

# Making assessment locally relevant: measuring functioning for maternal depression in Khayelitsha, Cape Town

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## Abstract

**Purpose** We developed a locally relevant functioning assessment instrument (FAI) for pregnant women and mothers of young babies to complement a widely validated instrument—the World Health Organization’s Disability Assessment Schedule (WHODAS) 12-item version. The FAI is an outcome measure in a randomised controlled trial on the effectiveness of a lay counsellor administered intervention for distressed pregnant women in Khayelitsha, Cape Town.

**Methods** Nine items most commonly reported by 40 pregnant women or mothers with young babies in qualitative interviews were selected for the instrument, with a 10th item ‘Other’. The FAI was validated with 142 pregnant women and mothers in Khayelitsha. Analysis was conducted to assess internal reliability, exploratory factor analysis and convergent validity.

**Results** The FAI had good internal reliability (Cronbach’s  $\alpha = 0.77$ ) and the explanatory factor analysis showed a clear 3-factor solution, relating to domestic, childcare and social activities. The FAI scores showed floor effects, but were positively correlated with the two measures of functioning (WHODAS 2.0 and Washington Group Short Set). The FAI scores also correlated with the measure of depression (Edinburgh Postnatal Depression Scale—

EPDS), reflecting increased functional limitations associated with increased depressive symptoms.

**Conclusion** The results show that the FAI has good internal reliability, and good convergent and construct validity as a measure of functioning for this context. This paper reports on the process of developing an instrument and highlights the importance of using instruments that are locally relevant to ensure accurate measurement of functional status.

**Keywords** Functional assessment · Maternal depression · WHODAS 2.0 · South Africa · Instrument development · Validity

## Background

Functional status measures provide a profile of an individual’s ability to execute everyday tasks and activities, from walking and seeing, through managing household and work responsibilities. These measures describe the consequences of health conditions and impairments in everyday life. There exists numerous functional status measures, reviewed by, for example, Cohen and Marino [1], including the Functional Independence Measure (FIM<sup>TM</sup>), Qualimetrics functional health and wellbeing measures (SF36), Katz Activities of Daily Living Scale, the Barthel Index and more recently the World Health Organization’s Disability Assessment Schedule (WHODAS 2.0) [2]. Advantages of the WHODAS over other instruments are its ease of use and free availability. There is evidence supporting the validity and reliability of the WHODAS 2.0 in many different settings [3], but, as Federici and Meloni [4] explain in their extensive review, there is insufficient evidence on the psychometric properties of translated versions

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of the WHODAS 2.0 typically used across cultural contexts.

Use of a commonly used and validated measure, such as the WHODAS 2.0, allows for comparison across studies and contexts. The more generic nature of these measures is, however, a potential limitation in measuring functioning in a specific population, as the activities or tasks may not reflect those that are relevant to the target population [5]. This is particularly the case when the health condition under study (e.g., depression) does not always result in major loss of functioning in basic domains such as seeing, hearing and mobility. Hence, as Bolton and Tang [5] have argued, it is useful to develop a complementary tool to tap into more complex, locally relevant tasks and activities that are likely to be affected by, for example, depression.

Depression is associated with impairments of mental function, as defined by the International Classification of Functioning, Disability and Health (ICF) [6, 7] and has an impact on a person's ability to carry out everyday tasks and activities [7, 8]. There are many assessment scales developed to identify the symptoms of depression, with some considering aspects of functioning. For example, the Mini International Neuropsychiatric Interview (MINI) [9] depression module asks about difficulties in doing day-to-day work. While there is a growing recognition of the importance of measuring and reporting on functional consequences of depression [7, 8, 10–12], most depression measures do not include information on the functional consequences of depression. These consequences are in part a marker of severity,<sup>1</sup> but also emphasise that depression (identified as a list of symptoms) is not sufficient to describe the experience of living with depression and resulting difficulties with complex activities of daily life [12].

