

**ADHD in Old Age:  
Self-rated Symptoms and Clinical Information from a  
Population-Based Swedish Sample Aged 65 and older**

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UNIVERSITY OF GOTHENBURG

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### ABSTRACT

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Our knowledge of attention deficit/hyperactivity disorder (ADHD) has increased in recent years. However, given sparse information about its course and manifestations in later life the overall aim of the thesis was to explore the frequency with which elderly individuals report childhood and current symptoms that may indicate a history of ADHD. The more specific aims were: 1) to investigate whether gender, age, marital status, number of employments, educational level, perceived problems in childhood, self-reported health and memory were significantly associated with childhood and current ADHD symptoms, 2) to compare scales capturing ADHD symptoms for older individuals' self-reports about childhood and current ADHD symptomatology and relating these results to the DSM-IV ADHD criteria, and 3) to analyse daily functioning, past psychiatric history, family psychiatric history and overall health history in older individuals meeting criteria for late life ADHD and to illustrate typical life courses through case reports. **Study I** The 25-item Wender Utah Rating Scale was administered in a population-based sample of 2500 persons aged 65 to 80 to study the prevalence of self-rated childhood ADHD. Demographics, self-ratings of problems in childhood, current health and memory were also investigated. A total of 1599 individuals participated corresponding to a response rate of 64%. The prevalence rate was 3,3% using a cut off score of 36 or more in the WURS-scale. Men rated significantly more ADHD symptoms. Those reporting more childhood ADHD symptoms also claimed general problems in childhood as well as worse current health. In **Study II** we examined the persistence of ADHD symptomatology across the lifespan by comparing older individuals' self-reports about current ADHD symptoms and childhood symptoms. Based on the WURS scores (below and above 36) in Study I, two sub-samples were randomly drawn, each with 30 individuals who were clinically worked-up using the Wender Riktad ADHD Symptom Skala (WRASS). Our finding suggests a persistence of self-reported ADHD symptoms over the entire lifespan. In **Study III** we compared different scales capturing ADHD symptoms for self-reports about childhood and current ADHD symptomatology. We also related these reports to the DSM-IV ADHD criteria using the WRASS and Barkley Scales. The results support the idea of life long persistence of ADHD symptoms. In **Study IV** we explored problems in daily functioning, past psychiatric history, family psychiatric history, and overall health history in elderly individuals reporting childhood ADHD symptomatology. The Barkley Scales and a clinical interview were used. Three individuals were selected for in depth-interviews about their lifetime experiences and functioning. Our main finding was that of significantly more childhood and current problems in daily functioning in most domains of daily life, and more of past psychiatric history among those reporting more childhood ADHD symptoms. **Conclusions:** Our findings support the idea that ADHD symptoms may remain across the lifespan although this claim only can be fully confirmed by a longitudinal study design. Future research is therefore needed to identify factors that can alleviate the life span burden of ADHD.

*Keywords:* ADHD, population-based, prevalence, persistency, old people, lifespan, scales

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*To my parents  
Maija and Pentti  
&  
My late grandmother  
Aili*

## PREFACE

This thesis is based on the following studies referred to in the text by their Roman numerals:

- I. Guldberg-Kjär, T., & Johansson, B. (2009). Old people reporting childhood AD/HD symptoms: Retrospectively self-rated AD/HD symptoms in a population-based Swedish sample aged 65-80. *Nordic Journal of Psychiatry*, 63:5, 375-382.
- II. Guldberg-Kjär, T., Sehlin, S., & Johansson, B. (2013). ADHD Symptoms across the Lifespan in a population-based Swedish Sample aged 65 to 80. *International Psychogeriatrics*, 25:5, 667-675.
- III. Guldberg-Kjär, T., & Johansson, B. (2013). ADHD Symptoms Across the Lifespan: A comparison of symptoms captured by the Wender and Barkley-scales and DSM-IV criteria in a Population-Based Swedish Sample Aged 65 to 80. Submitted manuscript.
- IV. Guldberg-Kjär, T., & Johansson, B. (2013). ADHD Burden Over the Lifespan: Clinical information from a Population-Based Swedish Sample Aged 65 to 80. Submitted manuscript.

## ABBREVIATIONS

|                  |  |
|------------------|--|
| ADD              | Attention Deficit Disorder   |
| ADHD             | Attention Deficit/Hyperactivity Disorder   |
| ASD              | Autism Spectrum Disorder   |
| BRIEF-A          | Behavior Rating Inventory of Executive Function- Adult Version                       |
| Conners' CPT II  | Conners' continuous performance test II  |
| CSS              | Barkley form: Current Symptoms Scale-Self-Report                                     |
| CSS-Child Recall | Barkley form: Childhood Symptoms Scale-Self-Report                                   |
| DESR             | Deficient emotional self-regulation  |
| DSM              | Diagnostic and Statistical Manual of Mental Disorders                                |
| DSM-II           | Diagnostic and Statistical Manual of Mental Disorders, Second Edition                |
| DSM-III          | Diagnostic and Statistical Manual of Mental Disorders, Third Edition                 |
| DSM-III-R        | Diagnostic and Statistical Manual of Mental Disorders, Third Edition-revised         |
| DSM-IV           | Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition                |
| DSM-IV-TR        | Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision |
| DSM-5            | Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition                 |
| EF               | Executive functions  |
| EI               | Emotional impulsiveness  |
| HKD              | Hyperkinetic Disorder  |
| ICD              | International Classification of Diseases   |
| ICD-10           | International Classification of Diseases, 10 <sup>th</sup> revision                  |
| ICD-11           | International Classification of Diseases, 11 <sup>th</sup> revision                  |
| MBD              | Minimal Brain Damage; Minimal Brain Dysfunction                                      |
| TADDS            | Targeted Attention Deficit Disorder Scale  |
| WAIS             | Wechsler Adult Intelligence Scale  |
| WHO              | World Health Organization  |
| WRASS            | Wender Riktad ADHD Symtom Skala  |
| WRAADDS          | The Wender Reimherr Adult Attention Deficit Disorder Scale                           |
| WURS             | Wender Utah Rating Scale   |
| WURS-25          | Wender Utah Rating Scale – 25 questions  |

## **SAMMANFATTNING PÅ SVENSKA** (Swedish summary)

Hyperaktivitetssyndrom med uppmärksamhetsstörning (ADHD) karakteriseras av symtom på impulsivitet, ouppmärksamhet och försämrade koncentrationsförmåga vilka ger emotionella problem och påtagliga funktionsstörningar i olika sammanhang. ADHD betraktas idag som det vanligaste barndomspsykiatriska tillståndet. American Psychiatric Association (APA) beräknar att mellan 3% och 7% av barn i skolåldern har ADHD. I en nyligen publicerad systematisk litteratursammanställning beräknas förekomsten av barndoms ADHD i världen vara drygt 5%. Senare forskning tyder på att ungefär hälften av barn med ADHD verkar uppvisa kvarstående ADHD symtom i vuxen ålder.

I alla tider har det funnits barn som varit rastlösa, överaktiva och oroliga och vars beteende avviker från sina jämnåriga kamrater sätt att vara och fungera. I de senaste 200 årens historiska litteratur finns många exempel på barn som uppvisat symtom på ouppmärksamhet, hyperaktivitet och impulsivitet. Den underliggande förståelsen av dessa barn liksom begreppen för att beskriva problemen och de kliniska tecknen har dock förändrats väsentligt. Många av de historiska beskrivningarna är dock intressanta och väl förenliga med de moderna diagnostiska kriterierna för ADHD. Definitionen enligt DSM-5 är däremot ny.

Senare tids kliniska erfarenhet och forskning ger stöd för att ADHD även förekommer hos äldre vuxna. Då det fortfarande till stor del saknas kunskap om förlopp och manifestationer av ADHD hos äldre, var avhandlingsprojektets övergripande syfte att undersöka förekomsten av retrospektivt skattade barndoms ADHD symtom respektive rapporterade, kvarstående aktuella ADHD symtom hos äldre i en populationsbaserad studie. Ett ytterligare syfte med projektet var att undersöka om kön, ålder, civilstånd, antal anställningar, utbildningsbakgrund, subjektivt upplevda problem i barndomen samt subjektivt upplevd aktuell hälsa och minne var relaterade både till barndoms- och aktuella ADHD



symtom. Vi jämförde även olika självskattningsskalors förmåga att fånga upp äldre individers självskattade ADHD symtom i barndomen och aktuellt samt hur utfallet på dessa skalor relaterade till ADHD kriterierna i DSM-IV. I en delstudie undersökte vi även rapporterade svårigheter i vardagslivet, förekomsten av tidigare psykiatriska problem, psykiatriska problem i släkten samt andra hälsorelaterade tillstånd hos de äldre som angett både barndoms- och aktuella ADHD symtom.

I **Studie I** användes Wender Utah Rating Scale (WURS) med 25 frågors kortversion i ett populationsbaserat urval av 2500 personer mellan 65 och 80 år. Gruppen tillfrågades även om demografiska uppgifter, självskattade problem i barndomen, subjektivt skattad aktuell hälsa samt minne. Sammanlagt medverkade 1599 personer vilket motsvarar en svarsfrekvens på 64%. Förekomsten av självskattade barndoms ADHD symtom beräknades till 3.3% när vi använde en cut-off poäng på 36 för WURS-skalan. Män skattade signifikant fler ADHD symtom. De som rapporterade fler barndoms ADHD symtom angav också i högre utsträckning en mer problematisk barndom men även en subjektivt upplevd sämre aktuell hälsa.

I **Studie II** var syftet att undersöka förekomsten av kvarstående ADHD symtom under livsloppet genom att jämföra äldre individers självrapporterade aktuella ADHD symtom med deras självskattade barndoms ADHD symtom. Med utgångspunkt i WURS-poängen (under och över 36) i Studie I valde vi slumpmässigt ut två undergrupper bestående av 30 individer till varje grupp. Dessa 60 individer följdes upp med Wender Riktad ADHD Symtom Skala (WRASS), en svensk version av the Targeted Attention Deficit Disorder Rating Scale (TADDS). Vårt huvudfynd var att högre WURS poäng var signifikant relaterade till högre poäng på WRASS-skalan vilket ger stöd för att ADHD symtom i många fall verkar kunna kvarstå under hela livet. Bland de som hade 36 eller fler poäng på WURS fanns 16 personer (53.3%) som fick 70 poäng eller mer på WRASS-skalan vilket är en kliniskt ofta använd cut-

off-poäng i Sverige. Inte någon av de som hade lägre än 36 poäng på WURS hade poäng över 70 på WRASS.

Andelen 65-80 åringar som rapporterade barndoms ADHD symtom var något lägre men jämförbart med senare tids prevalenssiffror för barndoms ADHD. Våra fynd ger stöd till tanken om förekomsten av kvarstående ADHD symtom från barndom till ålderdom.

I **studie III** var syftet att jämföra olika självskattningsskalors förmåga att fånga upp äldre individers självskattade ADHD symtom både i barndomen och aktuellt. Ett ytterligare syfte var att jämföra dessa skalor med ADHD kriterierna i DSM-IV. Undersökningsgruppen i denna studie var den samma som i studie II. WRASS och Barkley skalorna samt DSM-IV ADHD kriterierna användes. Resultaten visade på en överensstämmelse mellan de olika skalorna beträffande förmågan att fånga upp självskattade barndoms- och aktuella ADHD symtom.

I **studie IV** var syftet att undersöka svårigheter i vardagslivet, förekomst av tidigare psykiatriska problem, psykiatriska problem i släkten samt övrig hälsobakgrund hos äldre som skattat barndoms- och aktuella ADHD symtom. Undersökningsgruppen i denna studie var densamma som i delstudie II och III. Som metod användes Barkley skalorna och en klinisk intervju. Här gjordes även fördjupade intervjuer med några personer som diagnostiserats med ADHD på äldre dar för att visa hur ADHD kan påverka ett livslopp. Vårt huvudfynd var att personer som skattat mer barndoms- ADHD symtom också rapporterar mer problem i dagligt fungerande inom de flesta områden under hela livsloppet samt även mer av psykiatriska problem.

Den kliniska betydelsen av våra fynd gör gällande att upplevda problem i barndomen samt yrkeshistorik kan vara kritiska frågeområden när man ska identifiera en eventuell bakgrund med barndoms ADHD hos äldre. Rapporterade aktuella minnessvårigheter bland de

som hade högre poäng på WURS kan även reflektera livslånga exekutiva svårigheter samt bristande uppmärksamhetsfunktion snarare än åldersrelaterade minnessvårigheter. I ett differentialdiagnostiskt perspektiv ställer vår hypotes krav på att utveckla en metodik för att bättre kunna differentiera ADHD från andra psykiatriska eller demenstillstånd hos äldre. .

Den kliniska betydelsen av våra fynd måste dock utvärderas närmare då vi inte helt säkert känner till i vilken omfattning personer i vår studies åldersgrupp som faktiskt uppfylla kriterierna för ADHD. Våra fynd talar dock för att retrospektivt självskattade barndoms ADHD symtom kan tillföra väsentlig information om man söker metoder för att förstå symptom som är förenliga med ADHD ur ett livsloppsperspektiv. Ett fynd som kan vara kliniskt betydelsefullt är att medelpoängen för WRASS i vår undergrupp var så hög som 72.3. bland de som hade 36 eller fler poäng på WURS. En hög WURS poäng, baserad på retrospektiva rapporter om fungerandet i barndomen verkar alltså vara förenlig med symptom är relaterade till ADHD även under senare delen av vuxenlivet. I detta avseende ger våra resultat stöd till den aktuell kliniska svensk cut-off poängen på 70 för WRASS-skalan.

Upplevda problem i barndomen i allmänhet och subjektivt upplevd sämre aktuell hälsa och minne är utifrån våra resultat också relaterade till antalet rapporterade ADHD symptom, vilket kan vara kliniskt avgörande när man söker identifiera eventuell ADHD historik hos äldre. I ett differentialdiagnostiskt perspektiv aktualiseras också frågor om hur vi kan differentiera ADHD hos äldre från depression, möjlig demens eller andra psykiatriska tillstånd som kan ha likheter med ADHD symptomen.

En annan viktig aspekt för att kunna identifiera ADHD problematik hos äldre är det faktum att andelen äldre ökar kraftigt över hela världen. I Sverige där vår studie genomfördes förväntas 25% av befolkningen vara 65 år eller äldre år 2060. Detta faktum gör det till en verklig utmaning för hälso- och sjukvården att uppmärksamma ADHD i ett äldre- och livsloppsperspektiv. Våra resultat ger argument för att en ADHD utredning ska övervägas

oberoende patientens ålder då många riskerar ett fortsatt lidande på grund av ADHD utan tillgång till adekvat kunskap om sig själva och därmed till orsakerna för sina upplevda svårigheter vilka skulle kunna behandlas om de fick tillgång till professionell hjälp.

**En generell slutsats och rekommendation från avhandlingsprojektet är** att fortsatta studier av ADHD fordrar ett livsloppsperspektiv, i synnerhet om vi bättre ska kunna förstå ADHD symtom hos de äldre. Den fortsatta forskningen bör även inriktas på att systematiskt utvärdera faktorer och behandlingsåtgärder som kan minimera de negativa effekterna av ADHD problem under hela livsloppet.

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Taina Guldborg-Kjär  
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# CONTENTS

Preface

Abbreviations

Sammanfattning på svenska (Swedish summary)

Acknowledgements

|  |    |
|--|----|
| <b>Background and introduction</b> .....                               | 1  |
| Conceptual and diagnostic history of ADHD .....                        | 3  |
| Diagnostic criteria .....  | 12 |
| DSM IV .....   | 12 |
| DSM-5 .....  | 14 |
| ICD-10 .....   | 15 |
| ICD-11 .....   | 17 |
| Utah criteria .....  | 18 |
| Barkley's executive functions and self-regulation theory of ADHD ..... | 18 |
| Prevalence of ADHD .....   | 20 |
| ADHD in a life span perspective .....                                  | 22 |
| <b>Aims</b> .....  | 23 |
| <b>Methods</b> .....   | 24 |
| Participants .....   | 24 |
| Study I  |    |
| Study II   |    |
| Study III  |    |
| Study IV   |    |
| Instruments .....  | 27 |
| Procedure .....  | 41 |
| <b>Results</b> .....   | 43 |
| Study I  |    |
| Study II   |    |
| Study III  |    |
| Study IV   |    |
| Cases  |    |
| <b>Discussion</b> .....  | 79 |
| <b>Challenges in future research</b> .....                             | 91 |
| <b>Conclusions and clinical implications</b> .....                     | 92 |
| <b>References</b> .....  | 96 |
| <b>Appendix</b>  |    |
| Study I  |    |
| Study II   |    |
| Study III  |    |
| Study IV   |    |



## **BACKGROUND AND INTRODUCTION**

Attention deficit hyperactivity disorder (ADHD) is characterized by symptoms of impulsivity, distractability, and impaired concentration. ADHD is associated with significant functional and emotional impairment and considered as the most common psychiatric disorder in childhood (Biederman and Faraone, 2006; Faraone, Biederman, and Mick, 2006; Polanczyk, de Lima, Horta, Biederman, and Rohde, 2007; Wender, Wolf, and Wasserstein, 2001) affecting 3% to 7% of school-aged children. The heritable component of ADHD is well established. Based on twin studies it is estimated that about 70-80% of ADHD symptoms can be accounted for by genetic factors (Plomp, Van Engeland, and Durston, 2009; Purper-Ouakil, Ramoz, Lepagnol-Bestel, Gorwood, and Simonneau, 2011). ADHD has shown to be amongst the most impairing disorders, affecting multiple daily domains, including educational and occupational achievements, family functioning, peer and social relationships and health (Barbaresi, Colligan, Weaver, Voigt, Killian, and Katusic, 2013). Research has documented its persistence into adulthood by showing that about 50% of children diagnosed with ADHD retain symptoms into adulthood (Arolt, 2008; Barkley, Fischer, Smallish, and Fletcher, 2002; Lara, Fayyad, de Graaf, Kessler, Aguilar-Gaxiola, Angermeyer, Demyttenaere, de Girolamo, Haro, Jin, Karam, Lépine, Medina Mora, Ormel, Posada-Villa, and Sampson, 2009; Merikangas, He, Burstein, Swanson, Avenevoli, Cui, Benjet, Georgiades, and Swendsen, 2010; Okie, 2006) with estimated prevalence of adult ADHD being marginally lower at 4.4%.

ADHD in adulthood is known today to have a continued adverse impact on nearly all major life activities (Barbaresi et al., 2013; Barkley, 2002; Bernardi, Faraone, Cortese, Kerridge, Pallanti, Wang, and Blanco, 2011; Biederman, Petty, Clarke, Lomedico, and Faraone, 2011; Brook, Brook, Zhang, Seltzer, and Finch, 2013; Kessler, Adler, Ames, Barkley, Birnbaum, Greenberg, Johnston, Spencer, and Ustün, 2005b; Mordre, Groholt, Kjelsberg, Sandstad, and Myhre, 2011; Simon, Czobor, Bálint, Mészáros, and Bitter, 2009).

The functional impairments associated with ADHD in adults include various aspects of daily functioning, including education, work performance, social relationships, low conscientiousness in personality (a predictor of shorter life expectancy), accidental injuries, obesity, greater risk for smoking, substance dependence/abuse, higher crime rates, driving accidents, marital dissatisfaction and health-related conditions (Adamou, Arif, Asherson, Aw, Bolea, Coghill, Guðjónsson, Halmøy, Hodgkins, Müller, Pitts, Trakoli, Williams, and Young, 2013; Barkley, Murphy, and Fischer, 2008; Guðjónsson, Wells, and Young, 2012; Knapp, King, Healey, and Thomas, 2011; Mannuzza, Klein, and Moulton III, 2008; Moyá, Stringaris, Asherson, Sandberg, and Taylor, 2012; Ramos Olazagasti, Klein, Mannuzza, Roizen Belsky, Hutchison, Lashua-Shriftman, and Castellanos, 2013). Interestingly, a recent study indicates that adults with ADHD may underestimate the extent of their ADHD-related impairments (Manor, Vurembrandt, Rozen, Gevah, Weizman, and Zalsman, 2012)

In addition to overlapping neurodevelopmental disorders, coexisting psychiatric disorders are shown to be rather a rule than the exception in children and adults with ADHD (Barkley, Murphy, and Fischer, 2008; Sobanski, 2006; Sobanski, Brüggemann, Alm, Kern, Philipsen, Schmalzried, Heßlinger, Waschkowski, and Marcella Rietschel, 2008). Major comorbid disorders associated with adult ADHD are described in recent research in terms of a myriad of coexisting conditions such as compromised impulse- control, personality disorders, anxiety, mood disturbances, substance use, learning problems, eating and sleep disorders overlapping with adult ADHD (Barkley et al., 2008; Cumyn, French, and Hechtman, 2009; Kooij, Huss, Asherson, Akehurst, Beusterien, French, Sasané, and Hodgkins, 2012). ADHD is a complex syndrome with developmental impairments in executive functions (Barkley, 2012a,b; Brown, 2013). Although the impairments related to ADHD are variable, they seem to be chronic, and interfere significantly with functioning in many aspects of the daily life (Barkley, 2012a; Brown, 2013; Goldstein, and Teeter, 2002).

## *Conceptual and diagnostic history of ADHD*

It can be assumed that, the restless, overactive and fidgety children who stand out from their peers always have existed. An analysis of the historical literature in the last 200 years suggests that children presenting with symptoms of inattention, hyperactivity, and impulsivity are previously been described by several authors (Lange, Reichl, Lange, Tucha, & Tucha, 2010). The clinical characterizations, underlying concepts, and nomenclature of the described dysfunctions, however, have varied considerable over time (see Table 1). Many of the historical descriptions are consistent with the modern diagnostic criteria for ADHD (Lange, et al., 2010). The contemporary concept of attention deficit hyperactivity disorder (ADHD) as defined in the DSM-IV TR or in the latest DSM edition, DSM-5 (American Psychiatric Association, 2000, 2013a,b) are relatively new.

In a recent article by Barkley and Peters (Barkley and Peters, 2012) the authors argue that the earliest reference to the syndrome known today as attention deficit hyperactivity disorder, or ADHD occurs in a medical textbook dating from 1775 by the German physician, Melchior Adam Weikard. Their article comments on the discovery in the English translation of a short chapter describing attention disorders and why this should be viewed as relevant to the history of ADHD.

Among the recognized early descriptions of attention problems that nowadays could be associated with ADHD is Sir Alexander Crichton's book "On attention, and its diseases" where the second chapter is of special interest (Crichton, 1798). Here, Crichton defines two variants of abnormal inattention as "the oppositional poles of pathologically increased or decreased sensibility of the nerves" (Crichton, 1798), firstly "The incapacity of attending with a necessary degree of constancy to any one object, secondly a total suspension of its effects on the brain." "The incapacity of attending with a necessary degree of constancy to any one

object, almost always arises from an unnatural or morbid sensibility of the nerves, by which means this faculty is incessantly withdrawn from one impression to another. It may be either born with a person, or it may be the effect of accidental diseases. When born with a person it becomes evident that at a very early period of life, and has a very bad effect, inasmuch as it renders him incapable of education. But it seldom is in so great a degree as totally to impede all instruction; and what is very fortunate, it is generally diminished with age” (Crichton, 1798, reprint p.203). In his short description, Crichton gives several indications that he was depicting the same disorder as defined in the current DSM-IV-TR criteria of ADHD (Lange, et al., 2010). A description of ADHD being a disorder of childhood and affected children ”grown out” of this disorder during puberty (Okie, 2006) was common until the 1990s (Barkley, 2006a.) . Recent studies have, however, shown that about 50 % of children diagnosed with ADHD retain symptoms of ADHD into adulthood (Arolt, 2008; Lara, et al., 2009; Merikangas, et al., 2010; Okie, 2006). The notion made by Crichton that the “incapacity of attending”, if not innate, can be caused by nervous disorders was later rediscovered in the concepts of minimal brain damage or dysfunction. Crichton’s descriptions do not entirely reflect the current concept of ADHD (Lange, et al., 2010), i.e. he does not mention any symptoms of hyperactivity (Palmer and Finger, 2001; Lange et al., 2010). It is also possible that he described the inattentive subtype of ADHD (Palmer and Finger, 2001). Crichton’s patients might also have suffered from another disorder associated with attention problems, such as a metabolic dysfunction, epilepsy, or head injury (Lange, et al., 2010). Crichton’s descriptions provide, however, some evidence for the existence of ADHD at the end of the nineteenth century.

