

# Developmental Behaviour Checklist (DBC)<sup>©</sup>

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### INFORMATION PACKAGE

The DBC is a suite of instruments for the assessment of behavioural and emotional problems of children, adolescents, and adults with developmental and intellectual disabilities.

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#### STRUCTURE AND DERIVATION

The Developmental Behaviour Checklist (DBC) (Einfeld & Tonge, 1992, 2002) is a questionnaire which is completed by parents or other primary carers or teachers, reporting problems over a six month period. The DBC shares the structure of the Child Behaviour Checklist (Achenbach & Edelbrock, 1983), that is, each behavioural description is scored on a 0, 1, 2 rating where 0 = `not true as far as you know', 1 = `somewhat or sometimes true', and 2 = `very true or often true'. The items are completely independently derived from a study of the medical files of 7000 intellectually handicapped children and adolescents seen in a developmental assessment clinic.

Five versions of the Checklist are available: the Parent/Carer version (DBC-P), Teacher version (DBC-T), the Adult version (DBC-A), the Short-form (DBC-P24), and the Monitoring chart (DBC-M). In addition, the DBC-Score software used for scoring is available.

#### **❖ The DBC-P** (see page 4-6)

The DBC-P is a 96 item instrument used for the assessment of behavioural and emotional problems young people aged 4-18 years with developmental and intellectual disabilities. It is completed by a parent or carer. It can be used in clinical practice in assessments and monitoring interventions, and in research studies. See below for psychometric properties.

#### **The DBC-T** (see page 4-6)

The DBC-T is an instrument for the assessment of behavioural and emotional problems young people aged 4-18 years with developmental and intellectual disabilities and is completed by teachers or teacher aides. It can be used in clinical practice in assessments and monitoring interventions, and in research studies.

#### **The DBC-A** (see page 7-9)

The DBC-A is an instrument for the assessment of behavioural and emotional problems of adults with developmental and intellectual disabilities. It can be used in clinical practice in assessments and monitoring interventions, and in research studies. See below for psychometric properties.

#### **The DBC-Score** (see page 4)

The DBC-Score is a software program for scoring the DBC-P, DBC-T, DBC-A and DBC-M, which is available in **Windows versions only**. The software includes the DBC-ASA. Printable reports can be generate that include percentile ranks for subscale and total scores based on community norms. Data can be stored and graphs generated from DBC-M data.

#### **The DBC-ES** (see page 10)

The DBC-ES is a 17 item instrument, derived from the DPC-P, for the screening of autism in children with developmental delay aged 18-48 months. It is completed by a parent or carer. See below for psychometric properties.

#### **The DBC-ASA** (see page 11)

The DBC Autism Screening Algorithm (DBC-ASA) is a 29-item scale, developed using items from the DBC-P. The DBC-ASA is a screening tool designed to identify young people (aged 4-18yrs) with intellectual disability who are at risk of a diagnosis of autism.

#### **The DBC-P24** (see page 12)

The DBC-P24 is a 24-item short form of the DBC-P, completed by parents or carers, and has been developed to provide a brief measure of the Total Behaviour Problem Score for research purposes where large numbers of questionnaires are administered. It does not however, calculate subscale scores of the DBC-P. The items were chosen for low bias and high precision from 100 randomly selected item sets.

#### **The DBC-M** (see page 13-14)

The DBC-M is used for the daily monitoring of specific behaviours. It allows for up to five behaviours to be scored daily and requires far less time than completing the full DBC versions. The DBC-M is often used in clinical interventions with individuals to map progress.

# THE DEVELOPMENTAL BEHAVIOUR CHECKLIST PARENT/CARER (DBC-P) and TEACHER (DBC-T) VERSIONS

The DBC-P and DBC-T (Einfeld & Tonge, 1992, 2002) are 96-item instruments used for the assessment of behavioural and emotional problems young people aged 4-18 years with developmental and intellectual disabilities. The DBC-P is to be completed by a parent or carer, and the DPB-T is to be completed by teachers or teacher's aides. The tools can be used in clinical practice in assessments and monitoring interventions, and in research studies. See below for psychometric properties.

#### **Manual**

The manual is a comprehensive guide to the development, psychometric properties, applications, normative data, and scoring of the DBC-P and DBC-T.

