

Prevalence of pseudodementia in older adults with a severe or profound intellectual disability: a systematic review

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Date: 19-05-2021

Abstract

Background: Diagnosing dementia in people with an intellectual disability is complex. To improve diagnosing dementia in older people with a severe or profound intellectual disability, it is necessary to have knowledge on the prevalence rate of pseudodementia. Pseudodementia stands for health problems with symptoms resembling those of dementia.

Aim: This systematic review aimed to identify and compare studies reporting the prevalence of pseudodementia in older adults with a severe or profound intellectual disability.

Methods: A systematic search was conducted in Pubmed, Scopus and Psychinfo. Studies reporting quantitative prevalence data of adults with a profound or severe intellectual disability aged 30 years or over were included. The quality of the included studies were assessed using the Joanna Briggs Institute Prevalence Critical Appraisal Tool. A best evidence synthesis was performed to analyze the findings.

Results: Six studies were included which provided prevalence rates of 9 out of 22 predefined pseudodementia: hearing disorder, visual impairment, epilepsy, ADHD, pain, anxiety, autism, depression and schizophrenia. The level of evidence for reported prevalence rates of pseudodementia found, was insufficient due to inconsistent prevalence rates and the number of studies available.

Conclusion: This systematic review provided a first overview of the prevalence rates of pseudodementia in older adults with SPID. Insufficient evidence was found for the reported prevalence rates of pseudodementia.

Implication of key findings: There is a strong need for comprehensive epidemiological data focusing on prevalence rates of pseudodementia specific for older people with a severe or profound intellectual disability in order to improve diagnosing dementia.

Keywords: Severe or profound intellectual disabilities, dementia, pseudodementia, prevalence, aging.

1. Introduction

Nowadays people with intellectual disability are reaching a higher age because of improvements in medical care and public health¹⁻³. In the 1930s the estimated life expectancy of people with intellectual disability of any cause was 18.5 years, which increased to 66 years in the 1990s⁴. Because of this development, there is an increase in the incidence of age-related disorders like dementia¹⁻³. Dementia can be described as a progressive loss of cognitive ability and functional decline¹. It is known that 25% of the people with Down syndrome over the age of 35 show symptoms of dementia. This increases with age⁵. A review of Ballard et al⁶ about dementia in people with Down syndrome found eight studies which showed rising prevalence from age 30 years onwards. A prevalence of 55% was found in people aged 40-49 years. Studies examining older individuals showed prevalence of 77% in people aged 60-69 years⁶. A study of Takenoshita et al² concludes that people with intellectual disability, without Down syndrome, may develop dementia at an earlier age and at a higher rate than the general population. However, literature shows different results on this point⁷⁻⁸.

Diagnosing dementia in people with intellectual disability is complex, because most of them have difficulty in achieving more than the cut-off score on the screening tests even before the appearance of cognitive decline². This is especially true for people with a severe or profound intellectual disability (SPID). People with SPID have an estimated intelligence quotient lower than 35 points⁹. Difficulty in diagnosing dementia increases in people with more severe levels of intellectual disability⁹. They are likely to have different patterns of health problems and have multimorbidity more often than those with a milder intellectual disability¹⁰.

Some of these health problems give symptoms that resemble those of dementia, but have other underlying causes¹¹⁻¹². This is called pseudodementia and needs to be excluded before one can diagnose dementia¹². According to literature, pseudodementia can include the following health problems: stroke¹³, chronic pain¹⁴, diabetes¹⁵, delirium, epilepsy, hearing disorder¹³, hypertension¹⁵, hyper- and hypothyroidism^{13,16}, infections¹⁶, sleep apnea, visual impairment¹³, vitamin B11/B12 deficit^{13,16}, attention deficit hyperactivity disorder (ADHD), anxiety, autism, bipolar disorder, depression, obsessive-compulsive disorder, personality disorder and schizophrenia^{12,17-18}.

Although it is known which pseudodementia must be screened, it is unclear how often these health problems occur in people with SPID. Various prevalence rates of somatic or mental health problems have been studied in people with SPID, but a systematic overview of pseudodementia in people with SPID has not been made. To have this overview is especially important for people with SPID because of the complexity of diagnosing dementia through low cognitive functioning, existing health problems and a lack of self-report of cognitive and physical changes. Therefore this systematic review is conducted, in order to improve diagnostic of dementia in this group.

2. Objective

The objective of this systematic review was to identify and compare studies reporting the prevalence of pseudodementia in older adults with a severe/ profound intellectual disability.

3. Methods

3.1 Design

A systematic review was conducted to locate, assess and synthesize the best available evidence relating to prevalence pseudodementia in older adults with SPID¹⁹. The PRISMA statement for reporting systematic reviews was used to guide this review²⁰.

3.2 Information sources

The following databases were used for a systematic search of relevant studies on the 8th of March 2021: Pubmed, Scopus and Psychinfo. Terms were searched as text words in title and abstract and as key words that have been indexed by the databases.

3.3 Search strategy

To ensure the inclusion of all possible relevant studies, a wide range of search terms was used. The search terms of severe and profound intellectual disabilities were extended to a list that reflects the synonyms used as completely as possible, including older terminology. Terms like “adult, elder, older people” were added to search specifically for older adults. To provide a broad overview of all pseudodementia, physical health and mental health related terms were used as well as specific health problems. The database-specific search for Pubmed, Scopus and Psychinfo is shown

in Appendix 1. This search strings were peer reviewed by a researcher who is conducting research to the same population and topic.

3.4 Inclusion criteria

Studies were eligible for inclusion if they met the following criteria:

- a. Report data of adults with a profound or severe intellectual disability aged 30 years or over
- b. Report quantitative prevalence data on the pseudodementia defined prior to searching
- c. Original studies
- d. Peer-reviewed articles written in English

There are no restrictions of publication date.

Excluded were case studies and studies with mixed patient groups that did not allow for subgroup analyses.

3.5 Study selection

To identify and remove duplicates, the systematic review web app Rayyan was used. Title and abstract were screened for eligibility by one reviewer based on the inclusion criteria. The full-text was assessed to decide whether prevalence rates of pseudodementia were presented specifically for adults aged >30 years with SPID. Studies of which there was doubt, were discussed with another researcher who is researching the same topic, till consensus was reached. In addition, reference lists of the included studies have been screened.

3.6 Data extraction

One reviewer analyzed the study characteristics utilizing a protocol for data extraction based on the standard extraction form of Cochrane²¹. After adjusting this form to the aim and population of this systematic review, a data extraction form with the following items was established:

1. Authors, publication year and study location
2. Study design
3. Population: number of participants related to the review area, age, sex, severity of intellectual disability, inclusion/exclusion criteria

4. Pseudodementia: definition of pseudodementia, measurement of pseudodementia, prevalence rates of pseudodementia
5. Particular issues raised by the study that are relevant

This form was pilot tested on two randomly selected included studies and refined accordingly.

3.7 Methodological quality

The Joanna Briggs Institute Prevalence Critical Appraisal Tool was used to assess the methodological quality of the included studies and to determine the extent to which a study addressed the possibility of bias in its design, conduct and analysis²².

A recent systematic review of quality assessment of prevalence studies compares 30 different tools²³. They suggest that the Joanna Briggs Institute Prevalence Critical Appraisal Tool may be considered the most appropriate tool because it has a higher methodologic rigor and addresses the most important items related to the methodological quality of prevalence studies. A pilot study found that this tool had face validity, high levels of acceptability, ease of use and timeliness to complete²⁴. This tool can be used not only for cross sectional studies but all studies that might report prevalence data²⁴.

This quality assessment has nine questions and includes the following items: ensuring a representative sample, appropriate recruitment, adequate sample size, appropriate description and reporting of study subjects and setting, data coverage of identified sample, reliably and objectively measuring of condition, appropriate statistical analysis and confounding are identified and accounted for. Every question has four standard answer options: yes (1 point), no (0 points), unclear (0,5 points), not applicable (0 points). For this review 8-9 points were considered as low risk of bias, 6-7 points as moderate risk of bias and <6 as high risk of bias.

Two researchers independently appraised the design, methods and outcomes reported in each included study. Disagreements were resolved in a consensus meeting between the two researchers.

3.8 Synthesis

Proportion, relative frequency and 95% confidence level (CI) were notated from the included studies.

