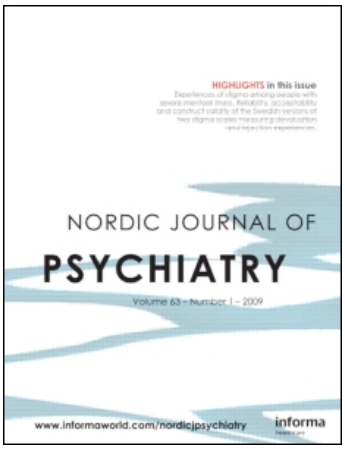

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Old people reporting childhood AD/HD symptoms: Retrospectively self-rated AD/HD symptoms in a population-based Swedish sample aged 65-80

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Our knowledge of attention deficit/hyperactivity disorder (AD/HD) has increased in recent years. Little is still known about the course and manifestations in later parts of life and whether elderly persons who once presented childhood AD/HD symptoms can be identified. The aim of the study was to explore the occurrence to which elderly individuals retrospectively report symptoms that may indicate childhood AD/HD. The 25-item Wender Utah Rating Scale (WURS) was administered in a population-based sample of 2500 persons aged 65–80. Demographics, self-ratings of problems in childhood, current health and memory were also investigated. A total of 1599 individuals participated, which corresponds to a response rate of 64%. The prevalence of self-rated childhood AD/HD symptoms was 3.3% using a cut-off score of 36 or more in the WURS. Men rated significantly more AD/HD symptoms. Those who reported more childhood AD/HD symptoms also claimed general problems in childhood as well as worse current health. The proportion of individuals among 65–80-year-olds, who report childhood AD/HD symptoms is slightly lower but comparable with recent prevalence rates of childhood AD/HD. The study encourages further studies of AD/HD using a lifespan perspective.

• *AD/HD, Lifespan, Old people, Population-based, Prevalence.*

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Older adults who may have presented AD/HD symptoms in childhood are most likely not to have had the diagnosis recognized. The current interest in AD/HD has, however, increased the likelihood that even older individuals for the first time can be identified and even diagnosed for AD/HD. In this perspective, there might be an obvious risk for misdiagnosing elderly individuals with eventual undiagnosed AD/HD with diagnosis such as dementia, personality disorder or other psychiatric diagnosis even though we cannot present any data to support this suspicion. Regarding both the present and future demographic age structure in our society, research and healthcare systems should direct their attention to AD/HD across the entire lifespan. It seems crucial to gain better understanding of how AD/HD is manifested in old age in order for clinicians to correctly identify and hopefully provide adequate treatment. Thus, we should consider the existence of old age AD/HD more seriously than is currently the case.

Although there is evidence that AD/HD symptoms show an age-related decline, there is no evidence that the disorder disappears in adolescence and adulthood (1–4). On contrary, there is considerable evidence that the vast majority of symptoms may persist and are frequently associated with functional impairments (1, 4). Research indicates that AD/HD remains into young adulthood among 30–70% of those originally affected (5–10). The American Psychiatric Association (11) estimates that 3–7% of school-aged children have AD/HD. In a recent systematic review, the worldwide prevalence of childhood AD/HD was estimated to be 5.29% (12). A review by Polanczyk & Jensen (13) based on 71 studies conducted in all continents found a wide range of AD/HD prevalence estimates in childhood and adolescence, ranging from as low as 0.2% to as high as 27%. The large variability in prevalence rates seems to be mainly explained by methodological differences across studies (13). From Sweden there are three population-based childhood prevalence studies available (14–16) using the

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conjunction of disorders of attention, motor control and perception (DAMP) as criteria with prevalence rates varying between 2.0% and 7.1%.

Evidence that AD/HD 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 is only one population-based study that covers the entire adult lifespan (17). Interestingly, in this Dutch study by Kooij and co-investigators (17), 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%. Unfortunately, the study did not report separate estimates for persons aged 65 and older.

From a lifespan developmental perspective, the study of AD/HD represents a major methodological challenge that ideally requires a prospective longitudinal design. Studies identifying an AD/HD symptomatology in older ages must be able to verify that the symptoms were present in childhood and that manifestations of AD/HD persisted into later life. Beside continuity of symptoms over time, the diagnostic criteria according to DSM-IV also require information about age of onset of symptoms and pervasiveness across situations (11). It is therefore not surprising that no studies have appropriately defined AD/HD according to age (18).

Aims

As a first step in exploring AD/HD in later life we examined the extent to which elderly individuals report childhood AD/HD symptoms. The present design is based on retrospectively experienced childhood AD/HD symptoms.