#### **Translations**

The DBC-P has been translated into other languages, namely Arabic, Bulgarian, Cambodian, Chinese, Croatian, Dutch, Finnish, French, German, Greek, Hindi, Italian, Japanese, Malay, Norwegian, Portuguese, Portuguese (Brazil), Spanish, Swedish, Turkish and Vietnamese.

The DBC-T has been translated into Spanish, Dutch, Finnish, and French.

#### **Scoring**

The DBC can be scored at three levels. The first is the Total Behaviour Problem Score, or equivalently the Mean Behaviour Problem Score, which gives an overall measure of behavioural/emotional disturbance. The second level is that of the subscale scores which measure disturbance in five dimensions. The third level is for scoring of individual items. The norms provide community prevalence rates for 96 individual disturbed behaviours and emotions.

Scores may be entered and calculated in two ways:

- 1) Handscoring. The scores are totalled on the DBC and compared with norms provided on the scoresheet. If you wish to score by hand you need to order scoresheets in addition to the DBC.
- 2) Computer data entry and scoring software (**DBC-Score**). This is available for Windows based PCs only. This software runs through Microsoft ExcelTM and requires macros to be enabled for use. Data are entered direct from the DBC. The software provides instant percentile ranking of scores compared against community norms in a professional printable report. A software instruction manual is provided. The software includes an autism screening module (DBC-ASA, Autism Screening Algorithm) to identify clients who may require a full Autism diagnostic assessment. The scoring software is a rapid and cost-effective method of recording the data.

#### **Norms**

Community norms for the DBC-P are derived from an extensive multicentre epidemiological study in New South Wales and Victoria, Australia (Einfeld & Tonge, 1996a; Einfeld & Tonge, 1996b). Norms are available for boys and girls and for the mild, moderate, and severe mental retardation

groups.

#### **Psychometric Properties**

#### Reliability

The instrument has a high inter-rater reliability between parents and between teachers. Test retest reliability and internal consistency are also high (see accompanying tables). The DBC-P has also been demonstrated to be sensitive to change over time.

#### **Validity**

High correlations between a total score on the checklist and two other measures of behaviour disturbance in children with intellectual, the AAMD Adaptive Behaviour Scales (Lambert & Windmiller, 1981) and the Scales of Independent Behaviour (Bruininks, Woodcock, Weatherman, & Hill, 1984) have been found. The total score on the DBC-P also correlates with child psychiatrists' ratings of severity of psychopathology using Rutter, Tigard and Whitmore's (1970) definition. The DBC-P instrument has high criterion group validity in distinguishing psychiatric cases from non cases (t = 7.8, p < .001).

#### **Receiver Operating Characteristics (ROC)**

The DBC-P has known sensitivity and specificity properties. The area under the ROC curve is 0.92. This means that it is both specific and sensitive with regard to expert clinician judgement of the subject as a psychiatric case or non-case.

#### **Factor structure**

Reporting emotional and behavioural problems, 5 subscales were derived from exploratory factor analysis and validated by confirmatory factor analysis. The subscales have documented content, construct, concurrent, and/or discriminant validity.

#### **Further application**

Ten items in the DBC-P describe symptoms of depressive disorder and can be grouped together to form the Depression Scale. This scale can be used to identify possible cases of depression which indicate further assessment is required. Additionally, the DBC-ADHD scale is a grouping of six DBC-P items which may indicate hyperactivity.

Summary of the Psychometric Properties of the DBC-P and DBC-T

| Study   | N            |                      |                |
|---|--------------|----------------------|----------------|
| Inter-rater reliability: Parent-Parent          | 42           | ICC = .80            | 99% CI = .5990 |
| Inter-rater reliability: Teachers-Aides         | 110          | ICC=.60              | 99% CI = .4274 |
| Internal consistency                            | 1093         | $\alpha$ = .941      |                |
| Clinician-parent agreement – item meaning       | 70           | 97%                  |                |
| Criterion group validity                        | 70           | t = 7.783            | p < .001       |
| Concurrent validity (1): DBC / ABS              | 40           | .86                  | p < .001       |
| Concurrent validity (2): DBC / SIB              | 40           | .70                  | p < .001       |
| Concurrent validity (3):Clinician ratings / DBC | 70           | r = .81              | p < .001       |
| Readability of the DBC                          | Flesch Index | x = 76.2             |                |
| Receiver operating characteristics              | Area under t | the ROC curve = 0.92 | 2              |