Maternal depression is a commonly occurring health condition, especially in contexts of poverty, limited access to resources and inadequate social networks [13–16]. Functional consequences of maternal depression have been described and noted [17, 18], but there remains a gap in methods for assessing functioning in these women. Some commonly used instruments for maternal depression do include some measures of functional status, but these do not provide a sufficiently detailed profile of functioning for these women. This is particularly absent in African settings, where measures of functioning developed in western contexts may have little cultural validity.

Given this gap, we decided to include a locally relevant functional assessment instrument (FAI) as a complement to the WHODAS 2.0 (12 item version) for use as an outcome measure in a trial on maternal depression in South Africa.

The Africa Focus on Intervention Research for Mental health South African (AFFIRM-SA) trial is an individual-level randomised controlled trial (RCT) to determine the effectiveness and cost effectiveness of a task-sharing counselling intervention for prenatal depression in a low-resource context in Cape Town.

This study presents the development and psychometric testing of the FAI for pregnant women and mothers of young babies who report symptoms of depression in Khayelitsha, Cape Town.

## Methods

The development and testing of the FAI included two phases, described below, as suggested by Bolton and his colleagues ([5, 17]): (a) free-listing qualitative interviews to identify common tasks and activities of women during the perinatal period, in order to construct the Functional Assessment Instrument ((FAI); and (b) a validation study of the constructed instrument. Data collection was carried out in Khayelitsha, Cape Town, at the Community Health Centre where the trial is being conducted.

### Phase I: free-listing interviews and selection of FAI items

A convenience sample of 40 women (20 pregnant women attending the antenatal clinic, and 20 mothers of young babies attending the well-baby clinic) were interviewed for the free-listing exercise. The sample included women waiting in line at the antenatal clinic or well-baby clinic. The inclusion criteria were that the respondents had a young baby (under 12 months) or were pregnant, 18 years or older, living in Khayelitsha and Xhosa speaking, the most common language spoken in Khayelitsha. Respondents were invited to take part and required to sign a consent form if they agreed to participate. A Xhosa speaking fieldworker, experienced in doing interviews in similar projects, was trained to recruit respondents, and ensure that consent was given and conduct the free-listing interviews. All interviews were carried out in Xhosa.

The interview questions (see “[box 1](#)”) were prepared in English and then translated into Xhosa. Basic demographic questions were asked first, and included age, marital or partner status, level of education, employment status, and the number of children and adults living in the same household as the respondent. The latter was important to understand the range of tasks and activities<sup>2</sup> listed by the

<sup>1</sup> If depression symptoms do not affect a person's functioning, they may have a less severe episode compared with a person who does experience functional limitations.

<sup>2</sup> ‘Tasks’ and ‘activities’ are both included as the former refers more to specific work tasks requiring to be done, while ‘activities’ refer to broader events or happenings. These terms are commonly used in combination, for example in the ICF [6].

women. For example, a woman in her first pregnancy living only with her partner may be unlikely to list childcare-specific tasks and activities.

All 40 respondents were asked question 1, and then either questions 2 or 3 depending on their pregnancy status. Women were asked to name tasks and activities related to taking care of themselves, their families and taking care of and participating in the community.

### Box 1 Free-listing questions asked in the FAI development

**Question 1:** What are the different tasks and activities that women like yourself living in Khayelitsha regularly do in their everyday life?

**Question 2:** [Asked only of pregnant women] What are the particular tasks and activities that pregnant women regularly do in their everyday lives?

**Question 3:** [Asked only of mothers of young babies – under 1 year] What are the particular tasks and activities that mothers of young babies regularly do in their everyday lives?

The fieldworker had each question listed on a separate page. As respondents reported tasks and activities, the fieldworker wrote them down in Xhosa. The fieldworker later translated the Xhosa phrases into English, and these were entered onto an MS Excel spreadsheet.

The data from the 40 respondents were reviewed and grouped into categories where different wordings referred to the same activity. For example, the category ‘taking care of babies/children’ includes activities such as ‘bathing and feeding baby/children’, ‘cooking porridge for baby/children’ and ‘preparing baby/children for crèche/school’. In total, 33 categories were created for the tasks and activities pertaining to women in general (question 1), 24 for pregnant women (question 2) and 18 for mothers of young babies.