In 1844, the German physician Heinrich Hoffman created some illustrated children’s stories including ”Fidgety Phil” (Zappelphilipp”), nowadays a popular allegory for children with ADHD (Hoffmann, 1846). In the story of ”Fidgety Phil”, Hoffmann illustrates a family

conflict at dinner caused by fidgety behaviour of the son, and his falling over together with the food on the table. This can be interpreted as an early case of ADHD (Lange et al., 2010). Another relevant story in Hoffmanns "Struwwelpeter" (Hoffmann, 1846) is that of "Johnny Look-in-the-air", which was added in the 5th edition in 1847 (Seidler, 2004; Lange et al., 2010) where Hoffmann describes a boy showing significant symptoms of inattention. Some authors are convinced that the stories of Johnny Look-in-the-air and Fidgety Phil are early descriptions of ADHD (Burd and Kerbeshian, 1988; Thome and Jacobs, 2004). Since at his time the symptoms of inattention and hyperactivity were not established as a psychiatric disorder, Hoffmann may have presented observations of conspicuous behaviour without considering describing a disorder (Lange, et al., 2010). One cannot conclude whether or not Hoffmann described a case of ADHD in the early nineteenth century, since the story of Fidgety Phil is too short and the described behavioural features insufficient to establish the diagnostic criteria of ADHD (Lange, et al., 2010). Fidgety Phil has nevertheless become a commonly used illustration of a child with ADHD.

The Goulstonian Lectures "On Some Abnormal Psychical Conditions in Children" (a series of three lectures to the Royal College of Physicians of London) of Sir George Frederic Still in 1902 (Still, 1902) are by many authors considered to be the scientific starting point of the history of ADHD (Barkley, 2006a; Conners, 2000; Palmer and Finger, 2001; Rafalovich, 2001; Rothenberger and Neumärker, 2005). Many of the Still's descriptions appear to indicate that children in the early twentieth century showed clear symptoms of ADHD. However, most of the symptoms listed by Still and described in his cases do not refer to ADHD (Lange, et al., 2010). Still's concept of a "defect of moral control" is not consistent with the concept of ADHD, since he did not predominantly refer to inattentive-impulsive children, but rather described several types of deviant behaviour observed in children (Lange et al., 2010). Still's work, nevertheless, "represents a break from the more general medical discussions of

morality” (Rafalovich, 2001) and his original notion of an impulsive syndrome different from general intellectual retardation and symptoms caused by physical diseases is pioneering (Conners, 2000). Still’s work can be considered ”the groundwork for a category of mental illness that is (...) specific to child deviance” (Rafalovich, 2001) and a historically important moment for child psychopathology in general (Barkley, 2006b). Regardless of whether or not Still’s descriptions include some cases of ADHD, his work is nevertheless important in the analysis of historical ideas concerning ADHD, and his demonstration of a connection between brain damage and deviant behaviour in children was highly influential in moulding the further conceptualization of ADHD (Lange, et al., 2010).

Some authors including Tredgold in 1908 gave an account of a correlation between early brain damage, for example caused by birth defect of perinatal anoxia, and subsequent behaviour problems or learning difficulties (Tredgold, 1908). This was confirmed by the encephalitis lethargica epidemic, which spread around the world from 1917 to 1928 and affected approximately 20 million people (Lange et al., 2010; Conners, 2000; Rafalovich, 2001). The residual effects of encephalitis, showed remarkably abnormal behaviour and were described as ”postencephalitic behavior disorder” (Barkley, 2006a; Rothenberger and Neumärker, 2005). Many children with this disorder include some characteristic symptoms of ADHD, and some behaviour of postencephalitic cases might also be attributed to ADHD (Barkley, 2006a; Rothenberger and Neumärker, 2005). The assumption of a causal connection between brain damage and symptoms of hyperactivity and distractibility was important to the further conceptualization of ADHD (Rafalovich, 2001; Rothenberger and Neumärker, 2005).

In 1932, the German physicians Franz Kramer and Hans Pollnow reported ”On a hyperkinetic disease of infancy” (”Über eine hyperkinetische Erkrankung im Kindesalter”) (Kramer and Pollnow, 1932). Kramer and Pollnow described that the characteristics of the disorder, especially the motor restlessness, would decline in intensity by the age of seven, and

in most cases, the children would recover in the subsequent years (Kramer and Pollnow, 1932), leading Kramer and Pollnow to consider the disorder as a "hyperkinesis of childhood" (Kramer and Pollnow, 1932). The descriptions of Kramer and Pollnow "on a hyperkinetic disease of infancy" meet all three main symptoms of ADHD and two additional DSM-IV-TR criteria, thus establishing a concept of the hyperkinetic disease that closely resembles the current concept of ADHD (Lange, et al., 2010).

Following the lectures of Still in 1902, the assumptions of Tredgold in 1908, and the reports of the epidemic encephalitis from 1917 to 1928, several cases of children with behaviour disorders were described as suffering from "gross lesions of the brain and a variety of acute diseases, conditions, and injuries that presumably had resulted in brain damage" (Ross and Ross, 1976, p.15). Research in the 1930s and 1940s thus, supported the idea of a causal connection between brain damage and deviant behaviour (Ross and Ross, 1976). The notion of a physiological explanation of behaviour disorders was at this time remarkable (Rothenberger and Neumärker, 2005) and led to the concept of "brain damage" (Kessler, 1980). This new concept was characterized by the assumption that minimal damage to the brain, even when it cannot be demonstrated objectively, would be the explanation behind the hyperactive behaviour (Barkley, 2006a; Ross and Ross, 1976) and, in turn, "that even when brain damage could not be demonstrated it could be presumed to be present" (Ross and Ross, 1976, p.16). Most symptoms described in the context of minimal brain damage meet the current DSM criteria, and the concept of minimal brain damage can be regarded as historical antecedent to ADHD (Lange, et al., 2010).

In the 1960s many critics challenged the argument that every child presenting with abnormal behaviour was to have minimal brain damage, even if this could neurologically not be demonstrated (Birch, 1964; Rapin, 1964). Laufer and his colleagues (1957) regarded it as a problem that there were "children who present the hyperkinetic impulse disorder without

having any of the classic etiologic traumatic or infectious factors in their historical backgrounds” (Denhoff, Laufer, and Solomons, 1957). In their study, Laufer and his colleagues found that ”children with the hyperkinetic impulse disorder, regardless of whether or not their history contains clear-cut evidence of any agent causing injury to the central nervous system” (Denhoff, et al., 1957) had a lower threshold for clinical responses in EEG to the administration of metrazol than children without the hyperkinetic syndrome. Interestingly, however, following the administration of amphetamines the threshold was similar to that of children without evidence of the syndrome (Denhoff, et al., 1957). Laufer and his colleagues’ results suggested a functional disturbance rather than damage to the brain as the cause of the characteristic syndrome (Denhoff, et al., 1957; Conners, 2000). The Oxford International Study Group of Child Neurology therefore proposed a shift in terminology by replacing the term ”minimal brain damage” by ”minimal brain dysfunction” (Ross and Ross, 1976; Rothenberger and Neumärker, 2005). The assignment of children with minimal brain dysfunction to the normal range of intelligence and therefore the differentiation from ”the brain-damaged mentally subnormal groups” was established (Clements, 1966, p.9). Although the concept of minimal brain dysfunction persisted until the 1980s its decline began already in the 1960s when severe critiques arose (Rothenberger and Neumärker, 2005) arguing that the presence of neurodevelopmental abnormalities were non-specific and also common in other psychiatric disorders (Conners, 2000). Minimal brain dysfunction concept was also criticized as too general and heterogeneous (Barkley, 2006a; Rothenberger and Neumärker, 2005). In 1968, a definition of the concept of hyperactivity was incorporated in the official diagnostic concepts, i.e. the second edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-II) labelling this concept ”Hyperkinetic Reaction of Childhood” (Barkley, 2006a; Volkmar, 2003).



In the 1970s, the predominant focus on hyperactivity was shifted toward an emphasis on the attention deficit in affected children (Rothenberger and Neumärker, 2005). "In 1980, the importance of attentional problems in the syndrome was recognized – and perhaps exaggerated - by the adoption of a new diagnostic label" (Douglas, 1984). With the publication of DSM-III in 1980, the American Psychiatric Association renamed the disorder "Attention Deficit Disorder (ADD) (with or without hyperactivity)" (Barkley, 2006a; Rothenberger and Neumärker, 2005). Subsequently, DSM-III at that time departed from the "International Classification of Diseases (ICD-9) by the World Health Organization, which continued to focus on hyperactivity as indicator of the disorder. DSM-III also developed three separate symptom lists for attention, impulsivity, and hyperactivity, which were far more specific than previous ones (Barkley, 2006a). In addition, DSM-III introduced "an explicit numerical cut-off score for symptoms, specific guidelines for age of onset and duration of symptoms, and the requirement of exclusion of other childhood psychiatric conditions" (Barkley, 2006a, pp.19f.) The discussion regarding the importance of certain symptoms continued, and the creation of subtypes of ADD on the basis of the presence or absence of hyperactivity was discussed controversially (Barkley, 2006a). It was not evident if the attention deficit of the subtype of ADD without hyperactivity was qualitatively similar to that of the subtype with hyperactivity, or if the two types should be considered as two separate psychiatric disorders (Barkley, 2006a). In order to further improve the criteria, the revision of the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R) in 1987 removed the concept of two subtypes and again renamed the disorder "Attention deficit-Hyperactivity Disorder (ADHD)". The symptoms of inattention, impulsivity, and hyperactivity were now combined into a single list of symptoms with a single cut-off score. The symptoms were empirically derived by rating scales and from a field trial (Barkley, 2006a; Conners, 2000). The subtype "ADD without hyperactivity" was removed and assigned

to a residual category named "undifferentiated ADD" (Rothenberger and Neumärker, 2005). In addition to the reorganization of the concept of ADD, several studies examined the existence of subtypes of ADD at the end of the 1980s (Barkley, 2006a). In addition, historical interpretations of brain damage or dysfunction were supported by the evidence of structural abnormalities in the brain of children with ADHD as shown with new neuroimaging techniques (Barkley, 2006a). Further research also found a genetic component of this disorder (Biederman, Faraone, Keenan, Knee, and Tsuang, 1990). As early as in the 1970's, research was showing that parents of hyperactive children were themselves likely to have been hyperactive and to suffer in adulthood from sociopathy, hysteria, and alcoholism (Cantwell, 1975; Morrison and Stewart, 1973). Later research has confirmed this familial association of hyperactivity in which the biological parents of children with ADHD also were abnormal in their attention, impulse control, and activity levels (Alberts-Corush, Firestone, and Goodman, 1986). That children with ADHD symptoms were likely to have parents with ADHD symptoms implied logically that ADHD could therefore exist in adults. In the 1990s it was finally recognized that ADHD was not exclusively a childhood disorder, disappearing with age as was previously thought, but rather a chronic, persistent disorder remaining into adulthood in many cases (Barkley, 2006a). The persistence of ADHD into adulthood is, however, even today very much dependent on the source of information and the diagnostic criteria used (Barkley et al., 2008).

In DSM-IV the previously heterogeneous category of ADHD according to DSM-III-R was consequently subdivided into three sub-types ( Lahey, Applegate, McBurnett, Biederman, Greenhill, Hynd, et al.1994), i.e. a predominantly inattentive type, a predominantly hyperactive-impulsive type, and a combined type with symptoms of both dimensions (American Psychiatric Association, 1994). The American Psychiatric Association accredited the diagnosis of ADHD in adulthood by including examples of workplace

difficulties in the descriptions of symptoms. "Based on a much larger field trial than any of their predecessors, the DSM-IV criteria for ADHD are the most empirically based in the history of this disorder" (Barkley, 2006a).

DSM-IV and ICD-10 have adopted almost identical criteria for the identification of inattentive, hyperactive, and impulsive symptoms. However, significant differences are still evident in the number of criteria in each domain required for a diagnosis, the importance of inattention and the handling of co-morbidity (Lange, et al., 2010). In comparison with DSM-IV, ICD-10 is more demanding about cross-situational pervasiveness and requires that all necessary criteria be present, both at home and at school or other situations (Lange, et al., 2010). The World Health Organization is currently revising the International Classification of Diseases and the ICD-11 and the revision is scheduled to be released in 2015.

To bridge the gap between DSM-IV and DSM-5, a text revision of the former was undertaken in 2000 (American Psychiatric Association, 2000). The main goals in this revision were to "maintain the currency of the DSM-IV text" (American Psychiatric Association, 2000) and to correct any errors identified in the DSM-IV text. The definition of ADHD has however not been changed. Critics have also called for a validation of ADHD in adults (Fischer and Barkley, 2007; McGough and Barkley, 2004). In the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5), published recently in May 2013 the definition of attention-deficit/hyperactivity disorder (ADHD) has been updated to more adequately characterize adults with ADHD. By adapting criteria for adults, DSM-5 aims to ensure that children with ADHD can continue to get care throughout their lives if needed.

Table 1. Conceptual and Diagnostic History of ADHD

| Year                   | Author                      | Concept/Diagnosis   |
|------------------------|-----------------------------|---|
| 1770                   | Melchior Adam Weikard       | First description of attention disorder in medical literature: "bacchanal", "flighty", "careless", and "mercurial".     |
| 1798                   | Sir Alexander Crichton      | "On Attention and its Diseases" - The incapacity of attending with a necessary degree of consistency to any one object. |
| 1844                   | Heinrich Hoffmann           | Fidgety Phil ("Zappelphillipp") in "Struwwelpeter".   |
| 1902                   | Sir George Frederic Still   | Defect of Moral control, The Goulstonian lectures.  |
| 1908                   | Tredgold et al              | Postencephalitic behavior disorder.   |
| 1932                   | Franz Kramer & Hans Pollnow | Hyperkinetic disorder of infancy.   |
| 1930s and 1940s        |                             | Minimal brain damage.   |
| 1960s                  |                             | Minimal brain dysfunction.  |
|                        |                             |   |
| <b>DSM</b>             |                             |   |
| 1968                   | DSM-II                      | Hyperkinetic reaction of childhood.   |
| 1980                   | DSM-III                     | Attention deficit disorder: with and without hyperactivity.   |
| 1987                   | DSM-III, revision           | Attention deficit hyperactivity disorder.   |
| 1994                   | DSM-IV                      | Attention deficit hyperactivity disorder.   |
| 2000                   | DSM-IV-TR                   | Attention deficit hyperactivity disorder.   |
| 2013                   | DSM-5                       | Attention deficit hyperactivity disorder.   |
|                        |                             |   |
| <b>ICD</b>             |                             |   |
| 1992                   | ICD-10                      | Hyperkinetic disorder.  |
| Scheduled release 2015 | ICD-11                      | Hyperkinetic disorder.  |

*Diagnostic criteria*

*DSM-IV-TR*

The diagnostic criteria for ADHD according DSM-IV used in the studies in this thesis are listed below in Table 2.

Table 2. DSM-IV Criteria for ADHD.

| <b>I. Either A or B:</b>  |  |
|---|--|
| <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:</b>                                |  |
| <i>Inattention</i>  |  |
| 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 give close attention to details or makes careless mistakes in schoolwork, work, or other activities.  |
| 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>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:</b> |  |
| <i>Hyperactivity</i>  |  |
| 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.   |
| <i>Impulsivity</i>  |  |
| 1.  | Often blurts out answers before questions have been finished.  |
| 2.  | Often has trouble waiting one's turn.  |
| 3.  | Often interrupts or intrudes on others (e.g., butts into conversations or games).  |
| <b>II.</b>  | <b>Some symptoms that cause impairment were present before age 7 years.</b>  |
| <b>III.</b>   | <b>Some impairment from the symptoms is present in two or more settings (e.g. at school/work and at home).</b>   |

|  |  |
|--|--|
| <b>IV.</b>   | <b>There must be clear evidence of clinically significant impairment in social, school, or work functioning.</b>   |
| <b>V.</b>  | <b>The symptoms do not happen only during the course of a Pervasive Development 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).</b> |
| Based on these criteria, three types of ADHD are identified:   |  |
| <b>IA.</b>   | ADHD, <i>Combined Type</i> : if both criteria IA and IB are met for the past 6 months.   |
| <b>IB.</b>   | ADHD, <i>Predominantly Inattentive Type</i> : if criterion IA is met but criterion IB is not met for the past six months.  |
| <b>IC.</b>   | ADHD, <i>Predominantly Hyperactive-Impulsive Type</i> : if Criterion IB is met but Criterion IA is not met for the past six months.  |
| <i>(American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision. Washington, DC, American Psychiatric Association, 2000.)</i> |  |

#### DSM-5

The diagnostic criteria for attention-deficit/hyperactivity disorder (ADHD) in DSM-5 are similar to those in DSM-IV. The same 18 symptoms are used as in DSM-IV, and continue to be divided into two symptom domains (inattention and hyperactivity/impulsivity), of which at least six symptoms in one domain are required for diagnosis. However, several changes have been made in DSM-5.

*Changes in DSM-5 (adapted from DSM-5 Attention Deficit/Hyperactivity Disorder Fact Sheet, APA, 2013):*

- 1) examples have been added to the criterion items to facilitate application across the life span
- 2) the cross-situational requirement has been strengthened to “several” symptoms in each setting

- 3) the onset criterion has been changed from “symptoms that caused impairment were present before age 7 years” to “several inattentive or hyperactive-impulsive symptoms were present prior to age 12”
- 4) subtypes have been replaced with presentation specifiers that map directly to the prior subtypes
- 5) a comorbid diagnosis with autism spectrum disorder is now allowed
- 6) a symptom threshold change has been made for adults, to reflect their substantial evidence of clinically significant ADHD impairment, with the cutoff for ADHD of five symptoms, instead of six required for younger persons, both for inattention and for hyperactivity and impulsivity.
- 7) ADHD was placed in the neurodevelopmental disorders chapter to reflect brain developmental correlates with ADHD and the DSM-5 decision to eliminate the DSM-IV chapter that includes all diagnoses usually first made in infancy, childhood, or adolescence.

In light of the research findings that ADHD does not fade at a specific age, DSM-5 makes a special effort to address adults affected by ADHD to ensure that they are able to get care when needed. (American Psychiatric Association, 2013)

### *ICD-10*

The current diagnostic criteria for Hyperkinetic Disorder according ICD-10 are listed below in Table 3.

Table 3. ICD- Criteria for Hyperkinetic disorder.

**Hyperkinetic disorder (HKD) as defined by the Diagnostic Criteria for Research for mental and behavioural disorders of the tenth edition of the International Classification of Disease (ICD-10; World Health Organization, 1992).**

**F90 – F98 BEHAVIOURAL AND EMOTIONAL DISORDERS WITH ONSET USUALLY OCCURRING IN CHILDHOOD AND ADOLESCENCE**

**F90 HYPERKINETIC DISORDERS**

**Note:** The research diagnosis of hyperkinetic disorder requires the definite presence of abnormal levels of inattention and restlessness that are pervasive across situations and persistent over time, that can be demonstrated by direct observation, and that are not caused by other disorders such as autism or affective disorders.

Eventually, assessment instruments should develop to the point where it is possible to take a quantitative cut-off score on reliable valid and standardized measures of hyperactive behavior in the home and classroom, corresponding to the 95th percentile on both measures. Such criteria would then replace G1 and G2 below.

**G1. Demonstrable abnormality of attention, activity and impulsivity at home, for the age and developmental level of the child, as evidenced by (1), (2) and (3):**

|            |  |
|------------|--|
| <b>(1)</b> | <i>at least three of the following attention problems:</i>   |
| (a)        | short duration of spontaneous activities;  |
| (b)        | often leaving play activities unfinished;  |
| (c)        | over-frequent changes between activities;  |
| (d)        | undue lack of persistence at tasks set by adults;  |
| (e)        | unduly high distractibility during study e.g. homework or reading assignment.                                      |
| <b>(2)</b> | <i>plus at least three of the following activity problems:</i>   |
| (a)        | very often runs about or climbs excessively in situations where it is inappropriate; seems unable to remain still; |
| (b)        | markedly excessive fidgeting & wriggling during spontaneous activities;  |
| (c)        | markedly excessive activity in situations expecting relative stillness (e.g. mealtimes, travel, visiting, church); |
| (d)        | often leaves seat in classroom or other situations when remaining seated is expected;                              |
| (e)        | often has difficulty playing quietly.  |
| <b>(3)</b> | <i>plus at least one of the following impulsivity problems:</i>  |
| (a)        | often has difficulty awaiting turns in games or group situations;  |
| (b)        | often interrupts or intrudes on others (e.g. butts in to others' conversations or games);                          |
| (c)        | often blurts out answers to questions before questions have been completed.  |

**G2. Demonstrable abnormality of attention and activity at school or nursery (if applicable), for the age and developmental level of the child, as evidenced by both (1) and (2):**

|            |  |
|------------|--|
| <b>(1)</b> | <i>at least two of the following attention problems:</i>                     |
| (a)        | undue lack of persistence at tasks;  |
| (b)        | unduly high distractibility, i.e. often orienting towards extrinsic stimuli; |
| (c)        | over-frequent changes between activities when choice is allowed;             |
| (d)        | excessively short duration of play activities.                               |



|  |   |
|--|---|
| <b>(2)</b>   | <i>and by at least three of the following activity problems:</i>  |
| <b>(a)</b>   | continuous (or almost continuous) and excessive motor restlessness (running, jumping, etc.) in situations allowing free activity;   |
| <b>(b)</b>   | markedly excessive fidgeting and wriggling in structured situations;  |
| <b>(c)</b>   | excessive levels of off-task activity during tasks;   |
| <b>(d)</b>   | unduly often out of seat when required to be sitting;   |
| <b>(e)</b>   | often has difficulty playing quietly.   |
| <b>G3. Directly observed abnormality of attention or activity. This must be excessive for the child's age and developmental level. The evidence may be any of the following:</b> |   |
| <b>(1)</b>   | direct observation of the criteria in G1 or G2 above, i.e. not solely the report of parent or teacher;  |
| <b>(2)</b>   | observation of abnormal levels of motor activity, or off-task behaviour, or lack of persistence in activities, in a setting outside home or school (e.g. clinic or laboratory);   |
| <b>(3)</b>   | significant impairment of performance on psychometric tests of attention.   |
| <b>G4. Does not meet criteria for pervasive developmental disorder (F84), mania (F30), depressive (F32) or anxiety disorder (F41).</b>   |   |
| <b>G5. Onset before the age of seven years.</b>  |   |
| <b>G6. Duration of at least six months.</b>  |   |
| <b>G7. IQ above 50.</b>  |   |
| <b>F90.0</b>   | Disturbance of activity and attention<br>The general criteria for hyperkinetic disorder (F90) must be met, but not those for conduct disorders (F91).   |
| <b>F90.1</b>   | Hyperkinetic conduct disorder.<br>Both the general criteria for hyperkinetic disorder (F90) and conduct disorder (F91) must be met.   |
| <b>F90.8</b>   | Other hyperkinetic disorders  |
| <b>F90.9</b>   | Hyperkinetic disorder, unspecified<br>This residual category is not recommended and should be used only when there is a lack of differentiation between F90.0 and F90.1 but the overall criteria for F90.- are fulfilled. |
| <i>(The ICD-10 Classification of Mental and Behavioural Disorders: clinical descriptions and diagnostic guidelines. Geneva, World Health Organization, 1992.)</i>                |   |

### ICD-11

The World Health Organization is currently revising the International Classification of Diseases to be released in 2015. New coding structure for ICD-11 is proposed. The proposed ICD-11 structure for Mental and Behavioural Disorders where ADHD is in category A:

Neurodevelopmental disorders under section 6; Attention Deficit Disorders (World Health Organization, 2013).

### *Utah criteria*

The Utah Criteria were developed by Paul Wender and collaborators to identify a homogeneous "core" of ADHD cases. These criteria require assessing both childhood and adult signs and symptoms, preferably using the subjects' parents to assess their childhood behaviour and a "significant other" to assess current symptoms. The criteria for a childhood history consistent with ADHD are defined by A or B: "

- A. *Narrow criteria.* The individual met DSM-IV criteria for ADHD in childhood (6 of the 9 signs or symptoms of inattention and/or 6 of the 9 signs or symptoms of hyperactivity/impulsivity).
- B. *Broad criteria.* The individual had a history of attention deficits and hyperactivity, and at least one of the following: behaviour problems in school, impulsivity, over-excitability, or temper outbursts. The patient also had a "Parent Rating Scale" or Wender Utah Rating Scale" score in 95th percentile.

The adult criteria are at least moderate impairment including both motor hyperactivity and attentional difficulties, plus at least two of the following characteristics: affective lability, inability to complete tasks/disorganization, hot temper, emotional overreactivity/stress intolerance, and impulsivity" in (Reimherr, Hedges, Strong, Marchant, and Williams, 2005).

### *Barkley's executive functions and self-regulation theory of ADHD*

Russell Barkley (Barkley, 1997; Barkley, 2010; Barkley, 2012a) has for a long time developed and advocated for a theoretic framework for ADHD where executive functions and self-regulation constitute the core nature of ADHD. Barkley defines executive functioning as

follows: “ *Executive Functioning is the use of self-directed actions (self- regulation) to choose goals, and to select, enact, and sustain actions across time toward those goals, usually in the context of others and often relying on social and cultural means. This is done for the maximization of one’s longer-term welfare as the person defines that to be* ”(Barkley, 2012a).

