0.70** |
| **FACTOR 2 Worries about medication and alternative therapies** | **12.18** | **5.97** | **15.36** | **5.76** | **3.18** | **0.004** | **0.54** |
| **FACTOR 3 Social stigma** | **4.89** | **2.20** | **5.72** | **1.70** | **0.83** | **0.022** | **0.42** |
| **FACTOR 4 Insight** | 2.70 | 2.70 | 2.61 | 2.14 | 0.11 | 0.848 | 0.04 |
| **FACTOR 5 Worries about future** | **4.69** | **2.00** | **5.53** | **1.77** | **0.84** | **0.017** | **0.44** |
| **FACTOR 6 Knowledge** | 2.16 | 1.53 | 2.13 | 1.77 | 0.03 | 0.917 | 0.01 |

Effect Size (Cohen's d): small (>0.20), medium (>0.50) or large (>0.70).

* Benefits scoring below median (1.48); ** Benefits scoring equals or above median (1.48);

## 5. DISCUSSION

The degree to which patients comply with their treatment is of enormous importance in the clinical setting, as the health and global functioning of the patient is directly affected. In order to improve clinical responses while minimizing side effects, it is crucial to work in the factors related to treatment adherence. At the same time, recognizing population at “high risk” of non-adherence may prevent people from abandoning medication.

Adherence to treatment is a crucial issue both in research and in the clinical setting. In a recent meta-analysis published by the BMJ, good adherence to any drug therapy was associated with positive outcomes, even when the “therapy” was placebo. This has been described as the *“healthy adherer” effect*, whereby adherence to drug therapy is a marker for overall healthy behaviour (Simpson et al. 2006).

Treatment adherence has also been crucial in research, as drug trials totally depend on adherence to medical instructions and attrition may result in biased samples (Brown et al. 1987; Buchanan 1996). For instance, if an outcome is positive (i.e., a statistical difference is found between two different groups), it may be that the patients remaining in the study presented different qualities. On the contrary, a negative outcome (i.e., a statistical difference is not found between two different groups) may have resulted because of the differential characteristics of the patients who failed to adhere, rather than a similarity in outcome between both groups.

In addition to its impact within the clinical and research settings, attitudes towards medication may be easily incorporated into decisions regarding pharmaceutical formularies and cost-effectiveness evaluations. In fact, health care economists have suggested that in the nearest future health care delivery and pharmaceutical industries will regard treatment satisfaction as essential to their viability (Atkinson et al. 2004)

When considering adherence to treatment in adult psychiatric population, it is generally accepted that one to two third of patients fail to adhere with treatment at two years follow-up (Buchanan 1996). For ADHD children and adolescents, these adherence rates may drop to 36% at 5 years follow-up, though these rates hugely vary depending on the measuring method (Charach et al. 2004).

Considering most of the treatment times for ADHD has to be for the long-term, and that the positive outcome in ADHD children may be improved by enhancing treatment adherence (Jensen 2002), it is really worth knowing which factors are contributing to adolescents making the specific decision to adhere or not to medication. To date, more emphasis has been made on factors indirectly contributing to the non-adherence, whereas attitudes of the subject directly involved in the "decision making" have not been properly measured. Furthermore, previous authors have not studied all these factors at the same time to explore how much everyone is contributing to the final decision of "continue" or "give-up" treatment (Harpur et al., 2008; Wong et al.,

2009). In all, there is an emerging need for developing a tool for assessing these attitudinal factors in a comprehensive manner.

This thesis describes the development and psychometric properties of a new questionnaire on attitudes towards treatment of ADHD. The questionnaire could be a useful tool for the clinical setting since underlying attitudes towards treatment may influence treatment adherence, especially in a population with low adherence rates and a long term condition. So far little attention has been paid to ADHD adolescents' attitudes, and much less to their perceptions regarding their own disorder and how they perceive medical treatments that bear an impact on their daily life and future.

## 5.1 Young people's attitudes towards treatment in ADHD

Our study checked the two main hypotheses posed at the beginning of the study.

i) The QATT *questionnaire is a valid and reliable scale for measuring attitudinal factors in the specific ADHD population of adolescents*

We found three main factors in relation with attitudes towards treatment. The first factor and the one with the most weight consisted of items regarding worries about current and future side effects of medications. In recent years there has been increasing public concern about giving any medication to children and adolescents in view of the effects it might have on their development, a concern likewise reflected in the ADHD population (Charach, Ickowicz, & Schachar, 2004). The second factor was formed by items specifically measuring insight towards illness and the necessity of professional help and medication. For the adult psychiatric population, especially with psychosis, three specific components of insight have been pointed out, namely: insight to illness, the consequences of the disorder, and the necessity of treatment (Johnston & Fine, 1993).(Johnston & Fine, 1993) Very little has been studied about insight in the paediatric psychiatric population, one study finding treatment adherence associated with insight in children and adolescents with psychosis (MTA cooperative group 1999a). Because friends and families may reinforce at the same time insight and both positive and negative viewpoints towards medication, it is important to develop educational strategies where families are adequately informed about

the disorder and the specific mechanisms and effects of medications. In addition, future studies should specifically assess the effect of psycho-educational strategies to enhance positive attitudes while dissipating non-rational concerns.

The last factor was related to *self-perception* and the *patient-doctor relationship*. The relationship between these items has not been previously reported, and the face validity of this last factor (e.g. the relation between getting on well with a doctor and the child's self-esteem) has to be regarded with caution. There might be a possible association between emotional and self-esteem factors and treatment attitudes; to this regard multimodal treatment approaches could be very beneficial for this specific group (MTA cooperative group 1999b). Also, because the quality of the relationship between the patient and the doctor has been shown to be a powerful determinant of medication non-adherence (Pitcher, Piek, & Hay, 2003), we can also state that the doctor-patient relationship mediates attitudes towards treatment. This affirmation is supported by a previous report of helpseeking behaviour in adolescents with depression being linked to perceptions of their doctors' capability to help and understand their feelings (Halayem et al., 2009). In any case, there might be more items contributing to this specific dimension, so further replication in another sample of adolescents with ADHD is needed.

As for the psychometric properties of the whole questionnaire and each one of the constituent factors, both *validity* (face and construct validity) and especially *reliability* (factor analysis, internal consistency and test-restest) of

the questionnaire proved adequate in this study. Only the third factor presented an internal consistency slightly below that expected (Chronbach's alpha 0.58), which was attributed to the limited number of items contributing to this factor. Again, in light of the complexity of the last factor and the number of different domains involved, it will be interesting to see how future research might approach this specific issue.

In terms of the external validity of the questionnaire, our sample proved representative of the adolescent ADHD population, since most of the participants were male, with white ethnicity, and presented other co-morbidities including conduct problems. Interestingly, most had been under treatment for a long time, and had histories of resistance to treatment (various previous treatment strategies tried before) (N. Taylor et al., 2010; Wong et al., 2009). As considered by the children's Health Belief Model (Bush & Iannotti, 1990) attitudes to treatment constitute a dynamic component of adherence, and thus it would be very interesting to measure how such attitudes may evolve from the time of diagnosis throughout the entire course of treatment.

*ii) Adequate attitudes towards medication measured by QATT are in close relationship with treatment adherence* and *benefits/side effects of the medication perceived by adolescents with ADHD.*

Stimulants and other medications have been successfully used for the treatment of Attention Deficit Hyperactivity Didorder (ADHD) in children for over 40 years. While it is known that for people with chronic medical diseases, non-adherence to treatment means a poorer long-term outcome, when talking about neuro-psychiatric problems in children or adolescent populations the frequency and impact of non-adherence might be even more relevant (Pitcher et al., 2003).

The questionnaire (QATT-young people version) appears to differentiate good adherents from poor adherents when using the global score, but not for every one of the factors integrating the scale. This could be traced to a couple of reasons. Firstly, the scale measures attitudes, but not the real treatment adherence itself. These attitudes could bear upon treatment adherence because they would represent “intentional” adherence, but there are also a number of “non-intentional” contributing factors. Secondly, even if we used two indirect methods in combination (self-report and clinical records, the latter being an objective measure of adherence), monitoring treatment adherence has always been a crucial problem (Moderators and mediators of treatment response for children with attention-deficit/hyperactivity disorder: The multimodal treatment study of children with attention-deficit/hyperactivity disorder.1999). Altogether, this could explain the differences between global scores and the values we obtained for each of the single factors.

Finally, because our initial aim was to develop a questionnaire that measures attitudes and perceptions, we specifically compared attitudes among those who perceived more benefits of the medication with those who did not. We arrived at differences between the two groups in total score and in two of the three individual factors. Our results strongly support the premise that young people will not continue to take a treatment if they do not believe it is helping them (Wong et al., 2009); conversely, the perceived impact of the side effects matters more than the real side effects. Perceptions might therefore be more important than any actual positive or negative effects experienced with medications.

## 5.2 Parents' attitudes towards treatment in ADHD/

### Actitudes hacia el tratamiento según la versión para padres

Nuevamente con la versión para padres el estudio intentó contestar las hipótesis que se habían planteado al principio del mismo

*i) El cuestionario QATT es válido y fiable para medir factores de actitud en los padres de adolescentes con TDAH*

Encontramos seis dimensiones diferentes en relación con las actitudes hacia el tratamiento de los padres de adolescentes con TDAH. El primer factor (con un total de 4 items, y que presentaba el mayor porcentaje de varianza aportado) se relacionaba con las actitudes y la predisposición que los padres percibían de sus hijos hacia el tratamiento. De esta manera cuando los padres percibían una *actitud más positiv*a (al niño le gusta la medicación, está motivado con el tratamiento) la actitud hacia el tratamiento de los padres era mejor, lo que se relacionaba con una mejor adherencia al tratamiento. La mejor adherencia a tratamiento de acuerdo con ambas mediciones (verbalización de los padres y de acuerdo con su historia clínica) también se relacionaba con el *conocimiento* que estos percibían tener, no solo del tratamiento sino también acerca del propio trastorno.

El segundo factor, con 8 items, se relacionaba con las preocupaciones actuales de los padres hacia la medicación, asi como las percepciones que estos tenían sobre las mismas ("los médicos dan pastillas para todo", "este tratamiento es solo por un tiempo", "mejor los remedios naturales" o "las

medicaciones pueden cambiar la personalidad de mi hijo"). Es muy importante tener en cuenta de nuevo esa dimensión, así como la necesidad de aportar a las familias un conocimiento adecuado y basado en la evidencia sobre los tratamientos para el TDAH. De otra manera, como asi se demuestra en el estudio, estas falsas creencias pueden condicionar la actitud, y por tanto la adherencia al tratamiento (Wong et al., 2009). La mayoría de estas creencias pueden cambiar con programas de psicoeducacion adecuados para estas familias (Ferrin et al. 2010)

El tercer factor se refiere a ítems en relación con el estigma social que puede suponer para el niño estar en tratamiento psiquiátrico ("siento vergüenza delante de mis compañeros" "me siento diferente por la medicación"). El estigma social se ha demostrado en relación con las actitudes hacia el tratamiento en otros estudios (Harpur et al., 2008) .

La cuarta dimensión surgida en el análisis factorial se relacionaba con ítems acerca del reconocimiento de la enfermedad, de la necesidad de ayuda y tratamiento. Este factor ha surgido también en el análisis de la versión de los adolescentes, y nos resalta la importancia que el *insight* tiene para el TDAH (Johnston & Fine, 1993) como en otras enfermedades mentales (Adler & Nierenberg, 2010; Amador & Gorman, 1998)

El quinto factor resultante en el análisis se ha referido a las preocupaciones que los padres tienen acerca de los futuros efectos del tratamiento. Estas preocupaciones son un fenómeno común en las familias de niños en tratamiento con medicaciones psicotrópicas, y en cierta manera son congruentes con la difusión de algunos estudios que reportan fenómenos

adversos con las mismas (Aagaard & Hansen, 2010; Clavenna & Bonati, 2009). Sin embargo hay que recalcar que si bien estos artículos pueden arrojar resultados preocupantes para las familias, el clínico debe conocer la población de riesgo, y proceder a emplear los tratamientos farmacológicos cuando estos sean necesarios de acuerdo con las guías terapéuticas disponibles en el momento(Hill & Taylor, 2001; E. Taylor et al., 2004) . Es importante también la monitorización de efectos adversos, así como reportar los mismos cuando estos se produzcan.

El último factor se encontraba en relación con los conocimientos acerca del trastorno y los tratamientos empleados. Sorprendentemente este factor se ha encontrado en la versión para padres y no en la de los niños. Tal vez esto puede sugerir que los padres son una población más susceptible de aplicar programas de psicoeducación sobre el trastorno.

Las propiedades psicométricas de esta versión fueron adecuadas, y solo para el factor 3 se encontró una correlación interna más débil de lo esperado (alfa de Chronbach 0.50). Esto una vez más se atribuyo a los pocos factores que contribuían a esta dimensión

*ii) Las actitudes adecuadas hacia el tratamiento medidas por el QATT se relacionan con la adherencia al tratamiento, asi como con la percepción de efectos beneficiosos y adversos del tratamiento*

El cuestionario QATT-versión para padres es capaz de diferenciar entre aquellos adolescentes que se adhieren y los que no al tratamiento cuando usamos la puntuación total, así como determinadas dimensiones de la misma. Estas dimensiones son la *actitud y predisposición del niño* hacia el tratamiento y el *conocimiento* sobre el trastorno y el tratamiento. Debido a que este no es un estudio prospectivo, debemos entender esta asociación sin poder explicar todavía bien la direccionalidad de la misma. Es decir, si bien la mejor actitud del niño hacia el tratamiento puede explicar una mejor adherencia al mismo, es también cierto que una buena adherencia al tratamiento se va a manifestar con una mejor predisposición del niño. Para entender la direccionalidad de esta asociación necesitaríamos estudiar la evolución en el tiempo de estas actitudes. Por otro lado un mejor conocimiento hacia el trastorno ya se ha relacionado con una mejor adherencia al mismo en otros estudios. El conocimiento adecuado acerca de la condición y su manejo podría suponer un factor mediador en la adherencia al tratamiento (MTA cooperative group 1999b) .

