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Psychometric evaluation of a Dutch version of the Mini PAS-ADD for assessing psychiatric disorders in adults with different levels of intellectual disability

R. Janssen & B. Maes

Faculty of Psychology and Educational Sciences, University of Leuven, Leuven, Belgium

Abstract

Background People with intellectual disabilities (ID) have an increased vulnerability to develop psychiatric problems. Moreover, the early recognition and the accurate diagnosis of psychiatric disorders in the population of persons with ID are challenging.

Method A Dutch version of the Mini PAS-ADD, which is a screening instrument for identification of mental health problems in people with ID, was evaluated in terms of internal consistency, interinformant reliability, item grouping and criterion validity based on a large-scale random sample ($n = 377$) and a clinical sample ($n = 99$) of adults with ID.

Results The Dutch version of the Mini PAS-ADD showed moderate internal consistency, and moderate concordance among informants. Both aspects of the reliability were comparable for different levels of ID. A factor analysis largely confirmed the scale structure. Concurrent validity with the Reiss Screen for Maladaptive Behavior was high for the Depression, Psychosis and Autism scale. The outcome of the criterion-validity analysis indicated high specificity. The sensitivity for specific psychiatric disorders by the corresponding scales was moderate, but the general sensitivity for the presence of psychopathology on the basis of any of the scales was satisfying.

Conclusions The present research reconfirmed the use of the Mini PAS-ADD as a primary screening device for the identification of mental health problems among people with ID.

Keywords behavioural measurement methods, intellectual disability, mental health, psychiatric disorders

Correspondence: Prof. Dr Bea Maes, Parenting and Special Education Research Group, University of Leuven, Vesaliusstraat 2 (PB 3765), 3000 Leuven, Belgium (e-mail: bea.maes@ppw.kuleuven.be).

Rianne Janssen (PhD) is an assistant professor at the Research Group Quantitative Psychology and the Centre for Educational Effectiveness and Evaluation, University of Leuven, Belgium. E-mail: rianne.janssen@ppw.kuleuven.be. Bea Maes (PhD) is a full professor at the Parenting and Special Education Research Group of the same university.

Introduction

People with intellectual disabilities (ID) have an increased vulnerability to develop mental health problems (Cooper & Bailey 2001; Deb *et al*. 2001; Emerson *et al*. 2001; Moss 2001; Dekker *et al*. 2002; Einfeld *et al*. 2006; Whitaker & Read 2006; Cooper *et al*. 2007). However, the early recognition and the

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accurate diagnosis of psychiatric disorders in the population of persons with ID are challenging. First of all, the onset or continuation of psychiatric disorders in individuals with ID is often influenced by a complex pattern of developmental, biological, socio-emotional and environmental factors (Roy *et al.* 2006; Došen *et al.* 2007). Next to this, people with ID have limited cognitive and communicative competences, which make it difficult to get an accurate insight in their thoughts and feelings. Psychiatric disorders may also be expressed in a specific and atypical way in individuals with ID (Cooper *et al.* 2003; Fletcher *et al.* 2007). Therefore, psychiatric problems are often not recognised, and attributed to the ID, instead of being considered as a psychiatric problem, a phenomenon that has been described as 'diagnostic overshadowing' (Reiss 1990; Prosser *et al.* 1998; Mikkelsen *et al.* 2005). In order to overcome these diagnostic challenges, specific checklists have been developed to enable support staff to rate the person's mental health problems realistically.

It is the purpose of the present manuscript to investigate the psychometric qualities of a Dutch version of the shortened version of the Psychiatric Assessment Schedules for Adults with Developmental Disabilities (Mini PAS-ADD) in a large-scale study with a special focus on the applicability of the checklist for different levels of ID. The Mini PAS-ADD is the youngest member of the PAS-ADD family that comprises three individual, but related schedules designed to improve the detection and diagnosis of mental health problems experienced by adults with an ID. The PAS-ADD 10 (Moss *et al.* 1993; Costello *et al.* 1997) is a semi-structured clinical interview used by trained professionals, typically psychiatrists or psychologists. The PAS-ADD Checklist (Moss *et al.* 1998) is a questionnaire that can be used by unqualified observers, such as family members or staff, who have known the person for at least 6 months. Finally, the Mini PAS-ADD (Prosser *et al.* 1997, 1998; Moss 2002) is a semi-structured interview conducted by a trained staff member from a direct support staff or a family member of the person with ID. The PAS-ADD instruments are not intended to provide a psychiatric diagnosis, but are useful to indicate the need to obtain further mental health assessments for adults with an ID.

The Mini PAS-ADD consists of 66 items describing possible psychiatric symptoms that are assessed on a 2- or 4-point scale of severity. The items are based on the International Classification of Diseases (ICD-10) of the World Health Organization (1992). Some items refer to the core symptoms of a particular disorder, while others are common to a range of conditions. The Mini PAS-ADD generates scores on seven symptom scales: Depression, Anxiety, Hypomania/Mania, Obsessive/Compulsive Disorder (OCD), Psychosis, Unspecified Disorder and Autism. Each scale is provided with a threshold or referral score. The item weights and threshold scores have been adjusted so that it is necessary to have at least one core symptom present for the threshold to be attained (Prosser *et al.* 1998).