Barkley refers to emotion regulation as a major component in his theory of ADHD. Barkley presents following six executive functions in his theory of ADHD (Barkley, 1997; Barkley, 2010; Barkley, 2012a): self-awareness, inhibition, nonverbal and verbal working memory, emotional inhibition and self-regulation, planning and problem-solving. Barkley (Barkley, 2012a; Barkley, 2012b) discusses how these six cognitive or instrumental executive functions extend outward into the social ecology of the individual to affect their activities in major domains of daily life. He refers to this as the executive functions extended phenotype and that they at that level help contribute to the five dimensions of executive functions in daily life assessed by his rating scale of executive functions (Barkley, 2012a; Barkley, 2012b). The five dimensions of executive functions in daily life described by Barkley:

- Self-management to time: Consideration of future consequences including those related to strong emotions.
- Self-organization and problem-solving: Self-distraction, down-regulation of emotions, using self-imagery and speech.
- Self-motivation: Substituting positive goal-supporting emotions for negative goal-destructive ones.
- Self-restraint (Inhibition): Cognitive, behavioral, verbal, emotional.
- Self-regulation of emotion.

Barkley (Barkley, 2012a) argues that these dimensions contribute to two other higher levels of executive functions that comprise human reciprocity and then cooperation.

Recent research supports the assertion that deficient emotional self-regulation (DESR) is prevalent among patients with ADHD (Surman, Biederman, Spencer, Yorks, Miller, Petty, and Faraone, 2011). Emotional impulsiveness (EI)/deficient emotional self-regulation (DESR) has been included in concepts of ADHD for 170 years (Barkley, 1997; Barkley, 2010; Barkley, 2012a; Barkley and Peters, 2012). In his description of attention disorder, 1770, Melchior Adam Weikard he uses words like "bacchanal", "flighty", "careless", and "mercurial" (Barkley and Peters, 2012). Alexander Crichton includes emotional frustration in his description of disorders of attention (Barkley, 2010; Crichton, 1798). George Still includes in 1902 emotional impulsiveness and poor regulation of emotions by "moral control" in his concepts of defective moral control of behavior (Barkley, 2010; Still, 1902). Concepts of MBD and the hyperactive child syndrome in 1960s included symptoms of EI/DESR (Barkley, 2010). In 1970, low frustration tolerance, quickness to anger and emotional excitability were included by Mark Stewart (Barkley, 2010; Stewart, 1970) in his description of the hyperactive child syndrome followed by Dennis Cantwell 1975 (Barkley, 1997; Barkley, 2012a; Barkley and Peters, 2012; Cantwell, 1975) who includes poor emotion regulation as a core feature of the hyperactive child syndrome. Paul Wender (1976) makes poor emotional control a core feature of his work on MBD in children and adults (Barkley, 2010; Wood, Reimherr, Wender, and Johnson, 1976). Something happens in 1968 when DSM-II does not note EI/DESR as a feature of ADHD and from that on, without any stated explanation for it EI/DESR stays out of DSM descriptions of ADHD while major problems related to EI/DESR continue among patients with ADHD (Barkley, 2010; Surman et al, 2011).

### *Prevalence of ADHD*

Although there is evidence that ADHD symptoms tend to decline with age significant levels of symptoms persist in most cases even if there is some decline in severity and some recovery

in a minority of cases (Asherson, Chen, Craddock, Taylor, 2007; Barkley et al., 2008; Faraone et al., 2006; Lara et al., 2009; Weiss Murray, 2003; Weiss, Murray, & Weiss, 2002). On the contrary there is considerable evidence that the vast majority of symptoms, especially inattention and impulsiveness, may persist and may frequently be associated with functional impairments (Asherson et al., 2007; Faraone et al., 2006; Lara et al., 2009). Recent research (Asherson et al., 2007; Biederman et al., 2011; Faraone et al., 2006; Lara et al., 2009; Merikangas et al., 2010; Simon et al., 2009) has documented the persistence of ADHD into adulthood. There have been discrepant results and large inconsistencies across studies concerning the persistence of ADHD ranging from an almost complete remission by early adulthood (Gittelman, Mannuzza, Shenker, and Bonagura, 1985; Mannuzza, Klein, Bessler, Malloy, and LaPadula, 1993) to 85% (Barkley et al., 2002; Biederman et al., 2011). The prevalence of adult ADHD has recently been estimated at 4% in two community-based epidemiological studies (Faraone et al., 2006; Kessler, Adler, Barkley, Biederman, Conners, Demler, Faraone, Greenhill, Howes, Secnik, Spencer, Ustün, Walters, and Zaslavsky, 2006). The first large-scale epidemiological community-based study found an estimated prevalence of adult ADHD to be 4.4% (Kessler, et al., 2006). Independent of exact prevalence rates ADHD is today anyhow assumed to be present throughout the entire lifespan.

The American Psychiatric Association estimates that 3% to 7% of school-aged children have ADHD (American Psychiatric Association, 2000). In a recent systematic review, the worldwide prevalence of childhood ADHD was estimated to be 5,29% (Polanczyk et al., 2007). A review by Polanczyk and Jensen (Polanczyk and Jensen, 2008) based on 71 studies conducted in all continents found a wide range of ADHD prevalence estimates in childhood and adolescence, ranging from as low as 0.2% to estimates as high as 27%. The large variability in prevalence rates seems to be mainly explained by methodological differences across studies (Polanczyk and Jensen, 2008). An age-dependent decline in ADHD symptoms

has been reported in earlier research, especially in symptoms of hyperactivity and impulsivity (Biederman, Mick, and Faraone, 2000; Faraone et al., 2006). Since the symptom criteria were originally based on children and adolescents and preferentially included boys more than girls there still may be major challenging difficulties assessing female children and all adults for ADHD by these criteria.

From a Swedish perspective there are three population-based childhood prevalence studies available (Gillberg, Rasmussen, Carlstrom, Svenson, and Waldenstrom, 1982; Kadesjö, 1998; Landgren, Pettersson, Kjellman, and Gillberg, 1996) using the conjunction of disorders of attention, motor control and perception (DAMP) as criteria with prevalence rates varying between 2.0 -7.1%. There is also a Swedish study using DSM-IV criteria that shows a prevalence of ADHD in about 25% among psychiatric outpatients (Nylander, Holmqvist, Gustafson, and Gillberg, 2009).

#### *ADHD in a life span perspective*

Clinical experience and recent research support the notion that ADHD can persist into adulthood (Brod, Schmitt, Goodwin, Hodgkins, and Niebler, 2011; da Silva and Louza, 2008; Guldborg-Kjar and Johansson, 2009; Guldborg-Kjär, Sehlin, and Johansson, 2013; Henry and Jones, 2011; Kooij, Buitelaar, van den Oord, Furer, Rijnders, and Hodiament, 2005; Manor, Rozen, Zemishlani, Weizman, and Zalsman, 2011; Matlen, 2008; Michielsen, Semeijn, Comijs, van de Ven, Beekman, Deeg, and Kooij, 2012; Seidman, 2006; Weiss, 2011; Wetzel and Burke, 2008).

Evidence that ADHD symptoms in many cases persist from childhood into adulthood, addresses the question of whether symptoms also remain into later life including old age. To our knowledge there are only two population-based studies that covers most of the adult life span (Kooij et al., 2005; Michielsen et al., 2012). Interestingly, in the Dutch study by Kooij

and co-investigators (Kooij et al., 2005), there were no significant age effects in the prevalence of ADHD from age 18 to 75 years. The prevalence estimate for childhood AD/HD in this study was 2.8%. This study estimated the ADHD prevalence in The Netherlands to be 1–2.5% among adults between 18 and 75 years of age, without any signs of decline in the older age groups. In a recent Dutch study (Michielsen et al., 2012) the prevalence of syndromatic ADHD in older adults (60-94 years) was found to be 2.8%, demonstrating that ADHD does not fade or disappear in the elderly.

## **AIMS**

### *Overall aim*

The overall aim of the thesis was to further examine the frequency with which elderly individuals report childhood and current symptoms that may indicate a history of ADHD. An additional aim was to investigate whether gender, age, marital status, number of employments, educational level, perceived problems in childhood, self-reported health and memory were significantly associated with childhood and current ADHD symptoms. Another aim was to compare various scales capturing ADHD symptoms in older individuals' self-reports about childhood and current ADHD symptomatology and to relate these results to the DSM-IV ADHD criteria. Finally, the aim was also to analyse daily functioning, past psychiatric history, family psychiatric history and overall health history in older individuals meeting criteria for late life ADHD.

- Study I: to explore the extent to which elderly individuals retrospectively report childhood ADHD symptoms.
- Study II: to specifically examine agreement between current and retrospectively recalled childhood ADHD symptoms across the lifespan by comparing self-

reports from a sample of older adults about current ADHD symptoms and the amount they experienced in childhood.

- Study III: to compare different scales capturing ADHD symptoms for older individuals' self-reports about childhood and current ADHD symptomatology. An additional aim was relating these results to the DSM-IV ADHD criteria.
- Study IV: to explore problems in daily functioning, past psychiatric history, family psychiatric history, and overall health history in elderly individuals reporting childhood and persistent ADHD symptomatology. An additional aim in Study IV was to present in more detail examples of life courses for individuals first identified with an ADHD history in late life.

## **METHODS**

### *Participants*

#### *Study Sample*

In Study I a population-based sample of 2500 persons in the age range 65 to 80 years old was randomly drawn in late August 2004 from the Hässleholm municipality population register. The register comprised a total of 6698 individuals (3534 women and 3164 men born between January 1<sup>st</sup> 1924 and the 29<sup>th</sup> of August 1939). The municipality of Hässleholm is located in southern Sweden. The geographical area includes the town of Hässleholm and its rural environs with a total of about 50 000 inhabitants.

Of the 2500 people (1318 females and 1182 males) randomly selected as a study sample, 1599 (830 females and 769 males) participated. These figures correspond to a participation rate of 63.9 %. The mean age was 72.0 years (SD= 4.6, range=65-80) and almost all participants were born in Sweden. Sixty-nine percent were married, 71% only had



elementary school education, which is typical for Swedish cohorts born before the 2<sup>nd</sup> World War. Almost 90 % had biological offspring. The mean number of children was 2.4 (SD=1.1, range=1-9). Employment history revealed that 52 % had had three jobs or less, 28 % reported 4-5 jobs, and 18 % more than five. Only 2.7 % had never been employed or reported a career as housewives. Socio-economic status (SES) was classified according to type of main occupation; 46.6% were manual workers, 36.5% were non-manual workers and 14.2% were self-employed (including farmers in this sample).

In Studies II, III and IV all the individuals with a total Wender Utah Rating Scale (WURS) score of 36 or more identified in our Study I from a population-based sample of 1599 persons in the age range 65-80 years were invited to participate. Among those, 52 individuals 30 accepted participation in studies II, III and IV. The study sample in studies II, III and IV consists of 60 individuals (30 individuals with total WURS score of 36 or more,  $m=44,23$ , range: 36-82) and 30 randomly derived individuals from Study I with total WURS score below 36 ( $m=11,47$ , range:0-35). All individuals accepted participation and written informed consent was obtained from all subjects. The age range was 66-86; mean age 74,4 (S.D = 5,2). In Study IV all individuals gave permission to review their medical and psychiatric records based on a signed form for informed consent. Three individuals were selected to represent case samples of life-long ADHD. For more details about the study sample see Guldberg-Kjar and Johansson, 2009, Guldberg-Kjar *et al.*, 2013.

### *Attrition*

In Study I reasons for nonparticipation among the 488 women and 413 men was known for 250 subjects (135 females and 115 males); 184 (73.6%) subjects refused without any stated reason, 48 (19.2%) reported compromised health/frailty, 10 (4.0%) referred to

fatigue/memory problems and eight (3.2%) subjects were deceased. There was no significant gender difference between responders and non-responders ( $\chi^2=1.175$ ,  $df=1$ ,  $p=0.278$ ). Non-responders (Mean age=72.46 years) were slightly older than participants (Mean age= 71.99) ( $t=2.397$ ,  $df=2498$ ,  $p=0.017$ ). In 651 subjects (353 females and 298 males) there was no information at all available regarding reason of nonparticipation. Among these, sixty-eight (10.4%) subjects (38 females and 30 males) were randomly selected and contacted by telephone to gather more detailed information about reasons for non-participation. In 25 (36.8%) cases it was refusal, in 27 (39.7%) cases fatigue/memory problems and for eight (3.2%) compromised health/frailty. Five (7.4%) subjects could not be contacted and three (4.4%) were already deceased. Additional analyses of potential differences between non-participants and participants were conducted. First, the factor structure of the 25 item WURS was examined with exploratory factor analysis using data from all 1599 responders. A Principal Component Analysis (Varimax with Kaiser Normalization) revealed a four-factor solution that accounted for 54.2% of the total variance. A second factor analysis was conducted based on the exclusion of five items with factor loadings below 0.50. This analysis, based on 20 items also revealed a four-factor solution that accounted for 59.4% of the variance. Given the critical issue of a potential difference between responders and non-responders, 68 subjects were randomly selected among all non-responders ( $n=651$ ) for the purpose of comparison. Thirty-seven (24 women, 13 men) agreed to answer the four-item WURS scale over the phone using the four items with the highest loading on each factor items being: “As a child I had temper outbursts, tantrums”, “As a child I acted without thinking, impulsive”, “As a child I was anxious, worrying” and “As a child in school, I had trouble with mathematics or numbers”. This comparison revealed no significant differences between responders and non-responders. For these questions there were no age differences between responders and non-responders, but more women agreed to respond.

In studies II, III and IV reasons for non-participation among the 22 individuals (16 males, 6 females) with a WURS score of 36 or more are known for 17 subjects; 3 reported compromised health/frailty, 2 were deceased, one had moved to another part of Sweden and 16 (73%) declined without stated reason. Attempts to gather more detailed information about reasons for non-participation from these individuals were made several times through telephone calls but without success. In the comparison group with a WURS score below 36 there were no drop-outs.

### *Instruments*

#### *Childhood scales*

##### *WURS*

The Wender Utah Rating Scale (WURS) was used to estimate childhood ADHD symptomatology. The WURS scale was developed by Wender and collaborators (Ward, Wender, and Reimherr, 1993) to guide the clinician in using retrospective self-reports in diagnosing childhood ADHD in adults. Paul Wender linked adult behaviours to childhood ADHD and provided a list of these behaviours (Ward et al., 1993; Wender, 1995; Wender, 1998; Wender, 2000). The WURS scale is described in detail in Ward et al 1993 (Ward et al., 1993). Thus, the scale was designed to measure a variety of childhood behaviours associated with ADHD among adults. Subjects are instructed to rate each of the 61 items on a 5-point Likert scale: 0= not at all or very slightly, 1= mildly, 2= moderately, 3= quite a bit and 4= very much. Subjects are instructed to rate each item on the basis of “as a child I was (or had)” or “as a child in school”. The short version with 25 items was (Ward et al., 1993) designed to specifically differentiate between those with attention deficit hyperactivity disorder and a non-patient comparison group. The range of total scores is 0 to 100. A cut-off score of 36 and more was suggested to distinguish non-patients from patients with ADHD and depression

(Ward et al., 1993). According to Wender and collaborators (Ward et al., 1993) a score of 36 or more on the 25 most discriminating questions (used in the studies in this thesis) correctly identifies 96% of adults with childhood ADHD. This was the reason for using cut-off score of 36 in Study I. Using a cut-off score of 46 and more, 86% of patients with ADHD, 99% of normal subjects, and 81% of depressed subjects were found to be correctly classified (Ward et al., 1993). The WURS was however not intended for diagnosing childhood ADHD in the absence of other required behavioural and clinical information. Suggested cut-off criteria are generally considered very restricted, only identifying individuals with a lifelong history of inattention and hyperactivity (McGough and Barkley, 2004), whereas individuals with predominantly inattentive ADHD are excluded (McGough and Barkley, 2004). Previous studies have analyzed the psychometric characteristics of the WURS scale including reliability, factor structure and discriminant validity in other samples (McCann, Scheele, Ward, and Roy-Byrne, 2000; Rossini and O'Connor, 1995; Stein, Sandoval, Szumowski, Roizen, Reinecke, Blondis, et al.1995). The 25-item version used in the present study was translated into Swedish by Dr. Sally Sehlin (personal communication), and is currently one of the few available and thereby widely used instruments for identifying ADHD in the Swedish clinical context (see Table 4). Considering strengths and weaknesses of the WURS scale it was selected as the only available instrument in Swedish for the study of retrospective childhood ADHD symptoms. Cronbach's alpha in our sample was .92, indicating good internal consistency.

Table 4. The 25-item WURS (total sample included, n=1599).

| Items                                     | Descriptives     | Factor Loadings |
|---|------------------|-----------------|
|   | Mean (range 0-4) | Factor 1        |
| Hot- or short-tempered, low boiling point | .47 (4)          | .776            |
| <u>Temper outbursts, tantrums</u>         | .24 (4)          | .787            |
| Stubborn, strong-willed                   | 1.48 (4)         | .334            |

|   |         |                 |
|---|---------|-----------------|
| Disobedient, rebellious, sassy  | .37 (4) | <b>.516</b>     |
| Irritable   | .35 (4) | <b>.648</b>     |
| Moody, ups and downs  | .30 (4) | <b>.726</b>     |
| Angry   | .35 (4) | <b>.690</b>     |
| Losing control of myself  | .26 (4) | <b>.506</b>     |
| Trouble with authorities, trouble with school,<br>visit to principal's office   | .13 (4) | <b>.422</b>     |
|   |         | <b>Factor 2</b> |
| Trouble with stick-to-it-tiveness   | .41 (4) | <b>.522</b>     |
| Acting without thinking, impulsive  | .56 (4) | <b>.638</b>     |
| Tendency to be immature   | .55 (4) | <b>.599</b>     |
| Guilty feelings, regretful  | .75 (4) | <b>.579</b>     |
| Tendency to be or act irrational  | .33 (3) | <b>.580</b>     |
| Unpopular with other children, didn't keep<br>friends for long, didn't get along with other<br>children                                     | .28 (4) | <b>.456</b>     |
| Trouble seeing things from someone else's<br>point of view  | .57 (4) | <b>.658</b>     |
|   |         | <b>Factor 3</b> |
| Anxious, worrying   | .60 (4) | <b>.837</b>     |
| Nervous, fidgety  | .38 (4) | <b>.649</b>     |
| Inattentive, daydreaming  | .49 (4) | <b>.425</b>     |
| Sad or blue, depressed, unhappy   | .54 (4) | <b>.695</b>     |
| Low opinion of myself   | .85 (4) | <b>.617</b>     |
|   |         | <b>Factor 4</b> |
| Concentration problems, easily distracted   | .47 (4) | <b>.495</b>     |
| Overall a poor student, slow learner  | .38 (4) | <b>.773</b>     |
| <u>Trouble with mathematics or numbers</u>  | .52 (4) | <b>.763</b>     |
| Not achieving up to potential   | .49 (4) | <b>.665</b>     |
| <i>NOTE: Underlined items (extracted from 20-item analysis) indicate items included in the 4-item scale used in the attrition analysis.</i> |         |                 |

*Barkley form: Childhood Symptoms Scale- Self-report (CSS-Child Recall)*

The Barkley Childhood Symptoms Scale (CSS-Child Recall) is described in detail in *Attention-Deficit Hyperactivity Disorder: A Handbook for Diagnosis and Treatment* (2<sup>nd</sup> ed.) by Russell A. Barkley (Barkley, 1998). The fact sheet including the scale and interview questions developed by Barkley (Barkley and Murphy, 1998) was used in the present study. This scale contains the 18 items (see table 5. for items included) from the *DSM-IV* criteria for ADHD with each item answered on a 4-point scale (from 0-3; *not at all, sometimes, often, and*

very often respectively). If any symptom of ADHD was rated *often* or more frequently, these ratings indicated meeting the DSM-IV criteria for childhood ADHD. Cronbach’s alpha in our sample of CSS-Child Recall was 0.98, indicating good internal consistency.

Table 5. Barkley Childhood and Current Symptoms Scale – Self-Report form

| <b>Childhood and Current Symptom Scale</b> |   |            |   |
|--|---|------------|---|
| <b>1.</b>                                  | <b>Failed/Fail to give close attention to details or made/make careless mistakes in my work.</b>                                | <b>10.</b> | <b>Felt/Feel “on the go” or “driven by a motor”.</b>  |
|  | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |            | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |
| <b>2.</b>                                  | <b>Fidgeted/Fidget with hands or feet or squirmed/squirm in seat.</b>   | <b>11.</b> | <b>Avoided/Avoid, disliked/dislike, or was/am redutant to engage in work that required/requires sustained mental effort.</b>    |
|  | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |            | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |
| <b>3.</b>                                  | <b>Had/Has difficulty sustaining my attention in tasks or fun activities.</b>   | <b>12.</b> | <b>Talked/talk excessively</b>  |
|  | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |            | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |
| <b>4.</b>                                  | <b>Left/Leave my seat in classroom or in other situations in which seating was/is expected.</b>                                 | <b>13.</b> | <b>Lost/Lose things necessary for tasks or activities.</b>  |
|  | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |            | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |
| <b>5.</b>                                  | <b>Didn’t/Don’t listen when spoken to directly.</b>   | <b>14.</b> | <b>Blurted/Blurt out answers before questions were/have been completed.</b>   |
|  | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |            | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |
| <b>6.</b>                                  | <b>Felt/feel restless.</b>  | <b>15.</b> | <b>Was/Is easily distracted.</b>  |
|  | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> </ul>  |            | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> </ul>  |

|           |   |            |   |
|-----------|---|------------|---|
|           | <ul style="list-style-type: none"> <li>✓ Often</li> <li>✓ Very often</li> </ul>   |            | <ul style="list-style-type: none"> <li>✓ Often</li> <li>✓ Very often</li> </ul>   |
| <b>7.</b> | <b>Didn't/Don't follow through on instructions and failed/fail to finish work.</b>  | <b>16.</b> | <b>Had/Has difficulty awaiting turn.</b>  |
|           | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |            | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |
| <b>8.</b> | <b>Had/have difficulty engaging in leisure activities or doing fun things quietly</b>   | <b>17.</b> | <b>Was/Am forgetful in daily activities.</b>  |
|           | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |            | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |
| <b>9.</b> | <b>Hade/Have difficulty organizing tasks and activities.</b>  | <b>18.</b> | <b>Interrupted/Interrupt or intruded/intrude on others</b>  |
|           | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |            | <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> |

*Late adulthood scales - current situation*

*WRASS*

Wender Riktad ADHD Symptom Skala (WRASS) is a modified and Swedish version of the Targeted Attention Deficit Disorder Scale (Wender, 1995) to capture persisting ADHD symptoms in adulthood. The scale properties of the Targeted Attention Deficit Disorder Scale (TADDS) are described by Paul Wender in his book Attention-Deficit Hyperactivity Disorder in Adults (Wender, 1995). The TADDS has later been further developed and modified (Reimherr, et al., 2005) and is presently known as The Wender-Reimherr Adult Attention Deficit Disorder Scale (WRAADDS). The TADDS was designed to measure severity of the target symptoms of adult ADHD using the Utah Criteria developed by Paul Wender (Wender, 1995). The TADDS measures symptoms in 7 categories: attention difficulties, hyperactivity/restlessness, temper, mood instability, disorganization, over-reactivity and impulsivity. The Swedish version of the TADDS, the WRASS is largely based on the TADDS

and consists of total 35 items and rates individual items from 0 to 4 (0= not at all or very slightly, 1= mildly, 2= moderately, 3= quite a bit, 4=very much). The range of total scores is 0 to 140. Like the TADDS, the WRASS scale cover the above 7 categories. There is no clear evidence for cut-off scores for WRASS, but scores of 70 or above e are often used based on clinical experience. Although this clinical cut-off level is not yet standardized it is typically used as a rule of thumb for identifying adults with a likely ADHD history. We used WRASS as a clinician-administered, semi-structured interview. The 35-item WRASS version used in Study II was backtranslated into English by co-author in Study II, Dr Sally Sehlin, who originally translated and presented the scale in Sweden (see Table 6). Cronbach’s alpha in our sample for WRASS was 0.97 indicating good internal consistency. Noteworthy, the WRASS scale used in Sweden is not equal although similar to the WRAADDS scale.

Table 6.

**Wender riktad ADHD Symtom Skala (WRASS), Interview version** (modification of the Targeted Attention Deficit Disorder Rating Scale (Wender 1995). Modified and translated into Swedish by Sally Sehlin (1998).