*Note.* ICC = Intraclass correlation; CI = Confidence intervals; r = Pearson correlation; ABS = AAMD Adaptive Behaviour Scales Maladaptive Behaviour Section (Nihira, Foster, Shellhaas, & Leland, 1975); SIB = Scales of Independent Behaviour Problem Behaviour Section (Bruininks et al., 1984)

#### Characteristics of the Subscales

| Subscale                       | Internal<br>consistency<br>(Cronbach's α) | Internal consistency (Cronbach's α) | Parent agreement<br>DBC-P |       | Teachers / Aides<br>agreement<br>DBC-T |       |
|--------------------------------|---|-------------------------------------|---------------------------|-------|--|-------|
|                                | DBC-P                                     | DBC-T                               | ICC                       | 99%CI | ICC                                    | 99%CI |
| "Disruptive/Antisocial"        | $\alpha = .91$                            | $\alpha = .90$                      | .66                       | .3783 | .63                                    | .4676 |
| "Self-Absorbed"                | $\alpha = .89$                            | $\alpha = .91$                      | .88                       | .7594 | .79                                    | .6787 |
| "Communication<br>Disturbance" | $\alpha = .73$                            | $\alpha = .73$                      | .76                       | .5389 | .61                                    | .4375 |
| "Anxiety"                      | $\alpha = .66$                            | $\alpha = .62$                      | .82                       | .6392 | .46                                    | .2463 |
| "Social Relating"              | $\alpha = .71$                            | $\alpha = .76$                      | .73                       | .4787 | .65                                    | .4877 |

*Note.* ICC = Intraclass correlation, CI = Confidence intervals

**Examples of items** loading on the subscales include the following in abbreviated from:

Disruptive/Antisocial: Manipulates; Abusive; Irritable; Kicks; Hits; Noisy, Lies, Lights fires.

Self-Absorbed: Eats non-food; Preoccupied with trivial items, e.g. string, twigs; Hums, grunts.

Communication Disturbance: Echolalia; Perseveration; Talks to self; Talks in whispers.

Anxiety: 'Separation anxiety'; Distressed if alone; Fears, phobias; Cries easily.

Social Relating: Doesn't show affection; Resists cuddling; Aloof; Doesn't respond to other's feelings.

### THE DEVELOPMENTAL BEHAVIOUR CHECKLIST ADULT VERSION (DBC-A)

The DBC-A is an instrument for the assessment of behavioural and emotional problems of adults (18 years and older) with developmental and intellectual disabilities. It can be used in clinical practice in assessments and monitoring interventions, and in research studies.

The DBC-A is a 107-item checklist which is completed by family members and/or paid carers who know the person with an intellectual disability well, reporting problems over a six month period. Each descriptive item of behavioural and emotional disturbance is scored on a 0, 1, 2 rating where 0 ='not true as far as you know', 1 ='somewhat or sometimes true' and 2 ='very true or often true'.

#### <u>Manual</u>

The DBC-A has a manual outlining the development, scoring, and psychometric properties of the tool.

#### **Translations**

The DBC-A has been translated into Dutch, Finnish, French and German.

#### **Scoring**

The DBC-A can be scored at three levels:

- Level 1. The overall measure, Total Behaviour Problem Score (TBPS), or alternatively the Mean Item Score (MIS). The Proportion of Items Checked (PIC) and the Intensity Index (II) are components of the MIS.
- Level 2. Subscale scores measure disturbance in six dimensions. These may also be scored as total scores or as Mean Item Scores (MIS) with PIC and II.
- Level 3. Scores on individual items.

The checklist can be hand-scored or scored using the DBC- Score, a software package written in ExceITM.

#### **Norms**

The DBC-A has now been updated to contain Australian norms for adults with developmental disabilities aged 18 to 85 years and has new robust factors (e.g., depressive and antisocial factors).

#### **Psychometric Properties**

#### Reliability

The DBC-A has acceptable test retest (2 weeks) and inter-rater reliability as assessed with paid carers and family members, and internal consistency was also high (Mohr, et al., 2005). Inter-rater reliability was assessed between paid carers working in residential group homes (services accommodating 4-6 residents with ID) (Mohr, et al., 2011).