The psychometric qualities of the Mini PAS-ADD were investigated in two studies. Prosser *et al.* (1998) investigated the reliability and validity in relation to clinical opinion in a sample of 68 people with ID who were in contact with psychiatric services. The internal consistency of the scales was generally considered acceptable with Cronbach's α varying between 0.60 and 0.95. However, the inter-rater reliability between a psychiatrist and a member of the community support team was relatively low. According to Prosser *et al.* (1998) this could indicate the desirability of using two raters and averaging the scores, as is recommended for the Reiss Screen. Finally, Prosser *et al.* (1998) found 91% agreement on case recognition (cases and non-cases) between the cases detected by the psychiatrists' Mini PAS-ADD scores and their own clinical opinion. The case recognition based on the Mini PAS-ADD scores of the member of the community support team was lower, but still had a sufficiently good value of 81%.

Myrbakk & von Tetzchner (2008) compared four of the most commonly used checklists for psychiatric disorders in adults with ID, namely the Reiss Screen, the Mini PAS-ADD, the Diagnostic Assessment for the Severely Handicapped – II and the Assessment of Dual Diagnosis. They used a sample of 181 individuals with ID, 75 of whom had been referred to a specialist service for displaying challenging behaviour. They found that the concordance of the overall scores on the four checklists was high, but the agreement on specific psychiatric disorders was limited. According to Myrbakk & von Tetzchner

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(2008), these results indicate that the checklists are useful as general indicators of psychiatric disorders, but are of less value for specifying the nature of the disorders.

The Mini PAS-ADD has also been used to assess the prevalence of psychiatric illness among adults with ID. Deb *et al*. (2001) administered the Mini PAS-ADD to a random community-based sample of 101 adults with ID and their carers to screen for psychiatric illness. In a second round, 19 carers out of the 20 adults who were identified as psychiatric cases according to the Mini PAS-ADD were interviewed in line with the full PAS-ADD 10 interview. Afterwards, a final psychiatric diagnosis was made according to the ICD-10 criteria. Deb *et al*. (2001) obtained an overall rate of functional psychiatric illness of 14%, which is similar to the point prevalence of 16% found in the overall population. In their study, the overall rate of psychiatric illness, and particularly that of psychosis, was higher according to the Mini PAS-ADD than the ICD-10. This showed that the Mini PAS-ADD is over-inclusive, which is an appropriate characteristic for a screening instrument.

Devine *et al*. (2010) estimated the prevalence of mental health problems in a community sample ($n = 96$) in Northern Ireland. One out of three persons with a mild to moderate ID were identified to have a potential mental health problem. For a random subsample ($n = 27$), the scores on the Mini PAS-ADD were compared with the clinical opinion of a psychiatrist specialised in learning disability. The Mini PAS-ADD was found to have an overall sensitivity of 100%; its specificity was 77%.

Using the Mini PAS-ADD, Turky *et al*. (2011) showed that adults with epilepsy and ID had a more than seven times increased risk for developing psychiatric disorders, particularly depression and unspecified disorders of presumed organic origin, including dementia, over a 1-year period compared to those with ID only.

The purpose of the present study is to provide an independent replication of the psychometric properties of the Mini PAS-ADD. For this purpose, the Mini PAS-ADD was administered in two samples: a large-scale sample of adults with ID (general sample) and a sample of adults with ID who were referred to a mental hospital for psychiatric problems (clinical sample). The reliability of the Mini PAS-ADD was investigated on the basis of the internal consistency (for the total sample) and the interinformant reliability (for the general sample). A factor analysis on the data of the total sample was performed to confirm the construct validity of the Mini PAS-ADD. The convergent validity of the Mini PAS-ADD was investigated by comparing the scores on the Mini PAS-ADD with the scores on the Reiss Screen for Maladaptive Behavior in the clinical sample. Finally, the criterion validity was investigated by comparing the scores between the general and the clinical sample and between people with and without a certain psychiatric diagnosis. The sensitivity and the specificity of the Mini PAS-ADD was calculated both for the case file diagnosis in the general sample and for the final psychiatric diagnosis in the clinical sample. When studying the reliability and validity of the Mini PAS-ADD, particular attention was paid to possible differences in usability of the Mini PAS-ADD for different levels of ID.

Method

Procedure and participants

General sample

In the Dutch-speaking part of Belgium (Flanders), adults with ID are registered in the Flemish Agency for Disabled Persons. This governmental institution coordinates and provides subsidy to organisations that support individuals with disabilities at home, in residential living accommodations and in day care settings. In order to get a large-scale general sample from the Flemish population of adults with ID, all organisations for persons with ID that are subsidised by the Agency were invited to participate in a 2-day training session on the Mini PAS-ADD under the directorship of S. Moss. Afterwards, each trainee was asked to administer the Mini PAS-ADD to at least 10 adults with ID that are supported by their organisation. In order to prevent that only individuals suspected to suffer from psychiatric problems would be selected, the trainees were given instructions for taking a random sample within their organisation. For each person selected, the trainee interviewed two informants independently. The informants could be a member of the direct support

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staff or a family member. The trainee also filled out a background questionnaire for each participant providing information on level of ID, daily activities, medication and earlier assessments of psychiatric disorders made by specialists in psychiatry or clinical psychology.