Por último, la percepción de efectos secundarios y beneficiosos en la versión para padres se relacionaba tanto con la escala global como con las actitudes que presenta el niño y las preocupaciones presentes y futuras acerca del trastorno y el tratamiento. En el caso de los beneficios acerca del tratamiento, este último se relacionaba en la validez de grupos conocidos también con el

estigma acerca de que el niño reciba un tratamiento. Estos resultados son coherentes con los de otros estudios que subrayan la importancia de los factores sociales y el estigma hacia la medicación en relación con las actitudes hacia el tratamiento (Harpur et al., 2008; Wong et al., 2009).

## 5.3 Strengths and limitations

This research addresses a new topic area regarding ADHD in which adolescents´ perceptions and attitudes are taken into account. Most of the adolescents have mixed attitudes towards their treatment (Baxley & Turner 1978). However, those who *adhered* to treatment presented different attitudes towards medication when comparing with the *Non-Adherent* group. As clinicians, we are in a position to enhance positive attitudes towards treatment by improving the patient-doctor relationship while increasing awareness towards medical conditions and the necessity of adequate treatments. In this respect, positive treatment attitudes are essential for following treatment prescriptions adequately in the long term. The QATT appears to be a valid and reliable measure to help clinicians understand attitudes and the factors that decisively contribute to treatment adherence in the ADHD population.

The present study provides a new tool for comprehensively measuring attitudes towards treatment in adolescents receiving treatment for ADHD. The study has identified a number of factors that could be related with attitudes towards treatment in both ADHD adolescents and their parents. It has also replicated findings from previous findings, which reported attitudes towards medication in ADHD adolescents association with perceived benefits and costs of medications, an social stigma (Harpur et al., 2008)

*Questionnaire format*

Answers depend on how the question has been phrased, as *wording effect* is fundamental to both validity and reliability of any study (PPR1992; PPR1995; Thompson et al. 2000). For instance, the *"social desirability"* effect has been associated with this (Stahl 2006). This effect reflects a natural tendency of some children to answer "true", or in a socially appropriate manner (Efron et al. 1998). We tried to overcome this problem by specifically reminding participants that their answers would not be shared with their respective clinicians.

There is also the possibility that children were partly parroting their parents' perceptions and attitudes towards treatment, instead of giving their own opinions (Baxley & Turner 1978). To avoid this, information was also obtained separately (Efron et al. 1998), and questions were formulated in both conceptual directions (towards and against treatment).

Likert scales have reported better predictive performance when measuring satisfaction of respondents than other type of scales, for instance visual analogue scales (Atkinson et al. 2004). Likert scales have been considered interval scales, that is, the difference between 1 and 2 should be the same as between 3 and 4. This assumption has not been seriously violated in our study as the items were not heavily skewed to one tail (Stahl 2006).

The closed response format chosen for this scale has the advantage of being highly structured, responses are easy to code and analyze, less time is taken, the respondents are able to answer in privacy, and the interactions between interviewer and subject are minimized. However, it also has the disadvantages of higher rejection rates, the inability to obtain further clarification or details, and less control over how the questionnaire is filled in (PPR 1995). The best way suggested in order to generate attitudinal statements would be to use semi-structured qualitative interviews with a small number of adolescents with ADHD (PPR 1995). This qualitative research would allow us to include a number of responses. We tried to minimize these disadvantages by staying close to the patient and families when they were completing the questionnaires and asking them about any doubts and things to add at the end of the questionnaire (PPR 1992).

Another effect that has to be kept in mind is that people usually do not answer the extremes (i.e., “always true” or “always false”), but they tend to select the central columns, this is called the “central tendency error” (PPR 1992; Stahl 2006).

*Sample*

Appropriateness of the sample size is a controversial topic when trying to develop a new questionnaire and especially when performing factor analysis. We used theories from previous authors that considered a ratio of 2:1 as minimum requirement for performing factor analysis (Gorsuch, 1974; Kline,

1998). In any case this limitation could be minimized when calculating the *effect sizes*. Medium and large effects found for some of the dimensions (Cohen's d > 0.5 and >0.7 respectively) suggest there would be potential group differences which might have been observed with a larger sample size, but in this case were non-significant due to the low power of our study.

For a couple of factors (factor 3 "*self perception*" in the young people's version and factor 3 "*social stigma*" in the parents' version*) internal consistency* measured by Chronbach's alpha was slightly below adequacy. Given the heterogeneity of the sample, the small number of items for some dimensions and the broad content coverage of the scale, the Internal Consistency found was considered as adequate, however further studies would be necessary in order to disentangle this.

The sample in this study could be considered *representative* of the general ADHD adolescent population attending clinical services. Most of the adolescents presented with more another comorbidity or were referred to the centre because of their difficulties in treatment management. Nevertheless, sampling bias is not considered as a serious criticism in this type of psychometric study, since the main objective is to examine the dimensions that underpin a theoretical construct (Atkinson et al. 2004).

Due to the lack of a gold standard measure, the methodology may be stronger at demonstrating reliability than validity, and the questionnaire would need to be assessed in a different sample of adolescents with ADHD, or using another

questionnaire that has previously measured attitudes towards treatment such as The *Southampton ADHD Medication Behaviour and Attitudes* scale (Harpur et al., 2008). As the sample reflects clinic attenders rather than those that have dropped out of treatment, it would be very interesting to evaluate attitudes of those adolescents who have dropped out of clinics. Equally it would be very important to measure how attitudes of adolescents with ADHD shape over the time.

*Measuring adherence*

An important limitation of the study is that *adherence* was measured by two indirect methods. As discussed before, the ability of physicians to recognize *non-adherence* is sometimes poor (Osteberg & Blaschke 2005), and this method is most of the time overestimating real adherence rates (Fenton et al. 1997). Cautions must be taken when interpreting these results.

We also used a retrospective measure, so the questionnaire may be measuring attitudes arising as a *consequence* of the adherence (or non-adherence) to treatment, and may not be useful to predict adherence behaviour. It would be useful to compare these results using a more reliable measure, such as the Brief Adherence Rating Scale (Byerly et al., 2008) that has been validated against microelectronic processing. However to the best of our knowledge this scale has not been validated for the adolescent ADHD population yet.

### 5.4 Future directions

The Children Health Belief Model was developed to explain attitudes towards treatment in this specific population (Bush & Iannotti1988). As seen when this model was adapted to other medical conditions, a number of different dimensions (*perceived illness threat*, *perceived benefits of medication;* and *motivations* or *illness concerns*) contribute to attitudes in treatment in our study. We have tried to incorporate these dimensions using the factors that emerged from our factor analyses. The *perceived benefits from medication* would correspond with the dimension we have named *"benefits from medication"*. *Illness concerns* would be represented in our study by the dimension "*concerns*". *Perceived illness threat* would be constituted in our study by the dimension "*insight"*. In our study, the cognitive-affective factors would include the dimension of "knowledge" **(Figures 3 and 4)**. In addition to the CBHM, our model would incorporate *time* as a new variable of study. Few authors have previously studied adolescents' attitudes towards treatment in any of the medical disciplines. Future studies should be more focused on the children and adolescents' own perceptions. It is important to address adolescents' views towards taking medication, as in many cases parents' reports could be incomplete and also for the children it could be difficult to verbalise their feelings (Efron et al. 1998). In conclusion, young people's views towards treatment must be considered when a decision about a long-term medication is made (Efron et al. 1998). As clinicians it is necessary to evaluate all these dimensions in a relationship with treatment, not only before

taking any clinical decision, but later on throughout the treatment process (Kampman et al. 2000)

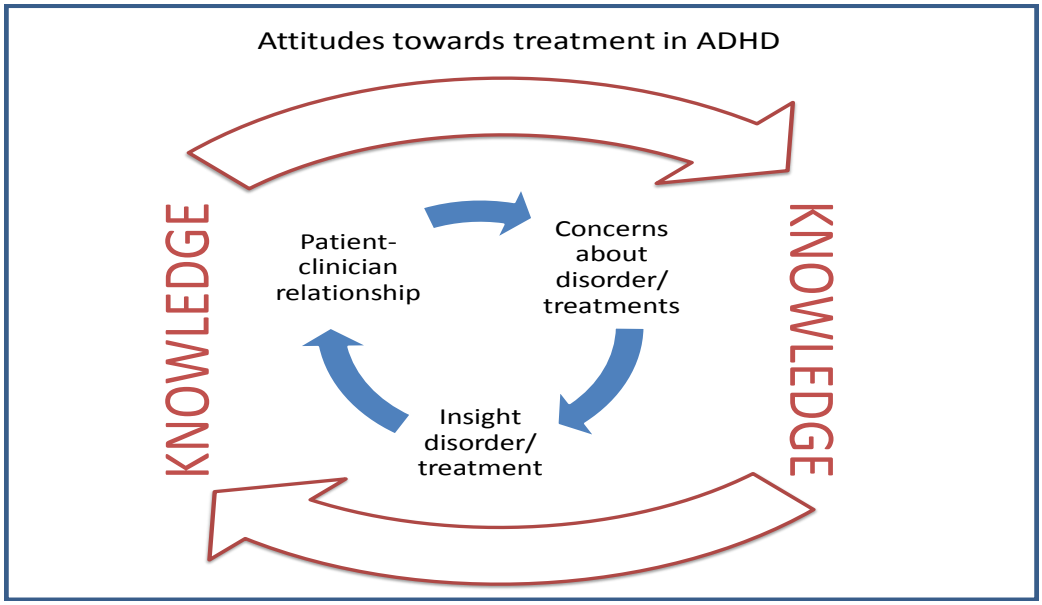



**Figure 3.** Attitudes towards treatment, influence of knowledge

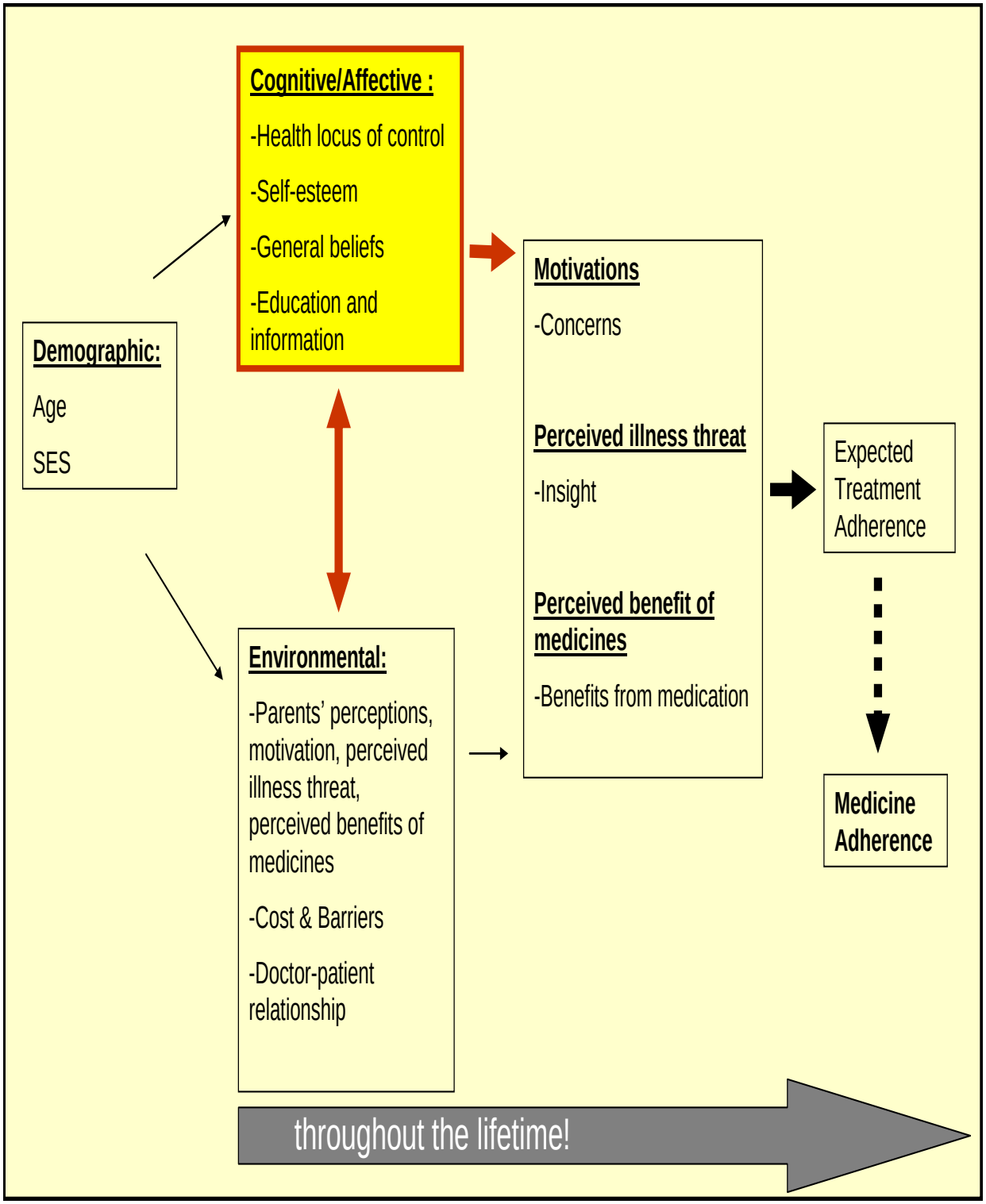



**Figure 4.** Proposed model for the *Children Health Beliefs Model* in ADHD The *cognitive-affective* factors are not only the main contribution to the attitudes towards medication, but also they are modifying and being modified by parental attitudes.

## 6. CONCLUSIONS

Results from this study suggest that attitudes towards treatment influence the adherence to treatment regime in adolescents with ADHD. The study also suggests this questionnaire is a highly reliable and a valid instrument that aims to tap into all the most important dimensions of adolescents' and parents' attitudes towards medication in ADHD. Both the parent and the child versions had robust component structures and adequate sub-scale internal reliability. Three key components (worries, insight and self perception) emerged in the adolescents' version. Four components emerged in the parents' version (child's attitudes and predisposition, current worries, stigma, insight, future worries for future and knowledge). These components were clearly distinguishable from one another.

This questionnaire is an added contribution to the literature in assessing adherence to treatment in ADHD adolescents and might be a tool for assessing adherence to different drug treatments and to facilitate the identification and addressing of problems and barriers to enhance treatment adherence in the ADHD adolescent group. At the same time, it can be used at the individual level as a tool to explore each patients' understanding and perceptions towards the specific treatment used. When specific problems are identified, appropriate education of the patient can be implemented, and the attitudes may be modified. Such approaches would include correcting misbelieves about treatment by health education programs, adequate information and practice styles or by health policies.