Table 1 - Reliability findings for the DBC-A

|                         |               | N                         | ICC | 95% CI |
|-------------------------|---------------|---------------------------|-----|--------|
| Test retest reliability | Paid carers   | 34                        | .75 | .5586  |
|                         | Family carers | 52                        | .85 | .7591  |
| Inter-rater reliability | Paid carers   | 38                        | .69 | .5486  |
|                         | Family carers | 27                        | .72 | .4886  |
| Internal consistency    | Total scale   | Cronbach's $\alpha = .95$ |     |        |
|                         | 6 Subscales   | range $\alpha$ = .7791    |     |        |

*Note.* ICC = Intraclass Correlation Coefficient; CI = Confidence Interval

#### **Validity**

There is a high correlation between the total score on the DBC-A and two other measures of behavioural and emotional disturbance in adults with ID, the Aberrant Behavior Checklist (ABC) and the Psychiatric Assessment Schedule for Adults with Developmental Disability Checklist (PAS-ADD). The total score on the DBC-A also correlates with clinician ratings of the presence and severity of psychopathology using Rutter's (1970) definition. The scale has high criterion group validity in distinguishing psychiatric cases from non-cases.

#### **Receiver operating characteristics (ROC)**

The DBC-A has known sensitivity and specificity properties. The area under the curve is 0.77. This means that it is both sensitive and specific with regard to expert clinician judgement of the subject as a psychiatric case or non-case.

Table 2 Validity findings for the DBC-A

|                                    | N                                      | Finding                          |                           |  |
|------------------------------------|--|----------------------------------|---------------------------|--|
| Internal consistency:              |  |                                  |                           |  |
| - Total scale internal consistency |  | $\alpha = .95$                   |                           |  |
| - Subscale internal consistency    |  | range $\alpha$ = .608            | 38                        |  |
| Criterion group validity:          | 70                                     | t = 4.48                         | $p < 0.000, \eta^2 = .22$ |  |
|                                    |  | Cut-off score for p<br>= TBPS 60 | osychiatric caseness      |  |
| Concurrent validity:               |  |                                  |                           |  |
| - Aberrant Behavior Checklist      | 77                                     | r = .63                          | p < 0.001                 |  |
| - PAS-ADD Checklist                | 70                                     | r = .61                          | p < 0.01                  |  |
| - Psychopathology ratings          | 70                                     | r = .52                          | p < 0.000                 |  |
| Readability                        | Flesch                                 | Grade level = 6.4                |                           |  |
| Receiver Operating Characteristics | Area under the curve $= .77$           |                                  |                           |  |
|                                    | Specificity = 0.69, Sensitivity = 0.79 |                                  |                           |  |

#### **Factor structure**

Data available in 2009 normative study enabled the factor structure to be re-examined with information from the DBC-A scores of 1538 adults with an intellectual disability. A six factor solution was selected and the six new subscales are described in Table 3.

Table 3 - Factor structure, variance and internal consistency

|   | Internal consist |                        |  |
|---|------------------|------------------------|--|
| Factors and highest loading items <sup>a</sup>            | % of variance    | (Cronbach's $\alpha$ ) |  |
| Disruptive  | 11               | 0.91                   |  |
| (Tantrums, irritable, whines, kicks, impatient)           |                  |                        |  |
| Communication and Anxiety Disturbance                     | 9                | 0.86                   |  |
| (Over-excited, resists change, talks to self, talks fast) |                  |                        |  |
| Self-Absorbed   | 7                | 0.84                   |  |
| (Hums, soils, urinates, flicks, wanders)                  |                  |                        |  |
| Antisocial  | 6                | 0.84                   |  |
| (Abusive, bossy, jealous, stubborn, impulsive)            |                  |                        |  |
| Depressive  | 6                | 0.80                   |  |
| (Unhappy, confused, withdrawn, lost enjoyment)            |                  |                        |  |
| Social Relating   | 4                | 0.77                   |  |
| (Arranges objects, loner, not affectionate, avoids eye    |                  |                        |  |
| contact)  |                  |                        |  |
| Total scale   | 43               | 0.95                   |  |

<sup>&</sup>lt;sup>a</sup> Item descriptions are abbreviations.