Because of the expected heterogeneity in study population and pseudodementia and limited available studies it has been previously decided not to choose for statistical pooling of the findings of the individual studies, but to perform a narrative best evidence synthesis. The strength of evidence has been defined by using a classification for assessment adapted from Proper et al²⁵. Three levels of evidence are distinguished:

1. Strong evidence: consistent findings in multiple (≥ 2) low risk of bias studies
2. Moderate evidence: consistent findings in one low or moderate risk of bias study and at least one high risk of bias study, or consistent findings in multiple high risk of bias studies
3. Insufficient evidence: only one study available or inconsistent finding in multiple (≥ 2) studies.

4. Results

4.1 Study selection

The database search resulted in 1404 English hits. After removing duplicates 1140 unique records remained. Based on title and abstract a total of 46 articles were identified as being potentially relevant for this review. If the abstract did not give enough information to determine eligibility the full-text was studied. After a full-text screening, 6 studies met the inclusion criteria and were included. In addition, the reference lists of the included studies were screened by using the same selection criteria, but no studies have been added (Figure 1).

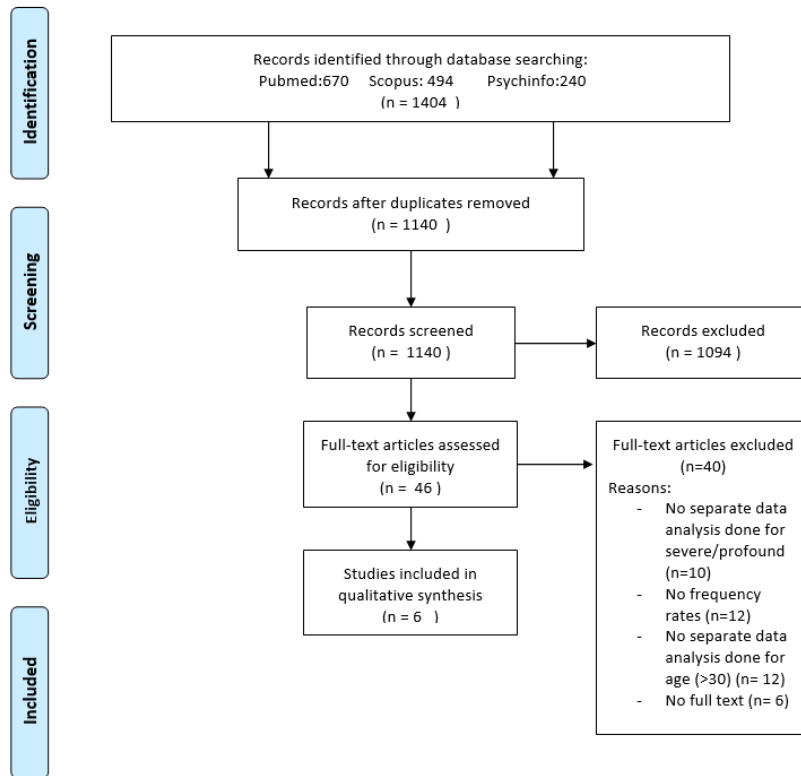


Figure 1: flowchart of selection of studies

4.2 Study characteristics

The number of participants ranged from 44-255 per study, with a total of 675 in all studies. All participants were at least 35 years old, but studies differed in subgroups of age. All studies included both men and women. The included studies presented prevalence rates of the following pseudodementia: pain, epilepsy, hearing disorder, visual impairment, ADHD, anxiety, autism, depression and schizophrenia. Not all studies used the same definition of the population SPID. Table 1 shows the characteristics for each study.

Table 1: Study characteristics

Author Year of publication Country	Design	Study population	Definition SPID	Setting	Methods of diagnose pseudodementia	Main results
Rousseau et al. ²⁶ 2019 France	18-month cross- sectional study	N=255 Age: 35-68 years Sex: male/female stable across the age ranges	PIMD: IQ<40	4 specialized rehabilitation centers, 9 residential facilities, 1 specialized neurological department of a university hospital	Collected from medical records	Visual impairment: 62/255 Hearing disorder: 13/255 Epilepsy: 130/255 Pain: 101/255
Van Splunder et al. ²⁷ 2006 The Netherlands	Cross- sectional study	N=194 Age: ≥ 50 years Sex: 56% male/ 44% female in whole group (n=1539), not specified for subgroup	Severe ID: IQ 25-35 Profound ID: IQ< 25	Random sample of Dutch intellectual disability services, both residential and day care.	<ul style="list-style-type: none"> - Tests based on recognition (Snellen's chart, Burghardt's children's chart, Stycar single characters and matching) - Tests based on pattern resolution (Cardiff Acuity Cards and Teller Acuity Cards) 	Visual impairment: Severe ID without DS: 22,7% Profound ID without DS: 39,3% Severe ID with DS: 36,1% Profound ID with DS: 66,7% (Frequency/total not known)
Thompson et al. ²⁸ 2002 United Kingdom	A long term prospective cohort study over a 26-year period	N=53 Age: 42-92 years (mean 57,6) Sex: 21 male/ 32 female	SPID: not further defined.	Sample of 1975/1976 of randomly selected adults with SPID.	Epilepsy: <ul style="list-style-type: none"> - > 3 fits over the last 2 years - Receiving anticonvulsant medication for previous epilepsy Psychiatric symptoms: <ul style="list-style-type: none"> - Staff informant interviews - Participant observation for 20 minutes using the Modified Manifest Abnormality Scale (MMAS) of the Clinical Interview Schedule 	Epilepsy: 17/53 Depression: 5/53 Hyperactivity: 7/53 Anxious: 12/53
Evenhuis et al. ²⁹ 2001 The Netherlands	Cross- sectional study	N=45 Age: Age: ≥ 50 years Sex: 60% male/ 40% female in whole group (n=672), not specified for subgroup	SPID: developmental age < 3 years	Individuals who lived at least 1 year in one institute for people with ID before 1997	Hearing: Oto-acoustic emission (OAE) Impedance audiometry In case of abnormal results: Ear, nose and throat assessment Pure-tone audiometry Auditory brainstem response (ABR) audiometry Vision: <ul style="list-style-type: none"> - Snellen chart - LH charts - Single symbols - Teler and Cardiff acuity cards 	Hearing impairment: Absence of DS: 59% Hearing loss of ≥ 25dB and 38% hearing loss of ≥ 35dB Presence of DS: 80% Hearing loss of ≥ 25dB and 60% hearing loss of ≥ 35dB (frequency/total not known)
Fox et al. ³⁰ 1998 United States of America	Preliminary cross- sectional study	N=44 Age >39 years Sex: 61 male/25 female in whole group, not specified by subgroup	SPID Average IQ: 22.2, range 12-49	Midwestern residential facility.	<ul style="list-style-type: none"> - Diagnostic criteria for ADHD from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) - Hyperactivity Index from the Conners' Rating Scales 	Visual impairment: Absence of DS: 53% Presence of DS: 78% (frequency/total not known) ADHD: Inattentive type: 47,7% (21/44) Hyperactive/impulsive: 11,4% (5/44) Conner's hyperactivity: 18,2% (8/44)
Cherry et al. ³¹ 1997 United states of America	Cross- sectional study	N=84 Age: 60-79 years (mean 66,7) Sex: 53.6% male/ 46,4% female	SPID according to American Association of Mental deficiency Criteria	Residents of state facilities for persons with mental retardation	DASH, diagnosed if more than half of the subscale items were endorsed. Items and disorder subscales were derived from the diagnostic and statistical manual: DSM- III-R	Anxiety: 1/84 Depression: 0/84 PDD/autism: 8/84 Schizophrenia: 1/84

Abbreviations: PIMD= Profound intellectual an motor deficiency, SPID= Severe/profound intellectual disability, ID= Intellectual disability, DS=Down syndrome, dB=Decibel, DASH= Diagnostic Assessment Severely Handicapped

4.3 Methodological quality

The quality of the studies varied from 6 points to 9 points (Table 2). Two of the studies fulfilled all nine quality criteria²⁶⁻²⁷. The other studies all had a moderate risk of bias²⁸⁻³¹. None of the studies described a sample size calculation, therefore only the large studies received quality points for this criteria²⁶⁻²⁷. One study scored 6 points, this was a preliminary study³⁰. In two of the studies it was unclear whether the measurement of the pseudodementia was taken in a standard reliable way²⁸⁻²⁹.