Despite the potential use of this scale to measure and identify attitudinal factors, the results have to be regarded as preliminary. Further research is required on external validity through the application to other clinical samples and the correlation with other more generic aspects of perceived quality of life and family functioning.

## 7. REFERENCIAS

Aagaard, L., & Hansen, E. H. (2010). Adverse drug reactions from psychotropic medicines in the paediatric population: Analysis of reports to the danish medicines agency over a decade. *BMC Research Notes, 3*, 176.

Adler, L. D., & Nierenberg, A. A. (2010). Review of medication adherence in children and adults with ADHD. *Postgraduate Medicine, 122*(1), 184-191.

Amador, X. F., & Gorman, J. M. (1998). Psychopathologic domains and insight in schizophrenia. *The Psychiatric Clinics of North America, 21*(1), 27-42.

Ambrosini, P. J. (2000). Historical development and present status of the schedule for affective disorders and schizophrenia for school-age children (K-SADS). *Journal of the American Academy of Child and Adolescent Psychiatry, 39*(1), 49-58.

Angold, A., & Costello, E. J. (2000). The child and adolescent psychiatric assessment (CAPA). *Journal of the American Academy of Child and Adolescent Psychiatry, 39*(1), 39-48.

Angold A., Costello EJ., Pickles A., Zinder F., Silver D. (1987)The development of a Questionnaire for the Use in Epidemiological Studies for the Depression in Children and Adolescents. Medical Research Council Child Psychiatric Unit, London.

Asadi- Pooya AA. (2005) Drug compliance of children and adolescents with epilepsy. *Seizure*;14:393-395.

Asherson, P., Chen, W., Craddock, B., & Taylor, E. (2007). Adult attention-deficit hyperactivity disorder: Recognition and treatment in general adult psychiatry. *The British Journal of Psychiatry : The Journal of Mental Science, 190*, 4-5.

Atkins L., Fallowfield L. Intentional and non-intentional non-adherence to medication amonst breast cancer patients (2006). *European Journal of Cancer*;42(14):2271-6.

Atkinson MJ., Sinha A, Hass SL, et al. (2004) Validation of a general measure of treatment satisfaction, the Treatment Satisfaction Questionnaire for Medication (TSQM). *Health and Quality of Life Outcomes*,2:12

Banaschewski, T., Buitelaar, J., Coghill, D. R., Sergeant, J. A., Sonuga-Barke, E., Zuddas, A., et al. (2009). The MTA at 8. *Journal of the American Academy of Child and Adolescent Psychiatry, 48*(11), 1120-1; author reply 1123-4.

Banaschewski, T., Coghill, D., Santosh, P., Zuddas, A., Asherson, P., Buitelaar, J., et al. (2006). Long-acting medications for the hyperkinetic disorders. A systematic review and european treatment guideline. *European Child & Adolescent Psychiatry, 15*(8), 476-495.

Banaschewski, T., Coghill, D., Santosh, P., Zuddas, A., Asherson, P., Buitelaar, J., et al. (2008). Long-acting medications for the treatment of hyperkinetic disorders - a systematic review and european treatment guidelines. part 2: A quantitative evaluation of long-acting medications. [Langwirksame Medikamente zur Behandlung der hyperkinetischen Storungen1. Eine systematische Ubersicht und europaische Behandlungsleitlinien Teil 2: Ein quantitativer Vergleich der langwirksamen

Praparate] *Zeitschrift Fur Kinder- Und Jugendpsychiatrie Und Psychotherapie, 36*(2), 97-106; quiz 106-7.

Barkley, R. A. (1997). Behavioral inhibition, sustained attention, and executive functions: Constructing a unifying theory of ADHD. *Psychological Bulletin, 121*(1), 65-94.

Barkley, R. A., Fischer, M., Edelbrock, C. S., & Smallish, L. (1990). The adolescent outcome of hyperactive children diagnosed by research criteria: I. an 8-year prospective follow-up study. *Journal of the American Academy of Child and Adolescent Psychiatry, 29*(4), 546-557.

Barlett MS. (1954). A note on the multiplying factors for various chi square approximations. *Journal of the Royal Society*;16 (Series B): 296-298

Barr CL., Wigg KG., Feng Y., et al. (2000). Attention-deficit hyperactivity disorder and the gene for the dopamine D5 receptor. *Molecular Psychiatry*;5:548-51

Baumgaertel, A., Wolraich, M. L., & Dietrich, M. (1995). Comparison of diagnostic criteria for attention deficit disorders in a german elementary school sample. *Journal of the American Academy of Child and Adolescent Psychiatry, 34*(5), 629-638.

Baxley GB., Turner PF. (1978). Hyperactive Children's Knowledge and Attitudes concerning drug treatment. *Journal of Pediatric Psychology* ;3(4):172-176

Bender B., Milgrom H., Rand C., Ackerson L. (1988). Psychological factors associated with medication non-adherence in asthmatic children. *J Asthma*;35(4)347-353

Biederman J., Faraone SV., Kiely K. (1996). Comorbidity in outcome of Attention-deficit/Hyperactivity disorder. In Do They Grow Out of It? Long-term outcomes of childhood disorders. *American Psychiatric Press*. pp 39-75.

Biederman, J., Faraone, S., Milberger, S., Curtis, S., Chen, L., Marrs, A., et al. (1996). Predictors of persistence and remission of ADHD into adolescence: Results from a four-year prospective follow-up study. *Journal of the American Academy of Child and Adolescent Psychiatry, 35*(3), 343-351.

Biederman J., Mick E., Faraone S., et al. (2002). Influence of gender on Attention Deficit Hiperactivity Disorder in children referred to a Psychiatric clinic*. Am J Psychiatry*; 159:36-42.

Biederman, J., Mick, E., Faraone, S. V., Spencer, T., Wilens, T. E., & Wozniak, J. (2003). Current concepts in the validity, diagnosis and treatment of paediatric bipolar disorder. *The International Journal of Neuropsychopharmacology / Official Scientific Journal of the Collegium Internationale Neuropsychopharmacologicum (CINP), 6*(3), 293-300.

Biederman J., Faraone SV. (2005) Attention-deficit hyperactivity disorder. *Lancet*;366:237-48

Biggerstaff, B. J. (2000). Comparing diagnostic tests: A simple graphic using likelihood ratios. *Statistics in Medicine, 19*(5), 649-663.

Bird HR, Canino G, Rubio-Spitec M, Ribera JC. (1987). Further measures of the psychometric properties of the Children's Global Assessments Scale. *Arc Gen Psychiatry*;44:821-824

Bohning, D., Bohning, W., & Holling, H. (2008). Revisiting youden's index as a useful measure of the misclassification error in meta-analysis of diagnostic studies. *Statistical Methods in Medical Research, 17*(6), 543-554.

Brown, R. T., Borden, K. A., Wynne, M. E., Spunt, A. L., & Clingerman, S. R. (1987). Compliance with pharmacological and cognitive treatments for attention deficit disorder. *Journal of the American Academy of Child and Adolescent Psychiatry, 26*(4), 521-526.

Brown RT, Amler RW, Freeman WS, et al. (2005). Treatment of ADHD: overview of the evidence. *Pediatrics*;115(6):e749-e757

Brown, T. E. (2009). *ADHD comorbidities : Handbook for ADHD complications in children and adults*. Washington, DC: American Psychiatric Pub.

Buchanan A. (1992). A two-year prospective study of treatment compliance in patients with schizophrenia. *Psychological Medicine* ,22:787-797.

Buchanan A (1996). Compliance with treatment in schizophrenia. *Maudsley Monographs 37. Psychology Press.* Taylor & Francis

Buchanan DA, Reed A, Almeida O. (1992). The assessment of insight in psychosis. *Br J Psychiatry.*;161:599-602.

Bush, P. J., & Iannotti, R. J. (1990). A children's health belief model. *Medical Care, 28*(1), 69-86.

Burns JJ, Cottrell L, Perkins K, Pack R, Stanon B et al (2004) Depressive symptoms and health risk among rural adolescents. *Pediatrics* 113:1313–1320

Byerly, M. J., Nakonezny, P. A., & Rush, A. J. (2008). The brief adherence rating scale (BARS) validated against electronic monitoring in assessing the antipsychotic medication adherence of outpatients with

schizophrenia and schizoaffective disorder. *Schizophrenia Research, 100*(1-3), 60-69.

Castellanos, F. X., Lee, P. P., Sharp, W., Jeffries, N. O., Greenstein, D. K., Clasen, L. S., et al. (2002). Developmental trajectories of brain volume abnormalities in children and adolescents with attention-deficit/hyperactivity disorder. *JAMA : The Journal of the American Medical Association, 288*(14), 1740-1748.

Centorrino F., Hernan MA., Drago-Ferrante G., Rendall M., et al. (2001). Factors associated with noncompliance with psychiatric outpatient visits. *Psychiatric Services*;52(3):378-380.

Charach, A., Ickowicz, A., & Schachar, R. (2004). Stimulant treatment over five years: Adherence, effectiveness, and adverse effects. *Journal of the American Academy of Child and Adolescent Psychiatry, 43*(5), 559-567.

Choi, B. C. (1998). Slopes of a receiver operating characteristic curve and likelihood ratios for a diagnostic test. *American Journal of Epidemiology, 148*(11), 1127-1132.

Conners, C. K., Wells, K. C., Parker, J. D., Sitarenios, G., Diamond, J. M., & Powell, J. W. (1997). A new self-report scale for assessment of adolescent psychopathology: Factor structure, reliability, validity, and diagnostic sensitivity. *Journal of Abnormal Child Psychology, 25*(6), 487-497.

Clavenna, A., & Bonati, M. (2009). Adverse drug reactions in childhood: A review of prospective studies and safety alerts. *Archives of Disease in Childhood, 94*(9), 724-728.

Cohen J. (1969). Statistical Power Analysis for the Behavioural Sciences. N.Y Accademic Press

Cook EH., Stein MA., Krasowski MD., et al. (1995). Association of attention deficit disorder and the dopamine transporter gene. *Am Journal of Human Genetics*; 56: 993-998

Compton, M. T., & Esterberg, M. L. (2005). Treatment delay in first-episode nonaffective psychosis: A pilot study with african american family members and the theory of planned behavior. *Comprehensive Psychiatry, 46*(4), 291-295.

Costello E, Angold A, Burns B, Erkanli A, Stangl DK et al (1996) The Great Smoky Mountains Study of Youth; functional impairment and serious emotional disturbance. *Arch Gen Psychiatry* 53:1137–1143

Cramer JA, Rosenheck R. (1998). Compliance with medication regimens for mental and physical disorders. *Psychiatric Services*;49(2):196-201.

Cromer BA., Tarnowsky KJ. (1989). Noncompliance in adolescence: a review. *Dev Behav Pediatr*;10(4):207-215

Daly G., Hawi Z., Fitzgerald M., and Gill M. (1999). Mapping susceptibility loci in attention deficit hyperactivity disorder: preferential transmission of parental alleles at DAT1, DBH and DRD5 to affected children. *Molecular Psychiatry*;4:192-6.

Danckaerts M., Taylor E. (1995). The epidemiology of childhood hyperactivity. In: *The Epidemiology of Child and Adolescent Psychopathology*. Eds. Verhust & Koot., pp 178-209. Oxford University Press, Oxford.

Dickstein, D. P., Garvey, M., Pradella, A. G., Greenstein, D. K., Sharp, W. S., Castellanos, F. X., et al. (2005). Neurologic examination abnormalities

in children with bipolar disorder or attention-deficit/hyperactivity disorder. *Biological Psychiatry, 58*(7), 517-524.

Dreyer, A. S., O'Laughlin, L., Moore, J., & Milam, Z. (2010). Parental adherence to clinical recommendations in an ADHD evaluation clinic. *Journal of Clinical Psychology, 66*(10), 1101-1120.

Durston, S., de Zeeuw, P., & Staal, W. G. (2009). Imaging genetics in ADHD: A focus on cognitive control. *Neuroscience and Biobehavioral Reviews, 33*(5), 674-689.

Ebrahim GJ. (2001) "Mother and Child Health: Research Methods". *Journal of Tropical Pediatrics,* Oxford University Press.

Efron D, Jraman FC, Barker MJ. (1998). Child and parent perceptions of stimulant medication treatment in ADHD. *J Paediatr Child Health*;34:288-92.

Faraone SV., Wilens T. (2003). Does stimulant treatment lead to substance use disorders? *J Clin Psychiatry*;64 (suppl 11):9-13.

Faraone, S. V., Biederman, J., & Mick, E. (2006). The age-dependent decline of attention deficit hyperactivity disorder: A meta-analysis of follow-up studies. *Psychological Medicine, 36*(2), 159-165.

Fenton WS., Blyler CR., Heinssen RK. (1997). Determinants of medication compliance in schizophrenia: empirical and clinical findings. *Schizophrenia Bulletin*;23:637-651.

Ferrin, M., Gledhill, J., Kramer, T., & Elena Garralda, M. (2009). Factors influencing primary care attendance in adolescents with high levels of depressive symptoms. *Social Psychiatry and Psychiatric Epidemiology, 44*(10), 825-833.

Firestone, P. (1982). Factors associated with children's adherence to stimulant medication. *The American Journal of Orthopsychiatry, 52*(3), 447-457.

Firestone P., Witt J.E. (1992). Characteristics of families completing a prematurely discontinuing a behavioural parent-training program*. J Pediat Psychol* ;7:209-222

Fishbein, M. (1980). A theory of reasoned action: Some applications and implications. *Nebraska Symposium on Motivation.Nebraska Symposium on Motivation, 27*, 65-116.

Geller, B., & DelBello, M. P. (2003). *Bipolar disorder in childhood and early adolescence*. New York ; London: Guilford Press.

Gledhill J, Kramer T, Iliffe S, Garralda ME (2003) Training general practitioners in the identification and management of adolescent depression within the consultation: a feasibility study. *J Adolesc* 26:245–250

Goldstein, S., & Ellison, A. T. (2002). *Clinicians' guide to adult ADHD : Assessment and intervention*. San Diego, Calif.: Academic Press.