Rate Frequency & Severity  
Global Ratings

|                                 |
|---------------------------------|
| 0 – Not at all or very slightly |
| 1 – Mildly                      |
| 2 – Moderately                  |
| 3 – Quite a bit                 |
| 4 – Very much                   |

| <b>Below 35 item version from the Targeted Attention Deficit Disorder Rating Scale (TADDS) comprising the Swedish WRASS</b> |   |                        |  |
|---|---|------------------------|--|
| <b>Attention difficulties</b>   |   | <b>Disorganization</b> |  |
| <b>1.</b>   | Do you have difficulty concentrating, distractibility?                        | 20.                    | Do you do things systematically or do you jump from one task to another? |
| <b>2.</b>   | Do people complain that you don’t pay attention to them when they’re talking? | 21.                    | Do you have difficulty completing tasks?                                 |
| <b>3.</b>   | Do you have difficulty keeping you mind on reading materials?                 | 22.                    | Do you plan out things ahead of time?                                    |



|                                   |   |                       |  |
|-----------------------------------|---|-----------------------|--|
| 4.                                | Are you forgetful? Do you misplace things such as your keys, purse, wallet, watch?                      | 23.                   | Do you have trouble getting to places on time?   |
| <b>Hyperactivity/restlessness</b> |   | 24.                   | Do you have trouble planning ahead concerning money?   |
| 5.                                | Are you fidgety?  | 25.                   | Do you misplace things, are you forgetful?   |
| 6.                                | Are you restless, can't sit still, always on the go?  | 26.                   | Do you have problems starting difficult projects, or do you keep on putting things off, procrastinate?   |
| 7.                                | Do you talk too much? Do other people feel you talk too much?   | <b>Overreactivity</b> |  |
| 8.                                | Do you have difficulty relaxing?  | 27.                   | Do you over-react to pressure? Do you feel easily stressed, flustered, easily hassled, discombobulated, depressed, and angry?                        |
| 9.                                | Can you sit still through a movie or TV show? Do you get up from the table immediately or after dinner? | 28.                   | Do you have problems with overstimulation or going too fast?   |
| <b>Mood instability</b>           |   | 29.                   | Do you make "mountains out of molehills", blow things up out of proportions?   |
| 10.                               | Are you (have you been) depressed, sad, blue, down in the dumps?  | <b>Impulsivity</b>    |  |
| 11.                               | Do you have periods when you get excited, "flying", going too fast?                                     | 30.                   | Are you reckless?  |
| 12.                               | Does your mood change up and down like a roller coaster?  | 31.                   | Do you often make impetuous decisions, based on angry feeling (such as exerting overly restrictive discipline, quitting jobs, ending relationships)? |
| 13.                               | Do you feel "down on yourself", self-critical, have low self-esteem?                                    | 32.                   | Do you interrupt others when they are talking?   |
| <b>Temper</b>                     |   | 33.                   | Have you had problems because of saying or doing things before you've thought them through?  |
| 14.                               | Are you irritable?  | 34.                   | Do you regard yourself as impatient?   |
| 15.                               | Do you have a "short fuse" or a "low boiling point"?  | 35.                   | Do you act first and think later – make decisions too quickly and without thinking them through, for example impulsive buying?                       |
| 16.                               | When you get angry does it usually just take a short time for you to cool down?                         |                       |  |
| 17.                               | When angry do you lose control verbally?  |                       |  |
| 18.                               | When angry do you take it out on inanimate objects?   |                       |  |
| 19.                               | When angry do you take it out on animals and/or people?   |                       |  |

Additional questions about demographical variables, subjective current health, subjective current memory and subjective opinion about experienced problems in childhood were also asked in Study I (see Table 11).

#### *Barkley form: Current Symptoms Scale- Self-report (CSS)*

The Barkley Current Symptoms Scale (CSS) is described in detail in *Attention-Deficit Hyperactivity Disorder: A Handbook for Diagnosis and Treatment* (2<sup>nd</sup> ed.) by Russell A. Barkley (Barkley, 1998). The fact sheet including the scale and interview questions developed by Barkley (Barkley and Murphy, 1998) was used in the present study. This scale contains the 18 items (see table 5. for items included) from the *DSM-IV* criteria for ADHD with each item answered on a 4-point scale (from 0-3; *not at all*, *sometimes*, *often*, and *very often* respectively). If any symptom of ADHD was rated *often* or more frequently, these ratings indicated meeting the *DSM-IV* criteria for childhood ADHD. Cronbach's alpha in our sample of CSS was 0.97, indicating good internal consistency.

#### *DSM-IV ADHD criteria and subtyping*

The diagnostic criteria for ADHD according *DSM-IV* (*Diagnostic and Statistical Manual for Mental Disorders—4th edition; DSM-IV*; American Psychiatric Association, 2000) were used in Studies III and IV. For a diagnosis, there are three critical aspects: at least 6 of 9 symptoms for one of the ADHD subtypes, childhood onset of symptoms, and impairment in at least two areas. ADHD can, according to the *DSM-IV* be divided into three subtypes: predominantly inattentive, predominantly hyperactive-impulsive and the combined type. For the combined type a patient must fully meet the criteria for both of the inattentive and hyperactive-impulsive subtypes.

Inattentive symptoms include failure to pay close attention to detail, difficulty sustaining attention, not listening when spoken to, failure to follow through on instructions or finish tasks, difficulty organizing, reluctance to engage in activities that require sustained mental effort, often losing things, being easily distracted, and often being forgetful. A patient must have at least 6 of these 9 symptoms to be considered to have the inattentive subtype. The symptoms of the hyperactive-impulsive subtype include frequent fidgeting; frequently leaving one's seat in situations where staying seated is expected; running about, climbing excessively, or a feeling of internal restlessness; difficulty engaging quietly in leisure activities; often "on-the-go" or acting like one is "driven by a motor"; talking excessively, blurting out answers, having difficulty waiting one's turn, and interrupting or intruding on others. At least 6 of these symptoms must be present for diagnosis of the hyperactive-impulse subtype. Patients who meet all criteria for both the inattentive and hyperactive-impulsive subtypes are diagnosed with the combined subtype.

Furthermore, the symptoms described cannot be episodic, they must persist for 6 months or longer and must affect at least two areas of functioning (school, work, home, social life). Age of onset is also an important adult ADHD diagnostic criterion. Symptoms must date back to age 7 or younger (in DSM-5 changed to prior to 12 years age, American Psychiatric Association, 2013). If the childhood history is not present, the patient does not meet criteria for a diagnosis. Most of the major rating scales used for screening patients for ADHD are modeled on the criteria in accordance with DSM.

### *Compromised Cognition and Dementia*

Medical records of all subjects in our sample were reviewed in Study III to identify individuals who might have been assessed for or diagnosed with dementia with the purpose of

detecting eventual cases of comorbid dementia and also to consider these subjects ratings in the light of eventual dementia.

*Problems in Daily functioning in Childhood and Currently*

The interview questions in the clinical interview on general day-to-day adaptive functioning (i.e., how the individual is doing in meeting the demands of daily life) developed by Barkley (Barkley and Murphy, 1998) was used in Study IV. There are eight childhood and 10 current domains where subjects are asked to answer to what extent ADHD symptoms in childhood and currently interfere with one's ability to function in different areas of daily life, with each question answered on a 4-point scale (from 0-3; *never or rarely, sometimes, often, and very often* respectively). Cronbach's alpha in our sample was 0.97 for Problems in Daily Functioning in Childhood questions and 0.97 for Problems in Daily Functioning Currently questions, indicating good internal consistency. See Table 7. for domains of problems in daily functioning in childhood and currently.

Table 7. Domains of problems in daily functioning in childhood and currently.

**Problems Functioning in childhood:** 4-point scale from 0-3; never or rarely, sometimes, often and very often respectively

- ✓ In my home life with my immediate family
- ✓ In my social interactions with other children
- ✓ In school
- ✓ In sports, clubs, or other organizations
- ✓ In learning to take care of myself
- ✓ In my play, leisure, or recreational activities
- ✓ In my handling of my daily chores or other responsibilities

**Problems in Current functioning:** 4-point scale from 0-3; never or rarely, sometimes, often and very often respectively

- ✓ In my home life with my immediate family
- ✓ In my work or occupation
- ✓ In my social interactions with others
- ✓ In my activities or dealing in the community
- ✓ In any educational activities
- ✓ In my dating or marital relationship

- ✓ In my management of money
- ✓ In my driving or a motor vehicle
- ✓ In my leisure or recreational activities
- ✓ In my management of my daily responsibilities

*Past Psychiatric history*

A clinical interview was conducted in Study IV about the subjects' past psychiatric history covering 13 domains about current psychiatric contact, any past psychiatric contact, psychiatric hospitalization, depression, suicidal thoughts, suicide attempts, anxiety, alcohol/drug abuse, antisocial personality, learning disability, bipolar disorder, oppositional defiant disorder or other. Answerers were scored 0=No, 1=Yes. A diagnostic summary of past psychiatric history was calculated for each subject. See Table 8. for domains of Past Psychiatric History. Additionally, specific notes were made whether any psychiatric disorders were present in childhood as shown in Table 8.

Table 8. Domains of Past Psychiatric History.

| Yes/No                             |
|------------------------------------|
| ✓ Current psychiatric contact      |
| ✓ Past psychiatric contact         |
| ✓ Past psychiatric hospitalization |
| ✓ Depression                       |
| ✓ Suicidal thoughts                |
| ✓ Suicide attempts                 |
| ✓ Anxiety                          |
| ✓ Alcohol/drug abuse               |
| ✓ Obsessive Compulsive Disorder    |
| ✓ Antisocial Personality           |
| ✓ Learning Disability              |
| ✓ Bipolar Disorder                 |
| ✓ Oppositional Defiant Disorder    |

### *Family psychiatric history*

In a clinical interview subjects in Study IV were asked about psychiatric problems amongst their biologically related family members (i.e., children, siblings, mother, father, others). The following disorders/14 domains were at focus: family psychiatric history ever, ADHD symptoms or diagnosis, learning disability symptoms or diagnosis, mental retardation, psychosis/schizophrenia, manic-depression, major depression, suicide, anxiety disorders, tics/Tourette syndrome, alcohol/substance abuse, in-patient psychiatric treatment, epilepsy/seizures and smoking. Answerers were scored 0=No, 1=Yes. See Table 9. for domains of Family Psychiatric History.

Table 9. Domains of Family Psychiatric History.

| Yes/No                            |
|-----------------------------------|
| ✓ ADHD symptoms or diagnosis      |
| ✓ LD symptoms or diagnosis        |
| ✓ Mental retardation              |
| ✓ Psychosis/schizophrenia         |
| ✓ Manic-depression                |
| ✓ Major depression                |
| ✓ Suicide                         |
| ✓ Anxiety disorders               |
| ✓ Tics/Tourette syndrome          |
| ✓ Alcohol or substance abuse      |
| ✓ Inpatient psychiatric treatment |
| ✓ Epilepsy/seizures               |

### *Health history in childhood, past adulthood and currently*

Subjects in Study IV were interviewed about their health history. The specific questions were asked in the format of “Have you ever had any of the following XXX in childhood, in adulthood, and/or currently”. The health topics covered included: allergies/asthma, heart problems, epilepsy or seizures, high blood pressure, serious head injury, injury resulting in

loss of consciousness, lead poisoning, broken bones, surgery, migraine headaches, thyroid condition, problems with vision, problems with hearing, diabetes. Answers were scored 0=No, 1=Yes. See Table 10. for domains of Health History.

Table 10. Domains of Health history scale.

| <b>Health history</b>                       |                                    |                                 |                             |
|---|------------------------------------|---------------------------------|-----------------------------|
| <b>Type of problem</b>                      | <b>During childhood<br/>Yes/No</b> | <b>Past as adult<br/>Yes/no</b> | <b>Currently<br/>Yes/No</b> |
| ✓ Allergies/asthma                          |                                    |                                 |                             |
| ✓ Heart problems                            |                                    |                                 |                             |
| ✓ Epilepsy or seizures                      |                                    |                                 |                             |
| ✓ High blood pressure                       |                                    |                                 |                             |
| ✓ Serious head injury                       |                                    |                                 |                             |
| ✓ Injury resulting in loss of consciousness |                                    |                                 |                             |
| ✓ Lead poisoning                            |                                    |                                 |                             |
| ✓ Broken bones                              |                                    |                                 |                             |
| ✓ Surgery                                   |                                    |                                 |                             |
| ✓ Migraine headaches                        |                                    |                                 |                             |
| ✓ Thyroid condition                         |                                    |                                 |                             |
| ✓ Problem with vision                       |                                    |                                 |                             |
| ✓ Problems with hearing                     |                                    |                                 |                             |
| ✓ Diabetes                                  |                                    |                                 |                             |

### *Neuropsychological measures*

Cases with a WURS score of 36 or more and diagnosed with ADHD in later life were (in Study IV) selected based upon their psychiatric records for further analyses. These cases are merely presented to serve as illustrations of “a life with ADHD”. Results from neuropsychological measures Conners' Continuous Performance Test II (CPT II V.5) (Conners, 2004) and the Wechsler Adult Intelligence Scale, third or fourth edition (Wechsler, 1997, 2008) were obtained from their psychiatric records when assessed for ADHD. They were invited and interviewed in more detail about their life in an additional session lasting between 60-90 minutes. In-depth interviews were semi-structured and contained the following questions: “How would you describe the impact of ADHD in your childhood, past adulthood

and currently” and “What does it mean to you being diagnosed with ADHD in late life? ”. Additionally, these three individuals were asked to rate their current executive functioning using Behaviour Rating Inventory of Executive Function – Adult Version (Roth, Isquith, and Gioia, 2005).

*- Conners' Continuous Performance Test II (Conners' CPT II V.5)*

The Conners' CPT II V.5 (Conners, 2004) is a task-oriented computerized assessment of attention disorders and neurological functioning. Results indicate the likelihood that an individual has an attention disorder. The examinee is given instructions to press the space bar or click the left mouse button when any letter except the letter “X” appears. These letters appear at varying speeds of one-, two-, and four-second intervals between stimuli and remain on the screen for 250 milliseconds.

When assessing an individual for ADHD, it is recommended that the clinician look at the ADHD Confidence Index, which will provide a percentage indicating that X out of 100 individuals with this profile tend to have ADHD (Conners, 2004). This index score is derived through computer scoring using extensive algorithms incorporating the other twelve index scores the individual receives from testing. Further examination of specific scores will provide support for this index score and a clearer picture of whether both inattention and/or hyperactivity/impulsivity are present at a significant level (Conners, 2004).

*- Behavior Rating Inventory of Executive Function – Adult Version (BRIEF-A)*

The BRIEF-A (Roth et al., 2005) is a standardized measure that captures views of an adult's (18-90 years of age) executive functions or self-regulation in his or her everyday environment. Two formats are used: a Self-report and an Informant report. In Study IV only the Self-report Form was used. The BRIEF-A is composed of 75 items within nine non-overlapping theoretically and empirically derived clinical scales: Inhibit, Self-Monitor,



Plan/Organize, Shift, Initiate, Task Monitor, Emotional Control, Working Memory, and Organization of Materials (Roth et al., 2005). The clinical scales form two broader indexes: Behavioral Regulation (*BRI*) and Metacognition (*MI*), and these indexes form the overall summary score, the Global Executive Composite (*GEC*).

- *The Wechsler Adult Intelligence Scale (WAIS-III, WAIS-IV)*

The Wechsler Adult Intelligence Scale (WAIS) is a test designed to measure intelligence in adults. It is currently in its fourth edition (WAIS-IV) released in 2008. The original WAIS (Form I) was published in 1955 by David Wechsler as a revision of the Wechsler-Bellevue Intelligence Scale that had been released in 1939.

The WAIS-III yields three IQ scores (Verbal IQ, Performance IQ, and Full Scale IQ) and four Index scores (Verbal Comprehension, Perceptual Organization, Working Memory, and Processing Speed) (Wechsler, 1997). The WAIS-IV yields four Index scores (Verbal Comprehension, Perceptual Reasoning, Working Memory, and Processing Speed) and an overall Full-Scale IQ (Wechsler, 2008).

### *Procedure*

All studies in this thesis were approved by the Regional Ethical Review Board in Lund (Dnr 194/2004). Informed consent was obtained from all subjects included in the study.

In Study I subjects were asked to participate by an information letter in which they were instructed to return their reply in a pre-stamped envelope together with a signed form for informed consent if they accepted participation. The envelope contained the 25-item Wender Utah Rating Scale for ratings of retrospective childhood ADHD symptoms, questions about demographical variables, current health, memory and subjective opinion about problems experienced in childhood. Subjects were asked to answer all the questions in the questionnaire

and return it by mail as above. Supplementary information was gathered by phone calls in the case of missing data. Reasons for non-participation were collected, when reported. Among those who did not state their reason for not participating, approximately 10 % were randomly selected for a more detailed analysis of attrition. A telephone call was made and the non-responders were asked about their reason for non-participation and about their willingness to be interviewed with four selected questions from the WURS-scale.

In Studies II, III, and IV subjects were asked for participation by an information letter in which they were instructed to return their reply in a pre-stamped envelope together with a signed form for informed consent if they accepted participation. Two reminders were sent within a 3-4 week interval. Reasons for non-participation were collected when reported. Participants were re-contacted by telephone and scheduled for a follow-up interview at Hässleholm hospital. If they were unable or unwilling to travel, a home-based interview was offered. In Study II semi-structured interviews with the Swedish “Wender Riktad ADHD Symtom Skala” (WRASS), a Swedish version of the Targeted Attention Deficit Disorder Rating Scale (TADDS) (Wender, 1995) were conducted in one session lasting between 60-90 minutes. In Study III semi-structured interviews with the forms for the evaluation of adults developed by Russell A. Barkley and Kevin R. Murphy (Barkley and Murphy, 1998) and DSM- IV criteria were conducted in one session lasting between 60-90 minutes. In Study IV semi-structured interviews with the forms for the evaluation of problems in daily functioning, health problems, past psychiatric history and family psychiatric history developed by Russell A. Barkley and Kevin R. Murphy (Barkley and Murphy, 1998) were conducted in one session lasting between 60-90 minutes. Medical records were reviewed and a signed form for informed consent was received if participants approved our access to their medical records. Based on information in their medical records three individuals with a WURS score of 36 or

more were invited and interviewed in more detail about their life in an additional session lasting between 60-90 minutes.

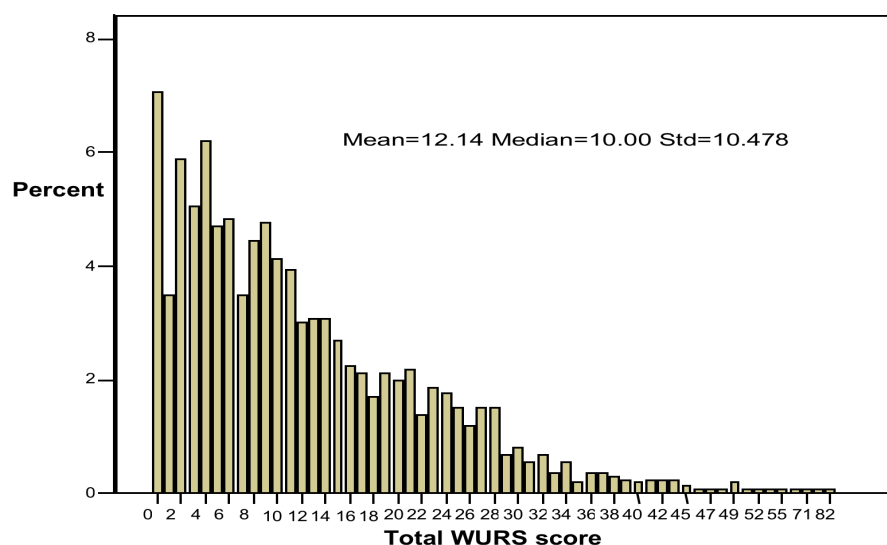
All interviews were conducted by author TG-K. Although, the interviewer was not blind to the results on the WURS scale, this potential bias was counterbalanced by the semi-structured format of the interview, by the interviewer's expertise in neuropsychology and geropsychology that motivated a willingness to provide accurate information.

## RESULTS

### *Study I*

The mean WURS score in this sample was 12.14 (median=10.00, SD=10.48, range=0-82). Fifty-two (3.3%) individuals (15 women, 37 men) scored 36 or more. The distribution of the WURS scores for subjects in this sample is presented in Figure 1.

Figure 1. Distribution of the total WURS score in the study sample, N=1 599.



*WURS scores and demographics:* A significant difference was found between women and men ( $t=-7.467$ ,  $df=1500.95$ ,  $p=0.000$ ) in their total WURS scores, men rated significantly more childhood ADHD symptoms. Also, the proportion of men was significantly greater in the group with scores of 36 and higher ( $\chi^2=11.45$ ,  $df=1$ ,  $p=0.001$ ). A significant difference between younger and older individuals' total WURS scores was found ( $F=2.143$ ,  $df=15.1583$ ,  $p=0.007$ ), younger individuals rated more childhood ADHD symptoms. There was, however no significant difference in age for those above or below the cut-off-score of 36. Significant differences were also found in marital status ( $F=10.377$ ,  $df=2.1596$ ,  $p=0.000$ ), where unmarried and divorced individuals rated more childhood ADHD symptoms. The proportion of unmarried and divorced participants was significantly greater in the group with scores of 36 and higher ( $\chi^2=23.876$ ,  $df=2$ ,  $p=0.000$ ). Additionally, there were significant differences in total WURS scores for number of employments ( $F=8.737$ ,  $df=3.1595$ ,  $p=0.000$ ), those who had had more jobs rated more childhood ADHD symptoms. The proportion of those with multiple employments (5+ jobs) was significantly greater in the group with scores of 36 and higher ( $\chi^2=18.74$ ,  $df=3$ ,  $p=0.000$ ). Those with a higher educational level rated significantly more childhood ADHD symptoms ( $F=5.735$ ,  $df=2.1596$ ,  $p=0.003$ ). There was however no significant difference in education for those above or below the cut-off-score of 36. No significant difference was found in total scores for having children or not. The proportion of those without biological offspring was, however greater among those with WURS scores of 36 and higher ( $\chi^2=16.45$ ,  $df=1$ ,  $p=0.000$ ). There were no differences for SES and number of children in total scores or when comparing the proportions of those with scores below 36 and those with higher scores.

*Perceived problems in childhood, self-reported health and memory:* The proportion of those who had perceived more problems in childhood was significantly greater among those with higher scores (36 or more) ( $\chi^2=199.569$ ,  $df=2$ ,  $p=0.000$ ). Similarly, the proportion who

experienced worse current subjective health ( $\chi^2=21.145$ ,  $df=2$ ,  $p=0.000$ ) and memory ( $\chi^2=14.745$ ,  $df=2$ ,  $p=0.001$ ) was greater among those who scored 36 and higher (see Table 11).

Table 11. WURS-score's distribution on demographic characteristics, perceived problems in childhood and subjective health, memory. N=1599.

| <b>Total sum WURS-score</b>                | <b>0-35<br/>N=1547</b> | <b>36-100<br/>N=52</b> |
|--|------------------------|------------------------|
| <b>Gender:Men</b>                          | 47.3%                  | 71.2%                  |
| Women                                      | 52.7%                  | 28.8%                  |
| <b>Age Mean(<math>\pm</math>SD)</b>        | 72.03 (4.58)           | 70.94 (4.92)           |
| <b>Marital status</b>                      |                        |                        |
| Married/cohabitant                         | 69.7%                  | 53.8%                  |
| Widowed                                    | 16.5%                  | 7.7%                   |
| Divorced                                   | 7.2%                   | 11.5%                  |
| Unmarried                                  | 4.8%                   | 23.1%                  |
| Partner, but not cohabitant                | 1.8%                   | 3.8%                   |
| <b>Educational level</b>                   |                        |                        |
| Less than elementary school                | 0.6%                   | 1.9%                   |
| Elementary school                          | 71.2%                  | 71.2%                  |
| Upper secondary school                     | 22.0%                  | 15.4%                  |
| University graduated                       | 6.1%                   | 11.5%                  |
| <b>Number of employments</b>               |                        |                        |
| Not employed/Housewife                     | 2.7%                   | 1.9%                   |
| 1-3 employments                            | 52.2%                  | 30.8%                  |
| 4-5 employments                            | 27.5%                  | 26.9%                  |
| >5 employments                             | 17.6%                  | 40.4%                  |
| <b>SES</b>                                 |                        |                        |
| Manual worker                              | 46.2%                  | 57.7%                  |
| Non-manual worker                          | 36.8%                  | 28.8%                  |
| Self-employed (includes farmers)           | 14.3%                  | 11.5%                  |
| Not employed/Housewife                     | 2.7%                   | 1.9%                   |
| <b>Having biological offspring</b>         |                        |                        |
| ✓ No                                       | 10.7%                  | 28.8%                  |
| ✓ Yes                                      | 89.3%                  | 71.2%                  |
| <b>Number of own children</b>              |                        |                        |
| Mean( $\pm$ SD)                            | 2.43(1.14)             | 2.41(1.14)             |
| <b>Perceived subjective current health</b> |                        |                        |
| Good                                       | 52.7%                  | 32.7%                  |
| Neither good nor bad                       | 40.3%                  | 44.2%                  |
| Bad  | 7.0%                   | 23.1%                  |
| <b>Perceived subjective current memory</b> |                        |                        |
| Good                                       | 47.5%                  | 21.2%                  |
| Neither good nor bad                       | 47.8%                  | 69.2%                  |

|  |       |       |
|--|-------|-------|
| Bad                                    | 4.7%  | 9.6%  |
| <b>Perceived problems in childhood</b> |       |       |
| To little extent                       | 85.9% | 23.1% |
| To some extent                         | 13.1% | 57.7% |
| To a large extent                      | 1.0%  | 19.2% |

*What accounts for the WURS score?* The regression analysis indicated that perceived problems in childhood (22.3%), gender (2.9%), perceived subjective current memory (1.9%), educational level (1.1%), number of employments (0.8%) and age (0.4%) in sum accounted for 29.0% of the variance of the total WURS scores (see Table 12:1). As gender was found to be significant, regressions were conducted for women and men separately, although the amount of variance predicted was similar (in women about 27% and in men 26%). Among women perceived problems in childhood accounted for 23.4% of the variance (see Table 12:2). The corresponding figure among men for perceived problems in childhood was 22% (see Table 12:3).

