

## Factor validation and Rasch analysis of the individual recovery outcomes counter (I.ROC)

Dickens, Geoffrey L.; Rudd, Bridey; Hallett, Nutmeg; Ion, Robin M.; Hardie, Scott M.

DOI:

[10.1080/09638288.2017.1375030](https://doi.org/10.1080/09638288.2017.1375030)

License:

Other (please specify with Rights Statement)

*Document Version*

Peer reviewed version

*Citation for published version (Harvard):*

Dickens, GL, Rudd, B, Hallett, N, Ion, RM & Hardie, SM 2017, 'Factor validation and Rasch analysis of the individual recovery outcomes counter (I.ROC)', *Disability and Rehabilitation*.  
<https://doi.org/10.1080/09638288.2017.1375030>

[Link to publication on Research at Birmingham portal](#)

### **Publisher Rights Statement:**

This is an Accepted Manuscript of an article published by Taylor & Francis in *Disability and Rehabilitation* on 11th Sept 2017, available online: <http://dx.doi.org/10.1080/09638288.2017.1375030>

### **General rights**

Unless a licence is specified above, all rights (including copyright and moral rights) in this document are retained by the authors and/or the copyright holders. The express permission of the copyright holder must be obtained for any use of this material other than for purposes permitted by law.

- Users may freely distribute the URL that is used to identify this publication.
- Users may download and/or print one copy of the publication from the University of Birmingham research portal for the purpose of private study or non-commercial research.
- User may use extracts from the document in line with the concept of 'fair dealing' under the Copyright, Designs and Patents Act 1988 (?)
- Users may not further distribute the material nor use it for the purposes of commercial gain.

Where a licence is displayed above, please note the terms and conditions of the licence govern your use of this document.

When citing, please reference the published version.

### **Take down policy**

While the University of Birmingham exercises care and attention in making items available there are rare occasions when an item has been uploaded in error or has been deemed to be commercially or otherwise sensitive.

If you believe that this is the case for this document, please contact [UBIRA@lists.bham.ac.uk](mailto:UBIRA@lists.bham.ac.uk) providing details and we will remove access to the work immediately and investigate.

## Appendix: Supplementary material

Table S1

*Reliability and validity measures for alternative Individual Recovery Outcomes Counter  
scoring measures*

Re-scoring method	<u>Separation</u>		<u>Reliability</u>		<u>Infit</u>		<u>Outfit MNSQ</u>	
	Person	Item	Person	Item	Person	Item	Person	Item
A. 1-2-3-4-5-6 (original scoring)	2.46	18.13	.86	1.00	1.04	1.01	1.03	1.03
B. 1-2-3-(4-5)-6 = 1-2-3-4-5	2.42	18.37	.85	1.00	1.02	1.00	1.02	1.02
C. 1-(2-3-4)-5-6 = 1-2-3-4	2.11	16.66	.82	1.00	1.00	1.00	0.99	0.99
D. (1-2)-(3-4)-(5-6) = 1-2-3	2.16	16.58	.82	1.00	1.01	1.00	1.02	1.02
E. 1-(2-3)-(4-5)-6 = 1-2-3-4	2.25	16.75	.84	1.00	1.02	1.00	1.00	1.00
F. (1-2)-3-(4-5)-6 = 1-2-3-4	2.22	16.66	.83	1.00	1.01	1.00	1.01	1.01

Infit MNSQ (mean square) = outlier sensitive fit statistic; it is sensitive to unexpected observations by service users on items that are relatively very hard or very easy for them (and vice versa); Outfit MNSQ = Inlier-pattern-sensitive fit statistic, sensitive to unexpected responses by service users on items that are roughly targeted on them (and vice versa).

Table S2: *Fit indices for Confirmatory Factor Analysis using 4-category Individual Recovery Outcomes Counter scoring method 1-(2-3)-(4-5)-6 = 1-2-3-4*

Fit Index	Notional four domain (HOPE) structure <sup>a</sup>	New 2-Factor Structure <sup>b</sup>	Original 2-Factor structure <sup>c</sup>	Single factor structure
Comparative Fit Index	0.949	0.949	0.906	0.902
Normed Fit Index	0.929	0.939	0.899	0.895
Goodness of Fit Index	0.972	0.973	0.929	0.927
Adjusted Goodness of Fit Index	0.957	0.961	0.910	0.909
RMSEA (90% C.I.)	0.0536 (0.0477-0.0597)	0.0507 (0.0451-0.0565)	0.0805 (0.0751-0.0861)	0.0815 (0.0760-0.0870)
X <sup>2</sup>	288.666	290.650	652.284	678.479
DF ( $p < 0.00001$ )	48	53	53	54

<sup>a</sup> Home (Mental health; Life skills; Safety and comfort); Oppportunity (Physical health; Exercise and activity; Purpose and direction); People (Personal network; Social network; Valuing myself); Empowerment (Participation and control; Self-management; Hope for the future).