Goodman, R., & Stevenson, J. (1989). A twin study of hyperactivity--II. the aetiological role of genes, family relationships and perinatal adversity. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 30*(5), 691-709.

Goodman R. (1997). The strengths and Difficulties Questionnaire: a research note. *J Child Psychol Psychiatry*;38(5):581-586

Gorsuch, R. L. (1974). *Factor analysis*. Philadelphia ; London: Saunders.

Grunebaum MF., Weiden PJ., Olfson M. (2001). Medication supervision and adherence of persons with psychotic disorders in residential treatment settings: a pilot study. *J Clin Psychiatry*;62:394-399

Hack S., Chow B. (2001). Pediatric psychotropic compliance: a literature review and research-based suggestions for improving treatment compliance. *J Child and Adol Psychopharmac*;11(1):59-67

Haddad PH., Garralda ME. (1992). Hyperkinetic syndrome and disruptive early experiences. *British Journal Psychiatry*;161:700-3.

Halayem, S., Bouden, A., Amado, I., Krebs, M. O., Tabbane, K., & Halayem, M. (2009). Adaptation of a soft-signs scale to children with autism spectrum disorders. [Adaptatation d'une echelle des signes neurologiques a l'enfant souffrant de trouble envahissant du developpement] *La Tunisie Medicale, 87*(10), 651-655.

Harpur, R. A., Thompson, M., Daley, D., Abikoff, H., & Sonuga-Barke, E. J. (2008). The attention-deficit/hyperactivity disorder medication-related attitudes of patients and their parents. *Journal of Child and Adolescent Psychopharmacology, 18*(5), 461-473.

Haywards P., Chan N., Kemp R., Youle S., David A. (1995). Medication Self Management: A Preliminary report on an intervention to improve medication compliance. *Journal of Mental Health*;4:511-517.

Hazell, P. L. (2009). 8-year follow-up of the MTA sample. *Journal of the American Academy of Child and Adolescent Psychiatry, 48*(5), 461-462.

Hechtman, L. T. (1996). *Do they grow out of it? : Long-term outcomes of childhood disorders*. Washington, DC: American Psychiatric Press.

Hill, P., & Taylor, E. (2001). An auditable protocol for treating attention deficit/hyperactivity disorder. *Archives of Disease in Childhood, 84*(5), 404-409.

Hogan, T. P., Awad, A. G., & Eastwood, R. (1983). A self-report scale predictive of drug compliance in schizophrenics: Reliability and discriminative validity. *Psychological Medicine, 13*(1), 177-183.

Horne R, Weinman J, Hankins M. (1999). The beliefs about medicines questionnaire: the development and evaluation of a new method for assessing the cognitive representation of medication. *Psychology and Health*;14:1-24

Jensen PS. and the MTA Group (2002). Treatments: the case of the MTA study. In Hyperactivity and attention disorders of childhood. Cambridge Child and Adolescent Psychiatry. *Cambridge University Press*, 2nd edition, pp 435-467.

Johnston, C., & Fine, S. (1993). Methods of evaluating methylphenidate in children with attention deficit hyperactivity disorder: Acceptability, satisfaction, and compliance. *Journal of Pediatric Psychology, 18*(6), 717-730.

Kaiser H. (1974). An index of factorial simplicity. *Psychometrika*;39:31-36

Kampman O., Laippala P., Väänänen J., et al. (2000). Indicators of medication compliance in first-episode psychosis. *Psychiatry Research*;110:39-48.

Klein RG. (1993). Clinical efficacy of methylphenidate in children and adolescents. *Encephale* ; 19(2):89-93.

Kline, P. (1998). *The new psychometrics : Science, psychology and measurement*. London: Routledge.

Kramer T, Garralda ME (1998) Psychiatric disorders in adolescents in primary care. Br J Psychiatry 173:508–513

Lazaratou H., Vlassopoulos M., Dellatolas G. (2000). Factors affecting compliance with treatment in an outpatient child psychiatric practice: a retrospective study in a community mental health centre in Athens. *Psychotherapy and Psychosomatics*;69:42-49.

Lieberman, J. A., Stroup, T. S., McEvoy, J. P., Swartz, M. S., Rosenheck, R. A., Perkins, D. O., et al. (2005). Effectiveness of antipsychotic drugs in patients with chronic schizophrenia. *The New England Journal of Medicine, 353*(12), 1209-1223.

McMaster University Evidence-Based Practice Centre (1999). Treatment of ADHD. *Rockville,MD:Agency for Health Care Policy and Research*. Evidence Report/Technology Assessment no.11,AHCPR Publication no.99-E018

McNeal RE, Roberts MC, Barone VJ. (2000). Mothers' and children's perceptions of medication for children with ADHD. *Child Psychiatry and Human Development*;30(3):173-187

Molina, B. S., Hinshaw, S. P., Swanson, J. M., Arnold, L. E., Vitiello, B., Jensen, P. S., et al. (2009). The MTA at 8 years: Prospective follow-up of children treated for combined-type ADHD in a multisite study. *Journal of the American Academy of Child and Adolescent Psychiatry, 48*(5), 484-500.

Morisky, D. E., Green, L. W., & Levine, D. M. (1986). Concurrent and predictive validity of a self-reported measure of medication adherence. *Medical Care, 24*(1), 67-74.

MTA cooperative group (1999a). A 14-month randomized clinical trial of treatment strategies for attention-deficit/hyperactivity disorder . *Archives of General Psychiatry, 56*(12), 1073-1086.

MTA cooperative group (1999b). Moderators and mediators of treatment response for children with attention-deficit/hyperactivity disorder. *Archives of General Psychiatry, 56*(12), 1088-1096.

National Institute for Clinical Excellence (2008). Attention deficit hyperactivity disorder Diagnosis and management of ADHD in children, young people and adults (www.nice.org.uk/CG072)

Offord DR, Boyle MH, Szatmari P, Rae-Grant NI, Links PS et al (1987) Ontario Child Health Study. II. Six month prevalence of disorder and rates of service utilization. *Arch Gen Psychiatry* 44:832–836

Okie S. (2006). ADHD in adults. *N Engl J Med* ;354;25:2637-2641

Oosterlaan, J., & Sergeant, J. A. (1998). Effects of reward and response cost on response inhibition in AD/HD, disruptive, anxious, and normal children. *Journal of Abnormal Child Psychology, 26*(3), 161-174.

Osterberg, L., & Blaschke, T. (2005). Adherence to medication. *The New England Journal of Medicine, 353*(5), 487-497.

Pitcher, T. M., Piek, J. P., & Hay, D. A. (2003). Fine and gross motor ability in males with ADHD. *Developmental Medicine and Child Neurology, 45*(8), 525-535.

Polanczyk, G., de Lima, M. S., Horta, B. L., Biederman, J., & Rohde, L. A. (2007). The worldwide prevalence of ADHD: A systematic review and metaregression analysis. *The American Journal of Psychiatry, 164*(6), 942-948.

Popper CW. (1988) Disorders usually first evident in infancy, childhood or adolescence. In: *Textbook of Psychiatry*. Talbott, Hales and Yudofsky, eds, pp649. Washington DC: American Psychiatric Press

Portney, L. G., & Watkins, M. P. (2009). *Foundations of clinical research : Applications to practice* (3rd ed.). Upper Saddle River, NJ: Prentice Hall.

PPR. (1992). Designing and administering questionnaires. Jan 1992;1(1):1-4.

PPR (1995). How to develop and validate a rating scale. April 1995;4(2):5-8

Polanczyk, G., de Lima, M. S., Horta, B. L., Biederman, J., & Rohde, L. A. (2007). The worldwide prevalence of ADHD: A systematic review and metaregression analysis. *The American Journal of Psychiatry, 164*(6), 942-948.

Preacher, K. J., & MacCallum, R. C. (2002). Exploratory factor analysis in behavior genetics research: Factor recovery with small sample sizes. *Behavior Genetics, 32*(2), 153-161.

Ramos-Quiroga, J. A., Daigre, C., Valero, S., Bosch, R., Gomez-Barros, N., Nogueira, M., et al. (2009). Validation of the spanish version of the attention deficit hyperactivity disorder adult screening scale (ASRS v. 1.1): A novel scoring strategy. [Validacion al espanol de la escala de cribado del

trastorno por deficit de atencion/hiperactividad en adultos (ASRS v. 1.1): una nueva estrategia de puntuacion] *Revista De Neurologia, 48*(9), 449-452.

Rapport MD., Denney C., DuPaul GJ., Gardner MJ. (1994). Attention deficit disorder and methylphenidate: normalization rates, clinical effectiveness and response prediction in 76 children. *J Am Academ of Child Adolesc Psychiatry*;33:882-893

Rodriguez, A., Olsen, J., Kotimaa, A. J., Kaakinen, M., Moilanen, I., Henriksen, T. B., et al. (2009). Is prenatal alcohol exposure related to inattention and hyperactivity symptoms in children? disentangling the effects of social adversity. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 50*(9), 1073-1083.

Rubia, K., Halari, R., Cubillo, A., Mohammad, A. M., Scott, S., & Brammer, M. (2010). Disorder-specific inferior prefrontal hypofunction in boys with pure attention-deficit/hyperactivity disorder compared to boys with pure conduct disorder during cognitive flexibility. *Human Brain Mapping, xxx*

Rutter M., Roy P., Kreppner J. (2002). Institutional care as a risk for inattention/overactivity. In: *Hyperactivity and attention disorders of childhood*. 2nd. Edition. Cambridge University Press, pp. 417-434.

Sandberg S. (2002). Psychosocial contributions. In: *Hyperactivity and attention disorders of childhood.* 2nd. Edition. Cambridge University Press 2002, pp. 367-416.

Schachar RJ., Tannock R., Cunningham C., Corkum PV. (1997). Behavioural, situational and temporal effects of treatment with methylphenidate. J *Am Acad Child Adolesc Psychiatry*;36:754-763

Schomerus, G., Matschinger, H., & Angermeyer, M. C. (2009). Attitudes that determine willingness to seek psychiatric help for depression: A representative population survey applying the theory of planned behaviour. *Psychological Medicine, 39*(11), 1855-1865.

Sellwood W, Tarrier N, Quinn J, Barrowclough C. (2003). The family and compliance in schizophrenia: the influence of clinical variables, relatives' knowledge and expressed emotion. *Psychol Med*.;33(1):91-6.

Sergeant, J. (2000). The cognitive-energetic model: An empirical approach to attention-deficit hyperactivity disorder. *Neuroscience and Biobehavioral Reviews, 24*(1), 7-12.

Shaffer, D., Fisher, P., Dulcan, M. K., Davies, M., Piacentini, J., Schwab-Stone, M. E., et al. (1996). The NIMH diagnostic interview schedule for children version 2.3 (DISC-2.3): Description, acceptability, prevalence rates, and performance in the MECA study. methods for the epidemiology of child and adolescent mental disorders study. *Journal of the American Academy of Child and Adolescent Psychiatry, 35*(7), 865-877.

Simpsom SH, Eurich DT, Majumdar SR, et al. (2006). A meta-analysis of the association between adherence to drug therapy and mortality. *BMJ*;333:15-18

Sleator EK., Ullmann RK., Von Neumann A. (1982). How do hyperactive children feel about taking stimulants and will they tell the doctor? *Behav Pediatr*;21:474-479

Sonuga-Barke, E. J., Taylor, E., & Heptinstall, E. (1992). Hyperactivity and delay aversion--II. the effect of self versus externally imposed stimulus

presentation periods on memory. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 33*(2), 399-409.

Sonuga-Barke, E. J., Taylor, E., Sembi, S., & Smith, J. (1992). Hyperactivity and delay aversion--I. the effect of delay on choice. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 33*(2), 387-398.

Sprich S, Biederman J, Crawford MH, et al. (2000). Adoptive and biological families of children and adolescents with ADHD. *J Am Acad Child Adolesc Psych*;39:1432-37.

Stahl D. (2006). Personal communication at the "Introduction to measurement and scale development" course. Institute of Psychiatry.

Stine J. (1994). Psychosocial and psychodynamic issues affecting noncompliance with psychostimulant treatment. *J Child Adolesc Psychopharmacol* ;4:75-86

Swanson JM., Sunohara GA., Kennady JL., et al. (1998). Association of the dopamine receptor D4 (DRD4) gene with a refined phenotype of attention deficit hyperactivity disorder (ADHD): a family-based approach. *Molecular Psychiatry*;3:38-41.

Szatmari P., Offord DR., Boyle M H. (1989). Ontario Child Health Study: prevalence of attention deficit disorder with hyperactivity. *Journal of Child Psychology and Psychiatry*,30;219-230

Taylor, E., Everitt, B., Thorley, G., Schachar, R., Rutter, M., & Wieselberg, M. (1986). Conduct disorder and hyperactivity: II. A cluster analytic approach to the identification of a behavioural syndrome. *The British Journal of Psychiatry : The Journal of Mental Science, 149*, 768-777.

Taylor, E., Schachar, R., Thorley, G., & Wieselberg, M. (1986). Conduct disorder and hyperactivity: I. separation of hyperactivity and antisocial conduct in british child psychiatric patients. *The British Journal of Psychiatry : The Journal of Mental Science, 149*, 760-767.

Taylor E., Schachar R., Thorley G., Wieselberg HM., Everitt B., Rutter M. (1987). Which boys respond to stimulant medication? *Psychol Med* 1987;17:121-143

Taylor, E., Dopfner, M., Sergeant, J., Asherson, P., Banaschewski, T., Buitelaar, J., et al. (2004). European clinical guidelines for hyperkinetic disorder -- first upgrade. *European Child & Adolescent Psychiatry, 13 Suppl 1*, I7-30.

Taylor, E. (2009). Developing ADHD. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 50*(1-2), 126-132.

Taylor, N., Fauset, A., & Harpin, V. (2010). Young adults with ADHD: An analysis of their service needs on transfer to adult services. *Archives of Disease in Childhood, 95*(7), 513-517.

Thapar A., Holmes J., Poulton K., Harrington R. (1999). Genetic basis of attention deficit and hyperactivity. *Br J Psychiatry* Feb;174:105-11

Thapar A., Fowler T, Rice F et al. (2003). Maternal smoking during pregnancy and ADHD symptoms in offspring. *Am J Psychiatry*;160:1985-89

Thapar A, O'Donovan M, Owen MJ. (2005). The genetics of attention deficit hyperactivity disorder. *Hum Mol Genet.*;14 Spec No. 2:R275-82.

