The Problem Behaviour Check List: a short scale to assess challenging behaviours

Peter Tyrer, Jessica Nagar, Rosie Evans, Patricia Oliver, Paul Bassett, Natalie Liedtka, and Aris Tarabi

Running title: The Problem Behaviour Check List

Peter Tyrer, FRCpsych, FMedSci, Centre for Mental Health, Imperial College, London, Jessica Nagar, MSc, CRF Health, Hammersmith, London, Rosie Evans, MSc, Harris Manchester College, University of Oxford, Oxford, Patricia Oliver, PhD, Centre for Mental Health, Imperial College, Paul Bassett, MSc, FRSS, Statistical Consultant, Natalie Liedtka, BSc, Western Psychiatric Institute, University of Pittsburg Medical Center, Pittsburg, USA, Aris Tarabi, MSc, Centre for Mental Health, Imperial College, London

Correspondence: Peter Tyrer, Centre for Mental Health, Imperial College, 7th Floor, Commonwealth Building, Hammersmith Hospital, London W12 0NN. Email: p.tyrer@imperial.ac.uk
The Problem Behaviour Check List: a short scale to assess challenging behaviours

Peter Tyrer, Jessica Nagar, Rosie Evans, Patricia Oliver, Paul Bassett, Natalie Liedtka, and Aris Tarabi

Abstract:

Background: Challenging behaviour, especially in intellectual disability, covers a wide range that is in need of further evaluation.

Aim: To develop a short but comprehensive instrument for all aspects of challenging behaviour.

Method: In the first part of a two-stage enquiry, a 28 item scale was constructed to examine the components of challenging behaviour. Following a simple factor analysis this was developed further to create a new short scale, the Problem Behaviour Check List (PBCL). The scale was subsequently used in a randomised controlled trial and tested for inter-rater reliability. Scores were also compared with a standard scale, the Modified Overt Aggression Scale (MOAS).

Results: Seven identified factors - personal violence, violence against property, self-harm, sexually inappropriate, contrary, demanding and disappearing behaviour – were scored on a five point scale. A subsequent factor analysis with the second population showed demanding, violent and contrary behaviour to account for most of the variance. Inter-rater reliability using weighted kappa showed good agreement (0.91; 95% CI 0.83-0.99). Good agreement was also shown with scores on the MOAS scale and a score of 1 on the PBCL showed high sensitivity (97%) and specificity (85%) for a threshold MOAS score of 4.

Conclusions: The PBCL appears to be a suitable and practical scale for assessing all aspects of challenging behaviour.

Declaration of interest: None

Keywords: intellectual disability, challenging behaviour, assessment, rating scale

There is increasing concern about problem behaviours in many forms of psychiatric care, and research has been handicapped by the absence of formal incorporation of these behaviours into diagnostic systems. Although there are several instruments that record these features\(^1\) many have poor internal consistency and reliability or only assess one component of challenging behaviour, and others with much better psychometric properties such as the Aberrant Behavior Checklist\(^2\) are a little long and not ideal for repeat assessments. We describe the development of a 7-item five-point scale, the Problem Behaviour Check List, and tested its reliability and utility in practice.

Problem behaviours, mainly in people with intellectual disability, cover a wide range of disturbance, are a source of considerable distress to hospital staff and carers\(^3\)\(^4\) and often expensive to manage in practice,
especially at more severe levels\textsuperscript{5}. Assessment is handicapped by the absence of a satisfactory diagnostic system for recording challenging behaviour and the overlap with existing diagnoses such as personality and mood disorders\textsuperscript{6}. Thus, although the prevalence of challenging behaviours is higher than any formal diagnostic group\textsuperscript{7}, the fact that it is not recognised diagnostically makes it even more important for it to be reliably and consistently assessed. In the course of research into interventions for these problems we recognised the need to examine the full range of behaviours reported as challenging and felt that these could be condensed into a much shorter instrument.