Table 2 Methodological quality of selected studies The Joanna Briggs Institute Prevalence Critical Appraisal Tool

	Sample frame	Sampling	Sample Size	Study subjects/ setting	Data analysis coverage of sample	Valid methods	Measurement in standard reliable way	Statistical analysis	Response rate	Risk of bias
Rousseau et al. ²⁶ (2019)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Low (9)
Van Splunder et al. ²⁷ (2006)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Low (9)
Thompson et al. ²⁸ (2002)	Y	Y	N	Y	Y	Y	U	Y	Y	Moderate (7.5)
Evenhuis et al. ²⁹ (2001)	Y	Y	N	Y	Y	Y	U	Y	Y	Moderate (7.5)
Fox et al. ³⁰ (1998)	N	Y	N	Y	Y	U	Y	U	Y	Moderate (6)
Cherry et al. ³¹ (1997)	Y	U	N	Y	Y	Y	Y	Y	Y	Moderate (7)

Abbreviations: Y= Yes, 1 point, N=NO, 0 points, U=Unclear, 0.5 points

4.4 Results of individual studies

The oldest study (Table 1) that reported prevalence rates of pseudodementia in older people with SPID is the study of Cherry et al(1997)³¹. Prevalence rates of anxiety, depression, autism and schizophrenia were reported of a sample of 84 people, aged 60-79 years. Autism was found most frequently (8/84). Anxiety and schizophrenia were both found in one person out of 84. None of the 84 people were diagnosed with depression.

Fox et al (1998)³⁰ did a preliminary study of ADHD in 44 people with SPID. They distinguished in different types of ADHD. The most frequent type found was the inattentive type (21/44). Conner's hyperactivity was found in 8 out of 44 people. The hyperactive/impulsive type was found in 5 out of 44 people.

Evenhuis et al (2001)²⁹ studied prevalence rates of hearing impairment and visual impairment in 45 people with SPID, with and without Down syndrome. The study did not report the total number of people with SPID and Down syndrome, but provided the percentages of hearing impairment and visual impairment for each subgroup. Hearing

impairment was found most frequently. They distinguished between hearing loss of $\geq 25\text{dB}$ and $\geq 35\text{dB}$. Respectively a prevalence rate of 59% and 38% was found in people without Down syndrome and a prevalence rate of 80% and 60% in people with Down syndrome. Visual impairment was found in 78% of the people with Down syndrome and 53% of the people without Down syndrome.

Thompson et al (2002)²⁸ reported prevalence rates of four pseudodementia. They studied this prevalence rates in 2001 of a sample recruited in 1975/1976. For this systematic review only the results of 2001 were useful because in 1975/1976 the sample was younger than 35 years old. Epilepsy was found most frequently (17/53), followed by anxiety (12/53). Hyperactivity was found in 7 out of 53 people and depression in 5 out of 53 people.

Van Splunder et al (2006)²⁷ studied the prevalence rates of visual impairment of 1539 people with all levels of intellectual disability. This study included 194 people with SPID, but did not describe how many people from this subgroup dropped out. In the total sample of 1539 people, determination of visual function was possible in 88,2% of the cases. The study distinguished between people with and without Down syndrome and between severe and profound intellectual disability. The highest prevalence rate was found in people with a profound intellectual disability with Down syndrome (66,7%). Subsequently a prevalence rate of 39,3% was found in people with a profound intellectual disability without Down syndrome. In people with a severe intellectual disability a prevalence rate of 36,1% was found in people with Down syndrome and a prevalence rate of 22,7% in people without Down syndrome.

The most recent study that provided prevalence rates of pseudodementia in older people with SPID is the study of Rousseau et al (2019)²⁶. They reported prevalence rates of four different pseudodementia which they collected from medical records from 255 people. Epilepsy was found most frequently (130/255). Pain was found in 101 out of 255 people. Visual impairment and hearing disorders were less frequent: respectively 62/255 and 13/255.

4.4 Synthesis of results

Table 3 provides an overview of the prevalence rates of pseudodementia. The results are listed according to pseudodementia with the highest reported prevalence rates to pseudodementia with the lowest reported prevalence rates. The level of evidence was determined according to the classification assessment of Proper et al²⁵.

Table 3: Prevalence rate of pseudodementia

Pseudodementia	Subgroup	Prevalence rate (frequency/total)	95% CI
Hearing disorder	Presence of DS:		
	Hearing loss of ≥ 25 dB	80% (??) ²⁹	
	Hearing loss of ≥ 35 dB	60% (??) ²⁹	
	Absence of DS:		
	Hearing loss of ≥ 25 dB	59% (??) ²⁹	
Visual impairment	Hearing loss of ≥ 35 dB	38% (??) ²⁹	
		5,1% (13/255) ²⁶	
	Presence of DS	78% (??) ²⁹	
	Profound ID with DS	66,7% (??) ²⁷	41,0-86,7
	Absence of DS	53% (??) ²⁹	
	Profound ID without DS	39,3% (??) ²⁷	21,5-59,4
	Severe ID with DS	36,1% (??) ²⁷	20,8-53,8
Epilepsy		24,3% (62/255) ²⁶	
	Severe ID without DS	22,7% (??) ²⁷	13,8-33,8
ADHD		51,0% (130/255) ²⁶	
		32,1% (17/53) ²⁸	
	Inattentive type	47,7% (21/44) ³⁰	
	Conner's hyperactivity	18,2% (8/44) ³⁰	
Pain	Hyperactivity	13,2% (7/53) ²⁸	
	Hyperactive/impulsive	11,4% (5/44) ³⁰	
Anxiety		39,6% (101/255) ²⁶	
Autism		22,6% (12/53) ²⁸	
		1,2% (1/84) ³¹	
Depression		9,5% (8/84) ³¹	
Schizophrenia		9,4% (5/53) ²⁸	
		0% (0/84) ³¹	
		1,2% (1/84) ³¹	

Abbreviations: DS=Down's Syndrome, ID=Intellectual disability, dB=decibel, ?=not known

4.4.1 Hearing disorder

Two studies reported prevalence rates of hearing disorder^{26,29}. One study with a low risk of bias²⁶ and one with a moderate risk of bias²⁹. The study of Evenhuis et al²⁹ distinguished between with and without Down syndrome. Frequency and number of total is not reported for the subgroups, making it difficult to compare these prevalence rates with the presented prevalence rates of the study of Rousseau et al²⁶. The reported prevalence rates of Evenhuis et al²⁹ varied from 38%-80%. Rousseau et al²⁶ reported a prevalence rate of 5,1%. Therefore, there is insufficient evidence to support the prevalence rate of hearing disorder.

4.4.2 Visual impairment

Prevalence rates of visual impairment were found in three studies^{26-27,29}. Two of these studies were classified as low risk of bias²⁶⁻²⁷, one as moderate risk of bias²⁹. The studies of van Splunder et al²⁷ and Evenhuis et al²⁹ distinguished between people with and without Down syndrome^{27,29}. Both studies found a higher prevalence rate of visual impairment in people with Down syndrome in comparison to people without Down syndrome. Rousseau et al²⁶ found a prevalence rate of 24,3% (62/255). The study of

van Splunder et al²⁷ found a comparable prevalence rate of 22,7%, in the group of people with a severe intellectual disability without Down syndrome. All the other prevalence rates presented by van Splunder et al were much higher: 36,1%-66,7%. The confidence intervals of the subgroups of the study of van Splunder et al²⁷ overlapped for the most part. Evenhuis et al²⁹ reported a prevalence rate of 53% in people without Down syndrome and a prevalence rate of 78% in people with Down syndrome. Because the prevalence rates of the three studies were not consistent, there is insufficient evidence to support the prevalence rate of visual impairment.

4.4.3 Epilepsy

One study classified as low risk of bias²⁶ and one study classified as moderate risk of bias²⁸ provided a prevalence rate of epilepsy. Rousseau et al²⁶ reported a prevalence rate of 51% (130/255), while Thompson et al²⁸ reported a prevalence rate of 32,1% (17/53). Because prevalence rates were inconsistent, there is insufficient evidence to support the prevalence rate of epilepsy.

4.4.4 ADHD

Two studies with a moderate risk of bias reported prevalence rates of ADHD^{28,30}. Thompson et al²⁸ reported a prevalence rate of hyperactivity of 13,2% (7/53). Fox et al³⁰ reported prevalence rates of three different types of ADHD: inattentive (47,7%, 7/53), hyperactive/ impulsive (11,4%, 5/44) and Conner's hyperactivity (18,2%, 8/44). Because different definitions of ADHD were used, prevalence rate are not easy to compare, so there is insufficient evidence to support the prevalence rate of ADHD.