Materials and Methods

Study sample

A population-based sample of 2500 persons in the age range 65–80 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 1 January 1924 and 29 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 (standard deviation, $s = 4.6$, range = 65–80) and almost all participants were born in Sweden. Sixty-nine per cent were married, 71% only had elementary school education, which is typical for Swedish cohorts born before the Second World War. Almost 90% had a biological offspring. The mean number of children was 2.4 ($s = 1.1$, range = 1–9). Employment history revealed that 52% had had three jobs or less, 28% reported four or five 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).

Procedure

As of January 2004, the Swedish research ethics review system is regulated by a new law (19). Following approval from the Regional Ethical Review Board in Lund (Dnr 194/2004), subjects were asked to participate in the study in an information letter including a form for informed consent. The envelope contained the 25-item Wender Utah Rating Scale (WURS) for ratings of retrospective childhood ADHD symptoms, questions about demographical variables, current health, memory and subjective opinion about experienced problems in childhood. Subjects were asked to answer all the questions in the questionnaire and return it by mail in a pre-stamped envelope. Informed consent was obtained from all subjects included in the study.

The first letter was administered at the end of September 2004, followed by two reminders within a 3–4-week interval. Data collection was completed for the most part by the end of December 2004. 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.

Instrument

The WURS was used to estimate childhood AD/HD symptomatology. The WURS was developed by Wender and collaborators (20–22) 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 (23). Thus, the scale was designed to measure a variety of childhood behaviours associated with AD/HD 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 (20) 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 (20). 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 (20). 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 (24), whereas individuals with predominantly inattentive AD/HD are excluded (24). Previous studies have analysed the psychometric characteristics of the WURS including reliability, factor structure and discriminant validity in other samples (25–27).

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 AD/HD in the Swedish clinical context (see Table 1 for all items). Considering strengths and weaknesses of the WURS it was selected as the only available instrument in Swedish for the study of retrospective childhood AD/HD symptoms. Cronbach's alpha in our sample was 0.92, indicating good internal consistency.

Attrition

Reasons for non-participation among the 488 women and 413 men is 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

Table 1. The Wender Utah Rating Scale (WURS) and factor solution (total sample included, $n = 1599$).

Items	Descriptives: mean (range 0–4)	Factor loadings
		Factor 1
Hot- or short-tempered, low boiling point	0.47 (4)	0.776
Temper outbursts, tantrums	0.24 (4)	0.787
Stubborn, strong-willed	1.48 (4)	0.334
Disobedient, rebellious, sassy	0.37 (4)	0.516
Irritable	0.35 (4)	0.648
Moody, ups and downs	0.30 (4)	0.726
Angry	0.35 (4)	0.690
Losing control of my self	0.26 (4)	0.506
Trouble with authorities, trouble with school, visits to principal's office	0.13 (4)	0.422
		Factor 2
Trouble with stick-to-it-tiveness	0.41 (4)	0.522
Acting without thinking, impulsive	0.56 (4)	0.638
Tendency to be immature	0.55 (4)	0.599
Guilty feelings, regretful	0.75 (4)	0.579
Tendency to be or act irrational	0.33 (3)	0.580
Unpopular with other children, didn't keep friends for long, didn't get along with other children	0.28 (4)	0.456
Trouble seeing things from someone else's point of view	0.57 (4)	0.658
		Factor 3
Anxious, worrying	0.60 (4)	0.837
Nervous, fidgety	0.38 (4)	0.649
Inattentive, daydreaming	0.49 (4)	0.425
Sad or blue, depressed, unhappy	0.54 (4)	0.695
Low opinion of myself	0.85 (4)	0.617
		Factor 4
Concentration problems, easily distracted	0.47 (4)	0.495
Overall a poor student, slow learner	0.38 (4)	0.773
Trouble with mathematics or numbers	0.52 (4)	0.763
Not achieving up to potential	0.49 (4)	0.665

Italic items (extracted from 20-item analysis) indicate items included in the four-item scale used in the attrition analysis.

non-participation. Among these, 68 (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 (see Table 1, right column). 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 over the phone using the four items with the highest loading on each factor (Table 1, underlined items: "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.

Data analyses

The total score for the WURS was calculated for each subject. Subsequent data analyses were conducted in two steps. First, analysis of variance and chi-square were used to investigate potential age and gender differences in the total WURS score and for differences in proportions for the total score and other variables included. Next, a hierarchical regression analysis was conducted with all subjects, as well as for women and men separately, with the WURS total score as the dependent variable and demographic, health and childhood problem variables as predictors. The significance level was set at 0.05 across analyses, conducted using SPSS 12.0 (29).

Results

The mean WURS score in this sample was 12.14 (median = 10.00, $s=10.48$, range = 0–82). Fifty-two (3.3%) individuals (15 women, 37 men) scored 36 or more (Table 2). The distribution of the WURS scores for subjects in this sample is presented in Fig. 1.