**METHOD**

**Participants**

During a randomised trial on the management of aggressive challenging behaviour\textsuperscript{8} it was observed that some forms of challenging behaviour apparently independent of aggression were not identified and these were noted. We subsequently attempted to encompass the range of all potential behaviours suitable for inclusion by close examination of two international comprehensive descriptions\textsuperscript{9-10}. Two studies were then involved in testing the scale. In the first, a field study was carried out for the World Health Organisation on personality status and aggressive challenging behaviour in patients with intellectual disability in Jamaica\textsuperscript{11}. The participant population was selected from a specialist intellectual disability high school (School of Hope), a supported care home and an adult day centre for people with intellectual disabilities, all operated by the Jamaican Association on Intellectual Disabilities (JAID) in Kingston, Jamaica.

In the second study, linked to a trial of nidotherapy (Tyrer et al, to be published) in the treatment of challenging behaviour in 200 residents in care homes the same list of behaviours was recorded for all residents at monthly intervals over the course of at least one year. The projects were ethically approved by the Jamaican Association on Intellectual Disabilities and North West Wales Research Ethics Committee (10/WNo01/1).

**Statistical Analysis**

Each of the possible challenging behaviours (see data supplement) were scored using a four point scale. A key aim of the analysis was to understand the associations between the different behaviours and factor analysis was the main tool of investigation, using a standard Varimax rotation. An individual behaviour was considered to be associated with each factor if the factor loadings for that variable were greater than 0.5. Separate factor analyses were performed for each of the two datasets. The scale, called the Problem Behaviour Check List (PBCL), was created after the first analysis.
A secondary objective was to compare the levels of agreement in the total scores of the scale in a subset of the data where the scores were determined by two different observers. During the course of the randomised trial, each of the two independent observers (AT and RE) visited at different times. A large proportion of scores on the PBCL were zero and to avoid spurious agreement the scores were divided into 5 categorical groups (0, 1-3, 4-6, 7-11 and ≥12). Weighted kappa was used to examine level of agreement between observers.

Concurrent validity was also assessed by examining scores on a well-established scale for aggression Modified Overt Aggression Scale (MOAS)\(^{12}\). ROC curves were used to identify the optimum cut-point for the total score in the prediction of aggressive challenging behaviour, defined as a MOAS score of 4. The sensitivity and specificity at this cut-point were calculated.

**Results**

37 potential types of challenging behaviour were identified from the literature search but because several of these appeared to be very similar the number was reduced to 28 in the analysis (Appendix). Factor analysis revealed seven discrete factors, personal and property violence, self-harm, sexually inappropriate behaviour, contrary behaviour, demanding and difficult behaviour, and wandering. Several of these made only a small contribution to the total variance, but at this stage it was felt they were sufficiently distinct to be included. Together these factors accounted for 91% of the variance in the Jamaican study with a Cronbach’s alpha of 0.7. The first factor explained around a third of the variation in the data, with components 2 and 3 explaining more than 10% of variation in the data. Components 4-10 explained much levels of the study variation. Each element was scored in terms of severity, with degree of disturbance and risk being the main driving force leading to higher scores (Table 1). The final Problem Behaviour Check List (Appendix) therefore comprised seven problem behaviour groups with five levels of severity. Aggressive behaviour was by far the most common of these. In the second factor analysis threatening, violent, demanding and contrary (oppositional) behaviour clustered with the aggressive factor, with sexually inappropriate, and self-harming behaviour accounting for much less variance (Table 2).
Comparison with scores on the Modified Overt Aggression Scale (MOAS)

In the randomised trial scores for aggressive challenging behaviour were assessed using the Modified Overt Aggression Scale (MOAS) at the same assessment using the PBCL. The MOAS is a well-established and reliable instrument for assessing aggressive behaviour in this population and a common threshold for aggression is a MOAS score of 4 or larger. The PBCL was strongly associated with this outcome, giving an area under the ROC curve of 0.95 (Figure 1). A PBCL score of 1 was found to give the best prediction of this outcome, which yielded high levels of sensitivity (97%) and specificity (85%).

Reliability

In the randomised trial two raters (AT and RE) assessed data from 38 subjects in 7 care homes over an extended period up to one year, providing a total of 407 monthly repeat assessments. In this study a large proportion of scores on the PBCL (62%) were zero and to avoid spurious agreement the scores were divided into 5 categorical groups (0, 1-3, 4-6, 7-11 and ≥12). Using weighted kappa the level of agreement was 0.91, with the 95% confidence interval ranging from 0.83 to 0.99. This high value indicates very good agreement between the two observers.