Thiruchelvam D., Charach A., Schachar RJ. (2001). Moderators and mediators of long-term adherence to stimulant treatment in children with ADHD. *J. Am. Acad. Child Adolesc. Psychiatry*;40(8):922-928

Thompson, K., Kulkarni, J., & Sergejew, A. A. (2000). Reliability and validity of a new medication adherence rating scale (MARS) for the psychoses. *Schizophrenia Research, 42*(3), 241-247.

Turner DC., Blackwell AD, Donovan JH et al. (2005). Neurocognitive effects of methylphenidate in adults with ADHD. *Psychopharmacology*;178(2-3):286-95.

Waldman ID., Rowe DC., Abramowitz A., et al. (1998). Association and linkage of the dopamine transporter gene (DAT1) and attention hyperactivity disorder in children. *Am J Human Genetics*;63:1767-76.

Weir, J. P. (2005). Quantifying test-retest reliability using the intraclass correlation coefficient and the SEM. *Journal of Strength and Conditioning Research / National Strength & Conditioning Association, 19*(1), 231-240.

Weiss, M., & Murray, C. (2003). Assessment and management of attention-deficit hyperactivity disorder in adults. *CMAJ : Canadian Medical Association Journal = Journal De l'Association Medicale Canadienne, 168*(6), 715-722.

Weiss, M., Murray, C., & Weiss, G. (2002). Adults with attention-deficit/hyperactivity disorder: Current concepts. *Journal of Psychiatric Practice, 8*(2), 99-111.

Wolraich, M. L., Hannah, J. N., Pinnock, T. Y., Baumgaertel, A., & Brown, J. (1996). Comparison of diagnostic criteria for attention-deficit hyperactivity disorder in a county-wide sample. *Journal of the American Academy of Child and Adolescent Psychiatry, 35*(3), 319-324.

Wong, I. C., Asherson, P., Bilbow, A., Clifford, S., Coghill, D., DeSoysa, R., et al. (2009). Cessation of attention deficit hyperactivity disorder drugs in

the young (CADDY)--a pharmacoepidemiological and qualitative study. *Health Technology Assessment (Winchester, England), 13*(50), iii-iv, ix-xi, 1-120.

Wrubel, J., Moskowitz, J. T., Richards, T. A., Prakke, H., Acree, M., & Folkman, S. (2005). Pediatric adherence: Perspectives of mothers of children with HIV. *Social Science & Medicine (1982), 61*(11), 2423-2433.

Yates P, Kramer T, Garralda ME (2004) Depressive symptoms amongst adolescents primary care attenders. Levels and associations. *Soc Psychiatry Psychiatr Epidemiol* 39:588–594

Yen, M., & Lo, L. H. (2002). Examining test-retest reliability: An intra-class correlation approach. *Nursing Research, 51*(1), 59-62.

Zuckerbrot RA, Jensen PS (2006) Improving recognition of adolescent depression in primary care. *Arch Pediatr Adolesc Med* 160:694–704

Zweig, M. H., & Campbell, G. (1993). Receiver-operating characteristic (ROC) plots: A fundamental evaluation tool in clinical medicine. *Clinical Chemistry, 39*(4), 561-577.

Soc Psychiat Epidemiol (2009) 44:825–833
DOI 10.1007/s00127-009-0004-x

ORIGINAL PAPER

# Factors influencing primary care attendance in adolescents with high levels of depressive symptoms

**Maite Ferrin · Julia Gledhill · Tami Kramer · M. Elena Garralda**

Received: 7 September 2008 / Accepted: 30 January 2009 / Published online: 27 February 2009


**Abstract**
*Background* Although depression is common amongst adolescents attending general practice, little is known about factors which influence consultation. This study aims to identify factors that contribute to GP attendance in adolescents with high levels of mood symptoms.
*Methods* Case–control study of 13 to 17-year-olds attending (cases, $N = 156$) and not attending (controls, $N = 120$) an urban general practice during a 6-month period; questionnaires on depressive symptoms (Mood and Feelings Questionnaire), physical symptoms (Child Somatisation Inventory), socio-demographic data and attitudes were completed.
*Results* Attenders had significantly more depressive and physical symptoms. In the comparison between 63 attenders and 34 non-attenders with a high level of depressive symptoms, attendance was significantly linked to lower socio-economic status, non-White ethnicity, non-intact families, and not believing that doctors are only interested in physical symptoms. On logistic regression analysis, attendance in males with depressive symptoms was predicted by more physical and less marked depressive symptoms; in females by non-White ethnicity and not believing doctors are only interested in physical symptoms.
*Conclusion* Both socio-demographic factors and adolescent attitudes influence general practitioner attendance in adolescents with high levels of depressive symptoms. These findings may help inform interventions to facilitate help seeking in primary care for young people with high levels of depressive symptoms.

**Keywords** Depressive symptoms · Attenders · Non-attenders · Primary care · Adolescents · Attitudes

M. Ferrin
Unidad de Psiquiatria Infanto-Juvenil,
Complejo Hospitalario de Jaen,
Carretera Bailen-Motril s/n, 23009 Jaén, Spain

J. Gledhill (✉) · T. Kramer · M. Elena Garralda
The Academic Unit of Child and Adolescent Psychiatry,
Imperial College London, St Mary's Campus, Norfolk Place,
London W2 1PG, UK
e-mail: j.gledhill@imperial.ac.uk

J. Gledhill · T. Kramer · M. Elena Garralda
Central and North West London NHS Foundation Trust,
London, UK

## Introduction

Approximately, one-fifth of adolescents in the general population have identifiable psychiatric disorders [8, 24], with prevalence estimates for depressive disorder of 0.92–8% [7, 11, 19], yet only a minority receive specialist psychiatric care. Few young people with high levels of depressive symptoms or persistent depressive disorder associated with functional impairment consult health care or other professionals [10, 25].

However, approximately 75% of registered adolescents consult their general practitioner each year [17]. High rates of psychopathology, particularly depressive symptoms (1 year period prevalence of 20%) [18], have been described amongst adolescents attending primary care in areas with both high and low levels of psychosocial disadvantage [5, 18, 33] but general practitioner identification of depressed adolescents, especially those with mild-to-moderate depressive symptoms is especially low and made more difficult by the fact that adolescents almost exclusively present with physical health complaints; comorbid psychiatric problems are frequently unrecognised by

doctors, but identification can be improved with training [14, 34]. Emphasis on risk profiling, identification and primary care management of depressive disorders in this age group are consistent with recent national guidelines for care [22].

Depressive symptoms in adolescence are distressing, associated with functional impairment and health risk behaviours such as substance abuse [27]. Depressive symptoms and disorders show continuity from adolescence to adulthood [6, 9, 20] where they are associated with impaired psychosocial functioning and increased risk of suicide [15, 31].

General practitioner attendance presents a potential opportunity for the identification and management of adolescents with high levels of impairing depressive symptoms and depressive disorders. However, the factors that contribute to attendance in this age group and specifically in young people with high levels of depressive symptoms are not well understood, although Black-Asian ethnicity and male gender are known to predict poor help-seeking behaviour in general amongst depressed adolescents [30].

The aim of this study is to identify factors that contribute to GP attendance in adolescents with high levels of mood symptoms. A better understanding may enhance recognition of depression and facilitate early intervention in the primary care setting.

## Methods

### Subjects

The study took place in one urban central London general practice serving a population with a broad ethnic and socio-economic mix. The practice had seven GP partners and a registrar; all were involved in the study. All young people and their parent(s) in the eligible age range (13–17) who were registered with the practice were informed about the study in writing prior to any data collection; those not wishing to be included were asked to opt out by returning a written reply slip or telephoning the research team. Further written informed consent was sought from adolescents and parents for research interviews. Ethical approval was obtained from St Mary's Hospital Local Research Ethics Committee.

Adolescents aged 13–17 years attending their general practitioner for any reason over a 6-month period (1 February–31 July 1998) were eligible for inclusion as attenders, unless insufficient English or a learning difficulty precluded completion of the study questionnaires.

All adolescents attending the practice for a GP consultation were asked to complete study questionnaires by reception staff when the young persons presented themselves on arrival. Additional information on young people with high levels of depressive symptoms was subsequently obtained at interview by a researcher.

The non-attenders group was defined by non-attendance at the practice during the same 6-month period; eligibility criteria were otherwise the same as for the attenders and the group was identified from the electronic GP database; adolescents who had not attended during the index period were mailed the same questionnaires as attenders to their home address and asked to return them by post (in a stamped addressed envelope provided). Those who failed to return the questionnaires were mailed a second set and a proportion were approached by telephone or home visit to increase participation.

### Assessment instruments

Questionnaires included The Mood and Feelings Questionnaire (MFQ) [1], a well-validated and reliable 32-item self-report instrument used to screen for depressive disorder in this age group. Items cover the DSM-IV symptom criteria for major depressive disorder; respondents indicate whether each statement is 'true', 'sometimes true' or 'not true' over the previous 2 weeks with item scores varying from 2 to 0, respectively. Two cut-points for risk of depressive disorder were used: first, a cut point of $\geq$17, found to be optimal for detection of mild-to-moderate depressive disorder amongst general practice attenders [33]; secondly, a cut-point of $\geq$26 to detect more severe depressive disorders as seen in adolescents attending specialist psychiatric services [32].

Adolescents also completed the Child Somatisation Inventory (CSI), a well-standardised instrument that describes the frequency and intensity of 35 psychophysiological symptoms over the previous 2 weeks [13]. Respondents indicate the extent to which they have been affected by each symptom on a 5-point scale ranging from 0 = not at all to 4 = a whole lot. The instrument yields a total intensity score (summation of the scores for all individual items) and a score reflecting the frequency of severe somatisation symptoms (items rated as bothering the young person 'a lot' or 'a whole lot' in the previous 2 weeks) that are consistent with a diagnosis of somatisation disorder [13]. Both scores are highly correlated in primary care attenders; the CSI intensity score was selected for inclusion in this analysis as it was considered to best encompass a measure of both frequency and intensity of symptomatology. Associated impairment from CSI-endorsed physical symptoms was assessed by asking adolescents about the degree to which physical symptoms were interfering with their life with regard to concentration, school work and enjoyment (no impairment/a little bit/a lot).

Socio-demographic information collected included (1) social class [23], which was classified according to the father's occupation unless they were unemployed or not living in the family home, in which case it was based on the

mother's occupation. For the purposes of analysis, social class was dichotomised into social classes 1–3 non-manual and social classes 3 manual, 4, 5 and unemployed; (2) ethnicity and (3) family composition. All young people also provided details about the number of days missed from school in the previous year as a proxy measure for functional impairment.

Young people's perceptions about doctors' attitudes towards psychological concerns were explored by asking them to indicate their level of agreement with two statements on a 5-point Likert scale: first, a statement addressing their views on whether doctors are interested in dealing with health problems other than physical ones ("doctors are only interested in physical symptoms") and another about doctors' interests in psychological matters ("doctors are interested in moods and feelings").

### Data analysis

The data were analysed with SPSS for Windows$^{TM}$ version 12.0 (SPSS Inc, Chicago, IL, USA). Non-parametric tests of statistical significance were used for continuous data and Fisher's exact test for categorical data. Multivariate logistic regression was performed in order to test for independent predictors of general practice attendance amongst adolescents with depressive symptoms; $P < 0.05$ was taken to indicate statistical significance.

## Results

### Participation

Over the study period a total of 184 youngsters attended the practice. Consultations were almost exclusively for concerns about physical health; only 4 (2.2%) consulted with psychological problems. The reasons for consultation were categorised according to Read Codes [28] and proportions of attenders in each group are illustrated in Fig. 1. Because of small numbers in some Read Code groups, the category 'other' was derived (for difficulties that did not fit into the a priori selected groups) and included nervous system and sense organ disease, infections as well as attendances for repeat prescriptions and medicals.

A total of 156 of the 184 attenders (84%) completed the study questionnaires; 63 (34%) scored above or equal to the MFQ cut-point of 17, of whom 61 completed the CSI. Sufficient details about parental occupation to facilitate coding of social class were obtained for 44 adolescents with high levels of depressive symptoms and 38/44 (86%) responded to the attitudinal questionnaires.

Of the 228 non-attenders approached by post 120 (52%) returned questionnaires: 34 (28.3%) scored above or equal to the MFQ cut-point of 17; CSI data were provided by all 34 participants in this group. Sufficient information to facilitate coding of social class was available for 31 young people with high levels of depressive symptoms and 26/34 (76%) replied to the attitudinal questionnaires. Non-attenders who did not return questionnaires did not differ from respondents with regard to gender, age or post-code/living area.