Table 12. Stepwise regression analyses WURS-25 total score.

12:1 Total sample

| Step                          | Variable                            | B         | $\beta$ | R Square Change |
|-------------------------------|-------------------------------------|-----------|---------|-----------------|
| 1                             | Perceived problems in childhood     | 11.344*** | .472    | .223***         |
| 2                             | Gender                              | 3.449***  | .171    | .029***         |
| 3                             | Perceived current subjective memory | 2.381***  | .137    | .019***         |
| 4                             | Educational level                   | 1.754***  | .105    | .011***         |
| 5                             | Number of employments               | 1.122***  | .089    | .008***         |
| 6                             | Age                                 | -.135**   | -.061   | .004**          |
| <b>Total</b>                  |                                     |           |         | .293            |
| <b>Adjusted R<sup>2</sup></b> |                                     |           |         | .290            |

12:2 Women

| Step | Variable                            | B         | $\beta$ | R Square Change |
|------|-------------------------------------|-----------|---------|-----------------|
| 1    | Perceived problems in childhood     | 10.723*** | .484    | .234***         |
| 2    | Perceived current subjective memory | 2.400***  | .153    | .023***         |
| 3    | Educational level                   | 1.813***  | .113    | .013***         |
| 4    | Number of employments               | .893*     | .078    | .006*           |

|                               |  |  |      |
|-------------------------------|--|--|------|
| <b>Total</b>                  |  |  | .276 |
| <b>Adjusted R<sup>2</sup></b> |  |  | .273 |

12:3 Men

| Step                          | Variable                            | B         | $\beta$ | R Square Change |
|-------------------------------|-------------------------------------|-----------|---------|-----------------|
| 1                             | Perceived problems in childhood     | 11.723*** | .469    | .220***         |
| 2                             | Perceived current subjective memory | 2.333***  | .127    | .016***         |
| 3                             | Educational level                   | 1.405**   | .106    | .011**          |
| 4                             | Number of employments               | 1.677**   | .100    | .010**          |
| 5                             | Age                                 | -.173*    | -.073   | .005*           |
| <b>Total</b>                  |                                     |           |         | .261            |
| <b>Adjusted R<sup>2</sup></b> |                                     |           |         | .256            |

\*p<.05, \*\*p<.01, \*\*\*p<.001,  $\beta$  = standardized regression coefficients, B = unstandardized coefficients

### Study II

The mean WRASS score in the total sample was 44.02 (median=49.00,  $s=31.11$ , range=4-97). As shown in Table 13, among those with a WURS score of 36 or more, 16 (53.3%) individuals scored 70 or more (i.e., the clinical cut-off 70 used in Sweden). None of the individuals with a WURS score below 36 scored 70 or higher on WRASS. The WRASS mean score was 15.7 among those with a WURS score lower than 36 and 72,3 among those who scored 36 and above.

Table 13. Descriptive characteristics of the sample (n=60).

| Total sum WURS score                                    | 0-35, n = 30 | 36-100, n = 30 |
|---|--------------|----------------|
| <b>Total sum WRASS score, mean (<math>\pm s</math>)</b> | 15.7 (10.5)  | 72.3 (14.1)    |
| ✓ <b>Men</b>  | 16.3 (10.7)  | 73.6 (16.4)    |
| ✓ <b>Women</b>  | 14.6 (4.7)   | 70.2 (5.5)     |
| <b>Age, mean (<math>\pm s</math>)</b>                   | 75.5 (4.7)   | 73.2 (5.5)     |
| <b>Gender</b>   |              |                |
| ✓ Men   | 36.7%        | 63.3%          |
| ✓ Women   | 63.3%        | 36.7%          |
| <b>Marital status:</b>                                  |              |                |
| ✓ Married/cohabitant                                    | 63.3%        | 50.0%          |
| ✓ Widowed   | 23.3%        | 13.3%          |
| ✓ Divorced  | 6.7%         | 13.3%          |
| ✓ Unmarried   | 0.0%         | 20.0%          |
| ✓ Partner, but not cohabitant                           | 6.7%         | 3.3%           |
| <b>Educational level:</b>                               |              |                |

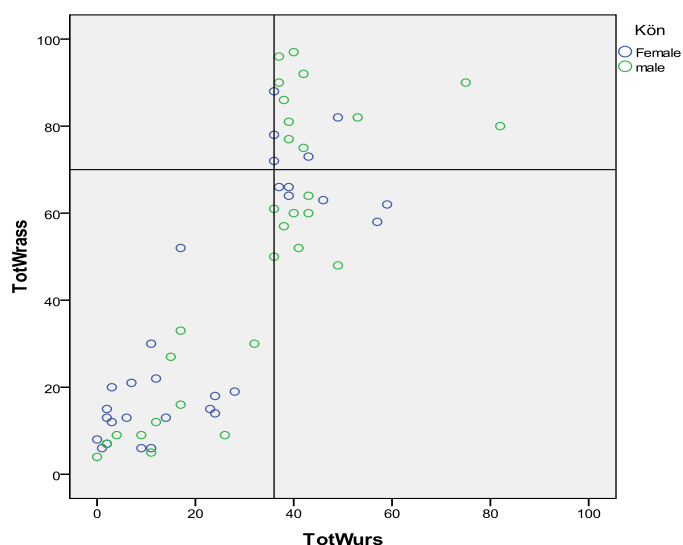
|   |       |       |
|---|-------|-------|
| ✓ Less than elementary school   | 3.3%  | 0.0%  |
| ✓ Elementary school   | 33.3% | 50.0% |
| ✓ Upper secondary school  | 26.7% | 20.0% |
| ✓ University graduate   | 26.7% | 30.0% |
| <b>Number of employments:</b>   |       |       |
| ✓ Not employed/housewife  | 3.3%  | 0.0%  |
| ✓ 1-3 places of employment  | 33.3% | 40.0% |
| ✓ 4-5 places of employment  | 46.7% | 30.0% |
| ✓ >5 places employment  | 16.7% | 30.0% |
| <b>Perceived subjective current health:</b>   |       |       |
| ✓ Good  | 63.3% | 26.7% |
| ✓ Neither good or bad   | 36.7% | 46.7% |
| ✓ Bad   | 0.0%  | 26.7% |
| <b>Perceived subjective current memory:</b>   |       |       |
| ✓ Good  | 63.3% | 16.7% |
| ✓ Neither good or bad   | 36.7% | 73.3% |
| ✓ Bad   | 0.0%  | 10.0% |
| <b>Perceived problems in childhood:</b>   |       |       |
| ✓ To a small extent   | 86.7% | 23.3% |
| ✓ To some extent  | 13.3% | 53.3% |
| ✓ To a large extent   | 0.0%  | 23.3% |
| <i>Note. s = standard deviation. WURS= Wender Utah Rating Scale. WRASS= Wender Riktad ADHD Symptom Skala (modified TADDS= Targeted Attention Deficit Disorder Rating Scale, Wender, 1995)</i> |       |       |

Significant differences in total WRASS scores were found between those with WURS score of 36 and higher and those with scores below 36 ( $t = -17.64$ ,  $df = 58$ ,  $P = 0.000$ ). Figure 2 demonstrates that those who reported more childhood ADHD symptoms also reported significantly more of current ADHD symptoms (median=72.50,  $s = 14.12$ , range=48-97). Those who rated less of childhood ADHD symptoms also rated less current ADHD symptoms (median=13.00,  $s = 10.49$ , range: 4-52).

Age was not associated with the WRASS scores. The mean WRASS scores, however, differed significantly between all men and women ( $t = -2.032$ ,  $df = 58$ ,  $P = 0.047$ ), men rated more frequently current ADHD symptoms. Separate analyses of gender differences among those with a WRASS score below and above 70 revealed no gender differences.



Figure 2. Scatterplot for the correlation between the total WURS and WRASS scores in Study II



In the total sample ( $n=60$ ) we found that the total WRASS score was significantly associated with perceived subjective current health ( $r=.39$ ), memory (.52) and perceived problems in childhood (.55). These associations, however, did not remain significant in analyses based on a split, according to the WURS cut-off of 36, but the direction remained informative for current memory problems and problems in childhood, however, only among those with a WURS score lower than 36 (see Table 14).

Table 14. Correlations between the Total WRASS score and variables in the study.

| Variable                            | WURS<br>score $\geq 36$<br>$n = 30$ | WURS<br>score $< 36$<br>$n = 30$ | Total<br>sample<br>$n = 60$ |
|-------------------------------------|-------------------------------------|----------------------------------|-----------------------------|
| Age                                 | .08                                 | -.14                             | -.20                        |
| Educational level                   | -.08                                | .01                              | .04                         |
| Number of employments               | .13                                 | -.04                             | .10                         |
| Perceived subjective current health | -.19                                | .10                              | .39**                       |
| Perceived subjective current memory | .06                                 | .36*                             | .52**                       |
| Perceived problems in childhood     | -.21                                | .27                              | .55**                       |

We also examined whether there were any differences between individuals with a WRASS score lower ( $n=14$ ) and above ( $n=16$ ) the cut-off at 70. This comparison revealed no

significant differences for age, gender, education, marital status, number of children, nor in responses to the questions concerning problems in childhood, current health and memory.

### *Study III*

The comparisons among scales are described in the following subsections: WURS versus CSS-Child Recall, WRASS versus CSS, WURS versus Childhood DSM-IV Criteria and Subtyping and WRASS versus Current DSM-IV Criteria and Subtyping.

#### *- WURS Versus CSS-Child Recall*

The CSS-Child Recall scale has separate cut-off scores for each subscale and for men and women over 50 years.

Inattention: Amongst men in our sample, 19 men had a CSS-Child Recall score of 12.1 (cut-off for men >50 years) or more for Inattention, their mean WURS score being 44.74. For women in our sample, 11 had a CSS-Child Recall score of 8.2 (cut-off for women >50 years) or more for Inattention, their mean WURS score being 43.36.

Hyperactive-Impulsive: 19 men had a CSS-Child Recall score of 10.7 (cut-off for men >50 years) or more, their mean WURS score being 43.42. For women in our sample, 12 had a CSS-Child Recall score of 7.4 (cut-off for women >50 years) or more for Hyperactive-Impulsive, their mean WURS score being 41.75.

Barkley total Childhood ADHD score (Sum of Inattention + Hyperactive-Impulsive): Amongst those with a WURS score of 36 or more, all 30 (100.0%) individuals surpassed the cut-off for the total ADHD score CSS-Child Recall (cut-off >50 years for men being 20.9 and for women 13.1). None of the individuals with a WURS score below 36 surpassed the cut-off score for total ADHD score. The CSS-Child Recall total ADHD sum mean score was 2.43 amongst those with a WURS score lower than 36 and 33.70 amongst those who scored

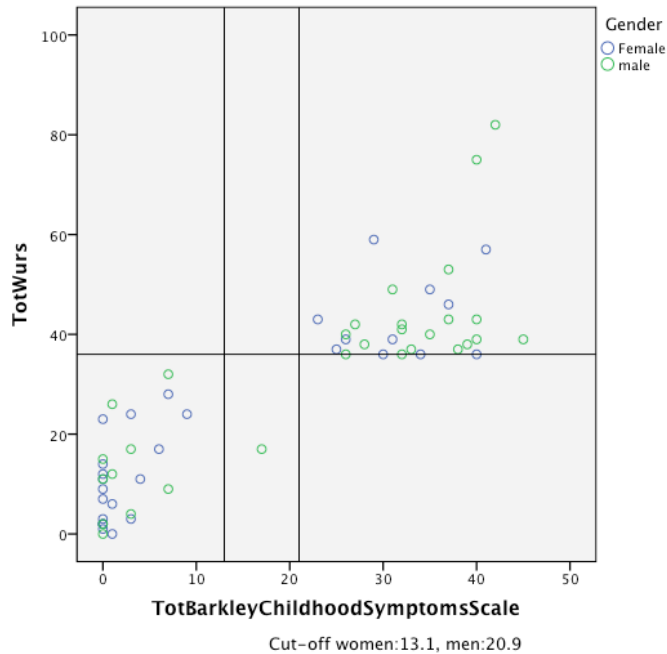
36 and above. Significant differences in total CSS-Child Recall scores were found between those with WURS scores of 36 and higher and those with scores below 36 ( $t=24.40$ ,  $df=58$ ,  $P=0.000$ ). Thus, those who reported more childhood ADHD symptoms on WURS also reported significantly more childhood ADHD symptoms on CSS-Child Recall scale (median=33.50,  $s=5.86$ , range=23-45). Those who rated less childhood ADHD symptoms on WURS also rated less childhood ADHD symptoms on CSS-Child Recall scale (median=0.50,  $s=3.86$ , range: 0-17). Age of the sample was not associated with scores on the CSS-Child Recall scale. In Table 15 below is shown WURS related to Barkley Childhood Symptoms Scale (CSS-Child Recall).

Table 15.

| <b>WURS related to Barkley Childhood Symptoms Scale, DSM-IV Childhood Diagnostic Criteria and subtyping of ADHD in study sample (<math>n=60</math>).</b> |  |   |   |
|--|--|---|---|
| <b>Age, mean (<math>\pm s</math>)</b>  | 74.37 (5.2)                                |   |   |
| <b>Gender</b>  |  |   |   |
| ✓ Men  | 30   |   |   |
| ✓ Women  | 30   |   |   |
| <b>Barkley Childhood Symptoms Scale</b>  | <b>Number subjects above/below cut-off</b> | <b>WURS Mean (<math>\pm s</math>) for above/below cut-off</b> | <b>WURS Range for above/below cut-off</b> |
| <b>Inattention</b>   |  |   |   |
| Cut-off (-1.5 SD/7%)   |  |   |   |
| > 50 years   |  |   |   |
| Men: 12.1  | 19/11                                      | 44.74 (12.69)/13.18 (9.79)                                    | 36-82/0-32                                |
| Women: 8.2   | 11/19                                      | 43.36 (8.43)/10.47 (8.97)                                     | 36-59/0-28                                |
| <b>Total</b>   | <b>30/30</b>                               | <b>44.05 (10.56)/11.83 (9.38)</b>                             | <b>36-82/0-32</b>                         |
| <b>Hyper. – Impulsive</b>  |  |   |   |
| Cut-off (-1.5 SD/7%)   |  |   |   |
| > 50 years   |  |   |   |
| Men: 10.7  | 19/11                                      | 43.42 (14.20)/15.45 (13.10)                                   | 17-82/0-42                                |
| Women: 7.4   | 12/18                                      | 41.75 (9.79)/9.72 (8.59)                                      | 24-59/0-28                                |
| <b>Total</b>   | <b>31/29</b>                               | <b>42.59 (11.99)/12.58 (10.85)</b>                            | <b>17-82/0-42</b>                         |
| <b>Total ADHD score</b>  |  |   |   |
| Cut-off (-1.5 SD/7%)   |  |   |   |
| > 50 years   |  |   |   |
| Men: 20.9  | 19/11                                      | 44.74 (12.69)/13.18 (9.79)                                    | 36-82/0-32                                |
| Women: 13.1  | 11/19                                      | 43.36 (8.43)/10.47 (8.97)                                     | 36-59/0-28                                |

|                                      |              |                                   |                   |
|--------------------------------------|--------------|-----------------------------------|-------------------|
| <b>Total</b>                         | <b>30/30</b> | <b>44.05 (10.56)/11.83 (9.38)</b> | <b>36-82/0-32</b> |
| <i>Note: s = standard deviation.</i> |              |                                   |                   |

Figure 3. WURS and Barkley Childhood Symptoms Scale.



- *WRASS Versus Barkley Current Symptoms Scale (CSS)*

Inattention: Amongst those in our total sample, 29 (18 men and 11 women) individuals had a CSS score of 9.5 (cut-off for >50 years) or more for Inattention, their mean WRASS score being 72.07.

Hyperactive-Impulsive: For Hyperactive-Impulsive current symptoms, 31 (20 men and 11 women) individuals had a CSS score of 9.9 (cut-off for >50 years) or more, their mean WRASS score being 71.06.

Barkley total CSS (sum Current Inattention and Current Hyperactive-Impulsive): Amongst those in our total sample, 30 individuals (19 men and 11 women) surpassed cut-off score of 18.2 for persons over 50 years for the Barkley total Current ADHD score, their mean WRASS score being 72.33.

Amongst those with a WRASS score of 70 or more (Swedish clinical cut-off), all 16 (m=34,06, range: 26-42) individuals surpassed cut-off for the total Barkley Current ADHD score (cut-off >50 years: 18.2). Amongst individuals with a WRASS score below 70 (n=44, m=12,02, range:0-35), interestingly 14 individuals surpassed the cut-off score for total ADHD score. The Barkley CSS Total ADHD score mean score was 12.02 amongst those with a WRASS score lower than 70 and 34.06 amongst those who scored 70 and above. Significant differences in total CSS scores were found between those with WRASS scores of 70 and higher and those with scores below 70 ( $t= 6,765$ ,  $df=58$ ,  $P=0,000$ ). Those who reported more current ADHD symptoms on WRASS also reported significantly more current ADHD symptoms on CSS (median=33.00,  $s=4.92$ , range=26-42).

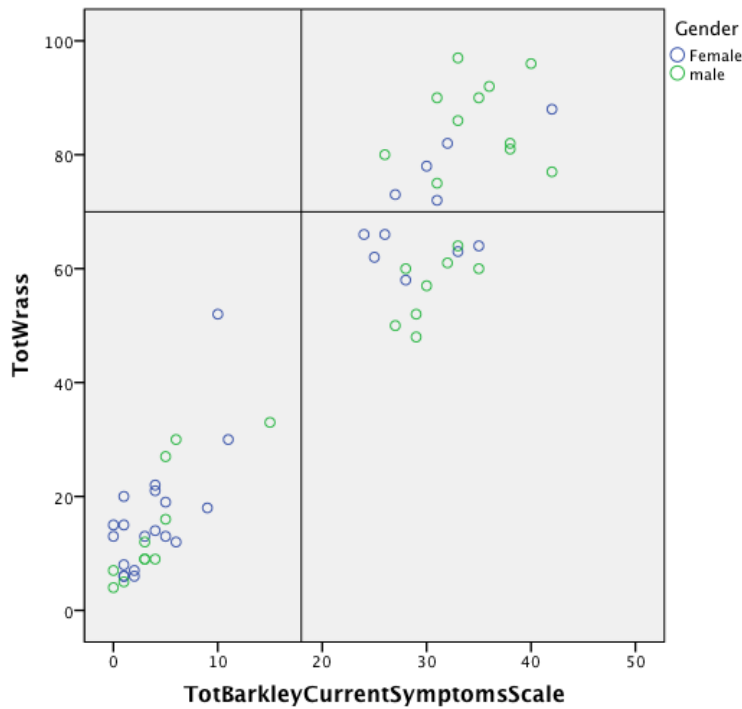
Age was not associated with scores on CSS. The mean score of the CSS, however, differed significantly between all men and women ( $t= -2,433$ ,  $df=58$ ,  $P=0,018$ ), men rated more frequently current ADHD symptoms. Separate analyses at the item level among those with a Current Symptoms Scale score below and above cut-off score revealed no gender differences. In Table 16 below is shown WRASS related to Barkley Current Symptoms Scale.

Table 16.

| <b>WRASS related to Barkley Current Symptoms Scale in study sample (n=60).</b> |  |   |  |
|--|--|---|--|
| <b>Age, mean (±s)</b>  | 74.37 (5.2)                                    |   |  |
| <b>Gender</b>  |  |   |  |
| ✓ Men  | 30   |   |  |
| ✓ Women  | 30   |   |  |
| <b>Barkley Childhood Symptoms Scale</b>  | <b>Number subjects above/below cut-off = n</b> | <b>WRASS Mean (±s) for above/ below cut-off</b> | <b>WRASS Range for above/below cut-off</b> |
| <b>Inattention</b>   |  |   |  |
| Cut-off (-1.5 SD/7%)<br>> 50 years: 9.5  | <b>29/31</b>                                   | <b>72.07 (14.3)/17.77 (15.48)</b>               | <b>48-97/4-80</b>                          |
| <b>Hyper. – Impulsive</b>  |  |   |  |
| Cut-off (-1.5 SD/7%)<br>> 50 years: 9.9  | <b>31/29</b>                                   | <b>71.06 (15.6)/15.10 (10.14)</b>               | <b>33-97/4-52</b>                          |

| Total ADHD score                     |       |                            |            |
|--------------------------------------|-------|----------------------------|------------|
| Cut-off (-1.5 SD/7%)<br>> 50 years   | 30/30 | 72.33 (14.1)/15.70 (10.49) | 48-97/4-52 |
| <i>Note: s = standard deviation.</i> |       |                            |            |

Figure 4. WRASS and Barkley Current Symptoms Scale.



- *WURS Versus Childhood DSM-IV Criteria and Subtyping*

Subtyping into ADHD-subgroups revealed 8 individuals being considered ADHD primarily Inattentive type, 5 individuals ADHD primarily Hyperactive-Impulsive type and 13 individuals were typed as ADHD Combined type.

The mean number of DSM-IV criteria for childhood Inattention type ADHD in the total sample (n=60) was 3.08 (median=1.00, s=3.29, range=0-9) and for childhood Hyperactive-Impulsive type ADHD in the total sample it was 3.05 (median=1.50, s=3.09, range=0-9). In our total sample, 21 individuals (16 men and 5 women) met 6 or more DSM-IV criteria for Inattention, their mean WURS score being 44.81.

Amongst those with a WURS score of 36 or more, 21 (70.0%) individuals met 6 or more DSM-IV criteria for childhood Inattentive type ADHD and 18 (60.0%) met 6 or more DSM-IV criteria for childhood Hyperactive-Impulsive type ADHD. None of the individuals with a WURS score below 36 met 6 DSM-IV criteria for either of the ADHD subtypes. The mean number DSM-IV criteria met for childhood Inattention type ADHD amongst those with a WURS score lower than 36 was 0.07 and for Hyperactive-Impulsive it was 0.50. The mean number DSM-IV criteria met for childhood Inattention type ADHD amongst those who scored 36 and above was 6.10 and for Hyperactive-Impulsive it was 5.60. Significant differences in the number of DSM-IV criteria met for childhood Inattentive type ADHD were found between those with WURS scores of 36 and higher and below 36 ( $t=18,50$ ,  $df=58$ ,  $P=0,000$ ). Those who reported more childhood ADHD symptoms on WURS also met more DSM-IV criteria for childhood Inattentive type ADHD (median=6.00,  $s=1.77$ , range=1-9). Even the number of DSM-IV criteria met for childhood Hyperactive-Impulsive type ADHD was significantly different between those with WURS scores of 36 and higher and those below 36 ( $t=11,45$ ,  $df=58$ ,  $P=0,000$ ). Subjects who rated less childhood ADHD symptoms on WURS also met less DSM-IV criteria for childhood Hyperactive-Impulsive type ADHD (median=0.00,  $s=1.08$ , range: 0-4). For Hyperactive-Impulsive DSM-IV criteria, 18 (11 men/7 women) individuals met 6 or more criteria, their mean WURS score being 47.78.

Age was not associated with the number of DSM-IV criteria met for childhood ADHD. The mean number of DSM-IV criteria met for childhood Inattentive type ADHD and childhood Hyperactive-Impulsive type ADHD, however, differed significantly between all men and women regarding Inattentive type ( $t= -2,964$ ,  $df=58$ ,  $P=0,004$ ), but not for Hyperactive-Impulsive type ADHD, men met more DSM-IV criteria for childhood Inattentive but not for Hyperactive-Impulsive type ADHD. Separate analyses of gender differences among those who met 6 or more childhood DSM-IV criteria for Inattentive or Hyperactive-

Impulsive type ADHD revealed similar gender differences for Inattentive type ADHD ( $t = -3.171$ ,  $df=58$ ,  $P=0.002$ ), men meeting more often 6 or more criteria for Inattentive type ADHD. There were no gender differences among those who met 6 or more criteria for Hyperactive-Impulsive type ADHD. In Table 17 below is shown WURS related to DSM-IV Childhood Diagnostic Criteria and subtyping of ADHD in study sample.