Table 2. Wender Utah Rating Scale (WURS) scores for demographic characteristics, perceived problems in childhood and subjective health, memory; $n=1599$.

Total sum WURS score	0–35, $n=1547$	36–100, $n=52$
Age, mean ($\pm s$)	72.03 (4.58)	70.94 (4.92)
Gender:		
Men	47.3%	71.2%
Women	52.7%	28.8%
Marital status		
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%
Educational level		
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%
Number of employments		
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%
SES		
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%
Having biological offspring		
No	10.7%	28.8%
Yes	89.3%	71.2%
Number of own children, mean($\pm s$)	2.43 (1.14)	2.41 (1.14)
Perceived subjective current health		
Good	52.7%	32.7%
Neither good nor bad	40.3%	44.2%
Bad	7.0%	23.1%
Perceived subjective current memory		
Good	47.5%	21.2%
Neither good nor bad	47.8%	69.2%
Bad	4.7%	9.6%
Perceived problems in childhood		
To little extent	85.9%	23.1%
To some extent	13.1%	57.7%
To a large extent	1.0%	19.2%

s, standard deviation.

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 AD/HD symptoms. Also, the proportion of men was

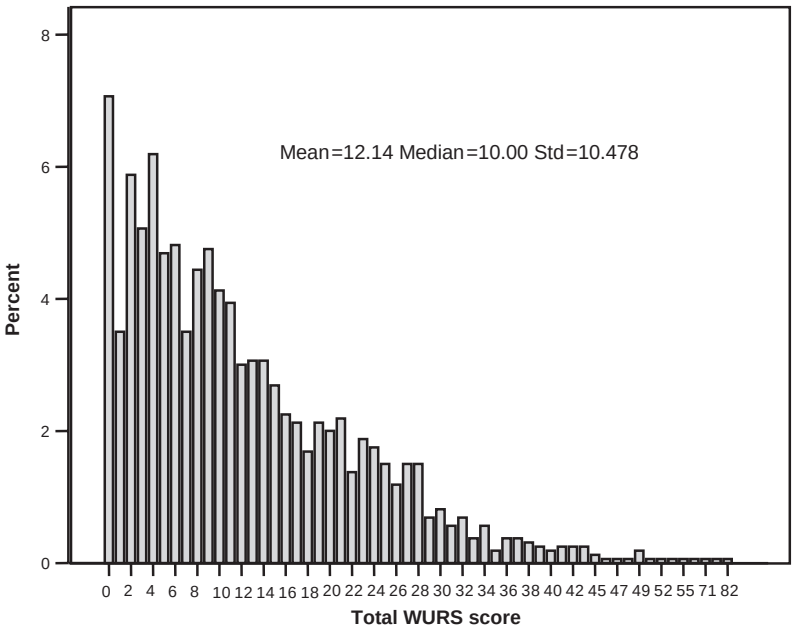

Fig. 1. Distribution of the total Wender Utah Rating Scale (WURS) score in the study sample, $n = 1599$.

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 AD/HD 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 AD/HD 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 AD/HD 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 AD/HD 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 (Table 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 (Table 3:1). 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 (Table 3:2). The corresponding figure among men for perceived problems in childhood was 22% (Table 3:3).

Discussion and conclusions

Given the sparse information about AD/HD in older adults, our study was designed to examine the prevalence of retrospectively self-rated childhood AD/HD symptoms in a population-based sample of individuals in the age range 65–80.

Table 3. Stepwise regression analyses 25-item Wender Utah Rating Scale (WURS-25) total score.

Step	Variable	*B*	β	R^2 change
3:1 Total sample				
1	Perceived problems in childhood	11.344***	0.472	0.223***
2	Gender	3.449***	0.171	0.029***
3	Perceived current subjective memory	2.381***	0.137	0.019***
4	Educational level	1.754***	0.105	0.011***
5	Number of employments	1.122***	0.089	0.008***
6	Age	−0.135**	−0.061	0.004**
Total				0.293
Adjusted R^2				0.290
3:2 Women				
1	Perceived problems in childhood	10.723***	0.484	0.234***
2	Perceived current subjective memory	2.400***	0.153	0.023***
3	Educational level	1.813***	0.113	0.013***
4	Number of employments	0.893*	0.078	0.006*
Total				0.276
Adjusted R^2				0.273
3:3 Men				
1	Perceived problems in childhood	11.723***	0.469	0.220***
2	Perceived current subjective memory	2.333***	0.127	0.016***
3	Educational level	1.405**	0.106	0.011**
4	Number of employments	1.677**	0.100	0.010**
5	Age	−0.173*	−0.073	0.005*
Total				0.261
Adjusted R^2				0.256

*$P<0.05$, **$P<0.01$, ***$P<0.001$, β, standardized regression coefficients; *B*, unstandardized coefficients.