4.4.5 Pain

One study, classified as low risk of bias, reported a prevalence of 39,6% (101/255) for pain²⁶. Because no other included study provided prevalence rates of pain, there is insufficient evidence to support this prevalence rate.

4.4.6 Anxiety

Two studies, classified as moderate risk of bias, reported prevalence rates of anxiety³⁰⁻³¹. Thompson et al³⁰ reported a prevalence rate of 22,6% (12/53), while Cherry et al³¹ reported a prevalence rate of 1,2% (1/84). Because these inconsistent findings, there is insufficient evidence to support the prevalence rate of anxiety.

4.4.7 Autism

One study classified as moderate risk of bias, provided the prevalence rate for autism (9,5%, 8/84)³¹. None of the other studies reported prevalence rates of autism. There is insufficient evidence to support the prevalence rate of autism, because only one included study reported a prevalence rate of autism.

4.4.8 Depression

Two studies with a moderate risk of bias reported prevalence rates of depression^{28,31}. Thompson et al²⁸ reported a prevalence of 9,4% (5/53). Cherry et al³¹ reported no participants with depression (0/84). Because of these inconsistent findings, there is insufficient evidence to support the prevalence rate of depression.

4.4.9 Schizophrenia

One study with a moderate risk of bias reported prevalence rates of schizophrenia (1,2%, 1/84)³¹. Because none of the other included studies reported prevalence rates for schizophrenia, there is insufficient evidence to support this prevalence rate.

According to the classification assessment of Proper et al²⁵ these findings made clear that the level of evidence is insufficient for the reported prevalence rates of pseudodementia in people with SPID, due to inconsistent prevalence rates and the number of studies available (Table 2 and 3).

5. Discussion

This systematic review aimed to identify and compare studies reporting the prevalence of pseudodementia in older adults with SPID. It is believed that this systematic review provided a first overview of the current state of research on the prevalence of pseudodementia in older adults with SPID. Nine pseudodementia in six different studies were identified. Insufficient evidence was found for the reported prevalence rates of pseudodementia. No prevalence rates were found of the thirteen other predefined pseudodementia, so this systematic review did not give a complete overview of the prevalence rates of pseudodementia in people with SPID.

This review found inconsistent prevalence rates for hearing- and visual problems. This is in line with a systematic review of Timmeren et al³², who did not find homogeneous prevalence rates of hearing- and visual problems either. However, they found a homogeneous prevalence rate for epilepsy of 70% (CI 65%-75%)³². This prevalence rate is much higher than the prevalence rates found in this review (51%²⁶ and 32,1%²⁸). The sample of Timmeren et al³² included people with SPID and motor disabilities. Maybe this could explain the higher prevalence rate for epilepsy in the that study, because people with motor disabilities may have more brain damage³². Further research is needed to confirm this. Timmeren et al³² also included studies which reported prevalence rates of epilepsy in children, but according to the literature there is no significant difference in prevalence of epilepsy between children and adults³³⁻³⁴. This review found a prevalence rate of 9,5% (8/84) of autism³¹. A study of la Malfa et al³⁵, focusing on autism in people with intellectual disability aged 16-87 found a prevalence rate of 37,1% (29/78) in people with a severe intellectual disability and a prevalence of 59,6% (28/47) in people with a profound intellectual disability. Differences in prevalence rates can be explained by the use of different measurement instruments but also from the fact that diagnosing autism in people with SPID is difficult because the many overlapping disorders³⁵.

This review found inconsistent prevalence rates of anxiety: 22,6% (12/53)²⁸ and 1,2% (1/84)³¹. Matson et al³⁶ studied anxiety disorders in persons with SPID and questions the accuracy of anxiety diagnoses in people with SPID. They found that assessable behavioral symptoms are often part of an anxiety syndrome, but are present as well in individuals without anxiety problems due to emotional conditions. They concluded, that anxiety diagnosis will rely heavily on the clinicians assessment and inferences made regarding the client's behavior³⁶. This could explain the inconsistent prevalence rates found in this review, because Thompson et al²⁸ and Cherry et al³¹ both diagnosed anxiety through a short term participant observation.

This review found lower prevalence rates for various mental health problems compared to the study conducted by Hermans et al³⁷. Hermans studied multimorbidity in 1047 people with intellectual disabilities aged 50 years and over. 16,2% of this sample were people with a severe intellectual disability and 8,7% were people with a profound intellectual disability. This review found a prevalence of autism of 9.5%³¹, compared to 18.5% in the study of Hermans; for depression 0%³¹ and 9.4%²⁸, compared to 15.2% in the study of Hermans and for anxiety 1.2%³¹ and 22.6%²⁸, compared to 13.6% in

the study of Hermans. This is of concern because this could indicate that these mental health problems are underdiagnosed in people with SPID and therefore could be easily missed as differential diagnosis of dementia.

This systematic review provided a first overview of the prevalence of pseudodementia in older adults with SPID. Furthermore, a strength of this systematic review is the thorough search strategy in three databases with the use of a broad range of search terms. To ensure methodological rigor all steps of the review were peer reviewed by three different people, one of whom works as researcher in the same topic of this review.

Because of the small number of participants in four of the six included studies²⁸⁻³¹, and because a meta-analysis was not possible for any of the pseudodementia, results of this review can not be generalized to the whole group of older people with SPID. Furthermore, the definition of SPID varies in the included studies just like definitions of health problems like ADHD. This limits the comparability of the individual results and also limits the generalizability of the results.

Study selection was done by one researcher. To limit this risk of overlooking relevant studies, the literature search was repeated several times and studies that raised questions, were discussed with another researcher who is conducting research on the same topic, until consensus was reached.

Although results of this review could not provide a clear overview of the exact prevalence rates of pseudodementia, results of this review indicate that it is worthwhile to screen first and extensively for a hearing disorder, visual impairment and epilepsy as differential diagnosis of dementia, because these health conditions were found most common in people with SPID and resemble symptoms of dementia. The results of this review also show that much more research is needed in order to know the prevalence of pseudodementia.

Future research should focus primarily on prevalence rates of pseudodementia in a large population of people with SPID who are 30 years or older. This is strongly recommended because this will improve diagnosing dementia in older people with SPID. Timely exclusion of pseudodementia may allow earlier diagnosis of dementia. Hence, this group will receive tailored care sooner and because of that their quality of

life will be improved or at the very least maintained. Prevalence rates of pseudodementia can be researched by collecting data from medical records or by conducting a cross sectional study. In order to do so, it is necessary that research focuses on valid and reliable measurement instruments as well, in order to measure pseudodementia in this group of people. This is especially important for people with SPID, because self-reporting of symptoms is often not possible due to nonverbal communication³⁸. Therefore, diagnosis of pseudodementia is largely dependent on observation through appropriate instruments.

6. Conclusion

This systematic review provided a first overview of the prevalence rates of pseudodementia in older adults with SPID. Insufficient evidence was found for the reported prevalence rates of pseudodementia, because only a few studies provided prevalence rates for this target group. There is a strong need for comprehensive epidemiological data in order to determine prevalence rates of pseudodementia specific for older people with SPID. This would provide insight to improve diagnosing dementia.