Clinical sample

For the clinical sample, two Flemish residential mental health services participated with all adults with ID who were referred to them within a time window of 1 year. The Mini PAS-ADD and the Reiss Screen were filled in by a member of the direct support staff after a stay of 30 days in the observation unit. At the moment of discharge from the observation unit or after 6 months, the psychiatrist was asked for a final psychiatric diagnosis.

Ethics

Informed consent was obtained from close relatives or guardians. The study was approved by the ethical committee of the university running the study.

Instruments

Mini PAS-ADD

The Mini PAS-ADD was translated into Dutch by a translation–retranslation procedure by two independently working translators.

Reiss

The Dutch version (van Minnen *et al.* 1995) of the Reiss Screen for Maladaptive Behavior (Reiss 1988) was used. The instrument contains 38 items, each representing a symptom of maladaptive behaviour. Each item is rated on a 3-point scale ('no problem', 'problem' and 'major problem') on the basis of the frequency, intensity and consequences of the behaviour. The Reiss Screen has eight scales, each consisting of five items: Aggressive Behavior, Autism, Psychosis, Paranoia, Depression (Behavioral Signs), Depression (Physical Signs), Dependent Personality Disorder and Avoidant Personality Disorder. In addition, there are six maladaptive behaviour items: drug/alcohol abuse, overactivity, self-injury, sexual problems, stealing and suicidal tendencies. As a measure of the severity of mental health problems, a total score can be computed, which is based on 26 items only.

Statistical analyses

Internal consistency

The reliability of the scales was measured by Cronbach's α coefficient of internal consistency. This statistic is related to the average interitem correlation, and, hence, gives an indication about the extent of measuring a common entity.

Concordance between informants on the Mini PAS-ADD

The concordance between the two informants in the general sample was investigated at the item level and at the level of the scale scores by calculating the absolute difference between the scores of the two informants.

Construct validity

The factorial validity of the Mini PAS-ADD was investigated by performing an exploratory principal component analysis using the Factor procedure of SAS (SAS 2009) on the interitem correlation matrix based on the data of the total sample. For the general sample, only the data from the first informant were used (as is the case for the other analyses discussed below). Given that the sample comprised 377 persons for 66 items, the subject to variable ratio is over 5, which is acceptable according to Hair *et al.* (1998) for principal component analysis. The number of factors was chosen on the basis of the scree test of the eigenvalues. The rotation procedure used was orthogonal varimax rotation (SAS 2009). Items were assigned to the factor(s) on which they had a loading of at least 0.30, which is an acceptable threshold for sample sizes over 350 (Hair *et al.* 1998).

Association of Mini PAS-ADD with Reiss

Correlations were calculated by the Pearson product moment correlation coefficient.

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Comparisons between groups

The criterion validity of the Mini PAS-ADD was investigated by comparing the scores between the general and the clinical sample controlling for differences in level of ID as well. The scores of participants with and without a certain diagnosis were also compared on the corresponding scale of the Mini PAS-ADD, both in the general sample (case file diagnosis) and the clinical sample (psychiatrist's diagnosis). Differences between groups were tested using an analysis of variance (ANOVA) including the main effect(s) and possible interaction effects. The *F*-tests for testing the significance of each effect were calculated under a fixed-effects model (Type I Sum of Squares). The level of significance was set at $P < 0.05$.

Sensitivity and specificity

As another indication of the criterion validity of the Mini PAS-ADD, the sensitivity and the specificity of the Mini PAS-ADD were calculated using the case file diagnosis in the general sample and the final psychiatric diagnosis in the clinical sample. The sensitivity refers to the percentage of correctly identified cases within the group of persons with a certain psychiatric disorder. More specifically, it is determined whether the persons with a specific psychiatric disorder (e.g. depression) scored above the threshold of the corresponding scale of the Mini PAS-ADD (e.g. the Depression scale). Hence, the sensitivity is the complement of the number of false negatives. The specificity refers to the percentage of correctly identified cases within the group of persons without a certain psychiatric disorder (i.e. the percentage of respondents in this group who have scores below the threshold). The specificity is the complement of the percentage of false positives.

In line with the instrument's ultimate function, an overall version of both measures was developed referring to the accuracy of case detection. The overall sensitivity determines whether the persons with a specific psychiatric disorder (e.g. depression) scored above the threshold of at least one of the seven scales of the Mini PAS-ADD. The overall specificity determines whether persons without any psychiatric disorder scored below the threshold of all of the seven scales of the Mini PAS-ADD. The overall specificity is not calculated for each psychiatric disorder separately as this would give a lot of overlap in the subgroups distinguished (e.g. the subgroup of persons without a depression overlaps with the subgroup of persons without an anxiety disorder).

Results

Description of the participants

A total of 377 adults with ID from 37 settings participated in the general sample. The majority of these persons (64%) were living with (foster) parents and were visiting a day care centre. The others were living in residential homes. Ninety adults with ID participated in the clinical sample.