### Socio-demographic data, physical and depressive symptoms in attenders and non-attenders

Comparisons with regard to demographic data, depressive symptoms, physical symptoms and associated impairment between attenders and non-attenders are shown in Table 1. Attenders and non-attenders were comparable with regard to age and gender distribution. Attenders reported significantly

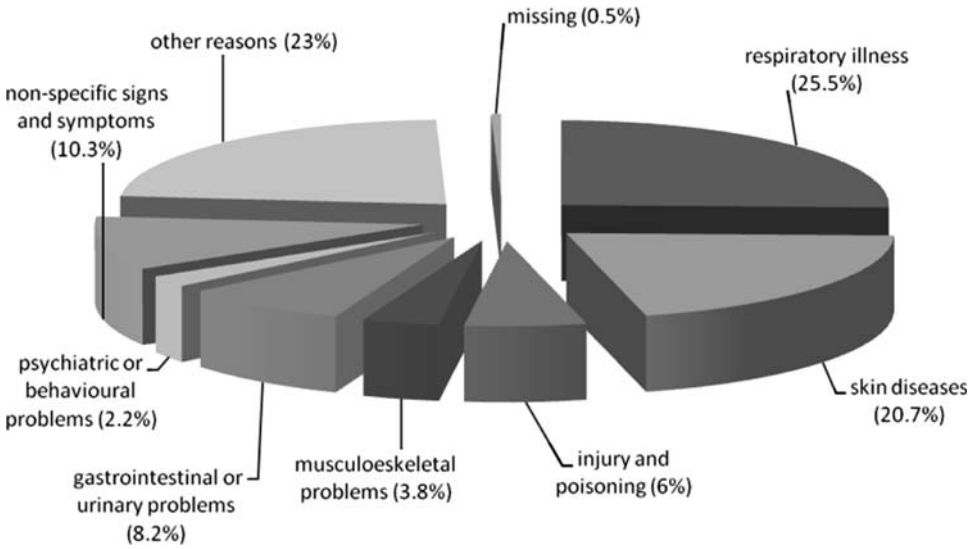



**Fig. 1** Reasons for adolescents to attend general practice in the study according to Read Codes [28]

**Table 1** Demographic data, depressive and physical symptoms in adolescents attending and not attending the GP over a 6-month period

| | Attenders ($N = 156$) | Non-attenders ($N = 120$) | $P$ value |
|---|---|---|---|
| Demographics | | | |
| Age (years), median (quartiles)[a] | 15.70 (14.0–17.0) | 15.2 (14.2–16.2) | 0.10 |
| Gender, females, *n/N* (%)[b] | 93/156 (59.6) | 57/120 (47.5) | 0.58 |
| Depressive symptoms (MFQ) | | | |
| Total score, median (quartiles)[a] | 14.0 (7.0–20.0) | 10.0 (4.0–18.0) | 0.04 |
| MFQ $\geq$ 17, *n/N* (%)[b] | 63/156 (40.3) | 34/120 (28.3) | 0.04 |
| MFQ $\geq$ 26, *n/N* (%)[b] | 24/156 (15.6) | 18/120 (15.0) | 0.86 |
| Physical symptoms (CSI intensity score) | | | |
| Total score, median (quartiles)[a] | 16.0 (8.5–26.0) | 13.0 (5.2–19.0) | 0.01 |
| Impairment of physical symptoms | | | |
| School work, *n/N* (%)[b] | 47/141 (33.3) | 34/118 (28.2) | 0.28 |
| Concentration, *n/N* (%)[b] | 76/143 (53.1) | 56/117 (47.8) | 0.63 |
| Enjoyment: *n/N* (%)[b] | 83/143 (58.0) | 56/118 (47.4) | 0.08 |
| Worsening with stress, *n/N* (%)[b] | 47/141 (33.3) | 77/116 (66.3) | 0.67 |

$P$ = Statistical significance

*MFQ* Mood and Feelings Questionnaire, *CSI* Child Somatisation Inventory

[a] Mann–Whitney test

[b] Fisher's exact test

**Table 2** Socio-demographic features, symptoms and views towards doctors amongst attenders and non-attenders with high levels of depressive symptoms (MFQ $\geq$ 17)

| | Attenders with MFQ $\geq$ 17 ($n = 63$) | Non-attenders with MFQ $\geq$ 17 ($n = 34$) | $P$ value |
|---|---|---|---|
| Demographics | | | |
| Age (years), median (quartiles)[a] | 15.7 (14.1–16.5) | 15.2 (14.0–16.4) | 0.78 |
| Females: *n/N* (%)(b) | 42/63 (66.6) | 18/32 (56.2) | 0.37 |
| Social class 1, 2 and 3 non-manual, *n/N* (%)[b] | 17/39 (43.5) | 22/31 (70.9) | 0.00 |
| Family composition both natural parents, *n/N* (%)[b] | 20/63 (31.7) | 18/34 (52.9) | 0.04 |
| White British or Irish ethnicity, *n/N* (%)[b] | 13/63 (20.6) | 20/34 (58.8) | 0.00 |
| Days off school in the past year | | | |
| $\geq$15 days, *n/N* (%)[b] | 34/63 (53.9) | 7/34 (20.5) | 0.00 |
| Depressive symptoms (MFQ) | | | |
| Median (quartiles)[a] | 26.00 (19.0–36.0) | 22.00 (19.0–31.0) | 0.10 |
| MFQ $\geq$ 26, *n/N* (%)[b] | 24/63 (38.0) | 18/34 (52.9.0) | 0.18 |
| Physical symptoms (CSI) | | | |
| Median (quartiles)[a] | 26.0 (15.5-–34.5) | 18.0 (15.7–29.5) | 0.13 |
| Views about general practitioners | | | |
| Agreement with "doctors only interested in physical problems", *n/N* (%)[b] | 11/38 (28.9) | 15/26 (57.6) | 0.01 |
| Agreement with "doctors interested in mood and feelings", *n/N* (%)[b] | 24/29 (82.7) | 14/21 (66.6) | 0.34 |

$P$ = Statistical significance

*MFQ* Mood and Feelings Questionnaire, *CSI* Child Somatisation Inventory

[a] Mann–Whitney test

[b] Fisher's exact test

more symptoms of depression on the MFQ as compared with non-attenders, and there was a statistically significant association between attendance and risk of depressive disorder, with attenders more likely to score above the cut-point of $\geq$17 on the MFQ. However, there was no statistically significant association between attendance and categorical risk of more severe depressive disorder according to the higher MFQ cut-point of 26. Attenders also reported significantly more physical symptoms on the CSI. There was little difference between the groups with respect to reported links between physical symptoms and either stress or impairment with regard to the domains assessed.

## Comparison of attenders and non-attenders with depressive symptoms (MFQ $\geq$ 17)

Table 2 compares young people with high levels of depressive symptoms (equal to or above the MFQ cut-point of 17) who had and had not attended general practice during the index 6-month period. There were no significant

**Table 3** Logistic regression analysis: factors associated with attendance in adolescents with high levels of depressive symptoms (MFQ ≥ 17) (analysis by total group and by gender)

| | B | SE | Wald | *df* | Significance | OR (CI 95%) |
|---|---|---|---|---|---|---|
| **Total sample (*n* = 64)** | | | | | | |
| Non-White ethnicity (compared with White ethnicity) | 1.21 | 0.55 | 4.81 | 1 | <0.05 | 3.37 (1.13–10.02) |
| Disagreement with "doctors are only interested in physical problems" (compared with agreement) | 1.18 | 0.55 | 4.47 | 1 | <0.05 | 3.25 (1.09–9.72) |
| Constant | −0.94 | 0.51 | 3.39 | 1 | 0.06 | 0.38 |
| Homer and Lemeshow test: Chi-square = 0.17, 2 *df*, *P* = 0.91; Model summary: −2Log Likelihood = 76.14, Nagelkerke $R^2$ = 0.20 | | | | | | |
| **Males (*n* = 36)** | | | | | | |
| CSI intensity score | 0.12 | 0.05 | 6.03 | 1 | 0.01 | 1.13 (1.02–1.25) |
| MFQ ≥ 26 (compared with MFQ < 26) | −2.20 | 0.94 | 5.49 | 1 | 0.01 | 0.11 (0.01–0.69) |
| Constant | −1.77 | 1.15 | 2.34 | 1 | 0.12 | 0.17 |
| Homer and Lemeshow test: Chi-square = 8.37, 2 *df*, *P* = 0.30; Model summary: −2Log Likelihood = 32.7, Nagelkerke $R^2$ = 0.49 | | | | | | |
| **Females (*n* = 38)** | | | | | | |
| Non-White ethnicity (compared with White ethnicity) | 3.12 | 1.22 | 6.51 | 1 | 0.01 | 22.6 (2.06–248.49) |
| Disagreement with "doctors are only interested in physical problems" (compared with agreement) | 2.15 | 1.01 | 4.55 | 1 | 0.03 | 8.62 (1.20–62.36) |
| Constant | −2.51 | 1.21 | 2.59 | 1 | 0.10 | 0.27 |
| Homer and Lemeshow test: Chi-square = 0.56, 2 *df*, *P* = 0.75; Model summary: −2Log Likelihood = 26.30, Nagelkerke $R^2$ = 0.53 | | | | | | |

*MFQ* Moods and Feelings Questionnaire, *CSI* Child Somatisation Inventory, *OR* odds ratio, *CI* confidence interval, *SE* standard error, *df* degrees of freedom

differences between the groups with regard to age or gender, but attenders were more likely to come from lower socio-economic groups, non-White ethnic groups and non-intact families.

No differences were detected in levels of depressive symptoms on the MFQ, physical symptoms on the CSI or impairment caused by these somatic symptoms. However, the groups did differ with regard to the number of days missed at school during the previous year, with more days missed by attenders. Significantly more non-attenders than attenders with high levels of mood symptoms, agreed with the statement that GPs are only interested in physical symptoms.

## Logistic regression analysis of factors associated with attendance in young people with high levels of depressive symptoms

Binary logistic regression analysis was performed using forward model selection to find the best set of predictors. Primary care attendance (present or not) was used as the dependent variable. All variables associated with attendance which had *P* values less than 0.1 from the univariate analysis reported in Table 2 (i.e. social class, family composition, ethnicity, days off school and agreement with the statement that doctors are only interested in physical problems) as well as factors known to be related to high levels of depressive symptoms amongst adolescent primary care attenders (age, gender) [33] were initially entered as independent variables. In order to achieve the best prediction model possible, variables were sequentially added to the model. At every step, each variable that was not already in the model was tested for inclusion. The most significant was added to the model so long as its *P* value was below 0.05.

Use of categories often makes understanding of multivariate analyses easier but because sample sizes were small, continuous variables such as CSI score were entered where possible to increase statistical power. However, because the sample had already been selected on the basis of high levels of depressive symptoms, for this analysis we categorised the severity of depressive symptoms from MFQ scores as equal to and above, or below the cut-point of 26, indicative of moderate-to-severe depressive disorder [32]. The results are shown in Table 3.

Both ethnicity and views towards the GP's role were powerful predictors of primary care attendance, with a non-significant contribution from social class, family composition, and days off school. Non-White ethnicity and disagreement with the statement 'doctors are only interested in physical problems' were independent predictors of consultation amongst young people with high levels of mood symptoms (each associated with more than a three-fold increase in the odds of consultation). The Homer and Lemeshow test of the model's goodness-of-fit was non-significant indicating the model fitted the data

adequately. With this model the rate for predicting attendance increased from 59.4 to 67.2% of the cases, with a sensitivity of 81.3%, specificity of 72.2%, and a positive predictive value of 92.05%.

Because gender differences for help-seeking behaviour in adolescent depression have been reported in the literature [30] and since the sample size did not allow examination of potential interactions between risk factors, the logistic regression analysis was repeated separately for males and females. This analysis resulted in the best models for males and females described in Table 3.

In males with high levels of depressive symptoms, the most powerful predictors of primary care attendance were the presence of physical symptoms on the CSI—every one point increase in CSI score making attendance 1.13 times more likely—and an MFQ score above the higher cut-point of 26 making attendance 11% less likely; put another way, an MFQ score <26 (1/odds ratio of 0.11) made attendance in males with high levels of depressive symptoms nine times more likely. The Homer and Lemeshow test for this model's goodness-of-fit was non-significant, indicating the model fitted well. The percentage accuracy in classification was 75.0%, an improvement over the initial 55.6%. The model correctly classified 75% of the cases, with a 75% specificity and a positive predictive value of 79%.

The most powerful predictors of attendance in females were non-White ethnicity—making attendance over 22 times more likely—and disagreement with the statement "doctors are only interested in physical symptoms", which made attendance more than eight times more likely. The Homer and Lemeshow test of the model's goodness-of-fit was non-significant thus suggesting the model fitted well. The model raised the rate for predicting attendance from 73.7 to 84.2% of the cases. The model correctly classified 93% of the females who attended primary care, with 60% specificity and a positive predictive value of 86%. In this model a total of three cases were excluded as they were considered outliers (residual values above 2.5).

## Discussion

### Main findings

The study documents higher levels of recent depressive and physical symptoms amongst adolescents attending an urban general practice, when compared with non-attenders. In young people with high levels of depressive symptoms, primary care attendance was significantly linked to lower socio-economic status, non-White ethnicity, non-intact families, and a perception by young people that general practitioners are interested in more than just physical symptoms.

Factors influencing primary care attendance differed according to gender. Whereas for depressed males attendance was predicted by more physical and less severe depressive symptoms, for females attendance was predicted by non-White ethnicity and a belief that the GP's role included an interest in psychological symptoms.

### Strengths and limitations

To the best of our knowledge this is the first study directly comparing the presence of depressive symptoms in (1) primary care attenders and non-attenders, and (2) exploring factors predicting attendance in young people with high levels of depressive symptoms, specifically the way in which adolescents' perceptions of the role of the GP with regard to physical and psychological well-being may influence help-seeking behaviour. We collected data using validated self-report questionnaires (the MFQ and CSI) in attenders and non-attenders from the same GP practice.

The study was confined to a single urban GP practice, which may limit generalisability. Nevertheless, as similar prevalence rates for high levels of mood symptoms in attenders have been found in both urban and suburban practices [33], it seems reasonable to assume that factors associated with attendance in this age group would also be comparable in different geographical areas. The 52% response rate for non-attenders was low, though higher than that seen in some other postal surveys [26]; this may have introduced response bias. Age, gender and postcode area did not differ between respondents and non-respondents, although it is possible that there were systematic differences with regard to other exposures or outcomes of interest. For example, it is possible in view of the results of our regression analyses that depressive symptoms were contributing to both non-attendance in boys and to non-response generally. The reported response rate for the non-attenders is moreover likely to be an underestimate as the denominator (young people in this age range registered with the practice according to the GP database) may be inaccurate. Denominators based on practice records as compared with an 'active patient' denominator have revealed up to 30% inactive records in inner London [29].

The decrease in effective sample size due to non-response also reduced the statistical power of the study. Some sub-group numbers were small, the number of variables that could be entered into multivariate analyses was limited and exploration of interactions between risk factors was precluded. Due to missing information, data from all participants could not be included in the multivariate analyses; as the variables with missing data differed for analyses with regard to the whole group as compared to those carried out for each gender separately, the number of

participants included in the gender-specific analyses, when summated did not equate to the total sample size. Although we identified a number of social and attitudinal factors linked to consultation in adolescents with depressive symptoms, the total variance explained by the logistic model was small, suggesting that other factors for example changed life circumstances may contribute to GP attendance in this patient group; these could be explored in future larger studies. In view of the small sample size, the gender-specific analyses are exploratory and the findings should be considered as pointers for future research looking at gender differences.

## Depressive symptoms in adolescent attenders

The high level of depressive symptoms amongst adolescents attending general practitioners is in line with findings from previous studies [18, 33]. By demonstrating more depressive symptoms in attenders as compared with non-attenders, it may be considered that, as for emotional disorders in younger children [4], mood change contributes to the decision to consult general practitioners for physical complaints. Depressive symptoms may be associated with a greater sense of poor physical well-being by enhancing awareness of somatic symptoms [18].