The categories listed for each of these groups were ordered by frequency of mention. A comparison between the most frequently mentioned tasks and activities for all three groups is shown in Table 1.

The decision to construct an assessment instrument with 10 items was based on the need to cover sufficient domains of functioning while retaining a brief instrument. This two-phase model was successfully used in previous locally relevant instrument development [5, 19]. Only nine activities were selected so that a last item remained open to allow respondents to add a further task or activity not included in the list but of importance to them (noted as ‘Other, specify’).

Selection of the FAI items was based on the following criteria:

- *Most frequently mentioned items* although the frequency of mention differed for the three categories of women, the tasks and activities reported were largely the same. The exceptions were the two items exercising and socialising, which were not at all reported by mothers of young babies as relevant for them. This could, in part, be a reflection of the time it takes to care for young babies who do not leave much time for these activities
- *Supplementary items related to child interaction and social interaction* items 1, 2, 3, 4, 5, 6 and 9 were

selected based on their frequency of mention across the three lists (Q1–3). Very few women mentioned taking care of children’s emotional and cognitive needs, such as loving them, playing with them and helping older children with homework. However, as several studies have shown strong associations between depression and limited emotional engagement with and care of babies [20–22], we decided to include item 7 focusing on emotional care. Similarly, given the commonly reported effect of depression on social interactions noted by Cabello and colleagues [7] and in the AFFIRM-SA trial’s unpublished formative work, we decided to include item 8 on social interactions with family and friends.

Using these 10 selected tasks and activities, we created the FAI with the following introductory phrase:

I am going to ask you about different tasks and activities that you do currently in your everyday life. Thinking about the last 2 weeks, how much difficulty do you have doing the following tasks and activities?

For each task and activity, women were asked to report their amount of difficulty using a 5-point scale ranging from 0 ‘no difficulty’ to 4 ‘can never do task or activity’. “Box 2” sets out the items for the FAI.

**Box 2 Tasks/activities included in the FAI**

1. Cleaning the house
2. Preparing and cooking food for the family
3. Doing laundry
4. Bathing yourself
5. Bathing babies and children
6. Taking care of the needs of babies and children (feeding, preparing for crèche or school, taking to crèche and school, keeping them safe; etc.)
7. Taking care of emotional needs of babies and children (loving them, playing with them, helping with homework, etc.)
8. Spending time and doing activities with family and friends
9. Exercising
10. Other (\_\_\_\_\_)

**Phase 2: validation of the FAI**

To validate the FAI and assess its psychometric properties, 142 women (71 pregnant women and 71 mothers of young babies) were recruited and interviewed at the same study sites using the same inclusion and exclusion criteria as for the listing exercise described in Phase 1. Women who participated in the free-listing exercise were also excluded. The same consenting process as for Phase 1 was used. An additional fieldworker was trained to recruit women and conduct interviews.

The interviews used a questionnaire comprising basic demographic questions, the FAI and four additional questionnaires: (a) two commonly used and internationally validated functional status instruments: the WHODAS 2.0 (12 item version) and Washington Group Short Set (WG Short Set)<sup>3</sup>; (b) a screening instrument for identifying depressive symptoms previously used and validated in South Africa: the Edinburgh Postnatal Depression Scale (EPDS) [23, 24]; and (c) a diagnostic assessment of depression: the Major Depressive Episode module of the Mini International Neuropsychiatric Interview (MINI 6.0) [9]. The questionnaire also included the same basic demographic questions as for the listing exercise.

In South Africa, the WHODAS 2.0 has been used in a large survey of adults [25], as has the WG Short Set [26, 27]. Use of these instruments allowed for an assessment of FAI's convergent validity. The EPDS has been used in South Africa in the context of maternal depression [23, 28], and the MINI among adults who have HIV/AIDS [29, 30]. Use of the depression measures (EPDS and MINI) yielded a further measure of convergent validity to determine if changes in FAI scores correlated with changes in depression symptoms. As the MINI was only administered to

women who scored 13 or more on the EPDS, the resulting data were too few for the MINI to yield meaningful analyses. The MINI scores were therefore not used in the final analysis.