Table 1 describes some background characteristics of the general and the clinical sample. Both samples were quite similar with respect to gender, but differed with respect to age and level of ID. The clinical sample contained more adults who are younger than 25. Adults with mild ID were clearly

Table 1 Description of the general sample ($n = 377$) and the clinical sample ($n = 90$) on a number of background characteristics

Variable	General	Clinical
Gender		
Male	60	56
Age (years)		
<25	9	27
25–44	54	47
45–64	32	25
>65	5	1
Intellectual disability		
Deep	9	3
Severe	24	6
Moderate	44	34
Mild	22	56
Missing	1	1
Case file diagnosis		
Depression	8	11
Anxiety disorder	3	1
(Hypo)mania	3	3
OCD	5	6
Psychosis	9	15
Autism	14	16
Personality Disorder	6	20
Dementia	2	2

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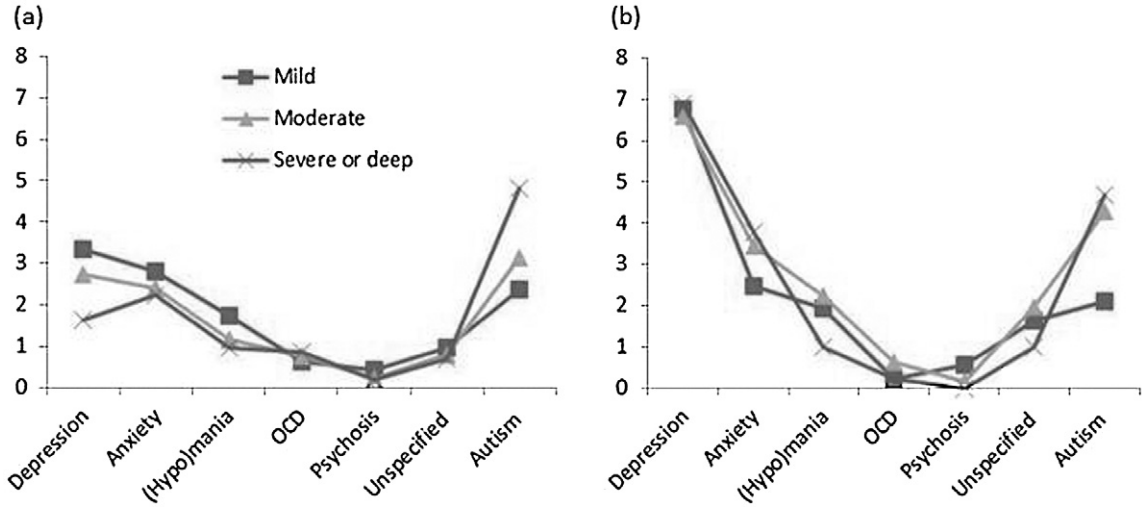

Figure 1 Average scale scores on the Mini PAS-ADD for different levels of intellectual disability for (a) the general sample and (b) the clinical sample. For the general sample the scores of the first informant are given. The results of the second informant are similar.

overrepresented in the clinical sample in comparison to the general sample. In the general sample, 39% of the case files of the participants mentioned a psychiatric diagnosis. This percentage differed across different levels of ID: 51% for mild ID, 36 % for moderate ID, 28% for severe ID and 48% for profound ID. In the clinical sample, 59% of the individuals had a case file diagnosis prior to referral to the psychiatric unit. The occurrence of specific psychiatric disorders in the case files of participants was comparable for the general and the clinical sample, except for psychosis and personality disorders, which occurred more frequently in the clinical sample. The latter was also the case for depression, but to a lesser extent.

Average scale scores on the Mini PAS-ADD

Figure 1 presents the average scale score for different levels of ID for the general sample and the clinical sample. A general finding is that for both samples the average scale scores are quite low in comparison to the maximum obtainable scale scores of each scale (which are mentioned in Table 4). For four of the seven scales (Depression, (Hypo)mania, OCD and Unspecified Disorder) the clinical sample scored significantly higher than the general sample (see Table 2). There were significant differences between different levels of ID for four scales as well. For the scale on depression (hypo)mania, and psychosis the persons with mild ID scored higher than the persons with a moderate ID, who in their turn scored higher than the persons with a severe or profound ID. For autism, the pattern was reversed: The persons with a severe or profound ID scored higher (general sample) or similar (clinical sample) in comparison with the persons with a moderate ID. The latter scored higher than the persons with a mild ID. There were no significant interaction effects between the group and the level of ID.

Reliability of the Mini PAS-ADD

Internal consistency

Table 3 presents the internal consistency of different scales of the Mini PAS-ADD, both for the general sample and the clinical sample and for different levels of ID in the total sample. In the general sample, only the scale for depression and autism had an α higher than 0.80. The other scales had an internal consistency below 0.70. However, the differences in α among the scales were highly correlated with the differences in the number of items in the scales ($r = 0.97$). In the clinical sample, the

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Table 2 *F*-statistics of the ANOVA on the scales of the Mini PAS-ADD

	Main effect of sample		Main effect of level of ID		Interaction effect	
Scale	***F****	***P***	***F**†*	***P***	***F**‡*	***P***
Depression	83.63	<0.0001	4.60	<0.05	0.75	0.47
Anxiety	1.18	0.27	0.10	0.90	1.31	0.27
(Hypo)mania	8.58	<0.01	3.16	<0.05	1.39	0.25
OCD	6.46	<0.05	1.01	0.36	0.64	0.53
Psychosis	0.69	0.41	3.10	<0.05	0.44	0.65
Unspecified	22.12	<0.0001	0.86	0.42	1.24	0.29
Autism	1.11	0.29	17.03	<0.0001	1.14	0.32

* d.f. = (1, 452), † d.f. = (2, 452), ‡ d.f. = (2, 452) with minor variations in the degrees of freedom across the scales due to a few missing values.
ID, intellectual disability.

