



## **Producing the RCI-30: Addendum Chapter to *Evaluating the Implementation of the Recovery Context Inventory in Irish Mental Health Services (O'Brien et al, 2015).***

### **Summary**

Based on the recommendations in “Evaluating the Implementation of the RCI in Irish Mental Health Services” (O'Brien, Webb, Stynes, Cosgrave and Ardis, 2015), the RCI Development Team set out to shorten the RCI in order to increase its utility as a tool which could be routinely used by individuals as a support for their mental health recovery. Psychometric properties of the RCI were established by analysing the data of 338 Irish mental health service users through a combination of Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), resulting in a reduction of the number of RCI items (or statements) from 80 to 30.

A two factor model ('Personal Supports' and 'Service Supports') was supported from the EFA which was completed using half the data selected at random. The remaining data was used to complete a CFA which confirmed the factor structure. The reliability of each of the factors was high and within acceptable levels. The

factors correlated in theoretically predictable ways with a number of existing, well established measures of personal mental health recovery, recovery orientation of services, quality of life and subjective wellbeing, thus indicating evidence of both convergent and divergent validity. Overall, these results suggest that the RCI is a robust tool, suitable for routine use.

### **RCI-30 Development Process and Results**

This addendum chapter details both the stepped process used and the results obtained from the psychometric analyses involved in the production of the 30 item version of the RCI.

Exploratory Factor Analysis (EFA) (Step 1) was achieved through using data gathered from both Stage Four of the RCI Development process which was completed in 2012 (n=211) and Stage Five of the RCI Development Process completed in 2014 (n=127). The EFA was used to examine the factor structure

and commence the process of item reduction. This process resulted in a reduction of the original 80 item RCI to 53 and identified two factors: 'Personal Supports' and 'Service Supports'.

Both sets of data were drawn from the responses of adults using public mental health services in Ireland. The data were randomly split into two groups, the first of which was used to complete the EFA, the second used to complete a Confirmatory Factor Analysis (CFA).

Examination of the resulting factor loadings and importance ratings from both Stages Four and Five of the development process, resulted in further item deletion, resulting in a 34 item version of the RCI (Step 2). Results from a CFA supported the two factor model (Step 3). Four further items were removed through further examination of the factor loadings and importance ratings, resulting in a 30 item version (Step 4). The factor structure was again confirmed through CFA (Step 5). Internal consistency of the two factors was examined using Cronbach's Alpha. Correlational analyses were conducted with five well established instruments to test for convergent and discriminant validity.

## **Step 1: Exploratory Factor Analysis and Item Reduction.**

### **Method**

A process of item deletion for the original 80 RCI items was conducted in 3 phases. First, items were removed if they failed to produce adequate variability and this was based on two exclusion criteria; (1) to avoid floor or ceiling effects all items that had 50% or more of the responses in one category were eliminated and (2) in order to ensure adequate scale score variability all items that were skewed ( $> \pm 1$ ) were eliminated. In addition, items were removed if they had more than 10% missing values.

Second, the remaining items were subjected to an EFA. A series of six EFA models, with one through to six correlated factors, were specified and tested using Mplus 7 (Muthén & Muthén, 2013). An oblique rotation, Geomin, was used for all models with more than one factor. All models were estimated using the weighted least squares mean variance adjusted (WLSMV) estimator with probit link function based on the polychoric correlation matrix of latent continuous response variables. These underlying response variables are related to the observed variables by use of threshold

parameters that reflects the position on the underlying continuous and normally distributed variable that distinguishes the categories of the observed categorical variable.

The WLSMV estimator is the most appropriate statistical treatment of categorical variables in a CFA framework. The WLSMV estimator is commonly used when analyzing categorical/ binary variables. The WLSMV estimator is a full information estimator for dealing with non-normal data, and therefore it reduces the need for remedial strategies such as bootstrapping (Brown, 2006).