As order of questions on a survey questionnaire may affect responses provided [31], answers on the FAI could be influenced by prior questions on depression (EPDS, MINI). For this reason, we tested two versions of the questionnaire: half of the sample completed the FAI before the EPDS and MINI, and the other half completed the EPDS and MINI before the FAI. The WHODAS questions were asked second last and WG questions last.

The FAI was translated into Xhosa using the original phrases reported in the free listing. Existing Xhosa translations of the other instruments were reviewed and used [23, 25, 28, 29]. The data from the interviews were captured onto an MS Excel spreadsheet and exported to SPSS version 21 [32] for analysis.

*Scoring of the instruments*

- Functional assessment instrument (FAI)

Each item on the FAI can score between 0 (no difficulty) and 4 (can never do task or activity). A 'not-applicable' response was also available, and not included in the scoring. The mean item score was calculated for each respondent by dividing the sum of the item scores by the number of items which have a score between 0 and 4 (i.e., excluding items with 'not applicable' response). The resulting variable is a continuous scale, with average FAI scores ranging from 0 to 4. While other scoring methods were tried (e.g., sum of all responses for each respondent), the mean score provided the most clear-cut results.

- Edinburgh PostNatal depression scale (EPDS)

The EPDS, a depression screening tool, comprises 10 items each scored on a scale from 0 (no problem) to 3 (major problem). The EPDS score was obtained by summing all item scores, creating a continuous variable. A cut-off score of 13 [16, 28, 33] was used to categorise the sample into distressed and non-distressed respondents.

- WHODAS 2.0 (12 items)

The WHODAS 2.0 comprises 12 questions with response options the same as the FAI, ranging from 0 (no difficulty) to 4 (extreme difficulty or unable to carry out the activity). Item-response-theory (IRT)-based scoring was used, as set out in the WHODAS 2.0 Manual [2]. The scoring takes into account the multiple levels of difficulty of each item. When the score of one item only was missing, the mean of the other items was used to assign a score to the missing item. All respondents answered at least 11 out

<sup>3</sup> See Washington Group website [http://www.cdc.gov/nchs/washington\\_group.htm](http://www.cdc.gov/nchs/washington_group.htm) and Miller, Mont, Maitland, Altman, & Madans [35] and UNESCAP [37].

**Table 1** Ranking and frequency of mention of all tasks and activities pertaining to women in general, pregnant women and mothers of young babies living in Khayelitsha ( $N = 40$ ; 20 pregnant women and 20 women with babies)

Category of task/activity	Women in general		Pregnant women		Women with babies	
	Ranking	Freq of mention	Ranking	Freq of mention	Ranking	Freq of mention
Taking care of needs of babies/children (excluding bathing)	1	42 <sup>a</sup>	3	5	1	45*
Cleaning the house	2	35	3	5	3	13
Preparing and cooking food for family	3	23	3	5	4	12
Doing laundry	4	17	5	3	5	9
Bathing self	5	13	4	4	6	7
Bathing babies/children	5	13	6	2	2	14
Go to work	6	7	2	6	9	2
Volunteering	7	6	5	3	–	0
Go to church	7	6	4	4	–	0
Run small business	8	5	–	0	9	2
Take care of family	8	5	6	2	10	1
Exercise	9	4	1	10	–	0
Feed self	9	4	6	2	–	0
Shopping	9	4	7	1	–	2
Wash dishes	9	4	–	0	8	3
Rest or relax	10	3	4	4	–	0
Watch TV or read	10	3	7	1	10	1
Sweep yard/talking to others for advice/look for work	11	2	–	0	–	0
Socialising with friends/family	11	2	6	2	–	0
Go to clubs	–	0	6	2	–	0
Gardening	11	2	7	1	8	3
Drinking and smoking	11	2	7	1	–	0
Help with schoolwork	11	2	–	0	10	1
Go to library/prepare water for husband's bath/studying/visit sick family member/ironing	12	1	–	0	–	0
Go to clinic	12	1	4	4	–	0
Community meetings	12	1	4	4	9	2
Play with, talk to or love baby	12	1	7	1	10	1
Take babies to clinic	12	1	–	0	7	4
Go to school meetings/	12	1	–	0	8	3
Look after pregnancy and health	–	0	5	3	–	0
Sewing	–	0	–	0	10	1