Table 17.

| <b>WURS related DSM-IV Childhood Diagnostic Criteria and subtyping of ADHD in study sample (n=60).</b> |  |   |   |
|--|--|---|---|
| <b>Age, mean (±s)</b>  | 74.37 (5.2)                                    |   |   |
| <b>Gender</b>  |  |   |   |
| ✓ Men  | 30   |   |   |
| ✓ Women  | 30   |   |   |
| <b>DSM-IV Criteria</b>   | <b>Number subjects above/below cut-off = n</b> | <b>WURS Mean (±s) for above/below cut-off</b> | <b>WURS Range for above/below cut-off</b> |
| <b>Inattention</b>   |  |   |   |
| 6 DSM-IV criteria met Total  | <b>21/39</b>                                   | <b>44.81 (12.4)/18.72 (16.06)</b>             | <b>36-82/0-59</b>                         |
| <b>Hyper. – Impulsive</b>  |  |   |   |
| 6 DSM-IV criteria met Total  | <b>18/42</b>                                   | <b>47.78 (13.2)/19.31 (14.81)</b>             | <b>36-82/0-43</b>                         |
| <b>ADHD subtyping according DSM-IV criteria met for</b>  |  |   |   |
| ✓ ADHD Primarily Inattentive   | <b>8</b>                                       |   |   |
| ✓ ADHD Primarily Hyperactive-Impulsive   | <b>5</b>                                       |   |   |
| ✓ ADHD Combined  | <b>13</b>                                      |   |   |
| Total  | <b>26</b>                                      |   |   |

*Note: s = standard deviation.*

- *WRASS Versus Current DSM-IV Criteria and Subtyping*

Subtyping into ADHD-subgroups revealed 7 individuals being considered ADHD primarily Inattentive type, 6 ADHD primarily Hyperactive-Impulsive type and 9 individuals were typed as ADHD Combined type.



The mean number of DSM-IV criteria for current Inattention type ADHD in the total sample ( $n=60$ ) was 2.87 (median=1.00,  $s=3.11$ , range=0-9) and for current Hyperactive-Impulsive type ADHD in the total sample it was 2.82 (median=2.00,  $s=2.95$ , range=0-9). In our total sample, 16 individuals (13 men and 3 women) individuals met 6 or more DSM-IV criteria for Inattention, their mean WRASS score was 77.94.

Amongst those with a WRASS score of 70 or more, 11 (68.8%) individuals met 6 or more DSM-IV criteria for current Inattentive type ADHD and 9 (56.3%) met 6 or more DSM-IV criteria for current Hyperactive-Impulsive type ADHD. In individuals with a WRASS score below 70, 5 (11.4%) met 6 or more DSM-IV criteria for current Inattentive type ADHD and 6 (13.6%) met 6 or more criteria for current Hyperactive-Impulsive type ADHD. The mean number DSM-IV criteria met for current Inattention type ADHD among those with a WRASS score lower than 70 was 1.64 and for Hyperactive-Impulsive it was 1.73. The mean number DSM-IV criteria met for current Inattention type ADHD in those who scored 70 and above on WRASS was 6.25 and for Hyperactive-Impulsive it was 5.81. Significant differences in number of DSM-IV criteria met for current Inattentive type ADHD were found between those with WRASS scores of 70 and higher and those with scores below 70 ( $t=6,737$ ,  $df=58$ ,  $P=0,000$ ). Those who reported more current ADHD symptoms on WRASS also met more DSM-IV criteria for current Inattentive type ADHD (median=7.00,  $s=2.27$ , range=0-9). Also, the number of DSM-IV criteria met for current Hyperactive-Impulsive type ADHD was significantly greater for those with a WRASS score of 70 and higher compared with those who scored below 70 ( $t=5,965$ ,  $df=58$ ,  $P=0,000$ ). Those who rated more current ADHD symptoms on WRASS also met more DSM-IV criteria for current Hyperactive-Impulsive type ADHD (median=6.00,  $s=2.14$ , range: 0-9). For Hyperactive-Impulsive DSM-IV criteria, 15 (11 men/4 women) individuals met 6 or more criteria, their mean WRASS score being 75.93.

Age was not associated with the number of DSM-IV criteria met for current ADHD. The mean number of DSM-IV criteria met for current Inattentive type ADHD and current Hyperactive-Impulsive type ADHD, however, differed significantly between all men and women regarding Inattentive type ( $t = -2,713$ ,  $df=58$ ,  $P=0,009$ ) and for Hyperactive-Impulsive type ADHD ( $t = -2,211$ ,  $df=58$ ,  $P=0,031$ ), men meeting more DSM-IV criteria for both current Inattentive and Hyperactive-Impulsive type ADHD. Separate analyses of gender differences among those who met 6 or more current DSM-IV criteria for Inattentive or Hyperactive-Impulsive type ADHD revealed similar gender differences for Inattentive ( $t = -3,009$ ,  $df=58$ ,  $P=0,003$ ) and for Hyperactive-Impulsive ( $t = -2,131$ ,  $df=58$ ,  $P=0,037$ ) type ADHD, men meeting more often 6 or more criteria for both Inattentive and Hyperactive-Impulsive type ADHD.

All 30 (100%) subjects with a WURS score of 36 or more surpassed the cut-off for the total childhood ADHD score on Barkley CSS-Child Recall scale. Similarly, 26 (87%) subjects with a WURS score of 36 or more met DSM-IV criteria for childhood ADHD. All 30 (100%) subjects from our total sample that surpassed the Barkley cut-off for childhood ADHD also surpassed the Barkley cut-off for adult ADHD on Barkley CSS. Interestingly, 14 subjects with a WRASS score below 70 (Swedish clinical cut-off) besides those 16 subjects with a WRASS score of 70 or more met Barkley cut-off for current ADHD. Similarly, 22 (85%) subjects in our sample who met DSM-IV criteria for childhood ADHD continued to meet DSM-IV adult ADHD criteria. In Table 18 below is shown WRASS related to DSM-IV Adult Diagnostic Criteria and subtyping of ADHD in study sample.

Table 18.

| <b>WRASS related DSM-IV Childhood Diagnostic Criteria and subtyping of ADHD in study sample (n=60).</b> |  |   |   |
|---|--|---|---|
| <b>Age, mean (±s)</b>   | 74.37 (5.2)                                    |   |   |
| <b>Gender</b>   |  |   |   |
| ✓ Men   | 30   |   |   |
| ✓ Women   | 30   |   |   |
| <b>DSM-IV Adult Criteria</b>  | <b>Number subjects above/below cut-off = n</b> | <b>WURS Mean (±s) for above/below cut-off</b> | <b>WURS Range for above/below cut-off</b> |
| <b>Inattention</b>  |  |   |   |
| 6 DSM-IV criteria met   |  |   |   |
| Total   | <b>16/44</b>                                   | <b>77.94 (14.9)/31.68 (25.81)</b>             | <b>48-97/4-82</b>                         |
| <b>Hyper. – Impulsive</b>   |  |   |   |
| 6 DSM-IV criteria met   |  |   |   |
| Total   | <b>15/45</b>                                   | <b>75.93 (13.9)/33.38 (27.80)</b>             | <b>57-97/4-92</b>                         |
| <b>ADHD subtyping according DSM-IV criteria met for</b>   |  |   |   |
| ✓ ADHD Primarily Inattentive  | <b>7</b>                                       |   |   |
| ✓ ADHD Primarily Hyperactive-Impulsive  | <b>6</b>                                       |   |   |
| ✓ ADHD Combined   | <b>9</b>                                       |   |   |
| Total   | <b>22</b>                                      |   |   |
| <i>Note: s = standard deviation.</i>  |  |   |   |

### *Psychiatric History and Dementia*

In individuals with a WURS score of 36 or more, 10 (33%) also reported current psychiatric contact. None of the individuals with a WURS score below 36 reported such contact. More than half (53%) of those with a WURS score of 36 or more reported previous psychiatric contacts, compared with 12 individuals (40%) of those with a WURS score below 36. Notably, none in our entire sample had had psychiatric contact in their childhood. Six (20%) individuals with a WURS score of 36 or more had past psychiatric hospitalization, but none of those with a WURS score below 36. Depression, anxiety and suicidal thoughts were most common among those with a WURS score of 36 or more. Distribution of past psychiatric history in our total sample is described in detail below in Table 19.

Table 19. Past Psychiatric History ( $n=60$ ).

| <b>Total sum WURS score</b>                        | <b>0-35, <math>n = 30</math></b> | <b>36-100, <math>n = 30</math></b> |
|--|----------------------------------|------------------------------------|
| <b>Age, mean (<math>\pm s</math>)</b>              | 75.5 (4.7)                       | 73.2 (5.5)                         |
| <b>Gender</b>                                      |                                  |                                    |
| ✓ Men  | 36.7%                            | 63.3%                              |
| ✓ Women  | 63.3%                            | 36.7%                              |
| <b>Current psychiatric contact</b>                 |                                  |                                    |
| ✓ Yes  | 0.0%                             | 33.3%                              |
| ✓ No   | 100.0%                           | 66.7%                              |
| <b>Past psychiatric contact</b>                    |                                  |                                    |
| ✓ Yes  | 40.0%                            | 53.3%                              |
| ✓ No   | 60.0%                            | 46.7%                              |
| <b>Past psychiatric hospitalization</b>            |                                  |                                    |
| ✓ Yes  | 0.0%                             | 20.0%                              |
| ✓ No   | 100.0%                           | 80.0%                              |
| <b>Depression</b>                                  |                                  |                                    |
| ✓ Yes  | 40.0%                            | 50.0%                              |
| ✓ No   | 60.0%                            | 50.0%                              |
| <b>Suicidal thoughts</b>                           |                                  |                                    |
| ✓ Yes  | 10.0%                            | 23.3%                              |
| ✓ No   | 90.0%                            | 76.7%                              |
| <b>Suicidal attempts</b>                           |                                  |                                    |
| ✓ Yes  | 0.0%                             | 10.0%                              |
| ✓ No   | 100.0%                           | 90.0%                              |
| <b>Anxiety</b>                                     |                                  |                                    |
| ✓ Yes  | 10.0%                            | 26.7%                              |
| ✓ No   | 90.0%                            | 73.3%                              |
| <b>Alcohol/drug abuse</b>                          |                                  |                                    |
| ✓ Yes  | 3.3%                             | 6.7%                               |
| ✓ No   | 96.7%                            | 93.3%                              |
| <b>Obsessive Compulsive Disorder</b>               |                                  |                                    |
| ✓ Yes  | 0.0%                             | 0.0%                               |
| ✓ No   | 100.0%                           | 100.0%                             |
| <b>Antisocial Personality</b>                      |                                  |                                    |
| ✓ Yes  | 0.0%                             | 0.0%                               |
| ✓ No   | 100.0%                           | 100.0%                             |
| <b>Learning Disability</b>                         |                                  |                                    |
| ✓ Yes  | 0.0%                             | 3.3%                               |
| ✓ No   | 100.0%                           | 96.7%                              |
| <b>Bipolar Disorder</b>                            |                                  |                                    |
| ✓ Yes  | 0.0%                             | 6.7%                               |
| ✓ No   | 100.0%                           | 93.3%                              |
| <b>Oppositional Defiant Disorder</b>               |                                  |                                    |
| ✓ Yes  | 0.0%                             | 0.0%                               |
| ✓ No   | 100.0%                           | 100.0%                             |
| <i>Note. <math>s</math> = .standard deviation.</i> |                                  |                                    |

A review of medical records in the entire sample showed none had experienced a previous assessment for suspected dementia or been diagnosed with dementia.

#### *Study IV*

The results are described in the following subsections: childhood problems in daily functioning, current problems in daily functioning, past psychiatric history, family psychiatric history and health history.

##### *- Childhood problems in daily functioning*

The total mean score on the Childhood problems in daily functioning scale was 7.80. Those with a WURS score of 36 or more had a mean score of 14.73 compared with 0.87 among those with a score below 36 (see Table 20).

Significant differences in total Childhood problems in daily functioning scores were found between those with WURS scores of 36 and higher and those with scores below 36 ( $t=23,484$ ,  $df=58$ ,  $P=0,000$ ). Those who reported more childhood ADHD symptoms on WURS also reported significantly more childhood problems in daily functioning in various areas of daily life.

Age was not associated with scores for Childhood problems in daily functioning. The mean Childhood problems in daily functioning scores, however, differed significantly between all men and women ( $t= -2,331$ ,  $df=58$ ,  $P=0,023$ ), men rated more childhood problems in daily life. Separate analyses among those with a WURS score below and above 36 revealed no gender differences. Frequencies related to problems in daily functioning in childhood are shown in more detail in Table 20.

- *Current problems in daily functioning*

In the total sample the mean score for Current problems in daily functioning was 8.67. Those with a WURS score of 36 or more had a mean score was 16.40 compared with 0.93 among those with a score below 36 (see Table 20).

Significant differences in total Current problems in daily functioning scores were found between those with WURS scores of 36 and higher and those with scores below 36 ( $t=23,747$ ,  $df=58$ ,  $P=0,000$ ). Those who reported more childhood ADHD symptoms on WURS also reported significantly more current problems in daily functioning in on various aspects of daily life.

Age was not associated with scores for Current problems in daily functioning. The mean Childhood problems in daily functioning scores, however, differed significantly between all men and women ( $t= -2,214$ ,  $df=58$ ,  $P=0,031$ ), men rated more current problems in daily life. Separate analyses among those with a WURS score below and above 36 revealed no gender differences. Frequencies related to current problems in daily functioning are shown in more detail in Table 20.

Table 20. Childhood and current functioning of sample ( $n=60$ ).

| <b>Total sum WURS score</b>                          | <b>0-35, <math>n = 30</math></b> | <b>36-100, <math>n = 30</math></b> |
|--|----------------------------------|------------------------------------|
| <b>Age, mean (<math>\pm</math>s)</b>                 | 75.5 (4.7)                       | 73.2 (5.5)                         |
| <b>Gender</b>  |                                  |                                    |
| ✓ Men  | 36.7%                            | 63.3%                              |
| ✓ Women  | 63.3%                            | 36.7%                              |
| <b>Problems functioning in childhood:</b>            |                                  |                                    |
| <b>In my home life with my immediate family</b>      |                                  |                                    |
| ✓ Never or rarely                                    | 80.0%                            | 0.0%                               |
| ✓ Sometimes  | 20.0%                            | 0.0%                               |
| ✓ Often  | 0.0%                             | 70.0%                              |
| ✓ Very often   | 0.0%                             | 30.0%                              |
| <b>In my social interactions with other children</b> |                                  |                                    |
| ✓ Never or rarely                                    | 83.3%                            | 0.0%                               |
| ✓ Sometimes  | 16.7%                            | 20.0%                              |
| ✓ Often  | 0.0%                             | 60.0%                              |
| ✓ Very often   | 0.0%                             | 20.0%                              |

|  |        |       |
|--|--------|-------|
| <b>In my activities or dealings in the community</b>               |        |       |
| ✓ Never or rarely  | 100.0% | 0.0%  |
| ✓ Sometimes  | 0.0%   | 50.0% |
| ✓ Often  | 0.0%   | 50.0% |
| ✓ Very often   | 0.0%   | 0.0%  |
| <b>In school</b>   |        |       |
| ✓ Never or rarely  | 80.0%  | 0.0%  |
| ✓ Sometimes  | 20.0%  | 10.0% |
| ✓ Often  | 0.0%   | 36.7% |
| ✓ Very often   | 0.0%   | 53.3% |
| <b>In sports, clubs, or other organizations</b>                    |        |       |
| ✓ Never or rarely  | 96.7%  | 0.0%  |
| ✓ Sometimes  | 3.3%   | 50.0% |
| ✓ Often  | 0.0%   | 40.0% |
| ✓ Very often   | 0.0%   | 10.0% |
| <b>In learning to take care of myself</b>                          |        |       |
| ✓ Never or rarely  | 100.0% | 0.0%  |
| ✓ Sometimes  | 0.0%   | 56.7% |
| ✓ Often  | 0.0%   | 43.3% |
| ✓ Very often   | 0.0%   | 0.0%  |
| <b>In my play, leisure, or recreational activities</b>             |        |       |
| ✓ Never or rarely  | 83.3%  | 3.3%  |
| ✓ Sometimes  | 16.7%  | 33.3% |
| ✓ Often  | 0.0%   | 46.7% |
| ✓ Very often   | 0.0%   | 16.7% |
| <b>In my handling of my daily chores or other responsibilities</b> |        |       |
| ✓ Never or rarely  | 86.7%  | 0.0%  |
| ✓ Sometimes  | 13.3%  | 36.7% |
| ✓ Often  | 0.0%   | 56.7% |
| ✓ Very often   | 0.0%   | 6.7%  |
| <b>Problems in current functioning:</b>                            |        |       |
| <b>In my home life with my immediate family</b>                    |        |       |
| ✓ Never or rarely  | 86.7%  | 0.0%  |
| ✓ Sometimes  | 13.3%  | 30.0% |
| ✓ Often  | 0.0%   | 66.7% |
| ✓ Very often   | 0.0%   | 3.3%  |
| <b>In my work or occupation</b>                                    |        |       |
| ✓ Never or rarely  | 86.7%  | 0.0%  |
| ✓ Sometimes  | 13.3%  | 23.3% |
| ✓ Often  | 0.0%   | 60.0% |
| ✓ Very often   | 0.0%   | 16.7% |
| <b>In my social interactions with others</b>                       |        |       |
| ✓ Never or rarely  | 90.0%  | 0.0%  |
| ✓ Sometimes  | 10.0%  | 53.3% |
| ✓ Often  | 0.0%   | 33.3% |
| ✓ Very often   | 0.0%   | 13.3% |
| <b>In my activities or dealings in the community</b>               |        |       |
| ✓ Never or rarely  | 100.0% | 0.0%  |
| ✓ Sometimes  | 0.0%   | 53.3% |

|   |       |       |
|---|-------|-------|
| ✓ Often                                     | 0.0%  | 33.3% |
| ✓ Very often                                | 0.0%  | 13.3% |
| <b>In any educational activities</b>        |       |       |
| ✓ Never or rarely                           | 96.7% | 0.0%  |
| ✓ Sometimes                                 | 3.3%  | 63.3% |
| ✓ Often                                     | 0.0%  | 33.3% |
| ✓ Very often                                | 0.0%  | 13.3% |
| <b>In my dating or marital relationship</b> |       |       |
| ✓ Never or rarely                           | 86.7% | 3.3%  |
| ✓ Sometimes                                 | 10.0% | 20.0% |
| ✓ Often                                     | 3.3%  | 60.0% |
| ✓ Very often                                | 0.0%  | 16.7% |
| <i>Note. s=.standard deviation.</i>         |       |       |

- *Past Psychiatric History*

The sum mean score in the Past Psychiatric History scale was 1.68. Those with a WURS score of 36 or more scored 2.33 compared with 1.03 among those with a WURS score below 36 (see Table 19).

The number of Past Psychiatric History problems differed significantly between those with WURS scores lower and 36 or higher ( $t= 2,261$ ,  $df=58$ ,  $P=0,028$ ). Those who reported more childhood ADHD symptoms on WURS also reported significantly more of Past Psychiatric History.

Age was not associated with total number of Past Psychiatric History. The mean sum Past Psychiatric History score, did not differ significantly between men and women. Separate analyses among those with a WURS score below and above 36 revealed no gender differences for those with a WURS score of 36 or more. However, women with a WURS score below 36 reported more Past Psychiatric History ( $t= 2,106$ ,  $df=28$ ,  $P=0,044$ ). Frequencies related to Past Psychiatric History are shown in more detail in Table 19.



- *Family Psychiatric History*

The mean score in the Family Psychiatric History scale in the whole sample was 2.37. Those with a WURS score of 36 or more had a mean score was 2.47 compared with 2.27 for those with a score below 36 (see Table 21).

No significant differences in total number Family Psychiatric History items were found between those with WURS scores of 36 and higher and those with scores below 36. At the item level, however, bipolar disorder family history showed to be significantly more common among those with WURS scores of 36 and higher ( $t= 2,047$ ,  $df=58$ ,  $P=0,045$ ).

Age was not associated with total number of Family Psychiatric History. The mean sum Family Psychiatric History score, did not differ significantly between men and women. Separate analyses among those with a WURS score below and above 36 revealed no gender differences for those with a WURS score of 36 or more. However, women with a WURS score below 36 reported more Family Psychiatric History ( $t= 2,719$ ,  $df=28$ ,  $P=0,011$ ). Frequencies related to Family Psychiatric History items are shown in more detail in Table 21.

Table 21. Family Psychiatric History ( $n=60$ ).

| Total sum WURS score                 | 0-35, $n = 30$ | 36-100, $n = 30$ |
|--------------------------------------|----------------|------------------|
| <b>Age, mean (<math>\pm</math>s)</b> | 75.5 (4.7)     | 73.2 (5.5)       |
| <b>Gender</b>                        |                |                  |
| ✓ Men                                | 36.7%          | 63.3%            |
| ✓ Women                              | 63.3%          | 36.7%            |
| <b>ADHD symptoms or diagnosis</b>    |                |                  |
| ✓ Yes                                | 6.7%           | 20.0%            |
| ✓ No                                 | 93.3%          | 80.0%            |
| <b>LD symptoms or diagnosis</b>      |                |                  |
| ✓ Yes                                | 6.7%           | 16.7%            |
| ✓ No                                 | 93.3%          | 83.3%            |
| <b>Mental retardation</b>            |                |                  |
| ✓ Yes                                | 3.3%           | 10.0%            |
| ✓ No                                 | 96.7%          | 90.0%            |
| <b>Psychosis/schizophrenia</b>       |                |                  |
| ✓ Yes                                | 10.0%          | 6.7%             |

|  |        |        |
|--|--------|--------|
| ✓ No                                   | 90.0%  | 93.3%  |
| <b>Manic-depression</b>                |        |        |
| ✓ Yes                                  | 3.3%   | 20.0%  |
| ✓ No                                   | 96.7%  | 80.0%  |
| <b>Major depression</b>                |        |        |
| ✓ Yes                                  | 40.0%  | 30.0%  |
| ✓ No                                   | 60.0%  | 70.0%  |
| <b>Suicide</b>                         |        |        |
| ✓ Yes                                  | 13.3%  | 10.0%  |
| ✓ No                                   | 86.7%  | 90.0%  |
| <b>Anxiety disorder</b>                |        |        |
| ✓ Yes                                  | 13.3%  | 10.0%  |
| ✓ No                                   | 86.7%  | 90.0%  |
| <b>Tics/Tourette syndrome</b>          |        |        |
| ✓ Yes                                  | 0.0%   | 3.3%   |
| ✓ No                                   | 100.0% | 96.7%  |
| <b>Alcohol abuse</b>                   |        |        |
| ✓ Yes                                  | 33.3%  | 30.0%  |
| ✓ No                                   | 66.7%  | 70.0%  |
| <b>Inpatient psychiatric treatment</b> |        |        |
| ✓ Yes                                  | 23.3%  | 33.3%  |
| ✓ No                                   | 76.7%  | 66.7%  |
| <b>Epilepsy/seizures</b>               |        |        |
| ✓ Yes                                  | 20.0%  | 0.0%   |
| ✓ No                                   | 80.0%  | 100.0% |
| <i>Note. s=.standard deviation.</i>    |        |        |

- *Health history in childhood, past adulthood and currently*

#### *Childhood health*

In the total sample the mean score was 0,97 for Childhood Health History. Those with a WURS score of 36 or more had a mean of 1.20 compared with 0.73 among those who scored below 36 (see Table 22).

No significant differences in total number Childhood Health History items were found between those with WURS scores of 36 and higher and those with scores below 36. Age and gender were not associated with total number of Childhood Health History. Frequencies related to Childhood Health History are shown in more detail in Table 22.

### *Health in Past adulthood*

The mean score for Past Adulthood Health History scale in the total sample was 3.30. Those with a WURS score of 36 or more had a mean of 3.47 compared with 3.13 among those with a score below 36 (see Table 22). There were no significant differences between groups. At the item level, however, heart problems in past adulthood were more common among those with WURS scores of 36 and higher ( $t= 2,131$ ,  $df=58$ ,  $P=0,037$ ). Age and gender were not associated with total number of Past Adulthood Health History. Frequencies related to Past Adulthood Health History are shown in more detail in Table 22.

### *Current health*

The mean score for Current Health scale in the total sample was 3.68. There were no difference between those with a WURS score of 36 or more (mean score 3.87) and those with a score below 36 (mean of 3,50). Age and gender were not associated with number of Current Health problems. Frequencies related to Current Health are shown in more detail in Table 22.