<sup>b</sup> Factor 1: Self management; Participation and control; Hope for the future; Valuing myself; Mental health; Safety and comfort; Life skills; Personal network. Factor 2: Exercise and activity; Physical health; Purpose and direction; Social network.

<sup>c</sup> Factor 1: Self management; Participation and control; Physical health; Valuing myself; Mental health; Safety and comfort; Life skills; Personal network. Factor 2: Exercise and activity; Hope for the future; Purpose and direction; Social network (i.e. physical health and Hope for the future 'swap places').

RMSEA = Root Mean Square Error of the Approximation. CI = Confidence Interval. DF = Degrees of Freedom.

Table S3

*Fit indices for Confirmatory Factor Analysis using scoring methods indicated*

Fit Index	Notional four domain (HOPE) structure <sup>a</sup> (original 6-category scoring) 1-2-3-4-5-6	Original 2-Factor structure <sup>b</sup> (6-category scoring) 1-2-3-4-5-6	Notional four domain (HOPE) structure <sup>a</sup> with 5-category scoring 1-2-3-(4-5)-6 = 1-2-3-4-5	Original 2-Factor structure <sup>b</sup> with 5-category scoring 1-2-3-(4-5)-6 = 1-2-3-4-5
Comparative Fit Index	0.945	0.942	0.942	0.939
Normed Fit Index	0.927	0.933	0.935	0.930
Goodness of Fit Index	0.966	0.964	0.967	0.965
Adjusted Goodness of Fit Index	0.946	0.948	0.947	0.948
RMSEA (90% CI)	0.0612 (0.0555-0.0672)	0.0599 (0.0544-0.0656)	0.0608 (0.0549-0.0667)	0.0598 (0.0542-0.0645)
$\chi^2$	362.062	384.79	357.01	383.43
DF ( $p < 0.00001$ )	48	53	48	53

<sup>a</sup> Home (Mental health; Life skills; Safety and comfort); Opportunity (Physical health; Exercise and activity; Purpose and direction); People (Personal network; Social network; Valuing myself); Empowerment (Participation and control; Self-management; Hope for the future).

<sup>b</sup> Factor 1: Self management; Participation and control; Hope for the future; Valuing myself; Mental health; Safety and comfort; Life skills; Personal network. Factor 2: Exercise and activity; Physical health; Purpose and direction; Social network.

RMSEA = Root Mean Square Error of the Approximation. CI = Confidence Interval. DF = Degrees of Freedom.

Table S4

*Fit indices for confirmatory factor analysis using scoring methods indicated*

Fit Index	Notional four domain (HOPE) structure <sup>a</sup> (3-category scoring)	Original 2-Factor <sup>b</sup> structure (3-category scoring)
Comparative Fit Index	0.938	0.933
Normed Fit Index	0.929	0.923
Goodness of Fit Index	0.968	0.965
Adjusted Goodness of Fit Index	0.948	0.948
RMSEA (90% C.I)	0.0591 (0.0532-0.0644)	0.0587 (0.0532-0.0644)
X <sup>2</sup>	340.24	371.63
DF ( $p < 0.00001$ )	48	53

<sup>a</sup> Home (Mental health; Life skills; Safety and comfort); Oppportunity (Physical health; Exercise and activity; Purpose and direction); People (Personal network; Social network; Valuing myself; Empowerment (Participation and control; Self-management; Hope for the future).

<sup>b</sup> Factor 1: Self management; Participation and control; Hope for the future; Valuing myself; Mental health; Safety and comfort; Life skills; Personal network. Factor 2: Exercise and activity; Physical health; Purpose and direction; Social network.

RMSEA = Root Mean Square Error of the Approximation. CI = Confidence Interval. DF = Degrees of Freedom.

Table S5: *Fit indices for confirmatory factor analysis using 4-category Individual Recovery Outcomes Counter scoring 1-(2-3)-(4-5)-6. Outlier data removed*