Table 3 Values of Cronbach's α of different scales of the Mini PAS-ADD for both samples and for different levels of intellectual disability in the total sample

Scale	n_{items}	**General sample*** **(*n* = 377)**	**Clinical sample (*n* = 90)**	**Mild (*n* = 132)**	**Moderate (*n* = 193)**	**Severe/profound (*n* = 133)**
Depression	18	0.81	0.76	0.80	0.84	0.78
Anxiety	8	0.63	0.49	0.66	0.60	0.63
(Hypo)mania	11	0.67	0.61	0.67	0.64	0.75
OCD	4	0.46	0.48	0.51	0.53	0.39
Psychosis	8	0.58	0.68	0.68	0.34	0.64
Unspecified Disorder	8	0.65	0.56	0.50	0.66	0.74
Autism	17	0.85	0.84	0.82	0.83	0.87

* Results based on the scores of the first informant; the results of the second informant were very similar.

values of Cronbach's α were somewhat lower than in the general sample, except for the scale on psychosis, which had a higher α in the clinical sample, and the scale on autism, which had a similar α.

The values of α varied across different levels of ID. However, only for three of the seven scales these differences were substantial. For these scales there was always one subgroup with a clearly lower α than the other two subgroups, but the pattern differed across the scales: the subgroup with severe or profound ID had a lower α for the OCD scale, the subgroup with moderate ID for the Psychosis scale and the subgroup with mild ID for the Unspecified Disorder scale.

Concordance between informants

In the general sample, the Mini PAS-ADD interviewer interviewed two informants separately. For each item, the concordance in response between the two informants was calculated. The concordance of individual items varied between 0.77 (items 31 and 57) and 0.99 (items 44, 45 and 48). Averaged over all items, the proportion of agreement was 0.90.

As can be seen in Table 4, the mean absolute scale score differences between the two informants were very limited in comparison to the maximum obtainable score of the scale. However, in comparison with the mean observed scale scores (see Fig. 1), the mean deviations are rather substantial.

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Table 4 Mean scale score difference between the two informants (and standard deviation) for different scales of the Mini PAS-ADD for the general sample and for different levels of intellectual disability with the results of the ANOVA for checking between-group differences

Scale	Maximum score	General sample ($n = 377$)	Mild ($n = 83$)	Moderate ($n = 163$)	Severe/profound ($n = 124$)	F*	P
Depression	30	1.6 (2.2)	2.1 (2.4)	1.8 (2.4)	1.0 (1.6)	6.54	0.0016
Anxiety	22	1.8 (2.9)	1.8 (2.6)	1.9 (3.0)	1.9 (3.0)	0.04	0.9556
(Hypo)mania	19	0.9 (1.5)	0.8 (1.2)	1.1 (1.8)	0.7 (1.3)	1.70	0.1840
OCD	10	0.6 (1.1)	0.5 (0.7)	0.7 (1.3)	0.6 (0.9)	0.81	0.4468
Psychosis	13	0.3 (0.9)	0.4 (1.1)	0.3 (0.9)	0.2 (0.8)	0.65	0.5204
Unspecified Disorder	11	0.6 (0.8)	0.7 (0.9)	0.6 (0.9)	0.4 (0.7)	1.88	0.1535
Autism	17	1.6 (1.8)	1.3 (1.3)	1.8 (1.9)	1.7 (1.8)	2.23	0.1094

* The degrees of freedom were (2, 365) with minor variations across scales due to a few missing values for some scales.

Table 5 Number of items from each scale having a loading of at least 0.30 on a particular factor in the six-factor solution, having double loadings, or having only low loadings (<0.30)

	Factor loading							
Items from scale	1	2	3	4	5	6	Double	Low
Depression	11			1				
Autism		15				1		1
Anxiety			11		1			1
(Hypo)mania	1			8				
Psychosis					5			3
Unspecified	1					2		
OCD		1	1					2
Multiple scales	3			1			2	

Note also that the standard deviations are large compared to the averages, indicating that there were cases where the difference between the two informants was large.

Table 4 also shows that there were no significant differences in concordance between the two informants for different levels of ID. The only exception is the scale on depression, where the persons with severe or profound ID showed a higher concordance between the two informants.

Validity of the Mini PAS-ADD

Factorial validity

A principal component analysis yielded six factors, which explained 33% of the total variance. A summary of the findings is presented in Table 5.