As suggested by Hoyle and Panter (1995) and Jackson, Gillaspay, and Purc-Stephenson (2009) model fit was assessed using a range of fit statistics including the chi-square statistic, the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), the comparative fit index (CFI) and the Tucker-Lewis Index (TLI). A non-significant chi-square and CFI and TLI values above .90 indicate reasonable fit. For the RMSEA and SRMR

values less than .05 indicate good fit, however values less than .08 also suggest adequate fit. It should be noted that a large chi-square value relative to the degrees of freedom should not lead to the rejection of a model as the chi-square is positively related to sample size and will tend to over-reject acceptable models using large samples (Tanaka, 1987). Third, items with factor loadings that were not statistically significant or less than .40 on their primary factor were eliminated.

### **Results**

Four items had more than 10% missing data (D7Q1, D7Q2, D7Q3, D8Q5), 15 had excessive skew (D1Q5, D6Q1, D9Q2, D9Q9, D9Q10, D9Q12, D9Q13, D9Q15, D9Q16, D9Q19, D9Q20, D9Q21, D9Q26, D9Q31, D9Q36), and 6 had floor/ceiling effects (D1Q5, D2Q5, D9Q13, D9Q15, D9Q19, D9Q26).

The fit statistics for the EFA of the remaining 53 items are presented in Table 1 below.

Table 1. *Fit Statistics for Exploratory Factor Analysis*

<b>Model</b>	<b><math>\chi^2</math></b>	<b>df</b> <b>(p)</b>	<b>CFI</b>	<b>TFI</b>	<b>RMSEA</b>	<b>SRMR</b>
Model 1	3287.426	1710 (.000)	0.840	0.834	0.074	0.118
Model 2	2348.070	1651 (.000)	0.929	0.924	0.050	0.074
Model 3	2113.634	1593 (.000)	0.947	0.941	0.044	0.065
Model 4	1984.159	1536 (.000)	0.955	0.948	0.042	0.059
Model 5	1870.877	1480 (.000)	0.960	0.953	0.040	0.054
Model 6	1767.639	1425 (.000)	0.965	0.957	0.038	0.050

Note.  $\chi^2$  = robust chi-square, df = degrees of freedom; CFI= comparative fit indices; TLI= Tucker Lewis indices; RMSEA= Root mean square of approximation.

The model with 2 factors was the simplest model that met all criteria for fit statistics.

The rotated factor loadings are reported in Table 2.

Table 2. *Rotated Factor Loadings for the Exploratory Factor Analysis of the Recovery Context Inventory*

<b>Item</b>	<b>loading</b>	<b>factor</b>	<b>Item Wording</b>
D1_Q3	0.468	1	I feel accepted by people even though I have mental health difficulties.
D1_Q4	0.415	1	I have money for basic needs.
D1_Q6	0.563	1	I am in control of the decisions that affect my mental health recovery.
D1_Q7	0.575	1	People respect the decisions I make for my future.
D1_Q8	0.525	1	I have enough supportive relationships in my life.
D2_Q1	0.535	1	I am learning new ways to develop my life.
D2_Q2	0.575	1	I stand up for myself.
D2_Q6	0.667	1	I seek out things to do in my life.
D2_Q7	0.768	1	I take on new challenges in my life.