Table 22. Health history of sample ( $n=60$ ).

| <b>Total sun WURS score</b>          |  | <b>0-35, <math>n = 30</math></b> |               |           | <b>36-100, <math>n = 30</math></b> |               |           |
|--------------------------------------|--|----------------------------------|---------------|-----------|------------------------------------|---------------|-----------|
| <b>Age, mean (<math>\pm</math>s)</b> |  | 75.5 (4.7)                       |               |           | 73.2 (5.5)                         |               |           |
| <b>Gender</b>                        |  |                                  |               |           |                                    |               |           |
| ✓ Men                                |  | 36.7%                            |               |           | 63.3%                              |               |           |
| ✓ Women                              |  | 63.3%                            |               |           | 36.7%                              |               |           |
| <b>Health History</b>                |  |                                  |               |           |                                    |               |           |
| Type of problem                      |  | During childhood                 | Past as adult | Currently | During childhood                   | Past as adult | Currently |
| <b>Allergies/asthma</b>              |  |                                  |               |           |                                    |               |           |
| ✓ Yes                                |  | 13.3%                            | 20.0%         | 33.3%     | 16.7%                              | 26.7%         | 33.3%     |
| ✓ No                                 |  | 86.7%                            | 80.0%         | 66.7%     | 83.3%                              | 73.3%         | 66.7%     |
| <b>Heart problems</b>                |  |                                  |               |           |                                    |               |           |
| ✓ Yes                                |  | 0.0%                             | 13.3%         | 36.7%     | 3.3%                               | 36.7%         | 46.7%     |
| ✓ No                                 |  | 100.0%                           | 86.7%         | 63.3%     | 96.7%                              | 63.3%         | 53.3%     |
| <b>Epilepsy or seizures</b>          |  |                                  |               |           |                                    |               |           |
| ✓ Yes                                |  | 0.0%                             | 0.0%          | 3.3%      | 0.0%                               | 0.0%          | 0.0%      |

|  |        |        |        |        |        |        |
|--|--------|--------|--------|--------|--------|--------|
| ✓ No   | 100.0% | 100.0% | 96.7%  | 100.0% | 100.0% | 100.0% |
| <b>High blood pressure</b>                       |        |        |        |        |        |        |
| ✓ Yes  | 0.0%   | 20.0%  | 43.3%  | 0.0%   | 0.0%   | 0.0%   |
| ✓ No   | 100.0% | 80.0%  | 56.7%  | 100.0% | 100.0% | 100.0% |
| <b>Serious head injury</b>                       |        |        |        |        |        |        |
| ✓ Yes  | 0.0%   | 3.3%   | 6.7%   | 3.3%   | 3.3%   | 6.7%   |
| ✓ No   | 100.0% | 96.7%  | 93.3%  | 96.7%  | 96.7%  | 93.3%  |
| <b>Injury resulting in loss of consciousness</b> |        |        |        |        |        |        |
| ✓ Yes  | 3.3%   | 23.3%  | 10.0%  | 10.0%  | 23.3%  | 10.0%  |
| ✓ No   | 96.7%  | 76.7%  | 90.0%  | 90.0%  | 76.7%  | 90.0%  |
| <b>Lead poisoning</b>                            |        |        |        |        |        |        |
| ✓ Yes  | 0.0%   | 3.3%   | 0.0%   | 3.3%   | 3.3%   | 0.0%   |
| ✓ No   | 100.0% | 96.7%  | 100.0% | 96.7%  | 96.7%  | 100.0% |
| <b>Broken bones</b>                              |        |        |        |        |        |        |
| ✓ Yes  | 13.3%  | 16.7%  | 13.3%  | 16.7%  | 23.3%  | 6.7%   |
| ✓ No   | 86.7%  | 83.3%  | 86.7%  | 83.3%  | 76.7%  | 93.3%  |
| <b>Surgery</b>                                   |        |        |        |        |        |        |
| ✓ Yes  | 20.0%  | 70.0%  | 36.7%  | 36.7%  | 66.7%  | 36.7%  |
| ✓ No   | 80.0%  | 30.0%  | 63.3%  | 63.3%  | 33.3%  | 63.3%  |
| <b>Migraine headaches</b>                        |        |        |        |        |        |        |
| ✓ Yes  | 10.0%  | 30.0%  | 20.0%  | 20.0%  | 26.7%  | 30.0%  |
| ✓ No   | 90.0%  | 70.0%  | 80.0%  | 80.0%  | 73.3%  | 70.0%  |
| <b>Thyroid condition</b>                         |        |        |        |        |        |        |
| ✓ Yes  | 0.0%   | 16.7%  | 10.0%  | 0.0%   | 6.7%   | 10.0%  |
| ✓ No   | 100.0% | 83.3%  | 90.0%  | 100.0% | 93.3%  | 90.0%  |
| <b>Problems with vision</b>                      |        |        |        |        |        |        |
| ✓ Yes  | 6.7%   | 70.0%  | 83.3%  | 3.3%   | 43.3%  | 73.3%  |
| ✓ No   | 93.3%  | 30.0%  | 16.7%  | 96.7%  | 56.7%  | 26.7%  |
| <b>Problems with hearing</b>                     |        |        |        |        |        |        |
| ✓ Yes  | 3.3%   | 16.7%  | 36.7%  | 3.3%   | 30.0%  | 56.7%  |
| ✓ No   | 96.7%  | 83.3%  | 63.3%  | 96.7%  | 70.0%  | 43.3%  |
| <b>Diabetes</b>                                  |        |        |        |        |        |        |
| ✓ Yes  | 3.3%   | 10.0%  | 16.7%  | 3.3%   | 20.0%  | 26.7%  |
| ✓ No   | 96.7%  | 90.0%  | 83.3%  | 96.7%  | 80.0%  | 73.3%  |
| <i>Note: s = standard deviation.</i>             |        |        |        |        |        |        |

#### *Cases in Study IV - ADHD in a life span perspective*

Three cases with a WURS score of 36 or more were selected based upon their psychiatric records for further analyses of the life course impact. Information from neuropsychological tests including Conners' Continuous Performance Test II (CPT II V.5) (Conners, 2004) and the Wechsler Adult Intelligence Scale, third or fourth edition (Wechsler, 1997, 2003, 2008,

2010) were obtained from their psychiatric records when they were assessed and received a diagnosis of ADHD. They were interviewed in detail about their life in an additional session lasting for 60-90 minutes. The in-depth interview was semi-structured and contained the following questions: “How would you describe the impact of ADHD in your childhood, past adulthood and currently” and “What does it mean to you being diagnosed with ADHD late in life? ”. Additionally, these individuals were asked to rate their current executive functioning using Behaviour Rating Inventory of Executive Function – Adult Version (Roth et al., 2005).

*Case I, Ms A.*

Ms A, is a 71-year-old woman. About 15 years ago she heard a radio program about ADHD and recognized through similarities to her own experience that she might suffer from ADHD, but she kept on thinking, “they’re only talking about children, there is no-one who would assess me for ADHD, an old person with most of her life behind her”. She had felt a strong inner restlessness her entire life, difficulties concentrating and major problems with her time management. She had had numerous jobs. She worked very hard but also “burned-out” several times leading to long periods of sick-leave. For many years she was working in areas of work clearly below her qualifications. She never got married or co-habited and she continues to experience difficulties in social settings (talking too much and too loud, feeling herself left out). For a period of time as a young woman she was addicted to tranquilizers. At the time of her ADHD assessment she was afraid her inner restlessness might worsen as she aged.

She was diagnosed with ADHD, combined subtype at the age of 68 when, on her own request, she was referred by her general practitioner to a geriatric outpatient clinic for suspected ADHD after other possible explanations including dementia were ruled out. General physical and neurological examination, and electrocardiogram, routine blood tests, and brain MRI were all in the normal range. Ms A. has recurrently been treated for

depression, anxiety and sleeping problems in her past life. She has been physically healthy except for well-treated breast cancer, back pain and age related problems with vision. She has never smoked and reported no alcohol abuse. Her family psychiatric history revealed learning disabilities such as dyslexia on her father's side. An aunt on her mothers' side had been a psychiatric in-patient for lengthy periods. Ms A. also suspects that her father, a hard working businessman with a hot temper and "always up to something" might have suffered from ADHD. Ms A. also refers to a son of one of her sisters who has been diagnosed with ADHD. Ms A. has been successfully treated pharmacologically with methylphenidate. Her results for example on Conners' CPT II were significantly improved, her ADHD index being below 50%, no longer indicating attention deficit. Due to the side effects she experienced with her medical ADHD treatment (headaches, nausea and dizziness), pharmacological ADHD treatment was ended. Her non-pharmacological ADHD treatment with a psychologist continues.

Her demographic characteristics, self-ratings, DSM-IV criteria, subtyping and neuropsychological measures are shown in Table 23. Her problems impact in daily functioning in childhood and currently related to ADHD symptoms are shown in Table 24.

*What does ADHD diagnosis mean to you?*

"I have always felt myself different, "awkward" without understanding why. I have been struggling all my life but my problems persisted. What's wrong with me, why can't I cope with life like other grown-ups? I'm always on the go and that wears me out.

It's still quite rough for me after I was diagnosed with ADHD but I don't have to fight a losing battle anymore. In my meetings with my psychologist I can learn how to make things easier in my everyday life. To become more of a friend with my watch for example, tricks to manage to come on time, check out how long my activities really take. Making plans on daily

and weekly basis including what I wish to accomplish. Learning to evaluate when I plan too many things to do. Learning to make priorities, to see what is most important and what can actually wait till next week. I have learnt to “check off” things that I’ve finished. To be able to see what I’ve actually accomplished and reward myself perhaps with something good to eat, take a nap in a sunny spot in my garden i.e. I nowadays mix days when I’m with other people (I need company) with days when I’m at home and can recover. I can now manage to have pretty regular times for meals (breakfast, lunch and dinner) – sometimes I use an egg timer as a reminder. I have also learnt to think over what I need to do next day when I go to bed and when I wake up in the morning. I have learnt to use a sleep diary and still use it to note how much and how well I’ve slept.

I appreciate and consider it a great privilege to see my psychologist every week. There are so many like me, struggling alone out there. I have been encouraged and I have been able to harness my strengths and learned how to struggle with my weaknesses in my daily life. For me it is important to have some one to talk to who understands my problems. When my psychologist is on vacation for a couple of weeks I think that I will do fine on my own – but no, my experience is that my life gets harder to cope with on my own, I get depressed and my anxiety mounts. The help I get is invaluable in my life.” – Ms A.

#### *Case II, Mr M.*

Mr M. is a 69-year-old man. He reports that he was considered difficult as a child; being restless and difficult to handle. He had severe behavioural problems at school but managed to graduate from a private high school. Mr M. states that has always been handle difficulties through “the gift of the gab” and charm. He left Sweden for USA at the age of 19 and managed to train as a salesman. He stayed in USA for 20 years where he married and divorced before returning to Sweden. He had numerous jobs; the longest one lasted for 6

years. He was fired from all of his places of employment. Back in Sweden he got married, and hoped to succeed as a businessman but his attempts were less than successful. Instead, he ended up in civil bankruptcy and he was divorced. He is currently living at subsistence level.

Mr M. was diagnosed with ADHD, combined subtype at the age of 66. He contacted a psychiatric outpatient clinic and asked to be assessed for ADHD after having heard about ADHD and wondering if it might be an explanation for problems he experienced. General physical and neurological examination, and electrocardiogram and routine blood tests were all in the normal range. Mr M. has been treated for depression, anxiety and sleeping problems. He also reports suicidal thoughts in his earlier adult life. He has been physically healthy except for stress vulnerability, rupture of a gastric ulcer (?), sleeping problems and age-related problems with vision. He has been smoking since he was 16 years old. He reports no alcohol abuse currently or earlier in his life. Mr Ms family psychiatric history revealed that his mother had dyslexia, and was diagnosed and treated for depression as a psychiatric in-patient. Mr M. also suspects that his mother might have suffered from ADHD.

Mr M. has been successfully treated pharmacologically with methylphenidate. His results for example on Conners' CPT II were significantly improved, his ADHD index being below 50%, no longer indicating attention deficit. Due to side effects (red skin rash) the pharmacological ADHD treatment was ended. His non-pharmacological ADHD treatment with a psychologist continues. He is also working with meditation and yoga to ease symptoms like restlessness. His demographic characteristics, self-ratings, DSM-IV criteria, subtyping and neuropsychological measures are shown in Table 23. His problems' impact on daily functioning in childhood and currently related to ADHD symptoms are shown in Table 24.

*What does ADHD diagnosis mean to you?*

“My life would naturally have been richer and more ”human” if I had been diagnosed earlier in life. As it is now, I am an utterly thankful for being recognized as having ADHD since it



has turned my whole existence upside down in a positive way. The personal "commandments" and the experiences that made me develop new ways, might now turn out to be useful.

Now I understand why I behaved and reacted in all those various ways. I think I now know myself better and in a new way and therefore I feel more secure in everything I do.

Presently I hope to be able to use this new insight and enrich my life in a way I was not able to imagine couple of years ago when everything in my life was a mess. My exwife got so scared then when she saw how I was doing that she took me to the emergency psychiatric ward since I was suicidal, and she knows me well. It is not likely that it will happen again" – Mr M.

#### *Case III, Ms B.*

Ms B. is a 70-year-old woman. As a child she was very lively, very talkative and had difficulties concentrating – "the clown" in her class. Her teachers told Ms B's mother time after time that Ms B would do well if she would only apply herself at school. She managed her homework by learning the first chapters by heart. At the age of 12 she was diagnosed with ulcerative proctocolitis (inflammatory bowel disease) and was treated in hospital for long periods between 12 and 15. She met her husband when she was 18 years old, a marriage that lasted 37 years before they divorced. She has three adult children, nine grandchildren and two great-grandchildren. She had numerous jobs working as a clerk or secretary. Because of her behaviour she was fired from three places of employment. At the age of 33 she trained as a drama-theatre-pedagogue. She "burned out" leading to her early retirement. Yet, she has continued to work with theatre. Two of her children have been diagnosed with ADHD as adults. Also, three of her grandchildren have been diagnosed with ADHD in their childhood and one grandchild is to be assessed for ADHD. Ms B started reading about ADHD when her

grandchildren were diagnosed and recognized that her problems with stress and anxiety might also be understood as a part of a problem with ADHD.

She was diagnosed with ADHD, combined subtype at the age of 67 when she went to a psychiatric outpatient clinic and wanted to be assessed for ADHD. General physical and neurological examination, and electrocardiogram and routine blood tests were all in the normal range. She has been physically well except for ulcerative proctocolitis in her childhood. She started smoking at the age of 14 years, quit smoking ten years ago and is currently using snuff. She reports no alcohol abuse but admits that a glass of wine now and then eases her anxiety. Besides ADHD diagnosed in two of her children and three of her grandchildren, her family psychiatric history revealed that her father was depressed and committed a suicide after his wife divorced him in old age. Ms Bs mother suffered from depression and anxiety. Both of Ms Bs sons have been diagnosed with dyslexia.

Pharmacological ADHD treatments (i.e. methylphenidate and atomoxetine) have not yet been successful in Ms Bs case, but she continues to try out other medical ADHD treatments with her psychiatrist. Her non-pharmacological ADHD treatment with a psychologist continues. Her demographic characteristics, self-ratings, DSM-IV criteria, subtyping and neuropsychological measures are shown in Table 23. Her problems impact in daily functioning in childhood and currently related to ADHD symptoms are shown in Table 24.

*What does ADHD diagnosis mean to you?*

”My work as drama-theatre-teacher which I continue with has saved my life many times. It suits my personality, my energy, my creativity and my interest in other people particularly children and adolescents. All the stress, anxiety, restlessness I suffer from may not disappear but is also in some way a part of my working process. But every morning I wake up with terrible anxiety – that often totally paralyzes me...till I can put together enough energy to get up and start with the daily doings. Sometimes this stress and anxiety gives me strength...or

how shall I put it, when I'm really hyperfocused on something it is like carbonated soda all over my body and that can also be a curse sometimes.

ADHD diagnosis for me means most of all that I am glad to now know what is the matter with me. I have a better understanding for why and how I react and act today. To be honest it is not that dramatic but I feel more responsibility for what I'm doing. It feels also good at the theatre that I can tell my assistant about ADHD and she can make adjustments to make the work smoother when I lose my temper – ha ha.

And suddenly I've reached that horrible figure 70. I'm still busy with my theatre group of 10 years – of course I get tired...but not until I get back home. At the theatre I'm everywhere like a shuttle, giving instructions, doing make-up, fixing hair, running up and down stairs....very intensive. I was thinking one night while cycling home...how on earth do I have energy for this....we'll see about next year...don't know. But on the other hand how would I survive without my theatre – that thought really scares me. Sure, I've got plenty other things to do....writing, reading, watching movies, go through old pictures....even cleaning more often ha ha! I might have to take it as it comes..." – Ms B.

Table 23. Demographic characteristics, self-rating, DMS-IV criteria, subtyping and neuropsychological measures among three cases.

|                                     | <b>Ms A</b><br><b>71 years</b> | <b>Mr M</b><br><b>69 years</b>  | <b>Ms B</b><br><b>70 years</b> |
|-------------------------------------|--------------------------------|---------------------------------|--------------------------------|
| <b>Demographic characteristics:</b> |                                |                                 |                                |
| Gender                              | Women                          | Man                             | Woman                          |
| Marital status                      | Living alone,<br>never married | Living alone,<br>divorced twice | Living alone,<br>divorced once |
| Educational level                   | University<br>graduate         | University<br>graduate          | University<br>graduate         |
| Number of employments               | > 5 employments                | > 5 employments                 | > 5 employments                |
| <b>SES</b>                          |                                |                                 |                                |
| ✓ while employed                    | Non-manual<br>worker           | Non-manual<br>worker            | Non-manual<br>worker           |
| ✓ currently                         | Average pension                | Subsistence level               | Low pension                    |
| Having biological offspring         | No                             | No                              | Yes                            |
| Number of own children              | 0                              | 0                               | 3                              |
| <b>Self-ratings, total score:</b>   |                                |                                 |                                |

|   |               |                |               |
|---|---------------|----------------|---------------|
| ✓ WURS-25   | 68            | 59             | 69            |
| ✓ WRASS   | 111           | 108            | 107           |
| ✓ Barkley total CSS-Child Recall                                      | 47            | 39             | 45            |
| ✓ Barkley total CSS-Current   | 45            | 44             | 43            |
| <b>DSM-IV, number ADHD criteria met:</b>                              |               |                |               |
| ✓ DSM-IV sum childhood ADHD criteria met                              | 15            | 15             | 17            |
| ✓ DSM-IV sum current ADHD criteria met                                | 15            | 18             | 16            |
| <b>DSM-IV ADHD subtype:</b>   |               |                |               |
| ✓ DSM-IV sum childhood ADHD subtype                                   | combined      | combined       | combined      |
| ✓ DSM-IV sum current ADHD subtype                                     | combined      | combined       | combined      |
| <b>Neuropsychological measures:</b>                                   |               |                |               |
| <i>Conners' CPTII</i>   |               |                |               |
| ✓ ADHD Index  | 99.9%         | 91.3%          | 50.0%         |
| <i>BRIEF-A, T-score</i><br>(T-score $\geq$ 65 clinically significant) |               |                |               |
| ✓ Inhibit   | 76            | 73             | 83            |
| ✓ Shift   | 84            | 51             | 81            |
| ✓ Emotional control   | 65            | 65             | 73            |
| ✓ Self-monitor  | 65            | 54             | 68            |
| ✓ Initiate  | 72            | 66             | 81            |
| ✓ Working memory  | 85            | 79             | 88            |
| ✓ Plan/organize   | 59            | 71             | 76            |
| ✓ Task monitor  | 65            | 89             | 85            |
| ✓ Organization of materials   | 56            | 67             | 72            |
| ✓ Behavioural regulation (BRI)  | 74            | 63             | 79            |
| ✓ Metacognition (MI)  | 69            | 76             | 83            |
| ✓ Global Executive Composite (GEC)                                    | 72            | 71             | 83            |
| <i>WAIS-III/WAIS-IV, IQ or Index score</i>                            |               |                |               |
|   | WAIS-III      | WAIS-IV        | WAIS-III      |
| ✓ Full Scale IQ (95% CI)  | 110 (106-114) | 98 (92-104)    | 101 (97-105)  |
| ✓ Verbal comprehensive/verbal comprehension index* (95% CI)           | 110 (104-115) | 114* (105-121) | 107 (101-112) |
| ✓ Perceptual Organization/Perceptual Reasoning Index* (95% CI)        | 118 (110-124) | 86* (80-94)    | 103 (96-110)  |
| ✓ Working Memory/Working Memory Index* (95% CI)                       | 115 (107-121) | 90* (83-98)    | 94 (88-101)   |
| ✓ Processing Speed/Processing Speed Index* (95% CI)                   | 96 (88-105)   | 101* (91-111)  | 88 (80-98)    |
| ✓ The General Ability Index* (95% CI)                                 | -             | 100* (94-106)  | -             |
| * = <i>WAIS-IV</i>  |               |                |               |

Table 24. Childhood and Current functioning among cases.

|   | <b>Ms A</b> | <b>Mr M</b> | <b>Ms B</b> |
|---|-------------|-------------|-------------|
| Age   | 68 years    | 67 years    | 69 years    |
| <b>Problems Functioning in childhood:</b>   |             |             |             |
| In my home life with my immediate family  |             |             |             |
| <input checked="" type="checkbox"/> Never or rarely<br><input checked="" type="checkbox"/> Sometimes<br><input checked="" type="checkbox"/> Often<br><input checked="" type="checkbox"/> Very often | Very often  | Very often  | Often       |
| In my social interactions with other children   |             |             |             |
| <input checked="" type="checkbox"/> Never or rarely<br><input checked="" type="checkbox"/> Sometimes<br><input checked="" type="checkbox"/> Often<br><input checked="" type="checkbox"/> Very often | Very often  | Very often  | Sometimes   |
| In my activities or dealings in the community   |             |             |             |
| <input checked="" type="checkbox"/> Never or rarely<br><input checked="" type="checkbox"/> Sometimes<br><input checked="" type="checkbox"/> Often<br><input checked="" type="checkbox"/> Very often | Often       | Very often  | Often       |
| In school   |             |             |             |
| <input checked="" type="checkbox"/> Never or rarely<br><input checked="" type="checkbox"/> Sometimes<br><input checked="" type="checkbox"/> Often<br><input checked="" type="checkbox"/> Very often | Often       | Very often  | Often       |
| In sports, clubs, or other organizations  |             |             |             |
| <input checked="" type="checkbox"/> Never or rarely<br><input checked="" type="checkbox"/> Sometimes<br><input checked="" type="checkbox"/> Often<br><input checked="" type="checkbox"/> Very often | Often       | Often       | Often       |
| In learning to take care of myself  |             |             |             |
| <input checked="" type="checkbox"/> Never or rarely<br><input checked="" type="checkbox"/> Sometimes<br><input checked="" type="checkbox"/> Often<br><input checked="" type="checkbox"/> Very often | Sometimes   | Very often  | Often       |
| In my play, leisure, or recreational activities   |             |             |             |
| <input checked="" type="checkbox"/> Never or rarely<br><input checked="" type="checkbox"/> Sometimes<br><input checked="" type="checkbox"/> Often<br><input checked="" type="checkbox"/> Very often | Very often  | Often       | Often       |
| In my handling of my daily chores or other responsibilities   |             |             |             |
| <input checked="" type="checkbox"/> Never or rarely<br><input checked="" type="checkbox"/> Sometimes<br><input checked="" type="checkbox"/> Often<br><input checked="" type="checkbox"/> Very often | Very often  | Very often  | Very often  |
| <b>Problems in Current functioning:</b>   |             |             |             |
| In my home life with my immediate family  |             |             |             |
| <input checked="" type="checkbox"/> Never or rarely   | Very often  | Often       | Often       |

|   |                 |            |            |
|---|-----------------|------------|------------|
| <ul style="list-style-type: none"> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul>                            |                 |            |            |
| <b>In my work or occupation</b>   |                 |            |            |
| <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> | Very often      | Very often | Very often |
| <b>In my social interactions with others</b>  |                 |            |            |
| <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> | Very often      | Often      | Very often |
| <b>In my activities or dealings in the community</b>  |                 |            |            |
| <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> | Very often      | Often      | Very often |
| <b>In any educational activities</b>  |                 |            |            |
| <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> | Very often      | Very often | Very often |
| <b>In my dating or marital relationship</b>   |                 |            |            |
| <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> | Very often      | Very often | Very often |
| <b>In my management of money</b>  |                 |            |            |
| <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> | Never or rarely | Very often | Very often |
| <b>In my driving of a motor vehicle</b>   |                 |            |            |
| <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> | Often           | Sometimes  | Often      |
| <b>In my leisure or recreational activities</b>   |                 |            |            |
| <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> | Very often      | Often      | Often      |
| <b>In my management of my daily responsibilities</b>  |                 |            |            |
| <ul style="list-style-type: none"> <li>✓ Never or rarely</li> <li>✓ Sometimes</li> <li>✓ Often</li> <li>✓ Very often</li> </ul> | Very often      | Very often | Very often |

## DISCUSSION

Given the sparse information about ADHD in older adults, Study I was designed to examine the prevalence of retrospectively self-rated childhood ADHD symptoms in a population-based sample of individuals in the age range 65-80. Study II was designed to examine to what extent the elderly with high ADHD symptom scores according to the WURS scale recall similarly elevated symptom levels in childhood. We compared the amount of self-reported ADHD symptoms in childhood and in older ages reported in a population-based sample aged 66-86. Study III was designed to compare currently used self-report scales for identifying ADHD symptomatology over the life-span. Information was provided in a population-based sample aged 66-86. Study IV was designed to explore problems in daily functioning, past psychiatric history, family psychiatric history, and overall health history in elderly individuals reporting childhood and persistent ADHD symptomatology in a population-based sample aged 66-86. Additionally, examples of life courses for individuals first identified with an ADHD history in late life were presented in more detail.