A lower cut-point on the MFQ ($\geq$17) more clearly differentiated attenders from non-attenders than the clinic cut-point of $\geq$26, suggesting that mild-to-moderate depressive disorders are particularly associated with primary care attendance. While more severely depressed young people are more likely to be identified by GPs and referred to specialist services [14, 21] those with mild-to-moderate symptoms are more likely to remain undetected [18]. Since high levels of depressive symptoms in young people can be associated with increased physical presentations in primary care [33], direct attention to psychiatric problems may decrease the likelihood of medical presentations.

## Factors contributing to primary care attendance in adolescents with depressive symptoms

In adolescents with high levels of depressive symptoms in our sample, general practice attendance was associated with lower social class, non-White ethnicity and non-intact families. These social indicators have not been previously linked with depression itself in this age group and context [33], suggesting they may be more specific to help-seeking than to adolescent depression itself. In line with our findings, a recent Finnish study, found that living with both parents was associated with not seeking professional help for adolescent depression [12].

Somatisation varies with ethnicity and may be more common in young people of non-White ethnicity; physical symptomatology is a likely precipitant for GP consultation. Our finding of an excess of young people with non-White ethnicity amongst attenders (particularly girls) with high levels of mood symptoms could be due to reduced GP recognition of mood symptoms in non-White compared with White adolescents [14]. It is possible that reduced recognition leads to an increased likelihood of attendance for associated medical symptoms.

Adolescents from more socially advantaged families may obtain support and help with depressive symptoms within their family or network; social disadvantage may be associated with help-seeking outside the family, although this hypothesis requires further exploration.

More time off school was reported by attenders with depressive symptoms, suggesting that mood symptoms which impact on school attendance may contribute to consultation. This difference, coupled with the finding that impairment from physical symptoms was not statistically different for attenders as compared with non-attenders, suggests that functional impairment in GP attenders with high levels of depressive symptoms may be primarily related to mood rather than physical symptoms. This is consistent with findings from previous work in adolescent primary care attenders where functional impairment has been found to be associated with depressive symptoms and not attributable to the presence of physical illness [2].

For females, attendance was also associated with a belief that doctors are not just interested in physical problems. Attitudinal factors of this kind may thus be an important factor in initiating help-seeking and are well worth further exploration.

Male adolescents with high levels of depressive symptoms, who screened positive for major depressive disorder (MFQ $\geq$ 26) were less likely to consult, but more physical symptoms were associated with GP attendance, suggesting male adolescents have an enhanced tendency to focus on physical symptoms in the presence of low mood.

Adolescents, especially boys, find it hard to discuss psychological difficulties with their GP [16, 21], and this may be even more difficult if young people do not perceive GPs as being interested in emotional problems. Educating young people that family doctors are able to help with such difficulties may enhance attendance of more young people with high levels of depressive symptoms. Primary care attendance in young people with high levels of depressive symptoms and improved recognition may facilitate early identification and management of depressive disorders in this population.

## Implications

Depressive disorders and high levels of depressive symptoms have important implications for health at this developmental stage and throughout the life span. Primary care may potentially have a very important role in the identification and management of depression in this age group. Evidence suggests that targetted interventions of this kind have beneficial effects [3, 14, 34]. Training for GPs in the recognition and management of adolescent depression together with ongoing support from Child and Adolescent Mental Health Service Staff in its implementation is likely to be necessary in order to optimise the role of primary care in addressing the needs of depressed young people.

Having equipped GPs with the confidence to engage young people in discussing their emotional well-being and the skills to recognise and address depressive disorder, this study points to ways in which the role of primary care in this area may be further enhanced. The study highlights factors that influence attendance in adolescents with high levels of depressive symptoms; some are fixed characteristics such as ethnicity and social class, which GPs can be made aware of through training. Others such as attitudes towards the GP's role could potentially be influenced by a public health intervention. This might include the use of posters and advertisements, school-based discussions as well as routine enquiry by GPs about psychological symptoms during consultations to increase awareness amongst young people that GP attendance for emotional problems is both appropriate and acceptable; this in turn may increase attendance in young people with high levels of mood symptoms.

**Acknowledgments** We would like to thank the GPs, adolescents and families who participated in the study. We are grateful to Dr. Emma Sedgwick for her help with data collection, to Daniel Stahl for statistical advice, and to Dr. Miguel Ruiz-Veguilla for his helpful comments.

**Conflict of interest statement** Dr. Ferrin is partially supported by grants from the Instituto de Salud Carlos III (Plan Nacional I+D+I 2007) and from the Fundacion Alicia Koplowitz. No other conflicts declared.

## References

1. Angold A, Weissmann MM, Merikangas KR, Prusoff P, Wickramaratne G, Gammon GD, Warner V (1987) Parent and child reports of depressive symptoms in children at low and high risk of depression. J Child Psychol Psychiatry 28:901–915
2. Asarnow JR, Jaycox LH, Duan N, LaBorde AP, Rea MM et al (2005) Depression and role impairment among adolescents in primary care clinics. J Adolesc Health 37:477–483
3. Arsanow JR, Jaycox LH, Duan N, LaBorde AP, Rea MM et al (2005) Effectiveness of a quality improvement intervention for adolescent depression in primary care. A randomized control trial. J Am Med Assoc 293:311–319
4. Bowman FM, Garralda ME (1993) Psychiatric morbidity among children who are frequent attenders in general practice. Br J Gen Pract 43:6–9
5. Burns JJ, Cottrell L, Perkins K, Pack R, Stanon B et al (2004) Depressive symptoms and health risk among rural adolescents. Pediatrics 113:1313–1320
6. Colman I, Wadsworth MEJ, Croudace TJ, Jones PB (2007) Forty-year psychiatric outcomes following assessment for internalizing disorders in adolescence. Am J Psychiatry 164:126–133
7. Cooper PJ, Goodyer I (1993) A community study of depression in adolescent girls. I: Estimates of symptom and syndrome prevalence. Br J Psychiatry 163:369–374
8. Costello E, Angold A, Burns B, Erkanli A, Stangl DK et al (1996) The Great Smoky Mountains Study of Youth; functional impairment and serious emotional disturbance. Arch Gen Psychiatry 53:1137–1143
9. Dunn V, Goodyer IM (2006) Longitudinal investigation into childhood and adolescence onset depression: psychiatric outcome in early adulthood. Br J Psychiatry 188:216–222
10. Essau CA (2007) Course and outcome of major depressive disorder in non-referred adolescents. J Affect Disord 99:191–201
11. Ford T, Goodman R, Meltzer H (2003) The British Child and Adolescent Mental Health Survey 1999: the prevalence of DSM-IV disorders. J Am Acad Child Adolesc Psychiatry 42:1203–1211
12. Fröjd S, Narttunen M, Pelkonen M, von der Pahlen B, Kaltiala-Heino R (2007) Adult and peer involvement in help-seeking for depression in adolescent population. A two-year follow-up in Finland. Soc Psychiatry Psychiatr Epidemiol 42:945–952
13. Garber J, Walker L, Zeman J (1991) Somatization symptoms in a community sample of children and adolescents: further validation of the children's somatisation inventory. J Consult Clin Psychol 3:588–595
14. Gledhill J, Kramer T, Iliffe S, Garralda ME (2003) Training general practitioners in the identification and management of adolescent depression within the consultation: a feasibility study. J Adolesc 26:245–250
15. Harrington R, Fudge H, Rutter M, Pickles A, Hill J (1990) Adult outcomes of child and adolescent depression. I. Psychiatric status. Arch Gen Psychiatry 47:465–473
16. Jorm AF, Wright A, Morgan AJ (2007) Where to seek help for a mental disorder? National survey of the beliefs of Australian youth and their parents. Med J Aust 187:556–560
17. Kramer T, Iliffe S, Murray E, Waterman S (1997) Which adolescents attend the GP? Br J Gen Pract 47:327
18. Kramer T, Garralda ME (1998) Psychiatric disorders in adolescents in primary care. Br J Psychiatry 173:508–513
19. Lewinsohn PM, Hops H, Roberts RE, Seeley JR, Andrews JA (1993) Adolescent psychopathology. I: Prevalence and incidence of depression and other DSM-III-R disorders in high school students. J Abnorm Psychol 102:133–134
20. Lewinsohn PM, Rhode P, Klein DN, Seeley JR (1999) Natural course of adolescent major depressive disorder. I: Continuity into young adulthood. J Am Acad Child Adolesc Psychiatry 38:56–63
21. Martinez R, Reynolds S, Howe A (2006) Factors that influence the detection of psychological problems in adolescents attending general practices. Br J Gen Pract 56:594–599
22. National Institute for Health and Clinical Excellence *NICE* (2005) Depression in children and young people. http://guidance.nice.org.uk/CG28/niceguidance/pdf/English
23. Office of Population Censuses and Surveys (1980) Classification of occupations. Her Majesty Stationery Office, London

24. Offord DR, Boyle MH, Szatmari P, Rae-Grant NI, Links PS et al (1987) Ontario Child Health Study. II. Six month prevalence of disorder and rates of service utilization. Arch Gen Psychiatry 44:832–836
25. Pelkonen M, Marttunen M, Aro H (2003) Risk for depression: a 6-year follow-up of Finnish adolescents. J Affect Disord 77:41–51
26. Prince M, Stewart R, Ford T, Hotopf M (2003) Practical psychiatric epidemiology. Oxford University Press, New York, p 28
27. Rao U, Hammen C, Daley S (1999) Continuity of depression during the transition to adulthood: a 5-year longitudinal study of young women. J Am Acad Child Adolesc Psychiatry 38:908–915
28. Read JD (1990) Royal College of general practitioners members reference book. RCGP, London
29. Robson J, Falshaw M (1995) Audit of preventive activities in 16 inner London practices using a validated measure of patient population, the 'active patient' denominator. Br J Gen Pract 45:463–466
30. Sen B (2004) Adolescent propensity for depressed mood and help seeking: race and gender differences. J Ment Health Policy Econ 7:133–145
31. Weissman MM, Wolk S, Goldstein RB, Moreau D, Adams P et al (1999) Depressed adolescents grown up. J Am Med Assoc 281:1707–1713
32. Wood A, Kroll L, Moore A, Harrington R (1995) Properties of the Mood and Feelings Questionnaire in adolescent psychiatric outpatients: a research note. J Child Psychol Psychiatry 36:327–334
33. Yates P, Kramer T, Garralda ME (2004) Depressive symptoms amongst adolescents primary care attenders. Levels and associations. Soc Psychiatry Psychiatr Epidemiol 39:588–594
34. Zuckerbrot RA, Jensen PS (2006) Improving recognition of adolescent depression in primary care. Arch Pediatr Adolesc Med 160:694–704

# Participant information sheet- Young people- QATT

***1. Could you help us with our research?***

We are interested in perceptions of young people with ADHD who are taking medication or have done so in the past.

***2. Why is the project being done?***

Researchers have not asked young people much about the treatment they receive or have received in the past for ADHD. We plan to take into account young people's and their families views by using this new questionnaire. The aim is to help families and clinicians know more about how you feel or have felt about the treatment you receive or have received in the past.

***3. What will happen to me if I take part?***

If you agree, we will ask you to complete a short questionnaire about your thoughts and feelings towards treatment. We will also ask your parent or carer to complete the same questionnaire so that we can have both points of view.

***4. Do I have to take part?***

No, it's your own choice. Even if you agree to participate you can still drop out at any time. If you don't want to answer some questions, just leave the question without any response. You do not have to tell us anything unless you want to. Refusing participation won't interfere with your treatment. Whether you help us or not, or whatever your responses are, you will still continue to have the same care at your clinic.

***5. Will there be any problems for me if I take part?***

If you are unhappy or uncomfortable about any question, please tell us. You can also tell your doctor.

*If you want more details you can contact us (Dr. Maite Ferrin, telephone number-----). We will be happy to help!*

# Participant information sheet- Parents- QATT

***1. The aim of the project***

The aim of the project is to gain a better understanding on how ADHD is currently treated. For that purpose, we will ask you and your child questions about their perceptions towards the medication they currently take or have taken in the past, and about the problems they may have experienced with their treatment.

***2. How will the project be done?***

Your child will be asked to complete a few short questionnaires which explore attitudes and feelings towards treatment and quality of life issues. Any information from the interview will be kept strictly confidential and your child's name will be removed so that s/he cannot be identified from the final report.

We are also interested in your own opinion and have included a parallel questionnaire for you to complete. Completing the questionnaires will take you approximately 10-15 minutes. We will be inviting a total of 120 young people and their respective parents/caregivers to complete this short questionnaire.

***3. Does your child have to take part in this project?***

No, it's totally voluntary. If you and/or your child decide not to take part in this project, it is entirely your right and will not affect your child's present or future treatment. If you do decide that your child can participate, they are still free to withdraw at any time and without giving a reason.

***4. How will the results be used?***

The information given to us will be used to develop a new questionnaire regarding attitudes towards treatment in ADHD. This report will be published in one of the medical journals.

***5. Who do I speak to if I have further questions?***

If you would like more information about the study please contact Dr Maite Ferrin on 0000000000.

**Thank you for your collaboration**

# Consent form (for parents and young people)

Centre:

Patient identification number:

Name of Chief Investigator: Dr Maite Ferrin

Title of project: Questtionnaire on Attitudes Towards Treatment (QATT)

Please read each of the statements below and tick each box if *both of you agree*.

❑ 1. I confirm that we have read and understood the information sheet for the above study and we have had the opportunity to ask questions

❑ 2. I understand that participation is voluntary and that my child is free to withdraw at any time, without giving any reason and without medical care or legal rights being affected

❑ 3. I understand that these answers and some sections of my child's medical notes may be looked at by the chief investigator (Dr Ferrin) just for this research purposes.

❑ 4. I give my consent for my child to take part in the above study

Please write your name, today's date and sign below.

_____ _____ _____

Name of parent Date Signature

_____ _____ _____

Name of patient Date Signature

_____ _____ _____

Name of researcher Date Signature

**APPENDIX 3**

Dear families,

We are trying to gain a better understanding of ADHD and the treatment you have received or going to receive.