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D2_Q8	0.596	1	I develop my work goals.
D2_Q9	0.549	1	I do things that are creative.
D3_Q1	0.670	1	I am able to do everyday tasks.
D3_Q2	0.647	1	I am able to take part in social activities.
D3_Q3	0.742	1	I am able to set goals for my life.
D3_Q4	0.685	1	I have the skills I need to find a job.
D3_Q5	0.810	1	I have the skills I need to keep a job.
D3_Q6	0.716	1	I am able to work.
D3_Q7	0.510	1	I take part in my local community.
D3_Q8	0.584	1	I exercise.
D4_Q1	0.602	1	The people who live in my community are friendly.
D4_Q2	0.554	1	My local community is safe.
D5_Q2	0.449	1	I am happy with my sex life.
D5_Q3	0.482	1	I am able to communicate well in my relationships.
D6_Q2	0.798	2	Staff offer me support to keep track of my goals.
D6_Q3	0.858	2	Staff help me to think about the skills I need to develop.
D8_Q1	0.501	2	Staff give me the opportunity to discuss my sex life.
D8_Q2	0.565	2	Staff give me the opportunity to talk about my spiritual needs
D8_Q3	0.711	2	Staff offer me support with friendships
D8_Q4	0.314	2	I use peer support services.
D9_Q1	0.613	2	I have choices within the service.
D9_Q3	0.702	2	The service provides activities that are meaningful to me.
D9_Q4	0.764	2	I enjoy the service.
D9_Q5	0.776	2	The staff takes all parts of my life into account.
D9_Q6	0.822	2	The staff focuses on my strengths.
D9_Q7	0.720	2	People who are important to me are included by the services.
D9_Q8	0.745	2	The service respects that everyone sees things differently.
D9_Q11	0.567	2	I am involved in the development of my treatment plans in my mental health service.
D9_Q14	0.507	2	I am satisfied with the medication I am using for my mental health recovery.
D9_Q17	0.813	2	I can get help with my relationships from the service.
D9_Q18	0.870	2	Staff offer me help to make important decisions.
D9_Q22	0.675	2	The service encourages me to speak up for myself.
D9_Q23	0.734	2	People who are important to me are involved in my plans for mental health recovery.
D9_Q24	0.764	2	The service sorts out problems between the people who use the services and staff.
D9_Q25	0.744	2	The service makes it easy to discuss very upsetting things.
D9_Q27	0.717	2	The staff helps me to think positively about my future.
D9_Q28	0.790	2	The staff responds to the views of the people who use the service.
D9_Q29	0.730	2	The service gives me information on mental health recovery.

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D9_Q30	0.645	2	I feel that I am really understood by the staff
D9_Q32	0.663	2	Staff offer me support with my education
D9_Q33	0.544	2	I have a range of services available to me that help my mental health recovery.
D9_Q34	0.629	2	The staff encourages people who use the service to support each other.
D9_Q35	0.772	2	The service helps me to develop plans to manage my mental health.
D9_Q37	0.767	2	The service gives me time to talk about the things that get in the way of my mental health recovery.

Factor 1 was labelled ‘Personal Supports’ and factor 2 was labelled ‘Service Supports’ and the correlation between the factors was  $r=0.406$  ( $p<.05$ ). No items were removed in phase 3 as all items were statistically significant and all factor loadings were greater than .40 on their primary factor.

### Step 2: Item Reduction to 34 items

Additional item reduction was achieved using an assessment of both the importance ratings from responses provided by participants in Stages Four and Five, factor loadings from the EFA detailed above, and an attempt to ensure maximum coverage of the domains previously identified from Stage Four. The assessment, completed by the

development team, resulted in 34 items.

### Step 3: Confirmatory Factor Analysis based on 34 items.

A CFA was conducted on the 34 item RCI and model fit was acceptable ( $\chi^2(526)=841.344$ ,  $P <.05$ ; RMSEA=0.060; CFI= 0.946; TLI=0.942).

Factor loadings are presented in Table 3.