<sup>a</sup> One respondent could give more than one separate mention of tasks/activities grouped into one category, giving a total of mentions greater than the total sample of respondents

of the 12 questions. The resulting scores range between 0 and 100, with higher scores indicating greater functional impairment.

- WG Short Set

While the WG Short Set comprises six questions (Washington Group, n.d.), we omitted the one on self care as this was sufficiently covered in the WHODAS 2.0 and to avoid repetitive questions for the respondent. The five questions have response options ranging from 0 (no difficulty) to 3 (extreme difficulty or unable to carry out the

activity). The scores for the five questions were summed to give a total WG Short Set score (0–15). This is a continuous scale with higher scores indicating more severe difficulty.

#### Statistical analysis

Preliminary analysis included exploring the distribution of scores on the FAI, WHODAS, WG Short Set and EPDS; none of the scores were normally distributed, and thus medians and ranges were reported. Non-parametric

independent tests were carried out to assess differences between pregnant women and mothers of young babies, and to identify any order effects of the questionnaire.

To evaluate reliability and validity of the FAI, we undertook the following analyses:

1. An Exploratory Factor Analysis (EFA), with an oblique (oblimin) rotation to assess the structure of the FAI. Different factors were identified, and these were analysed individually as well as the FAI overall scores. Where appropriate, factor scores (sum of item scores loading on each factor) were also analysed in relation to the other measures.
2. Cronbach's Alpha coefficient to assess the internal reliability.
3. Spearman Rho to analyse the correlations between FAI scores and the EPDS scores (depression measure), as well as between FAI scores and other measures of functioning (WG and WHODAS). This was done to assess both convergent validity of the FAI as a measure of functioning and as an outcome measure for depression.

## Results

### Respondent characteristics, order effect and group effect

Table 2 summarises the main characteristics of the respondents in the validation phase ( $N = 142$ ). The majority of women lived with two or more children in the same household, with equal proportions living with and without their partner. Most respondents had completed high school and a minority reported working (38 %). Altogether, 38 respondents scored above the cut-off on the EPDS, identifying psychological distress (26.8 %), and of these, 22 respondents were diagnosed with depression based on the MINI (57.9 %).

There were no effects of scale order on FAI, EPDS, WG or WHODAS scores. The FAI, EPDS, MINI and WG scores also did not significantly differ by pregnancy status. However, pregnant women scored significantly higher on the WHODAS compared to mothers ( $U = 1813.5$ ,  $p < 0.01$ ). A review of the responses on the WHODAS questions identifies mobility-related questions as the primary contributors to this difference in scores. Mobility effects comprise standing for long periods, walking, washing and dressing, which are typically affected by pregnancy. Given the lack of order effects and limited effect between pregnant women and mothers, further analysis did not differentiate between the two different orders of administration, or pregnant respondents from those with young infants. Additional Chi square analyses revealed no

**Table 2** Respondent characteristics (validation phase) ( $N = 142$ )

	<i>N</i>	%
Age	142	
Median	26	
Range	18–41	
Number of children living at home	134	
Median	2	
Range	0–8	
Marital Status	141	
Has a partner and they live together	57	40.4
Has a partner and they live separately	26	18.4
Doesn't have a partner and lives with her family	51	36.2
Doesn't have a partner and lives alone	7	5.0
Educational level	141	
Grade 5–7	6	4.3
Grade 8–12	130	92.2
Post-matric	5	3.5
Employment	141	
Full-time permanent	27	19.1
Part-time permanent	10	7.1
Casual/piece job	6	4.3
Self-employed	10	7.1
Unemployed and looking for a job	51	36.2
Unemployed and not looking for a job	21	14.9
Other (studying)	16	11.3
EPDS score	142	
Below cut-off (<13)	104	73.2
At or above cut-off ( $\geq 13$ )	38	26.8
MINI score <sup>a</sup>	38	
Below cut-off	16	42.1
At or above cut-off	22	57.9