For all the scales but one, a close resemblance in sets of items was found between the results of the principal component analysis and the original scales in the Mini PAS-ADD. For example, of the 12 items belonging exclusively to the Depression scale, 11 loaded on the Depression factor and one loaded on the (Hypo)mania factor. Only the scale for OCD did not show up as a separate factor. Two of its four items are loading on the factor for Autism and Anxiety, respectively. The other two items only have low factor loadings (<0.30). Three of the six items belonging to multiple scales loaded only on the Depression factor, one loaded on the (Hypo)mania scales and two items had double loadings. One item of the scale for psychosis was not loading on any factors as nobody in the total sample received a positive score on it.

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Table 6 Intercorrelations* among the scales of the Mini PAS-ADD and Reiss in the clinical sample ($n = 90$)

	Mini PAS-ADD							Reiss							
Scale	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Mini PAS-ADD															
1. Depression	**0.76**														
2. Anxiety	0.24	**0.49**													
3. (Hypo)mania	0.15	–.01	**0.61**												
4. OCD	0.01	0.23	0.05	**0.48**											
5. Psychosis	0.24	0.10	0.06	0.04	**0.68**										
6. Unspecified Disorder	0.58	0.21	0.34	0.01	0.11	**0.56**									
7. Autism	0.06	0.30	–.02	0.35	0.02	0.06	**0.84**								
Reiss															
1. Aggressive Behavior	0.08	–0.17	0.05	–0.06	0.08	0.04	0.16	**0.79**							
2. Autism	0.02	0.24	0.02	0.45	0.10	0.10	0.58	–0.11	**0.71**						
3. Psychosis	0.28	0.12	0.19	0.00	0.41	0.28	0.43	0.23	0.30	**0.50**					
4. Paranoia	0.14	–0.17	0.05	–0.13	0.34	–0.10	0.08	0.53	–0.04	0.54	**0.56**				
5. Depression (Behavioral)	0.61	0.17	0.16	0.14	–0.13	0.36	0.08	0.40	–0.05	0.24	0.36	**0.37**			
6. Depression (Physical)	0.58	0.07	0.18	0.07	0.28	0.55	–0.03	0.10	–0.20	0.21	–0.01	0.36	**0.62**		
7. Dependent PD	0.21	–0.13	0.11	–0.07	0.16	–0.03	–0.09	0.31	–0.24	0.22	0.40	0.46	0.33	**0.52**	
8. Avoidant PD	0.26	0.15	–0.05	0.35	0.13	0.35	0.67	0.10	0.58	0.50	0.00	0.19	0.28	–0.06	**0.66**

The value of the Cronbach's α is given on the main diagonal in bold.
* Correlations larger than 0.21 in absolute value differ significantly from zero with $P < 0.05$ using a non-directional test.
PD, personality disorder.

Convergent validity with the Reiss Screen

Table 6 presents the intercorrelations of the scales of the Mini PAS-ADD and the Reiss Screen. The values in bold on the main diagonal give for each scale the internal consistency (Cronbach's α)in the clinical sample. For the Reiss Screen, the internal consistency was above 0.60 for half of the scales. The scale on Depression (Behavioral) showed the lowest internal consistency.

Three clusters of scales could be discerned in the correlations among the scales. First, the Depression scale of the Mini PAS-ADD correlated highly with both depression scales of the Reiss Screen. These three scales of depression also correlated with the scale for unspecified disorders of the Mini PAS-ADD. Second, the scale Psychosis of the Mini PAS-ADD correlated with the scale of Psychosis of the Reiss Screen and to a lesser extent also with the Reiss scale of Paranoia. Finally, the Mini PAS-ADD scale for autism correlated highly with the corresponding scale of the Reiss Screen, but also with the scale for avoidant personality disorder of the Reiss Screen. The Mini PAS-ADD scale for OCD showed a similar pattern of correlations with both scales of the Reiss Screen, but the correlations were lower.

Association with psychiatric diagnoses

In the general sample, about four out of 10 participants had been given a psychiatric diagnosis prior to the present study. As can be seen in Table 7, the participants with a certain case file diagnosis generally scored significantly higher on the corresponding scale in the Mini PAS-ADD. This was the case for depression ($n = 42$), anxiety ($n = 11$), OCD ($n = 23$), psychosis ($n = 47$) and autism ($n = 68$), but not for hypomania (n = 13). In the clinical sample, the score difference between the participants who received versus who did not receive a certain final psychiatric diagnosis was not that clear on the Mini PAS-ADD. Significant differences were only found for depression ($n = 16$) and autism ($n = 16$).

Sensitivity and specificity

Table 8 presents the sensitivity and specificity of the Mini PAS-ADD. For the background diagnoses in

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the general sample, the results show a rather low sensitivity varying between 0% [for (hypo)mania] and 60% (anxiety). The overall sensitivity was substantially higher. It varied between 40% [for (hypo)mania] and 80% (anxiety) with an average of 62%. For the psychiatric diagnosis in the clinical sample, the sensitivity was very low for all scales, except for depression where it was 57%. Also in this group, the overall sensitivity was substantially higher with results varying between 50% [for (hypo)mania and OCD] and 79% (depression) with an average of 60%. Note that both measures of sensitivity are generally lower in the clinical sample than in the general sample.