#### THE DEVELOPMENTAL BEHAVIOUR CHECKLIST

#### **EARLY SCREEN (DBC-ES)**

The DBC-ES consists of 17 items within the DBC-P which have been shown to be effective as a screen for autism in young children with developmental disability aged 18-48 months (Gray & Tonge, 2005; Gray, Tonge, Sweeney, & Einfeld, 2008). It is completed by a parent or carer.

#### **Manual**

The DBC-P Manual is used for the DBC-ES.

#### **Scoring**

In scoring the DBC-ES, the specified 17 items from the DPC-P are scored. An unweighted cut off score of 11 has been found to be optimum for sensitivity and specificity for screening of autism.

#### **Psychometric Properties**

#### Reliability

The instrument has a good inter-rater reliability between mothers and fathers (interclass correlation of 0.772 significant at p < 0.01) (Gray et al., 2008).

#### **Validity**

There is a positive correlation between the total score of the DBC-ES and the Autism Diagnostic Interview-Revised (Lord et al., 1993; Rutter et al., 2003b) Social (r = 0.47, p < 0.01), Verbal Communication (r = 0.36, p < 0.01), Non-Verbal Communication (r = 0.37, p < 0.01) and the Restricted and Repetitive (r = 0.53, p < 0.01) domains (Gray et al., 2008).

#### **Sensitivity and Specificity**

Using a cut-off score of  $\geq$  11, the sensitivity of the tool is 0.83 (95% CI: 0.76-0.89) and specificity is 0.48 (95% CI: 0.35-0.60). Further information on the cut off scores and the subsequent sensitivity and specificity is available from Gray, Tonge, Sweeney, & Einfeld (2008).

#### **Receiver Operating Characteristics (ROC)**

The DBC-ES has known sensitivity and specificity properties. The area under the ROC curve is 0.87 indicating good overall performance of the unweighted screening algorithm when examining correlation with a clinician completed measure of autism symptomatology.

# THE DEVELOPMENTAL BEHAVIOUR CHECKLIST AUTISM SCREENING ALGORITHM (DBC-ASA)

The DBC Autism Screening Algorithm (DBC-ASA) is a 29-item scale, developed using items from the DBC-P (Brereton, Tonge, Mackinnon, & Einfeld, 2002). This scale has good validity in discriminating young people (aged 4-18yrs) with autism and intellectual disability from others with intellectual disability. Positive scores indicate the risk of a diagnosis of autism and the need for a comprehensive specialist autism assessment.

#### **Manual**

The DBC-P Manual is used for the DBC-ASA.

#### **Scoring**

In scoring the DBC-ASA, the specified 29 items from the DPC-P are scored. An unweighted cut off score of 17 has been found to be optimum for sensitivity and specificity for screening of autism.

#### **Psychometric Properties**

#### **Receiver Operating Characteristics (ROC)**

The DBC-ASA has known sensitivity and specificity properties. The area under the ROC curve is 0.80 (95% confidence interval 0.75-0.84) demonstrating a good differentiation between autism cases and noncases.

Steinhausen and Winkler Metzke (2004) have since cross-validated the DBC-ASA examining classification rates within a Swiss population of children and adolescents with developmental disabilities.

# THE DEVELOPMENTAL BEHAVIOUR CHECKLIST SHORT FORM (DBC- P24)

The DBC-P24 (Taffe et al., 2007) was developed from epidemiological data in the first 3 waves of the Australian Child to Adult Development (ACAD) study, and cross validated in Autism, Fragile X, Prader-Willi and Williams groups in the ACAD longitudinal study and in cross sectional Dutch, English and Finnish samples of young people with intellectual disability.

The DBC-P24 has low bias and high precision in cross validation samples and achieves high sensitivity and specificity to full DBC-P based caseness decisions.

Table 1

Mean Behaviour Problem Score and DBC-P24 estimator in the epidemiological sample of the ACAD study

|         | <u>Wa</u> v | Wave 1 |       | ve 2  | Wave 3 |       |  |
|---------|-------------|--------|-------|-------|--------|-------|--|
|         | N=!         | N=539  |       | 432   | N=403  |       |  |
| Measure | Mean        | SD     | Mean  | SD    | Mean   | SD    |  |
| MBPS    | 0.450       | 0.253  | 0.423 | 0.250 | 0.403  | 0.245 |  |
| DBC-P24 | 0.451       | 0.272  | 0.421 | 0.265 | 0.405  | 0.258 |  |

Table 2.