The main finding in this, to our knowledge first study addressing childhood AD/HD from an old age perspective, shows that the prevalence rate of retrospectively reported childhood AD/HD symptoms in old age is 3.3%. Notably this figure is slightly lower, but comparable with prevalence rates of current childhood AD/HD (11, 12).

Individuals who scored higher on the WURS, and especially those above the cut-off level of 36, may constitute survivors of those who actually exhibited childhood AD/HD. Given our AD/HD rate is similar with current childhood cohorts, our results may therefore suggest that there was no substantially elevated mortality risk among those who retrospectively scored higher on WURS. Considering more recent reports of higher childhood prevalence rates (12, 13, 30) one might, however, expect an even higher occurrence in our age cohort. In that case our 3.3% sub-sample might represent those with AD/HD in childhood who survived into old age. Caution must be exercised in interpreting our finding, since we do not know the sensitivity of the WURS as regards identifying those with childhood AD/HD using retrospective reports in our age cohort. Our results are based on one instrument only and rely on subjective recall of the past long ago and interpretation of our results must therefore be careful. Neither do we know the proportion of subjects in this age group who actually meet the diagnostic criteria of AD/HD presently.

Our study shows a significant gender difference in reported childhood symptoms with males reporting significantly more AD/HD symptoms. This finding is supported by previous studies on gender differences (30–32). Other studies suggest that women with predominantly inattentive AD/HD may be overrepresented among non-responders (33).

In the regression analyses, using the total WURS score as the dependent variable, we found that overall perceived problems in childhood was the best single predictor, accounting for more than 20% of the variance. Gender was the second most important factor with males rating more childhood AD/HD symptoms. Other factors, accounting for less of 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 knowing that most of the responders (more than 70%) only had elementary school education or less. This is typical for Swedish cohorts born before the Second World War. Notably, multiple jobs were more common among those who scored higher (over 36), a finding that is also supported in younger samples (31). Previous studies have not, to our knowledge, examined the variables we analysed for their potential relationship with reports of

childhood AD/HD symptoms in this age group. In younger samples, however, studies have shown associations between AD/HD and lower academic achievement, poorer work record, lower job status and overall greater problems in establishing and maintaining social networks, including family relations (31).

Our findings suggest that perceived overall problems in childhood and multiple employments might be critical questions in identifying a history of childhood AD/HD 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 find methods to differentiate an AD/HD history from other psychiatric conditions including dementia.

There are certainly limitations, but also strengths of the present study of retrospectively experienced childhood AD/HD symptoms in old age. A weakness of this design may be the reliability of self-reports about past behaviour, in this case, the lack of accurate recall of childhood conditions, since self-ratings may produce both under- and overestimations of previous symptoms (34–37). 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 AD/HD. Our results are also highly dependent on the strengths and limitations of the WURS itself (24). Items in the scale include many symptoms in common with other psychiatric disorders with the risk of making the scale less specific for AD/HD symptomatology. Using only one rating scale also prevents us from comparing the sensitivity of the scale with other measures for detecting retrospective childhood AD/HD symptoms. However, at the time of our data collection, the WURS was the only available scale in Swedish for the study of retrospective childhood AD/HD symptoms. Another problem with this design relates to previous reports about an elevated mortality risk in AD/HD individuals that may affect the likelihood of surviving into older ages (6, 38). The fact that individuals who once experienced AD/HD 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, 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 AD/HD symptoms. Our prevalence rate of 3.3%, based on a WURS cut-off score of 36 and more, suggest that this might be less of a serious problem. Furthermore, no evidence of such bias was found in the attrition analysis comparing the four-item WURS scores between responders and non-responders. Caution should however be exercised interpreting this finding since proportionally more women responded in the attrition group.

The strength of this study was the population-based approach with an acceptable participation rate (64%). This suggests a reasonable representativeness, further supported by the outcome of the attrition analysis. Thus, our results are likely to be generalized to similar settings with individuals in the age range 65–80.

In sum, our prevalence rate of 3.3%, based on the WURS for retrospectively self-rated childhood AD/HD symptoms, is largely consistent with recent reports in younger samples using the DSM-IV consensus criteria. 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 AD/HD presently. Our findings suggest that examinations of retrospectively self-rated childhood AD/HD symptoms might provide essential information as a beginning for finding methods for a better understanding of late life functioning by the acknowledgment of a lifespan perspective on symptoms associated with AD/HD. However, more detailed information about life history, comorbidity, late-life impairments and disability needs to be gathered in future research in AD/HD using the lifespan perspective.

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