<sup>a</sup> Only participants scoring above cut-off on the EPDS (score  $\geq 13$ ) completed the MINI

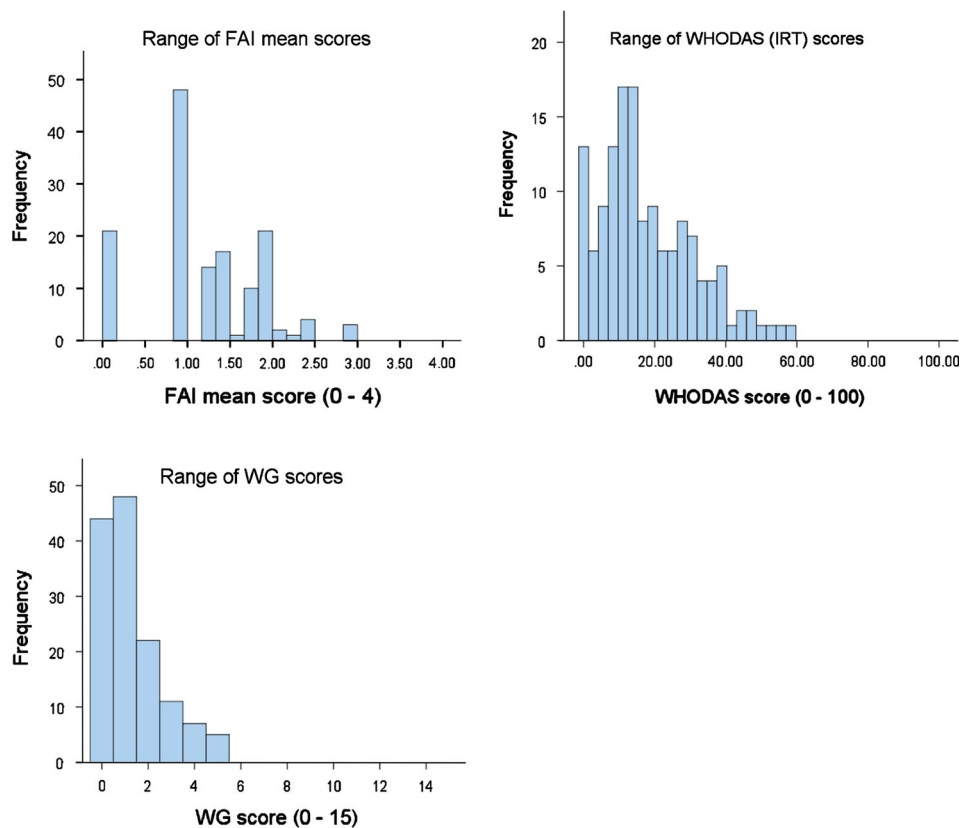
differences in FAI scores across marital status, education level or employment status.

### Distribution of FAI, WG Short Set and WHODAS scores

The distribution characteristics of the FAI, WG Short Set and WHODAS are reported in Fig. 1. Floor effects were identified by examining the percentage of the sample that scored in the lowest quarter of the range of scores, for each scale. Scores in the lowest quarter of the range were noted for 49 % of FAI responses, 91 % of WG responses and 74 % of WHODAS responses. The lower proportion of responses in the lowest quarter for the FAI compared to the WHODAS is raised in the discussion below.

The majority of respondents had scores in the lower ranges (i.e., towards 'no difficulty' end of the continuum)

**Fig. 1** Distribution of scores on the FAI, WHODAS and WG Short Set



with few reporting severe difficulties on the FAI, WHODAS or WG Short Set. This was the case even for depressed women.