Discussion

The results suggest the PBCL is a useful measure of challenging behaviour in people with intellectual disability. It has the advantages of simplicity, shortness, and repeatability, and may be of particular use in longitudinal studies. It also appears to be a comprehensive measure even though its main use in these studies has been to assess aggressive challenging behaviour and so many of the factors have correlates with aggression. The high agreement between the MOAS and PBCL scores also adds construct validity to the scale as the MOAS is an frequently used measure in the assessment of challenging behaviour.

Although the current work has been confined to people with intellectual disability it might well be extended to other populations with challenging behaviour (eg dementias, head injury), where direct questioning of subjects may yield limited information. Its weaknesses are the relative absence of personal input by people with intellectual disability in scoring the scale. Although the high correlation with the MOAS scale in this study suggest that both scales measuring challenging behaviour, the PBCL has a broader range covers behaviour that is not included in the MOAS scale (eg wandering, and sexually inappropriate behaviour that is not aggressive). It needs further testing before the preferred populations for assessment can be chosen.
Acknowledgments: This research was funded by the National Coordinating Centre for Health Technology Assessment (NCCHTA) programme (project number 01/07/02), the Nicola Pigott Memorial Fund, and the National Institute for Health Research: Imperial Biomedical Research Centre. The views expressed in this publication are those of the authors and do not necessarily reflect those of the HTA programme, NIHR, NHS, or the Department of Health. We thank Sandra O’Sullivan for her support and coordination during this study.
References:

1. National Institute for Health and Clinical Excellence. *Challenging behaviour and learning disabilities: prevention and interventions for people with learning disabilities whose behaviour challenges (NG11).* London: Department of Health, 2015.

2. Tyrer F, McGrother C, Thorp CF, Donaldson M, Bhaumik S, Watson JM et al. Physical aggression towards others in adults with learning disabilities: prevalence and associated factors. *J Int Dis Res* 2006; 50: 295-304.

3. Ali A, Blickwedel J, Hassiotis A. Interventions for challenging behaviour in intellectual disability. *Adv Psychiatric Treatment* 2014; 20: 184-92.

4. Aman MG, Singh NN, Stewart AW, Field CJ. The Aberrant Behavior Checklist: a behavior rating scale for the assessment of treatment effects. *Am J Ment Deficiency* 1985; 89: 485–91.

5. Knapp M, Comas-Herrera A, Astin J, Beecham J, Pendas C. Intellectual disability, challenging behaviour and cost in care accommodation: what are the links? *Health and Social Care in the Community*. 2005;13:297-306.

6. Felce D, Kerr M, Hastings RP. A general practice-based study of the relationship between indicators of mental illness and challenging 7andomiz among adults with intellectual disabilities. *J Intelect Disabil Res* 2009; 53: 243-54.

7. Cooper SA, Smiley E, Morrison J, Williamson A, Allan L. Mental ill-health in adults with intellectual disabilities: prevalence and associated factors. *Br J Psychiatry* 2007; 190: 27-35.

8. Tyrer P, Oliver-Africano PC, Ahmed Z, Bouras N, Cooray S, Deb S et al. Risperidone, haloperidol and placebo in the treatment of aggressive challenging 7andomiz in intellectual disability: 7andomized controlled trial’. *Lancet* 2008; 371: 57-63.

9. Royal College of Psychiatrists. *DC-LD: Diagnostic criteria for psychiatric disorders for use with adults with learning disabilities/mental retardation (OP48).* London, Royal College of Psychiatrists, 2001.

10. Ministerio de Salud Pública and Hospital Psiquiátrico de la Habana. *Tercer Glosario Cubano de Psiquitria.* Havana: 2001.

11. Tyrer P, Oliver P, Tarabi SA. Prevalence of aggressive challenging behaviours in intellectual disability and its relationship to personality status: Jamaican study. *J Intellect Disabil Res* 2014; 58: 1083-9.