Table 3. *Reduced Rotated Factor Loadings for the Confirmatory Factor Analysis of the 34 item Recovery Context Inventory*

<b>Item</b>	<b>Loading</b>	<b>Factor</b>	<b>Item Wording</b>
D1_Q3	0.616	1	I feel accepted by people even though I have mental health difficulties.
D1_Q4	0.474	1	I have money for basic needs.
D1_Q6	0.709	1	I am in control of the decisions that affect my mental health recovery.
D1_Q7	0.728	1	People respect the decisions I make for my future.
D1_Q8	0.707	1	I have enough supportive relationships in my life.
D2_Q1	0.757	1	I am learning new ways to develop my life.
D2_Q2	0.562	1	I stand up for myself.
D2_Q6	0.599	1	I seek out things to do in my life.
D3_Q1	0.546	1	I am able to do everyday tasks.
D3_Q2	0.695	1	I am able to take part in social activities.
D3_Q3	0.757	1	I am able to set goals for my life.
D3_Q4	0.563	1	I have the skills I need to find a job.
D3_Q5	0.659	1	I have the skills I need to keep a job.
D3_Q8	0.436	1	I exercise.
D4_Q2	0.554	1	My local community is safe.
D5_Q3	0.521	1	I am able to communicate well in my relationships.
D6_Q3	0.775	2	Staff help me to think about the skills I need to develop.
D9_Q1	0.734	2	I have choices within the service.
D9_Q5	0.738	2	The staff takes all parts of my life into account.
D9_Q6	0.803	2	The staff focuses on my strengths.
D9_Q7	0.730	2	People who are important to me are included by the services.
D9_Q8	0.718	2	The service respects that everyone sees things differently.
D9_Q11	0.624	2	I am involved in the development of my treatment plans in my mental health service.
D9_Q14	0.636	2	I am satisfied with the medication I am using for my mental health recovery.
D9_Q17	0.726	2	I can get help with my relationships from the service.
D9_Q22	0.732	2	The service encourages me to speak up for myself.
D9_Q25	0.685	2	The service makes it easy to discuss very upsetting things.
D9_Q27	0.837	2	The staff helps me to think positively about my future.
D9_Q28	0.704	2	The staff responds to the views of the people who use the service.
D9_Q29	0.803	2	The service gives me information on mental health recovery.
D9_Q30	0.760	2	I feel that I am really understood by the staff
D9_Q33	0.695	2	I have a range of services available to me that help my mental health recovery.
D9_Q35	0.852	2	The service helps me to develop plans to manage my mental health.
D9_Q37	0.769	2	The service gives me time to talk about the things that get in the way of my mental health recovery.

Note: All factor loadings statistically significant ( $p < .05$ ).

The factors correlated at  $r=0.575$  ( $p<.05$ ). The reliability of the Personal Supports scale ( $\alpha=.882$ ) and Service Supports ( $\alpha=.939$ ) scales were high suggesting an acceptable level of internal consistency.

#### Step 4: Item Reduction to 30 Items

Following further consideration, it was deemed appropriate that both domains have the same number of items as this makes the presentation of the profile easier. Therefore 4 items were removed (1 from Personal Supports and 3 from Service Supports) to achieve a balanced scale. This, as before, was achieved through an examination of factor loadings

and importance ratings from Stage Four and Stage Five data.

#### Step 5: Confirmatory Factor Analysis based on 30 Items

A CFA was conducted to test the structure of this abbreviated scale, testing a correlated two-factor model. The method of estimation and interpretation of the fit statistics was the same as for the Step 3 CFA. The model fit was acceptable ( $\chi^2(404)= 658.623$ ,  $P <.05$ ;  $RMSEA=0.061$ ;  $CFI= 0.951$ ;  $TLI=0.947$ ). Factor loadings are presented in Table 4. The factors correlated at  $r=0.552$  ( $p<.05$ ).

Table 4. *Reduced Factor Loadings for the Confirmatory Factor Analysis of the of the 30-item Recovery Context Inventory*

Item	Loading	Factor	Item Wording
<b>Personal Supports</b>			
D3_Q5_F	0.672		I have the skills I need to keep a job.
D3_Q3_F	0.752		I am able to set goals for my life.
D3_Q4_F	0.576		I have the skills I need to find a job.
D3_Q1_F	0.558		I am able to do everyday tasks.
D2_Q6_F	0.587		I look for things to do in my life.
D3_Q2_F	0.703		I am able to take part in social activities.
D3_Q8_F	0.457		I exercise.
D2_Q2_F	0.573		I stand up for myself.
D1_Q7_F	0.731		People respect the decisions I make for my future.
D1_Q6_F	0.713		I am in control of the decisions that affect my mental health.
D4_Q2_F	0.567		My local community is safe.
D1_Q8_F	0.724		I have enough supportive relationships in my life.
D5_Q3_F	0.532		I am able to communicate well in my relationships.