#### Exploratory factor analysis

The exploratory factor analysis of the FAI suggested a 3-factor solution as an appropriate structure, accounting for 63.2 % of the total variance (see Table 3). All items loaded highly on at least one factor ( $>0.6$ ), except for item 9 ‘exercising’, with a highest loading of 0.32 on Factor 1. Only one item, ‘Spending time with family and friends’, loaded highly on Factor 3. The three factors fit into descriptive labels of domestic activities for Factor 1, childcare activities for Factor 2, and social activities for Factor 3. Factor scores were then computed by adding the scores of items loading on each factor. Where appropriate, subsequent analyses investigated FAI’s three factors individually, in addition to overall FAI scores.

#### Internal reliability

The Cronbach’s alpha coefficient was of 0.77 for the FAI, suggesting good internal consistency [34].

#### Convergent validity

Table 4 presents the results of the correlations between the FAI, EPDS and other functioning instruments. The FAI was moderately correlated with the WG Short Set ( $\rho = 0.40$ ,  $p < 0.001$ ) and with the WHODAS ( $\rho = 0.50$ ,  $p < 0.001$ ). Increased functional limitations (i.e. higher scores) on the FAI were associated with increased functional limitations (i.e., higher scores) on the WG and the WHODAS. Low to medium significant correlations were also found between the three FAI factors and WHODAS and WG scores (see Table 4).

A weak but significant correlation was found between FAI and EPDS ( $\rho = 0.22$ ,  $p < 0.01$ ). Higher FAI scores (increased functional limitations) were associated with higher EPDS scores (increased depression). However, among the factor scores, only scores on Factor 3 (‘activities with friends and family’) showed weak to moderate positive correlation with EPDS scores ( $\rho = 0.30$ ,  $p < 0.001$ ). The other two factors did not show any correlation with the EPDS scores.

Similarly to the FAI, the WHODAS scores were positively associated with the EPDS scores ( $\rho = 0.24$ ,  $p < 0.01$ ).

**Table 3** Oblimin rotated loadings on the 3 factors solution from the exploratory factor analysis for the FAI

FAI items	Factor 1	Factor 2	Factor 3
Cleaning house	<b>0.82</b>		
Preparing food	<b>0.75</b>		0.25
Doing laundry	<b>0.60</b>		0.21
Bathing yourself	<b>0.74</b>	-0.32	
Bathing babies and children	0.24	<b>-0.78</b>	-0.36
Taking care of physical needs of children		<b>-0.89</b>	
Taking care of emotional needs of children		<b>-0.72</b>	0.38
Spending time with family and friends		-0.27	<b>0.81</b>
Exercising	<b>0.32</b>		

Bold values highlight the factor on which each FAI item loads the most highly

**Table 4** Spearman Rho correlation coefficients between the FAI, EPDS, WG Short Set and WHODAS scores

	EPDS		WG		WHODAS	
	$\rho$	<i>p</i>	$\rho$	<i>p</i>	$\rho$	<i>p</i>
FAI score	0.22	0.009	0.40	<0.001	0.48	<0.001
Factor 1	0.12	0.155	0.35	<0.001	0.55	<0.001
Factor 2	0.05	0.525	0.24	0.005	0.31	<0.001
Factor 3	0.30	<0.001	0.41	<0.001	0.34	<0.001

## Discussion

The aim of this paper was to present the development and psychometric evaluation of a locally developed Functional Assessment Instrument (FAI) for use as an outcome measure in a subsequent trial of a maternal depression intervention, as well as more generally, assessment of functional status of pregnant women and mothers of young babies in Khayelitsha or similar contexts. The results show that it is an internally valid, reliable measure of functioning for this context. Also, the FAI has good face validity as the set of items was directly derived from the target population, and reflected important and common tasks and activities in the population's context.