12. Sorgi P, Ratey J, Knoedler DW, Markert RJ, Reichman M. Rating aggression in the clinical setting – a retrospective adaptation of the overt aggression scale: preliminary results. *J Neuropsychiatry* 1991; 3: 552–6

13. Oliver PC, Crawford MJ, Rao B, Reece B & Tyrer P (2007). Modified Overt Aggression Scale (MOAS) for people with intellectual disability and aggressive challenging behaviour: a reliability study. *Journal of Applied Research in Intellectual Disability, 20*, 368–72.

14. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics* 1977; 33: 159–174.

15. Tsouris JA, Kim SY, Brown WT, Cohen IL. Association of aggressive behaviours with psychiatric disorders, age, sex and degree of intellectual disability: a large-scale survey. *J Intellect Disabil Res* 2011; 55: 636-49.

16. Unwin G, Deb S. Caregiver’s concerns-quality of life scale (CC-QoLS): development and evaluation of psychometric properties. *Res Dev Disabil* 2014; 35: 2329-40.
Appendix:

## Problem Behaviour Check List

Please assess each behaviour over the past week/month

| Patient Code/Identifier: ____________ | Date: ____________ | Assessor: ____________ |
|--------------------------------------|-------------------|-----------------------|

| Behaviour | Description |
|-----------|-------------|
| Behaviour absent | Minor and often frequent |
| Moderate problem behaviour creating | Serious problem behaviour |
| Extreme behaviour leads to threat of loss of life |
| Category | Personal Violence | Property Violence | Self-Harm | Sexually Inappropriate Behaviour | Contrary Behaviour | Demand behaviour |
|----------|-------------------|-------------------|-----------|----------------------------------|-------------------|-----------------|
| Score (0-4): | 0 | 0 | 0 | 0 | 0 | 0 |
| Behaviour | No verbal abuse and no form of violent behaviour | No damage | No self-harm | No inappropriate behaviour | No contrary behaviour | No demanding behaviour |
| but little disruption to others | Verbal abuse | Minor damage with no serious consequences (e.g. tearing paper) | Minor harm with no breaking of skin (e.g. minor head banging) | Obscene gestures or sexually abusive comments | Verbal negativity and initial refusal to obey instructions | Frequent need for attention but little disrupting behaviour |
| Distress and disruption | Threatened violence or minor assault with no lasting injury or breaking of skin (e.g. slapping, pushing) | Moderate damage with need for minor repairs (e.g. breaking front window) | Moderate self-harm with breaking of skin, scarring or small overdose but no long term | Touching, fondling and kissing (Non-violent but bodily contact) | Oppositional behavior, single or recurrent, creating problems for others but not serious disruption | Threatening and disturbing demanding |
| Leading to major concerns and risk to others | Physical assault with likelihood of, or consequent, injury with temporary handicap or psychological damage (e.g. bruising, fear avoidance) | Serious damage requiring major property repairs or creating some risk to others | Serious self-Harm with potential of risk of death (e.g. swallowing bleach, poking own eyes) | More serious sexual assault with bodily contact or indecent exposure | Severe contrary behaviour leading to potential danger to health and welfare (e.g. refusal to take prescribed medicine when essential; deliberate flooding of bathroom) | Violent demands on others that are a serious threat to life or limb (e.g. floor collapse) |
| Permanent injury or damage | Physical assault with permanent or life-threating injury (e.g. poking through eyes, stabbing, loss of consciousness) | Very serious damage threat to life or limb (e.g. floor collapse) | Suicidal act or violent self-harm leading to death permanent handicap | Violent sexual assault including rape and coerced sexual contact | Dangerous oppositional behaviour causing problems for health and welfare and welfare (e.g. refusal to leave building, running into pavement) | Extreme behaviour leading to threat of loss of life permanent injury or damage |

| Demand behaviour | 0 | 1 | 2 | 3 | 4 |
|------------------|---|---|---|---|---|
| Behaviour absent | Minor and often frequent behaviour but little disruption to others | Moderate problem behaviour creating distress and disruption | Serious problem behaviour leading to major concerns and risk to others | Extreme behaviour leading to threat of loss of life permanent injury or damage | |
| Frequent need for attention but little disrupting demanding | Threatening and disturbing demanding | Violent demanding | Violent demands on others that are a serious threat to life or limb (e.g. floor collapse) | |
### Disruptive Behavior

| Score (0-4): | 0 | 1 | 2 | 3 | 4 |
|--------------|---|---|---|---|---|
| **Disappearing Behaviour** | | | | | |
| Score (0-4): | | | | | |
| Total Score | 0 | 1 | 2 | 3 | 4 |
| Score (0-28): | | | | | |