Table 7 Results of the ANOVA's testing for scale score differences between individuals with and without a certain diagnosis in the general and clinical sample

	General sample		Clinical sample	
Diagnosis	***F****	***P***	***F**†*	***P***
Depression	28.70	<0.0001	2.78	0.10
Anxiety	30.60	<0.0001	–	–
(Hypo)mania	0.00	0.9881	0.06	0.80
OCD	42.94	<0.0001	0.29	0.59
Psychosis	44.39	<0.0001	2.03	0.16
Autism	94.84	<0.0001	22.31	<0.0001

* The degrees of freedom were (1, 375) with minor variations due to a few missing values for some scales.
† The degrees of freedom were (1, 88) with minor variations due to a few missing values for some scales.

The specificity was really high both in the general sample and the clinical sample. The only scales with a specificity lower than 90% were the Depression scale (clinical sample) and the Anxiety scale (both samples). The overall specificity was 75% in the general sample. The overall specificity could not be calculated in the clinical sample as all persons but one received a psychiatric diagnosis.

Discussion

The present study investigated the psychometric quality of the Mini PAS-ADD in a general and a clinical sample with a special focus on investigating the possibility of differential reliability or validity for different levels of ID.

Differences in background characteristics between the two samples

The differences in background characteristics between the general and the clinical sample may refer to a 'referral bias' to psychiatric aid: the persons in the clinical sample were on the average younger and had higher intellectual abilities. The latter finding is not surprising as in Flanders persons with severe and profound ID are not admitted into the specific observation units of the psychiatric hospitals. In the general sample the prevalence of case file diagnosis was rather high (39%), pointing to the high prevalence of psychiatric problems in the population of persons with ID.

Table 8 Percentage of Persons with a certain diagnosis and sensitivity and specificity of the Mini PAS-ADD for the case file psychiatric diagnoses in the general sample ($n = 378$) and for the final psychiatric diagnosis in the clinical sample ($n = 90$)

	General sample				Clinical sample			
		Sensitivity				Sensitivity		
Scale	**Base rate**	**Specific**	**Overall**	**Specificity**	**Base rate**	**Specific**	**Overall**	**Specificity**
Depression	8	33	63	96	16	57	79	71
Anxiety	3	60	80	86	0	–	–	82
(Hypo)mania	3	0	40	97	4	0	50	99
OCD	5	47	65	90	2	0	50	94
Psychosis	9	30	58	94	19	24	65	92
Autism	14	40	66	97	16	7	57	100

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Comparing the presence of a case file diagnosis in both samples suggests that above all persons with a case file diagnosis of psychosis, personality disorder and to a lesser extent depression had a higher referral rate to psychiatric services.

Reliability

The present study found evidence for a moderate internal consistency and inter-rater reliability for the Mini PAS-ADD.

Internal consistency

The values of the Cronbach's α differed considerably across the seven scales of the Mini PAS-ADD. It was shown that these differences correlated with the number of items in each scale. Hence, from a psychometric point of view, the low internal consistency of some of the existing scales could be improved if items of similar quality would be added.

Cronbach's α showed lower values in the general and clinical sample than those found in other studies (Prosser *et al*. 1998; Myrbakk & von Tetzchner 2008). As an explanation for the low values of Cronbach's α, Myrbakk & von Tetzchner (2008) referred to the low variance in the response to some items. In the present study, low variances and low average scale scores were indeed reported, both in the general sample and in the clinical sample. Prosser *et al*. (1998) argued that low internal consistency can be expected given that the Mini PAS-ADD is a screening instrument derived within a psychiatric framework. The items of the scales refer to the presence of core symptoms of a specific syndrome. In contrast to an instrument developed within a psychometric framework, the items do not present the whole range of symptomatic behaviour (differing in intensity or frequency). Moreover, the Mini PAS-ADD is constructed from the assumption that a psychiatric syndrome can pop up in very different ways, so that one can expect that a depressive patient will not answer all items of the Depression scale positively. Both characteristics may explain the low overall scores and the low internal consistency found in the present study.

Interinformant reliability

The average distance between the scale scores of the two observers was small in comparison to the maximum scale score but relatively large in comparison to the low average scale scores found in the present study. These results indicate that the concordance between most informants was high, but that in some cases the two informants had clearly different opinions (which are however still small in comparison to the score range of the scale). The latter findings indicate that different carers may have different views of a certain client. In case this happens in practice, it is certainly informative to try to find out the reason for the divergent opinions.

An alternative explanation for the high interinformant reliability is that the trainee interviewed both informants on each client, and, hence, had the opportunity to influence them in some way towards convergence. A partial counterargument for the latter explanation is the finding that in some cases the two informants had clearly different opinions, given the large difference in scale scores.

Differential reliability across different levels of intellectual disability

There were no indications that the reliability of the Mini PAS-ADD differs across different levels of ID. For some scales the Cronbach's α was lower in a specific subgroup, but these differences did not follow a systematic pattern and could not be explained by reference to the content of the scale. There were no significant differences between the scale scores of the two informants across different levels of ID, except for the scale for depression. On this scale, the concordance between the informants of a person with a severe or profound ID was higher than for the other subgroups. Note that the persons with a severe or profound ID also showed lower scores for depression.

Validity

The present study generally supports the construct and criterion validity of the Mini PAS-ADD.