The structure of FAI shows a clear structure with three factors, easily related to meaningful categories of domestic activities, childcare activities and social activities. Only the 'exercise' item did not load well on any of the factors, and it remains unclear whether this item fits within the instrument. This may be due to the fact that exercise as an activity was more frequently mentioned by pregnant women in the free-listing exercise, and the validation had both pregnant and postnatal respondents.

The FAI is a good measure of functioning when compared to the two other well-established measures of this construct—the WG Short Set and WHODAS 2.0. The WG Short Set has been validated in many different contexts and shown to provide a consistent measure of functioning in basic activities [26, 35]. The WHODAS 2.0 has also

undergone numerous validations [2, 36], and results have indicated that it is able to measure change over time. The statistically significant positive correlation of the FAI with the WG Short Set and WHODAS 2.0 confirms that all three measures reflect the same construct of functional status. The relatively weak correlation between the FAI and the other functioning scales suggests that, while these measure the same underlying construct (functioning), they may measure different components of this, enhancing the usefulness of the FAI as a complementary measure. The WG and WHODAS measures capture largely physical and sensory domains of functioning, while the FAI capture more complex domains of functioning, such as self care and social interactions. The relatively lower, albeit important, floor effect of the FAI scores compared to the WHODAS also supports this conclusion.

The positive correlation between the FAI and EPDS suggests that increasing functional limitations are associated with increased severity of depression. This is an important finding as it means that the functional consequences of depression can be measured in the target population. The impact of depression on functioning is an important factor to consider and can be used as an indicator of the effectiveness of an intervention, such as the one for which the FAI was developed.

We can conclude that the FAI has good internal reliability and adequate construct and convergent validity, and may be a useful instrument to complement or potentially replace (as a short instrument) other measures of functioning for this study population. This study highlights the importance of including an instrument that is based on locally relevant tasks and activities as a more sensitive measure than standard measures. There remain some limitations, nevertheless. Firstly, the lack of data at this point in time on its ability to measure change means that we do not have a full assessment of validity. However, the randomised controlled trial may provide evidence of this. Secondly, the floor effect in the FAI scores may affect the ability of the FAI to measure change effectively, and the internal reliability value must be interpreted with caution.



This floor effect may reflect the physical, socio-economic and cultural living conditions of the target population lives, which make it difficult to ignore the tasks and activities listed in the FAI, resulting in few difficulties reported. A further explanation could be a resilience developed over time through familiarity with chronic stress and adverse life events. Reduced floor effects could also be in part due to the non-depressed status of half of the respondents. Further research on how these factors interact with reports of functioning could elucidate this more clearly.

Given the study's results, three modifications to the FAI are suggested. The first is to increase the number of items relating to social activities. The rationale for this modification is to strengthen Factor 3 ('activities with friends and family'), as it was the only one with a statistically significant relationship with the EPDS scores; in other words, social activities are the most likely activities affected by psychological distress. A second modification is to delete the 'other' category which was not used by respondents. The third modification is based on the correlation coefficient of item 5 (bathing babies/children) with 6 (taking care of babies). A correlation matrix of the FAI items (matrix not included in results) showed that these two items were the only ones with a very high correlation coefficient of 0.724. These two items can thus be combined into one. These modifications will result in two items being deleted and two additional 'activities with friends and family' items being added.

There are a number of further areas of research. Firstly, the study further demonstrates the importance and feasibility of developing and validating functioning assessment instruments for use with pregnant women and mothers of young babies in low-resource settings. There is potential to apply this method to a range of age, gender and disorder-specific populations in a range of LMICs, including child and adolescent behavioural difficulties, and the dementias. Secondly, further research could address the floor effect observed in this instrument, and the extent to which these are environmentally or individually determined. Thirdly, further research is needed to assess the performance of this and other similar instruments as secondary (or primary) outcomes particularly in comparison with validated internationally used instruments. Finally, the potential for translating locally developed and validated functional impairment instruments into measures of economic impact needs to be explored. While this paper reports on the development of the FAI, the reason for the development is to ensure that appropriate instruments are used in research contexts.

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