This is a hierarchical scale – the higher levels are assumed to contain all the elements beneath it, so if a person scores 4 on an item the scores below that are disregarded. However, when the frequency or intensity of a behaviour becomes very great (e.g. repeated threatened violence or minor assault) to the point where it leads to major concerns to others the score may be raised by 1 (but no more). In deciding this please note the general requirements for the problem behaviour score at the top of the scale.

When making the assessment use as many informants as possible to cover all settings and observations.

---

**Figure and Tables**

![ROC Curve](image)

**Figure 1.** Relationship between the scores of 2300 assessments for a threshold of 4 on the MOAS scale and 1 on the PBCL.
| Group       | Variable                  | Score 0 N (%) | Score 1 N (%) | Score 2 N (%) | Score 3 N (%) |
|------------|---------------------------|---------------|---------------|---------------|---------------|
| Verbal     | Verbal behaviour          | 19 (50%)      | 8 (21%)       | 6 (16%)       | 5 (13%)       |
| Physical   | Pushing                   | 28 (74%)      | 4 (11%)       | 3 (8%)        | 3 (8%)        |
|            | Slapping                  | 29 (76%)      | 6 (16%)       | 2 (5%)        | 1 (3%)        |
|            | Punching                  | 37 (97%)      | 1 (3%)        | 0 (0%)        | 0 (0%)        |
|            | Kicking                   | 33 (87%)      | 4 (11%)       | 1 (3%)        | 0 (0%)        |
|            | Biting                    | 36 (95%)      | 2 (5%)        | 0 (0%)        | 0 (0%)        |
|            | Pulling hair              | 36 (95%)      | 0 (0%)        | 1 (3%)        | 1 (3%)        |
|            | Physical assault          | 38 (100%)     | 0 (0%)        | 0 (0%)        | 0 (0%)        |
|            | Threatening               | 37 (97%)      | 0 (0%)        | 1 (3%)        | 0 (0%)        |
|             | Destructive              |               |               |               |               |
|             | Tearing paper            | 30 (79%)      | 1 (3%)        | 4 (11%)       | 3 (8%)        |
|             | Smashing furniture        | 38 (100%)     | 0 (0%)        | 0 (0%)        | 0 (0%)        |
|             | Damaging doors            | 37 (97%)      | 1 (3%)        | 0 (0%)        | 0 (0%)        |
|             | Serious damage           | 38 (100%)     | 0 (0%)        | 0 (0%)        | 0 (0%)        |
|             | Self harm                |               |               |               |               |
|             | Bruising                 | 38 (100%)     | 0 (0%)        | 0 (0%)        | 0 (0%)        |
|             | Scarring                 | 37 (97%)      | 1 (3%)        | 0 (0%)        | 0 (0%)        |
|             | Skin Picking             | 31 (82%)      | 3 (8%)        | 3 (8%)        | 1 (3%)        |
|             | Scratchings              | 33 (87%)      | 2 (5%)        | 2 (5%)        | 1 (3%)        |
|             | Hair pulling             | 36 (95%)      | 1 (3%)        | 0 (0%)        | 1 (3%)        |
|             | Face slapping            | 37 (97%)      | 0 (0%)        | 1 (3%)        | 0 (0%)        |
|             | Biting hands             | 21 (64%)      | 0 (0%)        | 3 (9%)        | 9 (27%)       |
|             | Biting lips              | 37 (97%)      | 0 (0%)        | 0 (0%)        | 1 (3%)        |
|             | Poking                   | 38 (100%)     | 0 (0%)        | 0 (0%)        | 0 (0%)        |
|             | Head banging             | 38 (100%)     | 0 (0%)        | 0 (0%)        | 0 (0%)        |
|             | Cutting                  | 38 (100%)     | 0 (0%)        | 0 (0%)        | 0 (0%)        |
|             | Sexual                   |               |               |               |               |
|             | Touching                 | 33 (87%)      | 4 (11%)       | 0 (0%)        | 1 (3%)        |
|             | Unwelcome kissing        | 35 (92%)      | 2 (5%)        | 1 (3%)        | 0 (0%)        |
|             | Obscene communication    | 38 (100%)     | 0 (0%)        | 0 (0%)        | 0 (0%)        |
|             | Any exposure             | 38 (100%)     | 0 (0%)        | 0 (0%)        | 0 (0%)        |
|             | Public masturbation      | 38 (100%)     | 0 (0%)        | 0 (0%)        | 0 (0%)        |
|             | Sexual assault           | 34 (89%)      | 4 (11%)       | 0 (0%)        | 0 (0%)        |
|             | Oppositional             |               |               |               |               |
|             | Defying rules            | 20 (53%)      | 5 (13%)       | 7 (18%)       | 6 (16%)       |
|             | Refusing engage          | 25 (66%)      | 3 (8%)        | 6 (16%)       | 4 (11%)       |
|             | Demanding                |               |               |               |               |
|             | Repeated requests        | 26 (68%)      | 0 (0%)        | 4 (11%)       | 8 (21%)       |
|             | Impatient                | 28 (74%)      | 1 (2%)        | 2 (8%)        | 3 (14%)       |
|             | Wandering                |               |               |               |               |
|             | Wandering                | 32 (84%)      | 2 (5%)        | 4 (11%)       | 0 (0%)        |
|             | Darting                  | 36 (95%)      | 0 (0%)        | 1 (1%)        | 1 (1%)        |
|             | Running away             | 38 (100%)     | 0 (0%)        | 0 (0%)        | 0 (0%)        |
### Table 1. The 37 items of challenging behaviour initially selected