7. References

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Appendix 1: search string database Pubmed/ Scopus/ Psychinfo

Pubmed (filterd on Englisch language)

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Seriously learning incapacitated [tiab] OR Severely learning incapacitated [tiab] OR Multiply mentally incapacitated [tiab] OR Profoundly mentally incapacitated [tiab] OR Seriously mentally incapacitated [tiab] OR Severely mentally incapacitated [tiab] OR Multiply neurodevelopmentally incapacitated [tiab] OR Profoundly neurodevelopmentally incapacitated [tiab] OR Seriously neurodevelopmentally incapacitated [tiab] OR Severely neurodevelopmentally incapacitated [tiab] OR Polyhandicap* [tiab] OR Trainable mentally retardate* [tiab] OR Complex cognitive retardation [tiab] OR Multiple cognitive retardation [tiab] OR Profound cognitive retardation [tiab] OR Serious cognitive retardation [tiab] OR Severe cognitive retardation [tiab] OR Complex developmental retardation [tiab] OR Multiple developmental retardation [tiab] OR Profound developmental retardation [tiab] OR Serious developmental retardation [tiab] OR Severe developmental retardation [tiab] OR Complex intellectual retardation [tiab] OR Multiple intellectual retardation [tiab] OR Profound intellectual retardation [tiab] OR Serious intellectual retardation [tiab] OR Severe intellectual retardation [tiab] OR Complex learning retardation [tiab] OR Multiple learning retardation [tiab] OR Profound learning retardation [tiab] OR Serious learning retardation [tiab] OR Severe learning retardation [tiab] OR Complex mental retardation [tiab] OR Multiple mental retardation [tiab] OR Profound mental retardation [tiab] OR Serious mental retardation [tiab] OR Severe mental retardation [tiab] OR Trainable mental retardation [tiab] OR Complex neurodevelopmental retardation [tiab] OR Multiple neurodevelopmental retardation [tiab] OR Profound neurodevelopmental retardation [tiab] OR Serious neurodevelopmental retardation [tiab] OR Severe neurodevelopmental retardation [tiab] OR Multiply cognitively retarded [tiab] OR Profoundly cognitively retarded [tiab] OR Seriously cognitively retarded [tiab] OR Severely cognitively retarded [tiab] OR Multiply developmentally retarded [tiab] OR Profoundly developmentally retarded [tiab] OR Seriously developmentally retarded [tiab] OR Severely developmentally retarded [tiab] OR Multiply intellectually retarded [tiab] OR Profoundly intellectually retarded [tiab] OR Seriously intellectually retarded [tiab] OR Severely intellectually retarded [tiab] OR Multiply learning retarded [tiab] OR Profoundly learning retarded [tiab] OR Seriously learning retarded [tiab] OR Severely learning retarded [tiab] OR Multiply mentally retarded [tiab] OR Profoundly mentally retarded [tiab] OR Seriously mentally retarded [tiab] OR Severely mentally retarded [tiab] OR Multiply neurodevelopmentally retarded [tiab] OR Profoundly neurodevelopmentally retarded [tiab] OR Seriously

neurodevelopmentally retarded [tiab] OR Severely neurodevelopmentally retarded [tiab] OR Trainable mentally retarded [tiab] OR Trainable retarded [tiab] OR Multiply cognitively subnormal [tiab] OR Profoundly cognitively subnormal [tiab] OR Seriously cognitively subnormal [tiab] OR Severely cognitively subnormal [tiab] OR Multiply developmentally subnormal [tiab] OR Profoundly developmentally subnormal [tiab] OR Seriously developmentally subnormal [tiab] OR Severely developmentally subnormal [tiab] OR Multiply intellectually subnormal [tiab] OR Profoundly intellectually subnormal [tiab] OR Seriously intellectually subnormal [tiab] OR Severely intellectually subnormal [tiab] OR Multiply learning subnormal [tiab] OR Profoundly learning subnormal [tiab] OR Seriously learning subnormal [tiab] OR Severely learning subnormal [tiab] OR Multiply mentally subnormal [tiab] OR Profoundly mentally subnormal [tiab] OR Seriously mentally subnormal [tiab] OR Severely mentally subnormal [tiab] OR Multiply neurodevelopmentally subnormal [tiab] OR Profoundly neurodevelopmentally subnormal [tiab] OR Seriously neurodevelopmentally subnormal [tiab] OR Severely neurodevelopmentally subnormal [tiab] OR Multiply weak-minded [tiab] OR Profoundly weak-minded [tiab] OR Seriously weak-minded [tiab] OR Severely weak-minded [tiab] OR Multiply weak-mindedness [tiab] OR Profoundly weak-mindedness [tiab] OR Seriously weak-mindedness [tiab] OR Severely weak-mindedness [tiab]) AND (Elder* [tiab] OR Geriatric* [tiab] OR Old age [tiab] OR Older participant* [tiab] OR Older population* [tiab] OR Older individual* [tiab] OR Older adult* [tiab] OR Older patient* [tiab] OR Older people [tiab] OR Older person* [tiab] OR Older subject* [tiab] OR Oldest participant* [tiab] OR Oldest population* [tiab] OR Oldest individual* [tiab] OR Oldest adult* [tiab] OR Oldest patient* [tiab] OR Oldest people [tiab] OR Oldest person* [tiab] OR Oldest subject* [tiab] OR Senior* [tiab] OR Aged individual* [tiab] OR Aged population* [tiab] OR Aged participant* [tiab] OR Aged adult* [tiab] OR Aged patient* [tiab] OR Aged people [tiab] OR Aged person* [tiab] OR Aged subject* [tiab] OR adult* [tiab]) AND ("Stroke" [MeSH] OR stroke [tiab] OR Cerebrovascular Accident* [tiab] OR CVA [tiab] OR Cerebrovascular Apoplexy [tiab] OR Brain Vascular Accident* [tiab] OR "Chronic pain" [MeSH] OR chronic pain [tiab] OR "Diabetes mellitus" [MeSH] OR diabetes mellitus [tiab] OR "Delirium" [MeSH] OR delirium [tiab] OR "Epilepsy" [MeSH] OR epileps* [tiab] OR seizure disorder [tiab] OR "Hearing disorders" [MeSH] OR hearing disorder* [tiab] OR hearing loss [tiab] OR hearing problem* [tiab] OR distorted hearing [tiab] OR "Hypertension" [MeSH] OR

hypertension [tiab], OR high blood pressure* [tiab] OR "Hyperthyroidism" [MeSH] OR hyperthyroid* [tiab] "Hypothyroidism" [MeSH] OR hypothyroidism* [tiab] OR TSH deficienc* [tiab] OR Thyroid Stimulating Hormone Deficiency [tiab] OR "Infections" [Mesh] OR infection* [tiab] OR "inflammation" [MeSH] OR inflammation* [tiab] OR "Sleep apnea syndromes" [MeSH] OR sleep apnea* [tiab] OR sleep disordered breathing [tiab] OR "Vision disorder" [MeSH] OR vision disorder* [tiab] OR Visual disorder* [tiab] OR visual impairment* [tiab] OR vision disabilit* [tiab] OR "Vitamin B 12 deficiency" [MeSH] OR vitamin B 12 deficienc* [tiab] OR vitamin B 11 deficienc* [tiab] OR "Folic Acid" [MeSH] or folic acid [tiab] OR "Attention Deficit Disorder with Hyperactivity" [MeSH] OR Attention Deficit Disorder with hyperactivity [tiab] OR ADHD [tiab] OR Attention Deficit Hyperactivity Disorder [tiab] OR "Anxiety disorders" [MeSH] OR anxiety disorder* [tiab] OR anxiety neuroses [tiab] OR "Autism Spectrum Disorder" [MeSH] OR autism spectrum disorder* [tiab] OR autistic disorder* [tiab] OR "Bipolar disorder" [MeSH] OR bipolar disorder* [tiab] OR manic depressive psychosis [tiab] OR manic-depressive psychosis [tiab] OR bipolar mood disorder* [tiab] OR "Depressive Disorder" [MeSH] OR depressive disorder* [tiab] OR depressive neuroses [tiab] OR "depression" [MeSH] OR depression [tiab] OR depressive symptoms [tiab] OR Obsessive compulsive disorder* [tiab] OR obsessive-compulsive disorder* [tiab] OR "obsessive-compulsive disorder" [MeSH] OR obsessive compulsive neuros* [tiab] OR obsessive-compulsive neuros* [tiab] OR "Personality disorders" [MeSH] OR personality disorder* [tiab] OR "Schizophrenia" [MeSH] OR schizophrenia* [tiab] OR schizophrenic disorder* [tiab] OR Comorbidit* [tiab] OR "comorbidity"[MeSH] OR multimorbidity [tiab] OR psychiatric disorder* [tiab] OR "mental disorders" [MeSH] OR mental disorder* [tiab] OR physical health [tiab] OR pseudodementia [tiab] OR pseudo-dementia [tiab]) AND (Prevalence [tiab] OR "prevalence" [MeSH] OR "incidence" [MeSH] or incidence* [tiab] OR proportion [tiab] OR rate [tiab] OR frequen* [tiab] OR presence [tiab] OR morbidity [tiab] OR "morbidity" [MeSH])