Construct validity

Hatton & Taylor (2008) showed that the scales of the PAS-ADD Checklist were not consistent with the results of exploratory and confirmatory factor analyses. However, in our exploratory factor analysis of the Mini PAS-ADD six out of the seven

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scales were retrieved. Hence, generally speaking, for the Mini PAS-ADD the factorially derived scales coincided with the scales derived from a psychiatric framework, giving further evidence to the construct validity of the Mini PAS-ADD, except for the OCD scale.

The scale for OCD was not retrieved in the factor analysis. Half of its four items loaded on the anxiety factor, and half on the autism factor. In fact, the OCD scale also showed very low internal consistency (which is not surprising giving the results of the factor analysis and the low number of items). The correlational analyses showed that the scores on the OCD scale are associated with the scores on the Autism scale of both the Mini PAS-ADD and the Reiss Screen and to a lesser extent also with the scores on the Avoidant Personality Disorder scale of the Reiss Screen. The latter finding may be explained by the fact that informants may not always distinguish between the symptoms of OCD and tics or repetitive behaviour that frequently occur in people with autism. Despite its low construct validity, the OCD scale showed satisfactory criterion validity (cf. infra).

The construct validity of the Mini PAS-ADD was further supported by the evidence for the convergent validity of the Mini PAS-ADD with the scales of the Reiss Screen. The scales of the Mini PAS-ADD on depression, psychosis and autism showed high correlations with the corresponding scales of the Reiss Screen. However, there were also a few unexpected correlations. The scores on the Unspecified Disorder scale of the Mini PAS-ADD were associated with the scores on the scales for depression of both the Mini PAS-ADD and the Reiss Screen. This finding may be explained by the fact that the items for unspecified disorder partially refer to dementia, which is often associated with depression (Evenhuis 1992; Bigby 2004). The correlations also showed that there is an association among the scores for autism and avoidant personality disorder (and OCD, as discussed above).

Criterion validity

The criterion validity of the Mini PAS-ADD was investigated by comparing scale scores across different groups. First, the clinical sample scored higher than the general sample on the scales for depression (hypo)mania, OCD and unspecified disorder. Second, the participants with a certain case file diagnosis scored higher on the corresponding scale of the Mini PAS-ADD than the participants without this specific diagnosis. This was the case for depression and autism in both the general and the clinical sample and for anxiety, OCD, and psychosis in the general sample. Both findings support the criterion validity of the Mini PAS-ADD, especially for depression, autism and OCD.

The criterion validity of the Mini PAS-ADD was also investigated by studying the specificity and sensitivity. For both the general sample (case file diagnoses) and the clinical sample (psychiatric diagnoses) each scale of the Mini PAS-ADD showed a very low rate of false positives (high specificity), but a considerable rate of false negatives (low sensitivity). The sensitivity was improved by not looking at the passing rate for the scale corresponding to the diagnosis, but at the passing rate for at least one threshold. This lowered the number of false negatives considerably. However, the overall sensitivity was still lower in comparison with the accuracy of case recognition found in the study by Prosser *et al.* (1998). This might be explained by the fact that their measure summarised the Mini PAS-ADD's accuracy for both 'cases' (cf. our measure of overall sensitivity) and 'no cases' (cf. our measure of overall specificity) together. Also note that the latter study only contained a small sample ($n = 68$) of people who had been in contact with psychiatric services in the previous 6 months, which is more or less similar with the clinical sample in the present study.

A general remark from the present's study is that the criterion validity was higher in the general sample (case file diagnoses) than in the clinical sample (psychiatric diagnoses). One possible explanation is that some of the informants in the general sample knew the background diagnosis and this may have influenced their judgments. Another explanation is that in the clinical sample the persons were already under medication at the time the Mini PAS-ADD was administered and this may have affected their behaviour. Finally, it is also possible that the diagnoses of the psychiatrists in the two mental health hospitals were not well aligned with the fourth edition of the Diagnostic and

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Statistical Manual of Mental Disorders diagnoses leading to lower sensitivity values.

Differential validity across different levels of intellectual disability

The present sample was too small to look at the validity of the Mini PAS-ADD within each level of ID. However, it was shown that for some scales clear score patterns existed across different levels of ID. On the one hand, it was found that lower levels of intellectual functioning were associated with higher scores for autism. This is in line with the results of many studies, showing higher prevalence rates of autistic behaviours in persons with lower levels of ID (e.g. Einfeld & Tonge 1996; La Malfa *et al*. 2004).On the other hand, it was found that lower levels of intellectual functioning were associated with lower scores on the scales for depression (hypo)mania and psychosis. This finding may be explained in two ways. Either these psychiatric syndromes require a certain level of verbal functioning, and, hence, one can expect the found association with ID. Or there are other expressions of these psychiatric syndromes in people with lower levels of ID, and, hence, the checklists should contain other criteria for these groups.

Implications for clinical use of the Mini PAS-ADD

As a general conclusion, the present findings support the further use of the Mini PAS-ADD as a general screening instrument for the early recognition of psychiatric problems for adults with different levels of ID. Given the low reliability and sensitivity of some scales, conclusions based on individual scale scores should be made with great caution. Rather, the Mini PAS-ADD should be used for informed referral to specialised psychiatric aid, as was the original intention of its developers.

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