| Group       | Variable            | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 | Factor 6 | Factor 7 | Factor 8 | Factor 9 | Factor 10 |
|-------------|---------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| % variation explained |                     | 32% | 14% | 11% | 8% | 7% | 6% | 5% | <5% | <5% | <5% |
| Verbal      | Verbal behaviour    |          |          |          |          |          |          |          |          |          | 0.95      |
| Physical    | Pushing             | 0.85     |          |          |          |          |          |          |          |          |           |
|             | Slapping            | 0.87     |          |          |          |          |          |          |          |          |           |
|             | Kicking             | 0.81     |          |          |          |          |          |          |          |          |           |
| Destructive | Tearing paper       |          |          |          |          |          |          |          |          |          | 0.88      |
| Self harm   | Skin Picking        | 0.59     |          |          |          |          |          |          |          |          | 0.96      |
|             | Scratching          |          |          |          |          |          |          |          |          |          |           |
|             | Biting hands        |          |          |          |          |          |          |          |          |          | 0.90      |
| Sexual      | Touching            | 0.69     |          |          |          |          |          |          |          |          |           |
|             | Unwelcome kissing   | 0.75     |          |          |          |          |          |          |          |          |           |
|             | Sexual assault      | 0.88     |          |          |          |          |          |          |          |          |           |
| Oppositional| Defying rules       | 0.54     |          |          |          |          |          |          |          |          |           |
|             | Refusing engage     | 0.90     |          |          |          |          |          |          |          |          |           |
| Demanding   | Repeated requests   |          |          |          |          |          |          |          |          |          | 0.93      |
|             | Impatient           |          |          |          |          |          |          |          |          |          | 0.92      |
| Wandering   | Wandering           |          |          |          |          |          |          |          |          |          | 0.87      |

### Table 2. Results of first factor analysis of 38 patients and 28 variables of challenging behaviour. Only factors loadings >0.5 are reported.
| Component                                                                 | Eigenvale | % total variation |
|---------------------------------------------------------------------------|-----------|-------------------|
| 1 Threatening, oppositional, demanding and aggressive behaviour           | 6.4       | 21.4%             |
| 2 Aggressive sexual behaviour                                            | 1.9       | 6.3%              |
| 3 Self-harming behaviour                                                 | 1.6       | 5.4%              |
| 4 Hair pulling, scratching and head-banging                              | 1.5       | 4.9%              |

*Table 3. Results of second factor analysis of 2300 observations in 200 care home residents and 30 variables of challenging behaviour*