Scopus/ psychinfo (psychinfo without "): filterd on Englisch language

("Complex developmental abnormalit*" OR "Multiple developmental abnormalit*" OR "Profound developmental abnormalit*" OR "Serious developmental abnormalit*" OR "Severe developmental abnormalit*" OR "Complex intellectual abnormalit*" OR "Multiple intellectual abnormalit*" OR "Profound intellectual abnormalit*" OR "Serious

intellectual abnormalit*" OR "Severe intellectual abnormalit*" OR "Complex learning
 abnormalit*" OR "Multiple learning abnormalit*" OR "Profound learning abnormalit*" OR
 "Serious learning abnormalit*" OR "Severe learning abnormalit*" OR "Complex
 mental abnormalit*" OR "Multiple mental abnormalit*" OR "Profound mental
 abnormalit*" OR "Serious mental abnormalit*" OR "Severe mental abnormalit*" OR
 "Complex neurodevelopmental abnormalit*" OR "Multiple neurodevelopmental
 abnormalit*" OR "Profound neurodevelopmental abnormalit*" OR "Serious
 neurodevelopmental abnormalit*" OR "Severe neurodevelopmental abnormalit*" OR
 Amentia OR "Complex cognitive challenge*" OR "Multiple cognitive challenge*" OR
 "Profound cognitive challenge*" OR "Serious cognitive challenge*" OR "Severe
 cognitive challenge*" OR "Complex developmental challenge*" OR "Multiple
 developmental challenge*" OR "Profound developmental challenge*" OR "Serious
 developmental challenge*" OR "Severe developmental challenge*" OR "Complex
 intellectual challenge*" OR "Multiple intellectual challenge*" OR "Profound intellectual
 challenge*" OR "Serious intellectual challenge*" OR "Severe intellectual challenge*" OR
 "Complex learning challenge*" OR "Multiple learning challenge*" OR "Profound
 learning challenge*" OR "Serious learning challenge*" OR "Severe learning
 challenge*" OR "Complex neurodevelopmental challenge*" OR "Multiple
 neurodevelopmental challenge*" OR "Profound neurodevelopmental challenge*" OR
 "Serious neurodevelopmental challenge*" OR "Severe neurodevelopmental
 challenge*" OR "Multiply cognitively challenged" OR "Profoundly cognitively
 challenged" OR "Seriously cognitively challenged" OR "Severely cognitively
 challenged" OR "Multiply developmentally challenged" OR "Profoundly
 developmentally challenged" OR "Seriously developmentally challenged" OR
 "Severely developmentally challenged" OR "Multiply intellectually challenged" OR
 "Profoundly intellectually challenged" OR "Seriously intellectually challenged" OR
 "Severely intellectually challenged" OR "Multiply learning challenged" OR "Profoundly
 learning challenged" OR "Seriously learning challenged" OR "Severely learning
 challenged" OR "Multiply neurodevelopmentally challenged" OR "Profoundly
 neurodevelopmentally challenged" OR "Seriously neurodevelopmentally challenged"
 OR "Severely neurodevelopmentally challenged" OR "Complex cognitive defect*" OR
 "Multiple cognitive defect*" OR "Profound cognitive defect*" OR "Serious cognitive
 defect*" OR "Severe cognitive defect*" OR "Complex developmental defect*" OR
 "Multiple developmental defect*" OR "Profound developmental defect*" OR "Serious

developmental defect*" OR "Severe developmental defect*" OR "Complex intellectual defect*" OR "Multiple intellectual defect*" OR "Profound intellectual defect*" OR "Serious intellectual defect*" OR "Severe intellectual defect*" OR "Complex learning defect*" OR "Multiple learning defect*" OR "Profound learning defect*" OR "Serious learning defect*" OR "Severe learning defect*" OR "Complex mental defect*" OR "Multiple mental defect*" OR "Profound mental defect*" OR "Serious mental defect*" OR "Severe mental defect*" OR "Complex neurodevelopmental defect*" OR "Multiple neurodevelopmental defect*" OR "Profound neurodevelopmental defect*" OR "Serious neurodevelopmental defect*" OR "Severe neurodevelopmental defect*" OR "Multiply cognitively defective" OR "Profoundly cognitively defective" OR "Seriously cognitively defective" OR "Severely cognitively defective" OR "Multiply developmentally defective" OR "Profoundly developmentally defective" OR "Seriously developmentally defective" OR "Severely developmentally defective" OR "Multiply intellectually defective" OR "Profoundly intellectually defective" OR "Seriously intellectually defective" OR "Severely intellectually defective" OR "Multiply learning defective" OR "Profoundly learning defective" OR "Seriously learning defective" OR "Severely learning defective" OR "Multiply mentally defective" OR "Profoundly mentally defective" OR "Seriously mentally defective" OR "Severely mentally defective" OR "Multiply neurodevelopmentally defective" OR "Profoundly neurodevelopmentally defective" OR "Seriously neurodevelopmentally defective" OR "Severely neurodevelopmentally defective" OR "Complex cognitive deficiency*" OR "Multiple cognitive deficiency*" OR "Profound cognitive deficiency*" OR "Serious cognitive deficiency*" OR "Severe cognitive deficiency*" OR "Complex developmental deficiency*" OR "Multiple developmental deficiency*" OR "Profound developmental deficiency*" OR "Serious developmental deficiency*" OR "Severe developmental deficiency*" OR "Complex intellectual deficiency*" OR "Multiple intellectual deficiency*" OR "Profound intellectual deficiency*" OR "Serious intellectual deficiency*" OR "Severe intellectual deficiency*" OR "Complex learning deficiency*" OR "Multiple learning deficiency*" OR "Profound learning deficiency*" OR "Serious learning deficiency*" OR "Severe learning deficiency*" OR "Complex mental deficiency*" OR "Multiple mental deficiency*" OR "Profound mental deficiency*" OR "Serious mental deficiency*" OR "Severe mental deficiency*" OR "Complex neurodevelopmental deficiency*" OR "Multiple neurodevelopmental deficiency*" OR "Profound neurodevelopmental deficiency*" OR "Serious neurodevelopmental deficiency*" OR "Severe

neurodevelopmental deficiency" OR "Multiply cognitively deficient" OR "Profoundly cognitively deficient" OR "Seriously cognitively deficient" OR "Severely cognitively deficient" OR "Multiply developmentally deficient" OR "Profoundly developmentally deficient" OR "Seriously developmentally deficient" OR "Severely developmentally deficient" OR "Multiply intellectually deficient" OR "Profoundly intellectually deficient" OR "Seriously intellectually deficient" OR "Severely intellectually deficient" OR "Multiply learning deficient" OR "Profoundly learning deficient" OR "Seriously learning deficient" OR "Severely learning deficient" OR "Multiply mentally deficient" OR "Profoundly mentally deficient" OR "Seriously mentally deficient" OR "Severely mentally deficient" OR "Multiply neurodevelopmentally deficient" OR "Profoundly neurodevelopmentally deficient" OR "Seriously neurodevelopmentally deficient" OR "Severely neurodevelopmentally deficient" OR "Complex developmental deficit*" OR "Multiple developmental deficit*" OR "Profound developmental deficit*" OR "Serious developmental deficit*" OR "Severe developmental deficit*" OR "Complex intellectual deficit*" OR "Multiple intellectual deficit*" OR "Profound intellectual deficit*" OR "Serious intellectual deficit*" OR "Severe intellectual deficit*" OR "Complex learning deficit*" OR "Multiple learning deficit*" OR "Profound learning deficit*" OR "Serious learning deficit*" OR "Severe learning deficit*" OR "Complex mental deficit*" OR "Multiple mental deficit*" OR "Profound mental deficit*" OR "Serious mental deficit*" OR "Severe mental deficit*" OR "Complex neurodevelopmental deficit*" OR "Multiple neurodevelopmental deficit*" OR "Profound neurodevelopmental deficit*" OR "Serious neurodevelopmental deficit*" OR "Severe neurodevelopmental deficit*" OR "Complex cognitive delay" OR "Multiple cognitive delay" OR "Profound cognitive delay" OR "Serious cognitive delay" OR "Severe cognitive delay" OR "Complex developmental delay" OR "Multiple developmental delay" OR "Profound developmental delay" OR "Serious developmental delay" OR "Severe developmental delay" OR "Complex intellectual delay" OR "Multiple intellectual delay" OR "Profound intellectual delay" OR "Serious intellectual delay" OR "Severe intellectual delay" OR "Complex learning delay" OR "Multiple learning delay" OR "Profound learning delay" OR "Serious learning delay" OR "Severe learning delay" OR "Complex mental delay" OR "Multiple mental delay" OR "Profound mental delay" OR "Serious mental delay" OR "Severe mental delay" OR "Complex neurodevelopmental delay" OR "Multiple neurodevelopmental delay" OR "Profound neurodevelopmental delay" OR "Serious neurodevelopmental delay" OR "Severe neurodevelopmental delay" OR "Multiply