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D1_Q3_F	0.632	I feel accepted by people.
D1_Q4_F	0.492	I have money for basic needs.
<b>Service Supports</b>		
D6_Q3_F	0.777	Staff help me to think about the skills I need to develop.
D9_Q6_F	0.811	Staff focus on my strengths.
D9_Q17_F	0.713	Staff offer me support with my relationships.
D9_Q28_F	0.699	Staff respond to the views of the people who use the service.
D9_Q5_F	0.749	Staff take all parts of my life into account.
D9_Q35_F	0.848	Staff help me to develop plans to manage my mental health.
D9_Q37_F	0.768	Staff give me time to talk about the things that get in the way of my mental health recovery.
D9_Q8_F	0.715	Staff respect that everyone sees things differently.
D9_Q29_F	0.804	Staff give me information on mental health recovery.
D9_Q7_F	0.728	People who are important to me are included by the service.
D9_Q27_F	0.837	Staff help me to think positively about my future.
D9_Q22_F	0.737	Staff encourage me to speak up for myself.
D9_Q30_F	0.764	I feel that I am really understood by the staff.
D9_Q1_F	0.723	I have choices within the service.
D9_Q33_F	0.691	I have a range of services available to me that help my mental health recovery.

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## Scale Reliability and Validity

The reliability of the Personal Supports scale ( $\alpha=.866$ ) and Service Supports scale ( $\alpha=.941$ ) were high and are within acceptable levels. This suggests that for each factor, the items contained therein measure a similar construct. While the reliability value for the Supports Scale suggests some redundancy in the scale, a decision was taken by the development team not to reduce the number of items further. This decision was taken as one of the main purposes of the RCI is as a

support to mental health recovery planning and it was felt that further reducing the items in the scale would diminish its utility for this purpose.

Correlational analyses were conducted using the data gathered from the additional measures used in Stage 5. The correlations with the summed scores on the criterion variables are presented in Table 5. The results from these analyses suggest that the RCI relates to these additional measures in theoretically predictable ways. There is evidence of

both convergent and divergent validity. For example, the Service Supports factor of the RCI has a strong positive correlation ( $r=.803$ ) with the RSA (a measure of the recovery orientation of services), whereas the Personal Supports section of the RCI has a more moderate correlation (.407) with this questionnaire.

In contrast, the Personal Supports factor of the RCI has a strong positive correlation (.741) with the QPR (a measure of personal recovery), while the Service Supports section has a weaker correlation (.362). The Personal Supports factor also correlates strongly with the MANSA (a quality of life measure), and moderately with the SWEMWBS (a measure of subjective wellbeing) and Empowerment sub-scale.

Table 5. *Correlations with the Summed Scores on the Criterion Variables*

		Personal Support	Service Support
RSA Total Score	Pearson Correlation	.407**	.803**
	Sig. (2-tailed)	.001	.000
	N	63	63
SWEMWBS Total Score	Pearson Correlation	.651**	.505**
	Sig. (2-tailed)	.000	.000
	N	63	63
Empowerment Sub-scale Total Score	Pearson Correlation	.573**	.469**
	Sig. (2-tailed)	.000	.000
	N	63	63
MANSA Total Score	Pearson Correlation	.704**	.453**
	Sig. (2-tailed)	.000	.000
	N	63	63
QPR Completion 1 Total Score	Pearson Correlation	.741**	.362**
	Sig. (2-tailed)	.000	.002
	N	63	63

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