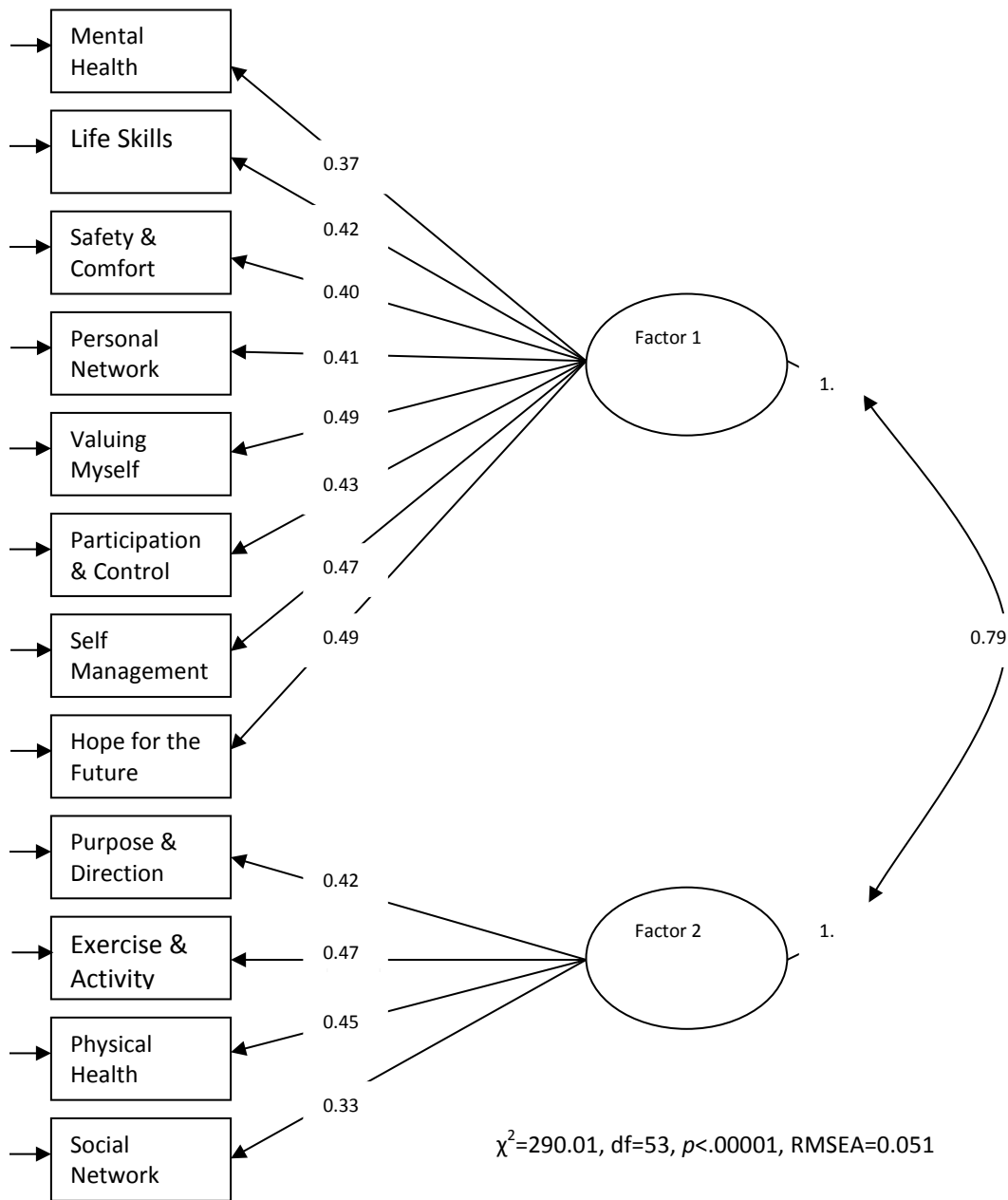
Fit Index	Notional four domain (HOPE) structure <sup>a</sup>	New 2-Factor Structure <sup>b</sup>
Comparative Fit Index	0.951	0.0951
Normed Fit Index	0.0942	0.0941
Goodness of Fit Index	0.0972	0.0972
Adjusted Goodness of Fit Index	0.0956	0.0960
RMSEA (90% C.I)	0.0538 (0.0479-0.0599)	0.0514 (0.0457-0.0572)
X <sup>2</sup>	286.356	292.878
DF ( $p < 0.00001$ )	48	53

<sup>a</sup> Home (Mental health; Life skills; Safety and comfort); Oppportunity (Physical health; Exercise and activity; Purpose and direction); People (Personal network; Social network; Valuing myself; Empowerment (Participation and control; Self-management; Hope for the future).

<sup>b</sup> Factor 1: Self management; Participation and control; Physical health; Valuing myself; Mental health; Safety and comfort; Life skills; Personal network. Factor 2: Exercise and activity; Hope for the future; Purpose and direction; Social network (i.e. physical health and Hope for the future ‘swap places from the 2-Factor structure reported in Hardie et al., 2013).

RMSEA = Root Mean Square Error of the Approximation. CI = Confidence Interval. DF = Degrees of Freedom.

Figure S2: *Confirmatory factor analysis of the 2-factor intrapersonal interpersonal personal recovery model.*



Note the high (0.79) correlation between the factors which suggests that a single superordinate factor is present. As a result we reanalysed the data with covariance between the factors set at zero as is the assumption of the model. In these circumstances model fit was substantially poorer ( $RMSEA=0.0649$ ).  $RMSEA$  = Root Mean Square Error of the Approximation.