cognitively delayed" OR "Profoundly cognitively delayed" OR "Seriously cognitively delayed" OR "Severely cognitively delayed" OR "Multiply developmentally delayed" OR "Profoundly developmentally delayed" OR "Seriously developmentally delayed" OR "Severely developmentally delayed" OR "Multiply intellectually delayed" OR "Profoundly intellectually delayed" OR "Seriously intellectually delayed" OR "Severely intellectually delayed" OR "Multiply learning delayed" OR "Profoundly learning delayed" OR "Seriously learning delayed" OR "Severely learning delayed" OR "Multiply mentally delayed" OR "Profoundly mentally delayed" OR "Seriously mentally delayed" OR "Severely mentally delayed" OR "Multiply neurodevelopmentally delayed" OR "Profoundly neurodevelopmentally delayed" OR "Seriously neurodevelopmentally delayed" OR "Severely neurodevelopmentally delayed" OR "Multiply differently-abled" OR "Profoundly differently-abled" OR "Seriously differently-abled" OR "Severely differently-abled" OR "Multiple developmental difficult*" OR "Complex developmental difficult*" OR "Profound developmental difficult*" OR "Serious developmental difficult*" OR "Severe developmental difficult*" OR "Multiple intellectual difficult*" OR "Complex intellectual difficult*" OR "Profound intellectual difficult*" OR "Serious intellectual difficult*" OR "Severe intellectual difficult*" OR "Complex learning difficult*" OR "Multiple learning difficult*" OR "Profound learning difficult*" OR "Serious learning difficult*" OR "Severe learning difficult*" OR "Multiple mental difficult*" OR "Complex mental difficult*" OR "Profound mental difficult*" OR "Serious mental difficult*" OR "Severe mental difficult*" OR "Complex neurodevelopmental difficult*" OR "Multiple neurodevelopmental difficult*" OR "Profound neurodevelopmental difficult*" OR "Serious neurodevelopmental difficult*" OR "Severe neurodevelopmental difficult*" OR "Complex cognitive disabilit*" OR "Multiple cognitive disabilit*" OR "Profound cognitive disabilit*" OR "Serious cognitive disabilit*" OR "Severe cognitive disabilit*" OR "Complex developmental disabilit*" OR "Multiple developmental disabilit*" OR "Multiple developmental disabilit*" OR "Serious developmental disabilit*" OR "Severe developmental disabilit*" OR "Trainable intellectual disabilit*" OR "Complex intellectual disabilit*" OR "Multiple intellectual disabilit*" OR "Profound intellectual disabilit*" OR "Serious intellectual disabilit*" OR "Severe intellectual disabilit*" OR "Severe profound intellectual motor disabilit*" OR "Complex learning disabilit*" OR "Multiple learning disabilit*" OR "Profound learning disabilit*" OR "Serious learning disabilit*" OR "Severe learning disabilit*" OR "Complex mental disabilit*" OR "Multiple

mental disability*" OR "Profound mental disability*" OR "Serious mental disability*" OR
 "Severe mental disability*" OR "Trainable mental disability*" OR "Complex
 neurodevelopmental disability*" OR "Multiple neurodevelopmental disability*" OR
 "Profound neurodevelopmental disability*" OR "Serious neurodevelopmental disability*" OR
 "Severe neurodevelopmental disability*" OR "Multiple disability*" OR "Multiply
 cognitively disabled" OR "Profoundly cognitively disabled" OR "Seriously cognitively
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 OR "Profoundly developmentally disabled" OR "Seriously developmentally disabled"
 OR "Severely developmentally disabled" OR "Trainable developmentally disabled"
 OR "Multiply intellectually disabled" OR "Profoundly intellectually disabled" OR
 "Seriously intellectually disabled" OR "Severely intellectually disabled" OR "Trainable
 intellectually disabled" OR "Multiply learning disabled" OR "Profoundly learning
 disabled" OR "Seriously learning disabled" OR "Severely learning disabled" OR
 "Multiply mentally disabled" OR "Profoundly mentally disabled" OR "Seriously
 mentally disabled" OR "Severely mentally disabled" OR "Multiply
 neurodevelopmentally disabled" OR "Profoundly neurodevelopmentally disabled" OR
 "Seriously neurodevelopmentally disabled" OR "Severely neurodevelopmentally
 disabled" OR "Multiply disabled" OR "Trainable mentally disabled" OR "Complex
 developmental disorder*" OR "Multiple developmental disorder*" OR "Profound
 developmental disorder*" OR "Serious developmental disorder*" OR "Severe
 developmental disorder*" OR "Complex intellectual disorder*" OR "Multiple
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 disorder*" OR "Severe intellectual disorder*" OR "Complex learning disorder*" OR
 "Multiple learning disorder*" OR "Profound learning disorder*" OR "Serious learning
 disorder*" OR "Severe learning disorder*" OR "Complex neurodevelopmental
 disorder*" OR "Multiple neurodevelopmental disorder*" OR "Profound
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 "Severe neurodevelopmental disorder*" OR "Profoundly feeble-minded" OR
 "Seriously feeble-minded" OR "Severely feeble-minded" OR "Profound feeble-
 mindedness" OR "Serious feeble-mindedness" OR "Severe feeble-mindedness" OR
 "Complex cognitive handicap*" OR "Multiple cognitive handicap*" OR "Profound
 cognitive handicap*" OR "Serious cognitive handicap*" OR "Severe cognitive
 handicap*" OR "Complex developmental handicap*" OR "Multiple developmental
 handicap*" OR "Profound developmental handicap*" OR "Serious developmental

handicap*" OR "Severe developmental handicap*" OR "Complex intellectual handicap*" OR "Multiple intellectual handicap*" OR "Profound intellectual handicap*" OR "Serious intellectual handicap*" OR "Severe intellectual handicap*" OR "Complex learning handicap*" OR "Multiple learning handicap*" OR "Profound learning handicap*" OR "Serious learning handicap*" OR "Severe learning handicap*" OR "Complex mental handicap*" OR "Multiple mental handicap*" OR "Profound mental handicap*" OR "Serious mental handicap*" OR "Severe mental handicap*" OR "Trainable mental handicap*" OR "Complex neurodevelopmental handicap*" OR "Multiple neurodevelopmental handicap*" OR "Profound neurodevelopmental handicap*" OR "Serious neurodevelopmental handicap*" OR "Severe neurodevelopmental handicap*" OR "Multiply cognitively handicapped" OR "Profoundly cognitively handicapped" OR "Seriously cognitively handicapped" OR "Severely cognitively handicapped" OR "Multiply developmentally handicapped" OR "Profoundly developmentally handicapped" OR "Seriously developmentally handicapped" OR "Severely developmentally handicapped" OR "Multiply intellectually handicapped" OR "Profoundly intellectually handicapped" OR "Seriously intellectually handicapped" OR "Severely intellectually handicapped" OR "Multiply learning handicapped" OR "Profoundly learning handicapped" OR "Seriously learning handicapped" OR "Severely learning handicapped" OR "Multiply mentally handicapped" OR "Profoundly mentally handicapped" OR "Seriously mentally handicapped" OR "Severely mentally handicapped" OR "Multiply neurodevelopmentally handicapped" OR "Profoundly neurodevelopmentally handicapped" OR "Seriously neurodevelopmentally handicapped" OR "Severely neurodevelopmentally handicapped" OR "Multiply handicapped" OR "Trainable mentally handicapped" OR Idiocy OR Idiot OR Idiotcy OR Idiotic OR Idiotism OR Idiots OR Imbecil* OR "Multiply developmentally impaired" OR "Profoundly developmentally impaired" OR "Seriously developmentally impaired" OR "Severely developmentally impaired" OR "Multiply intellectually impaired" OR "Profoundly intellectually impaired" OR "Seriously intellectually impaired" OR "Severely intellectually impaired" OR "Multiply learning impaired" OR "Profoundly learning impaired" OR "Seriously learning impaired" OR "Severely learning impaired" OR "Multiply mentally impaired" OR "Profoundly mentally impaired" OR "Seriously