This questionnaire is for research purposes. It is **only for those young people above 12 years of age**. It has 2 similar versions. They have to be completed **by the young person** and **one of the parents (father or mother).**

Please feel totally free to answer it. The results will not affect your personal treatment. However, this research may help you and some others like you in the future!

Thank you very much.

Sincerely,

**Dr. Ferrín**
Consultant Psychiatrist
Researcher for the Neuropsychiatric Team
at the Michael Rutter Centre

**Child's name:** **Date:**

## QUESTIONNAIRE FOR YOUNG PEOPLE:

We would like to know your personal views towards medical treatments you have been prescribed. For each item please tick the most appropriate box to answer:

**a) Your personal views and feelings towards the medication**

And

**b) How you feel since you started taking this medication** (only if you are receiving or have received medication).

There is no right or wrong answers. It will take you approximately 10 minutes to complete the form. Your responses will be anonymous and will not be shared with others.

You will have to choose one of the following answers:

- **4 is ALWAYS TRUE**
- **3 is MOSTLY TRUE**
- **2 is NOT SURE**
- **1 is MOSTLY FALSE**
- **0 is ALWAYS FALSE**

**Thank you very much for your help.**

| MY PERSONAL VIEWS: | 4 always true | 3 mostly true | 2 not sure | 1 mostly false | 0 always false |
|---|---|---|---|---|---|
| 1. I know everything about my condition (hyperactivity/ADHD) | | | | | |
| 2. I prefer natural remedies rather than medicines | | | | | |
| 3. I have to take this medication only for a short time | | | | | |
| 4. I think I really need this medication | | | | | |
| 5. I think my friends or parents like this medication | | | | | |
| 6. I have psychological problems that require medication | | | | | |
| 7. I prefer to take only one pill a day (rather than many pills) | | | | | |
| 8. I am happy with the way I am | | | | | |
| 9. I am happy with how I am doing at school (or at work) | | | | | |
| MY PERSONAL VIEWS: | 4 always true | 3 mostly true | 2 not sure | 1 mostly false | 0 always false |
| 10. I prefer speaking with someone about my difficulties (rather than taking medicines) | | | | | |
| 11. I can stop this treatment as soon as I feel better | | | | | |
| 12. I am worried about having to take medicines | | | | | |
| 13. I think medicines are only for very ill people | | | | | |
| 14. I take this medication against my will | | | | | |
| 15. I am worried that this medication may be bad for me in the long term | | | | | |
| 16. I have to take this treatment exactly as doctor has prescribed | | | | | |
| 17. I will tell someone if I consider stopping this treatment | | | | | |
| 18. I need someone to remind me to take this medication | | | | | |

| *a) MY PERSONAL VIEWS:* | *4 always true* | *3 mostly true* | *2 not sure* | *1 mostly false* | *0 always false* |
|---|---|---|---|---|---|
| *19. I am worried this medication can be addictive* | | | | | |
| *20. I get on well with my doctor* | | | | | |
| *21. I am worried that this medication can change the way I am* | | | | | |
| *22. I am ready to follow this treatment* | | | | | |
| *23. I usually forget about taking the pills* | | | | | |
| *24. I think doctors prescribe drugs for everything* | | | | | |
| *25. I am the only person responsible for my treatment* | | | | | |
| *26. I need some help to deal with my problems* | | | | | |
| *27. I feel embarrassed if I have to take this pills in front of my peers* | | | | | |
| *28. I have difficulties in swallowing pills* | | | | | |
| *29. I trust doctors and nurses a lot* | | | | | |
| *30. I had to stop medication if I wanted to consume alcohol or drugs* | | | | | |
| *31. I feel different because I am on this medication* | | | | | |
| *32. I can prevent getting into troubles by taking this medication* | | | | | |
| *33. I know everything about this treatment* | | | | | |
| *34. I think this treatment is expensive** | | | | | |

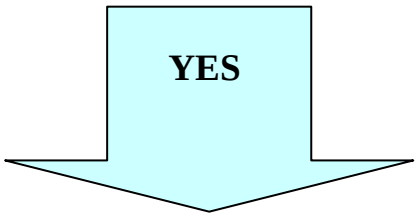
| b) SINCE I STARTED TAKING THIS MEDICATION: | 4 always true | 3 mostly true | 2 not sure | 1 mostly false | 0 always false |
|---|---|---|---|---|---|
| 34. I am less fidgety | | | | | |
| 35. I can start and complete jobs better | | | | | |
| 36. I feel dizzy, "like a zombie" | | | | | |
| 37. I feel more angry | | | | | |
| 38. I feel better in myself | | | | | |
| 39. I can concentrate better | | | | | |
| 40. I have had headaches or tummy aches | | | | | |
| 41. I enjoy being with my friends more | | | | | |
| 42. I have had problems with my height or weight | | | | | |
| 43. I feel miserable or unhappy | | | | | |
| 44. I feel my mind is much clearer | | | | | |
| 45. I feel nervous and overexcited | | | | | |
| 46. I feel more in control of my actions | | | | | |
| 47. I feel more tired or sleepy | | | | | |
| 48. I feel I am a better person | | | | | |
| 49. I have had movements or twitches I can not control | | | | | |
| 50. I have had fewer problems at home, at school, or with my friends | | | | | |
| 51. I am more organized in my school work or daily routines | | | | | |
| 52. I have lost my appetite | | | | | |
| 53. I can work better (at school, etc) | | | | | |
| 54. I have had sleeping problems | | | | | |
| 55. I can remember things more easily | | | | | |
| 56. I feel grumpy or irritable | | | | | |
| 57. I feel my mood and feelings are more stable | | | | | |
| 58. I can cope better with my problems | | | | | |
| 59. I am more my "real self" | | | | | |

- **Have you had any difficulty with this questionnaire? Is there anything you have not understood?** Please mention what

- **Have you been on medication for ADHD before?**

  YES/ NO.

If YES please complete the next questions




- **I have followed previous prescriptions for ADHD as indicated by doctors (select the appropriate answer):**

  0- ALWAYS
  1- MOST OF THE TIMES
  2- HALF THE TIME
  3- SOMETIMES
  4- NEVER

- **If you have not followed previous treatments for ADHD as prescribed, the reason for that was:**

- **If you have stopped taking previous treatments for ADHD, did you discuss this with your doctor before stopping?**

  YES/NO

Dear families,

We are trying to gain a better understanding of ADHD and the treatment your child has received or going to receive.

This questionnaire is for research purposes. It is **only for those young people above 12 years of age**. It has 2 similar versions. They have to be completed **by the young person** and **one of the parents (father or mother).**

Please feel totally free to answer it. The results will not affect your child's personal treatment. However, this research may help your child and some others like him in the future!

Thank you very much.

Sincerely,

**Dr. Ferrín**
Consultant Psychiatrist
Researcher for the Neuropsychiatric Team
at the Michael Rutter Centre

**Child's name:** **Date:**

## QUESTIONNAIRE FOR PARENTS:

We want to know your personal views towards the medical treatments you have been prescribed. For each item please tick the box which best describes:

**a) Your personal views and feelings towards medication.**

And,

**b) How your child feels since he/she started taking this medication** (only in case he/she is receiving or has received medication).

There are no right or wrong answers. It will take you approximately 10 minutes to complete the form. Your responses will be anonymous and will not be shared with others.

You will have to choose one of the following answers:

- **4 is ALWAYS TRUE**
- **3 is MOSTLY TRUE**
- **2 is NOT SURE**
- **1 is MOSTLY FALSE**
- **0 is ALWAYS FALSE**

**Thank you very much for your help.**

| *a) MY PERSONAL VIEWS:* | *4 always true* | *3 mostly true* | *2 not sure* | *1 mostly false* | *0 always false* |
|---|---|---|---|---|---|
| *1. I know everything about my child's condition* | | | | | |
| *2. I prefer natural remedies rather than medicines* | | | | | |
| *3.This medication is only for a short time* | | | | | |
| *4. This medication is necessary for my child* | | | | | |
| *5. My child likes this medication* | | | | | |
| *6. My child has psychological difficulties* | | | | | |
| *7. My child prefers taking only one pill a day (rather than many pills a day)* | | | | | |
| *8. My child is happy with the way he or she is* | | | | | |
| *9. My child is happy with how he or she is doing at school* | | | | | |
| *10. My child prefers talking with someone about his problems (rather than taking medicines)* | | | | | |
| *11. My child can stop this treatment as soon as he or she feels better* | | | | | |
| *12. I am worried about my child being on medication* | | | | | |
| *13. I think medicines are only for very ill people* | | | | | |
| *14. My child takes medication against his or her will* | | | | | |
| *15. I am worried that this medication may be bad for my child in the long term* | | | | | |
| *16. My child has to take this medication exactly as prescribed by doctors* | | | | | |
| *17. We will discuss with the doctor if we consider stopping this treatment* | | | | | |
| *18. My child needs someone to remind him or her about his or her medication* | | | | | |

| *a) MY PERSONAL VIEWS:* | *4 always true* | *3 mostly true* | *2 not sure* | *1 mostly false* | *0 always false* |
|---|---|---|---|---|---|
| *19. I am afraid this medication can be additive* | | | | | |
| *20. I get on well with my child's doctor* | | | | | |
| *21. I am worried that medication can change my child's personality* | | | | | |
| *22. My child is motivated and ready to follow a treatment* | | | | | |
| *23. My child usually forgets about taking his pills* | | | | | |
| *24. I think doctors prescribe pills for everything* | | | | | |
| *25. My child is the only person responsible for his or her treatment* | | | | | |
| *26. My child needs some help to deal with his or her problems* | | | | | |
| *27. My child feels embarrassed if he has to take this medication in front of his peers* | | | | | |
| *28. My child has difficulties in swallowing pills* | | | | | |
| *29. I trust doctors and nurses a lot* | | | | | |
| *30. My child would stop medication if he or she wanted to consume alcohol or drugs* | | | | | |
| *31. My child feels different because he or she is on this medication* | | | | | |
| *32. My child can prevent getting sick by staying on this medication* | | | | | |
| *33. I know everything about this treatment* | | | | | |
| *34. I think this treatment is expensive** | | | | | |

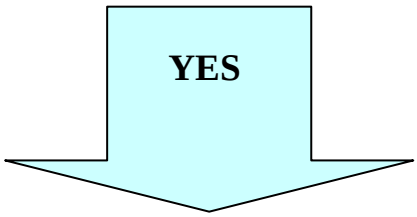
| b) SINCE MY CHILD STARTED TAKING MEDICATION: | 4 always true | 3 mostly true | 2 not sure | 1 mostly false | 0 always false |
|---|---|---|---|---|---|
| 34. He or she is less fidgety | | | | | |
| 35. He or she is able to start and complete his or her jobs better | | | | | |
| 36. He or she looks dizzy or drowsy | | | | | |
| 37. He or she feels more angry | | | | | |
| 38. He or she feels and looks better | | | | | |
| 39. He or she concentrates better | | | | | |
| 40. He or she has had more headaches or tummy aches | | | | | |
| 41. He or she enjoys more with his or her friends | | | | | |
| 42. He or she has had problems with height or weight | | | | | |
| 43. He or she feels or looks miserable or unhappy | | | | | |
| 44. His or her mind is much clearer | | | | | |
| 45. He or she looks more nervous or overexcited | | | | | |
| 46. He or she can control himself or herself much better | | | | | |
| 47. He or she feels tired or sleepy | | | | | |
| 48. His or her behaviour is much better | | | | | |
| 49. He or she has presented with involuntary movements or twitches | | | | | |
| 50. He or she has had fewer problems at school, at home or with friends | | | | | |
| 51. He or she is more organized in his or her school work or daily routines | | | | | |
| 52. He or she has lost his or her appetite | | | | | |
| 53. He or she can work better (at school, at home,…) | | | | | |
| 54. He or she has had sleeping problems | | | | | |
| 55. He or she remembers things better | | | | | |
| 56. He or she is more grumpy or irritable | | | | | |
| 57. His or her mood is more stable | | | | | |
| 58. He or she can cope better with his problems | | | | | |
| 59. He or she is more "his or her real self" | | | | | |

- **Have you had any difficulty with this questionnaire? Is there anything you have not understood?** Please mention

- **Has your child been on medication before?**

  YES/ NO.

If YES please complete the next questions




- **My child has followed previous prescriptions as indicated by doctors (select the appropriate answer):**

  0- ALWAYS
  1- MOST OF THE TIMES
  2- HALF THE TIME
  3- SOMETIMES
  4- NEVER

- **If you have not followed previous treatments as prescribed, the reason for that was:**

- **If your child has stopped taking previous treatments, did you discuss this with your doctor before stopping?**

  YES/NO

## QUESTIONNAIRE FOR PARENTS:

For a more comprehensive evaluation, we also need some more details about you:

**-Relationship with the child:** (e.g., father, mother, stepfather, etc)

**-Age:**

**-Have you ever been on *psychiatric treatment*?** YES/NO

- If YES please mention WHY:

- If YES please mention FOR HOW MANY MONTHS or YEARS:

**Child's name:** **Date:**

**PATIENT'S DETAILS FROM MEDICAL HISTORY**
(to be completed with the patients' file)

- **Demographic factors :**

-age (years, months)

-gender (male, female)

-ethnicity:

1. white British;
2. white Irish;
3. white other;
4. black British;
5. black African;
6. black Caribbean;
7. black other;
8. Indian;
9. Pakistani;
10. Bangladeshi;
11. Chinese;

-family composition

1. both natural parents;
2. mother & stepfather;
3. father or stepmother;
4. only mother;
5. only father;
6. other

-parents' jobs/SES:

1. social class 1,
2. social class 2,
3. social class 3 non-manual
4. social class 3 non-manual
5. social class 4
6. social class 5,
7. unemployed,
8. not known

-parents current age (years)

-parents years of education (years)

-parents' personal history of psychiatric treatment (yes/no)

- **Diagnosis & comorbidity:**

-psychopathology (severity rates measured by Conner's/Tea-Ch/others)

-comorbidity

1. anxiety
2. depression
3. CD
4. ODD
5. LD
6. PDD

-IQ (from history/WISC-IV)

- **Factors related to treatment:**

-current medication (only one treatment/combination; specify treatment-e.g.: methylphenidate, atomoxetine...)

-dosage (once daily/multiple doses)

-previous treatments (number of treatment essayed)

-years in treatment

*-previous reported compliance*

*-reasons for stopping treatment*