Cross validation in three non-ACAD samples

|         | orr mr con co mon | TIOTIE CUITIPICE |                     |             |             |  |
|---------|-------------------|------------------|---------------------|-------------|-------------|--|
|         |                   | *Bias statistics | **DBC-P24 casesness |             |             |  |
| Sample  | n                 | mean             | sd                  | sensitivity | specificity |  |
| Dutch   | 1057              | -0.029           | 0.086               | 0.81        | 0.97        |  |
| English | 419               | 0.008            | 0.098               | 0.93        | 0.94        |  |
| Finnish | 85                | 0.001            | 0.089               | 0.82        | 0.91        |  |

<sup>\*</sup> Bias = mean of DBC-P24 - Mean Behaviour Problem Score (MBPS)

<sup>\*\*</sup> caseness decided by mean DBC-P24>.48, cf MBPS>.48 (=TBPS>46)

# THE DEVELOPMENTAL BEHAVIOUR CHECKLIST MONITORING (DBC-M)

The DBC-M is a system for daily monitoring of up to 5 specific target behaviours. It provides quantitative monitoring of target behaviours over time and is a useful tool for monitoring success of interventions, including behavioural interventions and pharmacotherapy. Parents or carers complete the DBC-M only once per day, rating the target behaviours for that day as 0, 1 or 2. This can be completed in 1 minute.

#### **Manual**

A manual and score sheet for using the DBC-M is available.

#### **Scoring**

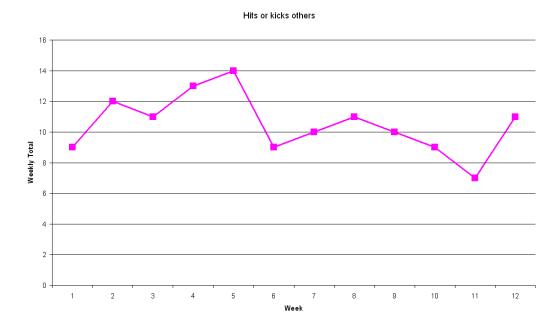
The behaviours of interest are written on the scoring sheet, and the item is scored daily. The DBC-Score, the scoring software for the DBC, provides a quick and easy way to store the data. The software can then produce graphs for each behaviour, and for the weekly totals of all behaviours combined. Up to five target behaviours per subject can be stored, and up to 12 months of DBC-M data can be graphed at a time.

#### Example DBC-M

0 = not a problem today  $1 = \underline{\text{somewhat of a problem today/moderate problem}}$  2 = major problem today

|   |       | Date  |       |       |       |       |       |                 |
|---|-------|-------|-------|-------|-------|-------|-------|-----------------|
| Behaviours                                    | 2 Oct | 3 Oct | 4 Oct | 5 Oct | 6 Oct | 7 Oct | 8 Oct | Weekly<br>Total |
| 1. Hits or Kicks others                       | 2     | 1     | 1     | 2     | 0     | 1     | 2     | 9               |
| 2. Screams                                    | 1     | 0     | 0     | 1     | 0     | 0     | 1     | 3               |
| 3. Licks objects                              | 2     | 1     | 2     | 2     | 2     | 1     | 2     | 12              |
| 4. Steals food                                | 0     | 2     | 1     | 2     | 2     | 1     | 0     | 8               |
| 5. Urinates outside toilet,<br>though trained | 0     | 0     | 2     | 0     | 0     | 2     | 0     | 4               |

### Example output chart



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#### **Enquiries and Orders E-mail: DBC@ monash.edu**

Western Psychological Services (WPS) is now the publisher of the Developmental Behaviour Checklist (DBC) and all related materials. **Until the WPS edition is available we will continue to provide you with prepublication DBC materials.** Once the publisher has finalised and produced the WPS version of the DBC, we will cease authorizing publication uses, and refer all DBC enquiries to their offices. Information and order forms will be available on the WPS website in due course <a href="https://www.wpspublish.com">www.wpspublish.com</a>

#### A complete bibliography of DBC references is available on request

Web Page: http://www.med.monash.edu.au/spppm/research/devpsych/dbc.html

The Developmental Behaviour Checklist is a not-for-profit project. Any proceeds from the sale of DBC materials are used to support research into intellectual disability