mentally impaired" OR "Severely mentally impaired" OR "Multiply
 neurodevelopmentally impaired" OR "Profoundly neurodevelopmentally impaired" OR
 "Seriously neurodevelopmentally impaired" OR "Severely neurodevelopmentally
 impaired" OR "Trainable mentally impaired" OR "Complex developmental
 impairment*" OR "Multiple developmental impairment*" OR "Profound developmental
 impairment*" OR "Serious developmental impairment*" OR "Severe developmental
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 impairment*" OR "Profound intellectual impairment*" OR "Serious intellectual
 impairment*" OR "Severe intellectual impairment*" OR "Complex learning
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 impairment*" OR "Serious mental impairment*" OR "Severe mental impairment*" OR
 "Complex neurodevelopmental impairment*" OR "Multiple neurodevelopmental
 impairment*" OR "Profound neurodevelopmental impairment*" OR "Serious
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 "Profound learning incapacit*" OR "Serious learning incapacit*" OR "Severe learning
 incapacit*" OR "Complex mental incapacit*" OR "Multiple mental incapacit*" OR
 "Profound mental incapacit*" OR "Serious mental incapacit*" OR "Severe mental
 incapacit*" OR "Complex neurodevelopmental incapacit*" OR "Multiple
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 "Serious neurodevelopmental incapacit*" OR "Severe neurodevelopmental
 incapacit*" OR "Multiply cognitively incapacitated" OR "Profoundly cognitively
 incapacitated" OR "Seriously cognitively incapacitated" OR "Severely cognitively
 incapacitated" OR "Multiply developmentally incapacitated" OR "Profoundly
 developmentally incapacitated" OR "Seriously developmentally incapacitated" OR

"Severely developmentally incapacitated" OR "Multiply intellectually incapacitated" OR "Profoundly intellectually incapacitated" OR "Seriously intellectually incapacitated" OR "Severely intellectually incapacitated" OR "Multiply learning incapacitated" OR "Profoundly learning incapacitated" OR "Seriously learning incapacitated" OR "Severely learning incapacitated" OR "Multiply mentally incapacitated" OR "Profoundly mentally incapacitated" OR "Seriously mentally incapacitated" OR "Severely mentally incapacitated" OR "Multiply neurodevelopmentally incapacitated" OR "Profoundly neurodevelopmentally incapacitated" OR "Seriously neurodevelopmentally incapacitated" OR "Severely neurodevelopmentally incapacitated" OR "Polyhandicap*" OR "Trainable mentally retardate*" OR "Complex cognitive retardation" OR "Multiple cognitive retardation" OR "Profound cognitive retardation" OR "Serious cognitive retardation" OR "Severe cognitive retardation" OR "Complex developmental retardation" OR "Multiple developmental retardation" OR "Profound developmental retardation" OR "Serious developmental retardation" OR "Severe developmental retardation" OR "Complex intellectual retardation" OR "Multiple intellectual retardation" OR "Profound intellectual retardation" OR "Serious intellectual retardation" OR "Severe intellectual retardation" OR "Complex learning retardation" OR "Multiple learning retardation" OR "Profound learning retardation" OR "Serious learning retardation" OR "Severe learning retardation" OR "Complex mental retardation" OR "Multiple mental retardation" OR "Profound mental retardation" OR "Serious mental retardation" OR "Severe mental retardation" OR "Trainable mental retardation" OR "Complex neurodevelopmental retardation" OR "Multiple neurodevelopmental retardation" OR "Profound neurodevelopmental retardation" OR "Serious neurodevelopmental retardation" OR "Severe neurodevelopmental retardation" OR "Multiply cognitively retarded" OR "Profoundly cognitively retarded" OR "Seriously cognitively retarded" OR "Severely cognitively retarded" OR "Multiply developmentally retarded" OR "Profoundly developmentally retarded" OR "Seriously developmentally retarded" OR "Severely developmentally retarded" OR "Multiply intellectually retarded" OR "Profoundly intellectually retarded" OR "Seriously intellectually retarded" OR "Severely intellectually retarded" OR "Multiply learning retarded" OR "Profoundly learning retarded" OR "Seriously learning retarded" OR "Severely learning retarded" OR "Multiply mentally retarded" OR "Profoundly mentally retarded" OR "Seriously mentally retarded" OR "Severely mentally retarded" OR "Multiply

neurodevelopmentally retarded" OR "Profoundly neurodevelopmentally retarded" OR
 "Seriously neurodevelopmentally retarded" OR "Severely neurodevelopmentally
 retarded" OR "Trainable mentally retarded" OR "Trainable retarded" OR "Multiply
 cognitively subnormal" OR "Profoundly cognitively subnormal" OR "Seriously
 cognitively subnormal" OR "Severely cognitively subnormal" OR "Multiply
 developmentally subnormal" OR "Profoundly developmentally subnormal" OR
 "Seriously developmentally subnormal" OR "Severely developmentally subnormal"
 OR "Multiply intellectually subnormal" OR "Profoundly intellectually subnormal" OR
 "Seriously intellectually subnormal" OR "Severely intellectually subnormal" OR
 "Multiply learning subnormal" OR "Profoundly learning subnormal" OR "Seriously
 learning subnormal" OR "Severely learning subnormal" OR "Multiply mentally
 subnormal" OR "Profoundly mentally subnormal" OR "Seriously mentally subnormal"
 OR "Severely mentally subnormal" OR "Multiply neurodevelopmentally subnormal"
 OR "Profoundly neurodevelopmentally subnormal" OR "Seriously
 neurodevelopmentally subnormal" OR "Severely neurodevelopmentally subnormal"
 OR "Multiply weak-minded" OR "Profoundly weak-minded" OR "Seriously weak-
 minded" OR "Severely weak-minded" OR "Multiply weak-mindedness" OR
 "Profoundly weak-mindedness" OR "Seriously weak-mindedness" OR "Severely
 weak-mindedness") AND ("stroke" OR "Cerebrovascular Accident*" OR "CVA" OR
 "Cerebrovascular Apoplexy" OR "Brain Vascular Accident*" OR "chronic pain" OR
 "Diabetes mellitus" OR "Delirium" OR epileps* OR "seizure disorder" OR "Hearing
 disorder*" OR "hearing loss" OR "hearing problem*" OR "distorted hearing" OR
 "Hypertension" OR "high blood pressure*" OR "Hyperthyroid*" OR "Hypothyroidism*"
 OR "TSH deficienc*" OR "Thyroid Stimulating Hormone Deficiency" OR "Infection*"
 OR "inflammation*" OR "Sleep apnea*" OR "sleep disordered breathing" OR "Vision
 disorder*" OR "Visual disorder*" OR "visual impairment*" OR "vision disabilit*" OR
 "Vitamin B 12 deficienc*" OR "vitamin B 11 deficienc*" OR "Folic Acid" OR "Attention
 Deficit Disorder with Hyperactivity" OR "ADDH" OR "Attention Deficit Hyperactivity
 Disorder" OR "Anxiety disorder*" OR "anxiety neuroses" OR "Autism Spectrum
 Disorder*" OR "autistic disorder*" OR "Bipolar disorder*" OR "manic depressive
 psychosis" OR "manic-depressive psychosis" OR "bipolar mood disorder*" OR
 "Depressive Disorder*" OR "depressive neuroses" OR "depression" OR "depressive
 symptoms" OR "Obsessive compulsive disorder*" OR "obsessive-compulsive
 disorder*" OR "obsessive compulsive neuros*" OR "obsessive-compulsive neuros*"

OR "Personality disorder*" OR "Schizophrenia*" OR "schizophrenic disorder*" OR
 "physical health" OR "psychiatric health" OR "multimorbidity" OR "psychiatric
 disorder*" OR "mental disorder*" OR "physical health" OR "pseudodementia") AND
 ("Prevalence" OR "incidence*" OR "proportion" OR "rate" OR "frequenc*" OR
 "presence" OR "morbidity") AND ("Elder*" OR "Geriatric*" OR "Old age" OR "Older
 participant*" OR "Older population*" OR "Older individual*" OR "Older adult*" OR
 "Older patient*" OR "Older people" OR "Older person*" OR "Older subject*" OR
 "Oldest participant*" OR "Oldest population*" OR "Oldest individual*" OR "Oldest
 adult*" OR "Oldest patient*" OR "Oldest people" OR "Oldest person*" OR "Oldest
 subject*" OR "Senior*" OR "Aged individual*" OR "Aged population*" OR "Aged
 participant*" OR "Aged adult*" OR "Aged patient*" OR "Aged people" OR "Aged
 person*" OR "Aged subject*" OR "adult*")