### *Childhood symptoms in retrospect*

The main finding shows that the prevalence rate of retrospectively reported childhood ADHD symptoms in old age is 3.3%. Notably this figure is slightly lower, but comparable with prevalence rates of current childhood ADHD (American Psychiatric Association, 2000; Kessler et al., 2005a,b; Kessler et al., 2006; Merikangas et al., 2010; Polanczyk et al., 2007; Polanczyk and Jensen, 2008).

Individuals, who scored higher on the WURS scale, and especially those above the cut-off level of 36, may constitute a group of select survivors among all those who actually exhibited childhood ADHD. Childhood ADHD is often assumed to be associated with lower survival into older ages. Long-term follow-up studies, however, do not demonstrate clear

evidence for an elevated adult mortality even though many findings indicate more risk factors implying lower survival among those with ADHD (Adamou et al., 2013; Barkley et al., 2008; Guðjónsson et al., 2012; Knapp et al., 2011; Mannuzza et al., 2008; Moyá et al., 2012; Ramos Olazagasti et al., 2013). There are good reasons to believe that this is the case. Possible explanations including personality characteristics of low conscientiousness, which in turn can be a predictor of accidental injuries, obesity, greater risk for smoking and alcohol use, higher crime rates and other health related risk factors (Barkley et al., 2008). Given that our ADHD rate is similar with figures in current childhood cohorts, our results may suggest that there was no substantially elevated mortality risk among those who were captured due to WURS-scores of 36 and more. Considering more recent reports of higher childhood prevalence rates (Kessler et al., 2005b; Merikangas et al., 2010; Polanczyk et al., 2007; Polanczyk and Jensen, 2008) one might, however, expect an even higher occurrence in our age cohort. In any case our 3.3% sub-sample is likely to represent those with ADHD in childhood who survived into old age.

#### *Consistency of ADHD symptoms reported for childhood and in old age*

Our main finding was that of a significant concordance of childhood and current ADHD symptoms, i.e. those who reported more childhood ADHD symptoms on the WURS scale also rated more current symptoms in older ages on the WRASS scale. Noteworthy in the sub-sample with a WURS score of 36 or higher, more than half also scored 70 or above on WRASS. Although this clinical cut-off level is not yet standardized it is typically used as the level or rule of thumb for identifying adults with a likely ADHD history. Likewise individuals who reported less childhood ADHD also reported current ADHD symptoms to a lesser degree and none of the individuals with a WURS score below 36 scored 70 or more on the WRASS. These results are largely supported by a Dutch study by Kooij and co-investigators (Kooij et al., 2005), where there were no significant age effects in the prevalence of ADHD from age



18 to 75 years and also by another recent Dutch study (Michielsen et al., 2012) where the prevalence of syndromatic ADHD in older adults was found to be 2.8%, demonstrating that ADHD is found also in older ages.

*Comparison of currently used self-report scales for identifying ADHD symptomatology over the lifespan.*

The main finding was that of a significant correspondence in self-reported ADHD symptoms in using DSM-IV criteria and Wender and Barkley scales. Those who reported more childhood and current ADHD symptoms on the WURS and WRASS scales also rated more childhood and current DSM-IV symptoms of ADHD on the Barkley childhood and current symptoms scales. Further, those who rated more childhood and current ADHD symptoms in both the Wender and Barkley scales also met more DSM-IV criteria for childhood and current adult ADHD. Similarly, individuals who reported less childhood and current ADHD symptoms on Wender scales reported to a lesser degree childhood and current ADHD symptoms on the Barkley scales. They also met less of the DSM-IV criteria for childhood and current adult ADHD.

Like most of the major rating scales used for screening patients for ADHD, the Barkley scales are modeled on DSM-IV, whereas the Wender Scales are based on the more restrictive Utah criteria. Comparison of these measures revealed that fewer of those who rated less current ADHD symptoms on Wender scale (WRASS) met criteria for current ADHD using the Barkley scale. This discrepancy is perhaps due to more age appropriate cut-off points for current symptoms in the latter scale. In our sample of 30 individuals with a WURS score of 36 or more, 16 individuals (53%) scored 70 or more on the WRASS. In using the Barkley Current Scale for Inattention type ADHD, 29 individuals in our total sample were identified, 31 individuals scored above cut-off for Hyperactive-Impulsive type ADHD and 30 individuals

scored above cut-off for total ADHD score. Thirty individuals, corresponding to 100% among those with a WURS score of 36 or more actually met criteria for ADHD using Barkley scores.

Concerning the DSM-IV criteria, or 26 individuals (87%) with a WURS score of 36 or more met childhood diagnostic criteria for ADHD. Further, 22 individuals (73%) with a WURS score of 36 or more met adult diagnostic criteria for ADHD (7 for primarily Inattentive type, 6 for primarily Hyperactive-Impulsive type and 9 or Combined ADHD type) as laid out in DSM-IV. Our results support the importance of recognizing types of ADHD within a life span perspective and provide arguments for the need of age appropriate norms in assessing older individuals suspected for ADHD.

*Daily functioning, past psychiatric history, family psychiatric history, and overall health history*

The main finding was that of significantly more self-reported problems also in later everyday life among those who reported more childhood ADHD symptoms. The functional impairments associated with ADHD affect various aspects of daily functioning, which is demonstrated in recent research (Adamou et al., 2013; Barkley, Murphy, and Fischer, 2008; Guðjónsson et al., 2012; Knapp et al., 2011; Mannuzza et al., 2008; Moyá et al., 2012; Ramos Olazagasti et al., 2013). The novelty of our study is that we can confirm similar problems in daily functioning in an elderly sample. Those who exhibited childhood ADHD symptoms also reported more past psychiatric history: depression, anxiety and suicidal thought being those most frequently reported. Because other psychiatric disorders may account for a later onset of similar symptoms we also investigated the role of psychiatric comorbidity both in childhood and currently. The results support the idea of coexisting psychiatric disorders (Sobanski, 2006) besides a lifelong ADHD history with typical symptoms. By reviewing medical records

we could partly account for other disorders with a later onset, including dementia. Among those whom we identified in later life with a previously unrecognized lifelong ADHD, at least as reflected in self-reports, we found that both past and current psychiatric problems were more prevalent, compared with those without an ADHD history. Past psychiatric hospitalization, depression, suicidal thoughts and attempts, anxiety, alcohol/drug abuse, learning disability and bipolar disorder were more common among those we identified with persistent ADHD. No significant differences were found in family psychiatric history. At the item level, however, bipolar disorder family history was more common among those with higher WURS scores. Our results thus support the idea of coexisting psychiatric disorders as shown in other studies on comorbidity (Barkley et al., 2008; Cumyn et al., 2009; Kooij et al., 2012; Sobanski, 2006; Sobanski et al., 2008). Interestingly, our study found similar results in an elderly sample reporting high levels of childhood and current ADHD.

Other health histories did not differ between those who reported more or less childhood ADHD symptoms. At the item level, however, heart problems were more common among those who reported more childhood ADHD symptoms. Those who reported more childhood ADHD symptoms also experienced worse current subjective health. A more detailed interview with a broader scope of health issues might clarify this association beyond what we captured in the current project. A recent study (Brook et al., 2013) in a younger sample has shown adolescent ADHD is a major predictor of an array of physical, mental, work, and financial problems in adulthood. Another recent study shows that children who were consistently overactive (possible cases of ADHD) and in their adolescence 30 years later suffered more from chronic widespread pain (Pang, Jones, Power, and MacFarlane, 2010). Our findings and recent research (Brook et al., 2013; Pang et al., 2010) emphasize the importance of acknowledging health issues in a broad scope when assessing and treating individuals for ADHD independent of their age.

### *Life courses for individuals first identified with an ADHD history in late life.*

The case reports present three unique life courses for persons affected with ADHD who were diagnosed first in late life. In common, however, is that they all express substantial impact on their everyday life functioning, from childhood into old ages. As often seems to be the case they were eager to be assessed for their experienced problems and eager to find treatment to reduce their suffering. The case reports also demonstrate how these individuals tried to cope with their problems by using their strengths.

Interestingly, our few cases clearly illustrate recent reports of an increasing number of older patients who nowadays suspect that they might have an ADHD history and who now demand to be systematically assessed (Brod et al., 2011; da Silva and Louza, 2008; Henry and Jones, 2011; Manor et al., 2011; Wetzel and Burke, 2008). Also, reflected in the case reports is the overall negative impact of ADHD on financial, social, and emotional wellbeing in compromising quality of life (Brod et al., 2011).

### *Associations*

In the regression analyses, using the 1 WURS sum score as the dependent variable, we found that the occurrence of overall perceived problems in childhood was the best single predictor, accounting for more than 20 percent of the variance. Gender was the second most important factor with males rating more childhood ADHD symptoms. Other factors, accounting for the variance were perceived impaired current subjective memory, education and number of employments. The finding of no difference in education between those who scored above and below the cut-off should be evaluated taking into account that most of the responders (more than 70%) only had elementary school education or less. This is typical for Swedish cohorts born before the 2<sup>nd</sup> World War. Notably, multiple jobs were more common

among those who scored higher (over 36), a finding that is also supported in younger samples (Barkley, 1998).

We also examined whether other self-evaluations of past and present situation were associated with the amount of current ADHD symptoms. Overall perceived problems in childhood, perceived impaired current health and memory turned out to be significantly related to current ADHD symptoms, more so for men than women. However, we found no gender differences in our sub-samples when covariates were tested for their potential associations with current ADHD symptoms. The results confirm that perceived overall problems in childhood as well as subjective impaired current health and memory are significantly related to amount reported current ADHD symptoms. This might be critical in a clinical setting aiming to identify a potential ADHD history in older adults. Previous studies have, to our knowledge, not examined the variables we analyzed for their potential relationship with reports of childhood ADHD symptoms in this age group. In younger samples, however, studies have shown associations between ADHD and lower academic achievement, poorer work record, lower job status and overall greater problems in establishing and maintaining social networks, including family relations (Adamou et al., 2013; Barkley et al., 2008; Guðjónsson et al., 2012; Knapp et al., 2011; Mannuzza et al., 2008; Moyá et al., 2012; Ramos Olazagasti et al., 2013).

### *Age*

Younger individuals in the study sample rated more childhood ADHD symptoms. There was, however no significant difference in age for those above or below the cut-off-score of 36. Age was not associated with current ADHD symptoms. Age was not associated with the Barkley Childhood or Current Symptoms Scales. Neither was age associated with the number of DSM-IV criteria for childhood ADHD met, nor with the number of DSM-IV

criteria for current ADHD met. Age was not associated with past psychiatric history, family psychiatric history or childhood, past adulthood or current health history. Our results support the findings in previous research there being only two population-based studies that covers most of the adult life span (Kooij et al., 2005; Michielsen et al., 2012) where no signs of decline in the older age groups were found. Noteworthy, the prevalence of syndromatic ADHD in older adults (60-94 years) was found to be 2.8%, suggesting that ADHD does not fade or disappear in the elderly (Michielsen et al., 2012).

### *Gender*

We found a significant gender difference in reported childhood symptoms with males reporting significantly more ADHD symptoms. This finding is supported by previous studies on gender differences in children and in retrospectively recalled childhood symptoms in adults (Barkley, 1998; Barkley et al., 2008; Buitelaar, 2002; Kessler et al., 2005; Merikangas et al., 2010). Other studies suggest that women with predominantly inattentive ADHD may be overrepresented among non-responders (Biederman, Faraone, Mick, Williamson, Wilens, Spencer, Weber, Jetton, Kraus, Pert, and Zallen, 1999). A Swedish study has on the other hand shown that girls often are missed or misdiagnosed (Kopp, Beckung, and Gillberg, 2010). In this study two of 100 girls (3-18 years) referred for social and/or attention deficits to a specialized neuropsychiatric clinic had received a diagnosis of autism spectrum disorder (ASD) before coming to the clinic. In the other 98, a diagnosis of ASD or ADHD had not been considered. 47 of the girls had ADHD “only” and 47 of them had ASD (many of them also met criteria for ADHD). Interestingly, all these girls had previously been diagnosed as having depression, anxiety or “family relationship problems”, some even with personality disorder diagnosis (Kopp et al., 2010).

We also found a weak gender difference in men rating more current ADHD symptoms compared to women on WRASS. Interestingly, no gender differences were found in the total WRASS score when we divided our total sample into those with a WURS score of 36 or more and those with scores below 36. The mean Barkley Current Symptoms Scale scores, differed significantly between men and women, men rated more current ADHD symptoms. Separate analyses at the item level among those with a Barkley Current Symptoms Scale score below and above cut-off score revealed no gender differences. The mean number of DSM-IV criteria met for childhood Inattentive type ADHD and childhood Hyperactive-Impulsive type ADHD, differed significantly between men and women regarding Inattentive type but not for Hyperactive-Impulsive type ADHD, men meeting more criteria for childhood Inattentive type ADHD. Men also met more DSM-IV criteria for current Inattentive but not for Hyperactive-Impulsive type ADHD. Analyses of gender differences among those who met 6 or more childhood DSM-IV criteria for the Inattentive revealed similar differences. Gender was not associated with past psychiatric history, family psychiatric history or with childhood, past adulthood or current health history.

Despite the fact that our studies only revealed few gender differences among those who reported more ADHD in their childhood and currently in old age, gender appropriate norms and descriptions of the expressions of ADHD in adult and later life are still warranted.

### *Limitations*

A major weakness of the design and methods used in our studies on retrospectively experienced childhood ADHD symptoms is the reliability of self-reports about past behavior. A lack of accurate recall of childhood conditions should be acknowledged since self-reports may produce under- as well as overestimations of previous symptoms (Mannuzza, Klein,

Klein, Bessler, and Shrout, 2002; McCann and Roy-Byrne, 2004; Murphy and Adler, 2004; P. Murphy and Schachar, 2000). Self-reports may be affected by responders recall bias, subjectivity and ambition to provide socially desirable answers, influences that may have contributed to an underestimation of symptoms associated with childhood ADHD.

Our results are also highly dependent on the strengths and especially the many limitations of the WURS-scale itself (McGough and Barkley, 2004). The fact that we employed the cut-off score of 36 in our initial study biased all subsequent analyses and should be considered as a potential weakness. Items in the scale include many symptoms in common with other psychiatric disorders with the risk of making the scale less specific for ADHD symptomatology. The use of only one rating scale in our first study with a relatively large sample prevents us from comparing the sensitivity of the scale with other measures for detecting retrospective childhood ADHD symptoms. However, at the time of our data collection the WURS scale was the only available scale in Swedish for the study of retrospective childhood ADHD symptoms.

Another problem with this design relates to previous reports about an elevated mortality risk in ADHD individuals that may affect the likelihood of surviving into older ages (Barkley, 2002; Barkley et al., 2008; Weiss and Hechtman, 1993). The fact that individuals who once experienced ADHD may be less willing to participate in a study addressing childhood problem behaviours is also a concern. These shortcomings need to be considered in the interpretation of findings using this study design. The optimal longitudinal design that would allow the study of individual trajectories across the lifespan is, however, for many reasons not a realistic alternative. We administered the WURS scale, with additional items, in a randomly drawn sample of individuals who were not dependent on the researchers in any way. This type of sample selection is likely to have the positive effect of facilitating subjects to report more freely and truthfully.



A potential negative aspect of using a population-based sample is the question about the representativeness of our responders. One might also suspect a greater reluctance to participate among those who actually showed childhood ADHD symptoms. Our prevalence rate of 3.3%, based on a WURS cut-off score of 36 and more, however suggest that this might be less of a serious problem given its similarity to prevalence figures of ADHD in adults found in other studies. Furthermore, no evidence of such bias was found in the attrition analysis comparing the 4-item WURS scores between responders and non-responders. Caution should, however, be exercised in interpreting this finding since we do not know the sensitivity of the WURS scale as regards identifying those with childhood ADHD using retrospective reports in our age cohort based on one instrument only and proportionally more women responding in the attrition group.

Limitations in our follow-up studies were the small sample size, reliability of self-reports and the fact that the subjects were not blind for the interviewer, unfortunately the only realistic alternative. The possible lack of accurate recall of childhood conditions as well as the risk for both under- and overestimation of symptoms concerning past long ago as well as the ability to give objective information about the present behaviour must be considered as possible biases. On the other hand this is the only realistic alternative in older adults - there are no parents or teachers available and no significant others who could provide objective information or confirm self-evaluations. Our results are also highly dependent on the strengths and limitations of the scales used. The sub-sample of 60 individuals based on their total WURS score used in these studies is not completely unbiased since individual WURS scores from our original sample of 1599 individuals determined our sub-sample in our other studies. Ideally, it would have been to prefer using our original sample of 1599 individuals (Guldberg-Kjar and Johansson, 2009) in all subsequent analyses. The small sample size in studies III and IV is mainly due to the attrition among those from our previous study (Guldberg-Kjar and

Johansson, 2009) who had WURS score 36 or more. This is of course is a weakness and might lead to association by error. A potential confirmative source in a clinical setting might be reports from siblings and children; a method that was less feasible in these present population-based studies. However, multiple studies have shown that self-reports have validity (Harrison, Martin, Enev, and Harrington, 2007).

### *Strengths*

A major strength of the studies was the population-based approach with an acceptable participation rate (64%) in Study I. This suggests a reasonable representativeness, further supported by the outcome of the attrition analysis. Thus, results from the Study I are likely to be generalized to similar settings with individuals in the age range 65-80. In studies II, III and IV the population-based approach with a randomly drawn sample of individuals not dependent on the researchers in any way is the major strength. This type of sample selection is likely to facilitate participants to report more truthfully. The question about the representativeness of our responders might be a negative aspect using a population-based sample. Our findings may not be generalizable across all older adults with ADHD symptoms but are likely to be generalized to similar birth cohorts and settings with individuals in the age range (66-86).

Finally, a major strength is that ADHD symptoms in adults so far is grossly understudied in individuals older than 65 years of age which was an imperative and the rationale for the conducted studies in this dissertation project. In this respect our results contribute with new knowledge on retrospectively recalled childhood symptoms, self-reported current symptoms, self-reported life-time history of impairment, comorbidity and health.

## **CHALLENGES IN FUTURE RESEARCH**

Future research on ADHD would benefit from an optimal longitudinal design that would allow the study of individual trajectories across the life-span. More detailed information about life history, co-morbidity, late-life impairments and disability, needs to be gathered in future research taking into account the life-span perspective. Other questions that need to be addressed are: What is the unique expression of ADHD in old age? How is normal mental and cognitive aging influenced by persisting ADHD? How do life-long difficulties in executive functioning associated with ADHD compromise adaptation in old age?

Studies of healthy older adults have shown age-related deficits in emotional/cognitive integration as well as in executive function (Baena, Allen, Kaut, and Hall, 2010) which taken in conjunction with the evidence presented for deficits in emotional self-regulation as a core component of ADHD (Barkley, 2010), raises questions as whether age-related cognitive changes to a greater extent affect adults with an ADHD history. Some recent studies have interestingly shown association between ADHD and the development of dementia with Lewy bodies (Golimstok, Rojas, Zurni, Doctorovich, and Cristiano, 2010) and between childhood symptoms of ADHD and the development of Parkinson's disease (Walitza, Melfsen, Herhaus, Scheuerpflug, Warnke, Muller, et al. 2007). Questions have also been raised about the effects of hormonal changes in later life in individuals with ADHD (Nadeau and Quinn, 2002). Many postmenopausal women with depression and anxiety (and memory problems) might have ADHD (masked by estrogen and dopamine during the fertile period). The ultimate question in a life course perspective is that about various aging related outcomes for new generations of individuals with ADHD?

Considering the fact of an increasing number of older individuals with an ADHD history and the substantial worldwide increase of population aging, our basic

knowledge of this disorder, as well as information regarding burden of individuals daily functioning is still sparse. Further research is needed to explore in more depth the underlying individual life histories. Further development and use of age-appropriate diagnostic criteria identifying ADHD in different age groups is encouraged on the basis of results in studies in this thesis. Finally, the greatest challenge in future research is to attempt to identify and clarify the factors and treatments that can alter and alleviate the burden of ADHD across the entire life span.

## **CONCLUSIONS AND CLINICAL IMPLICATIONS**

The findings from studies in the current project largely support the concordance of ADHD symptoms recalled from childhood and those reported in old age. There is evidence of considerable persistence in longitudinal research to support that the vast majority of individuals affected with ADHD continue to have significant symptoms into mid-life (Arolt, 2008; Barkley, Fischer, Smallish, and Fletcher, 2002; Lara, et al., 2009; Merikangas, et al., 2010; Okie, 2006). This study implies that such symptoms may continue into old age, although the cross-sectional and retrospective nature of the design of the study cannot fully confirm this assumption.

Our prevalence rate of 3,3%, based on The Wender Utah Rating Scale (WURS) for retrospectively self-rated childhood ADHD symptoms, is largely consistent with recent reports in younger samples using the DSM-IV consensus criteria (American Psychiatric Association, 2000). The findings suggest that perceived overall problems in childhood and multiple employments might be critical questions in identifying a history of childhood ADHD in the elderly. Also, more frequent reports of current memory problems among those who scored higher on WURS may reflect life-long difficulties in executive functioning and

attention, rather than late life experienced memory impairment. In a differential-diagnostic perspective this hypothesis addresses the need to improve methods to differentiate an ADHD history from other psychiatric conditions including dementia. The clinical relevance of our findings remains to be explored since we do not know the proportion of subjects in our age group who actually meet the diagnostic criteria of ADHD presently. Our findings suggest that examinations of retrospectively self-rated childhood ADHD symptoms might provide essential information as a beginning for finding methods for a better understanding of late life functioning by the acknowledgment of a life-span perspective on symptoms associated with ADHD.

Our findings also support the idea of a significant concordance of ADHD symptoms recalled from childhood with those reported currently in old age. An interesting finding that might have clinical implications is that of a mean score on WRASS in fact was as high as 72.3 among those who scored 36 and above on the WURS scale. A high WURS score, based on retrospective reports of functioning in childhood, seem to be consistent with symptoms corresponding with ADHD in late adulthood. In this respect our findings provide support for the current Swedish clinical cut-off of 70 suggested for the WRASS scale. Our results also confirm findings that perceived overall problems in childhood as well as subjective impaired current health and memory are significantly related to the amount of reported current ADHD symptoms. This might be critical in a clinical setting aiming to identify a potential ADHD history in older adults. In a differential-diagnostic perspective critical questions also arise about how we can differentiate ADHD in old age from depression, possible dementia and other psychiatric conditions that might imitate ADHD symptoms.

We found evidence for the assumption of a significant agreement of self-reported ADHD symptoms between childhood and late life that might imply persistence of the

symptoms over the lifetime. The vast majority of those who experienced childhood ADHD also report that symptoms continue to affect them in old age.

Our study highlights and provides support for the assumption of the possible adverse impact associated with ADHD. The benefits in identifying ADHD in late life, on the other hand are substantial which our cases illustrated. Because of the often severe long-term consequences of ADHD we find it important that clinicians actually diagnose and treat ADHD as early as possible. The benefits of identifying ADHD in late life, on the other hand are substantial illustrated by our cases who reported that they for the first time were adequately listened to and treated adequately for their life long problems.

There are considerable costs (direct and indirect) associated with ADHD, attributable both to the patient and their family members (Asherson , Akehurst, Kooij, Huss, Beusterien, Sasane , Gholizadeh, Hodgkins,2012; Biederman and Faraone, 2006; Hodgkins, Montejano, Sasane, and Huse, 2011; Kessler et al., 2005b; Kessler, Lane, Stang, and Van Brunt, 2009; Kleinman, Durkin, Melkonian, and Markosyn, 2009; Myrén, Thernlund, Nylén, Schacht, and Svanborg, 2010). ADHD is expensive, creates suffering, impairs social productivity, and creates a public health risk to the public at large. Costs associated with ADHD in old age are currently not studied but besides costs related to ADHD only, with increasing physical frailty in old age, it would not be surprising if the cost of ADHD in older ages would be even substantially greater.

In Sweden where all the current studies were conducted, 25% of the population is expected to reach 65 years or more in 2060. This fact makes recognizing ADHD in old age a true challenge for our health care system. Results from our follow-up study suggest that an ADHD assessment should be considered regardless of a patient's age because most of the older adults will otherwise continue suffering from ADHD symptoms without having

appropriate knowledge themselves of the origin of problems experienced and that hopefully could be ameliorated when given professional help. The negative impact of ADHD on different domains of life may be lessened through early diagnosis and treatment.

In conclusion, results from the studies provide evidence for a significant concordance of self-reported ADHD symptoms between retrospectively recalled childhood and current symptoms in old age, suggesting persistence over the life course. Thus, there is an inevitable challenge in current psychiatric and psychogeriatric practice and in society as a whole in focusing on the entire life course, even in regarding a disorder previously considered only in younger ages.

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