

## Exploratory and Confirmatory Factor Analysis of Mental Health Recovery Knowledge Inventory

**Jackson de Carvalho, PhD**

Associate Professor  
Prairie View A & M University  
Prairie View, Texas 77446  
United States of America

**Felix O. Chima, PhD**

Professor  
College of Arts and Sciences  
Prairie View A&M University  
United States of America

### Abstract

*The Recovery Knowledge Inventory is a self-report measure intended to identify the knowledge of and attitudes toward recovery-oriented care among mental health providers and staff. The developers of the Recovery Knowledge Inventory found good-to-poor reliability statistics on the original four-factor model. This study reassessed the psychometric properties of the Recovery Knowledge Inventory using exploratory factor analysis to find a factor structure that was a good fit for the model. Thus, a confirmatory factor analysis was used to verify the exact structure of the relationship among the factor structures in the model. Results indicated identified a single factor structure consisting of ten items, which reflected the process of recovery. The factor loadings, however, did not support more than one factor. The original developers of the Recovery Knowledge Inventory recognized the limitations of the instrument, which was originally comprised of four-factor structure, and asked for further development of the measure. Therefore, this study endeavored to address the psychometric properties of the Recovery Knowledge Inventory and identifies a factor structure that better defines the recovery orientation of mental health staff and practitioners. As a result, it adds to the limited literature of measures that evaluate staff recovery orientation.*

**Keywords:** Measures, psychometric, factor analysis, mental health, recovery, knowledge inventory

### 1.0. Introduction

The Recovery Knowledge Inventory was first introduced to the research community in a published article by Bedregal, O'Connell, and Davidson (2006). Recovery Knowledge Inventory was created in Connecticut as a result of The President's New Freedom Commission on Mental Health report and its recommended shift toward recovery-oriented care (2006). The Recovery Knowledge Inventory is a 20-item Likert-scale measure created to assess the attitudes and knowledge of recovery-oriented care among staff and practitioners providing such care. The Recovery Knowledge Inventory was initially 36 items, but, after a Principal Component Analysis (PCA), the instrument was reduced to a 20-item scale. The initial PCA yielded five components with eigenvalues greater than 1.0, the criterion for retaining components; however, the items were force loaded on to four components. Eigenvalues for the remaining components were 4.96, 2.43, 1.35, and 1.21, respectively (Bedregal et al., 2006). The Cronbach's alpha for the four domains was 0.81, 0.70, 0.63 and 0.47, respectively. Bedregal and colleagues acknowledged the Recovery Knowledge Inventory's weak psychometric properties and recognized the need for further research into the measure's development.

The developers of the Recovery Knowledge Inventory defined mental health recovery as involving "a redefinition of one's illness as only one aspect of a multidimensional sense of self, capable of identifying, choosing, and pursuing personally meaningful goals and aspirations despite one's mental illness" (Bedregal et al., 2006, p. 97). The Recovery Knowledge Inventory addresses the complexity of recovery through its four domains: roles and responsibility of recovery, non-linearity of recovery, roles of self-definition and peers in recovery, and expectations regarding recovery. The researchers of the measure suggested the need for future research to address generalizability and the measure's psychometric properties (Bedregal, O'Connell, & Davidson, 2006). Unlike the other recovery-oriented measurement tools, the Recovery Knowledge Inventory was developed with the intention of statewide distribution in Connecticut: it is practical, brief, has a strong theoretical foundation, and it easy to administer.

The aforementioned characteristics increase the likelihood of usage. Therefore, an evaluation of the Recovery Knowledge Inventory can make the greatest impact on provision of recovery-oriented services.

Currently, the Recovery Knowledge Inventory still lacks appropriate validation studies, which its developers recognize still need to be done. This study reassessed the psychometric properties of the Recovery Knowledge Inventory using exploratory factor analysis to find a factor structure that was a good fit for the model. Thus, a confirmatory factor analysis was used to verify the exact structure of the relationship among the factor structures in the model. Results indicated identified a single factor structure consisting of ten items, which reflected the process of recovery. The factor loadings, however, did not support more than one factor. Therefore, this study endeavored to address the psychometric properties of the Recovery Knowledge Inventory and identifies a factor structure that better defines the recovery orientation of mental health staff and practitioners. The results of this study will add to the limited amount of literature of measures that evaluate staff recovery orientation.

## **2.0. Literature Review**

Upon an extensive review of the relevant literature, there have been three studies that assessed the psychometric properties of the Recovery Knowledge Inventory; the initial article by the developers, a study in the Netherlands and a study in San Francisco assessing the current factor structure. The study in the Netherlands, assessed a translated version of the Recovery Knowledge Inventory using a Dutch sample of 203 mental health providers and found a 14-item single factor structure as the best fit for the data (Wilrycx et al., 2012). The study in San Francisco determined that the four-factor model of the Recovery Knowledge Inventory was not an appropriate fit for the data and encouraged further research to identify a more appropriate factor structure (Ofina, Ja, Prentiss, & Cooper, 2014; Wilrycx, Croon, van den Broek, & van Nieuwenhuizen, 2012). In this paper, the factor structure of the Recovery Knowledge Inventory is assessed to address the lack of valid measures available, the need for staff-orientation measures, and the wide use of the Recovery Knowledge Inventory in recovery research.

In the mental health field, the term recovery can refer to recovery from substance use, recovery from serious mental illness, or both. In all uses of the word, recovery is seen as a process of getting better from an initial event and improving quality of life. Unlike the rehabilitation model, which has been the most prevalent model until now, the recovery model not only focuses on a person's illness and its consequences but on his/her strengths as well. The focus of this dissertation is recovery from serious mental illness (SMI). The "recovery model" refers to a treatment model that focuses on improving quality of life versus absence of symptoms. The recovery model differs from the traditional model by the way treatment is understood, how treatment is approached, how treatment goals are identified, the setting in which interventions are made, the attitude of the clinicians, and the focus of care.

In a concept analysis, Battersby, and Morrow (2012) recognized that the definition of recovery is not consistent across such disciplines as social work, nursing, and psychology. The differences in the definition of recovery complicated treatment collaboration for SMI clients. Over time the research on the recovery model led to a multifaceted definition with no clear consensus. In an attempt to consolidate the influx of information and research on the recovery model, researchers analyzed the various current definitions of recovery and identified common themes (Armstrong, & Steffen, 2009; Davidson, Tondora, O'Connell, Kirk, Rockholz, & Evans, 2007; Moran, Zisman-Ilani, Garber-Epstein, & Roe, 2014). A review of the literature identified a series of components that defined recovery: quality of life, self-determination, empowerment, hope, meaningful roles, peripheral effects of serious mental illness, support system, and unique treatment (Advancing Recovery Collaborative (ARC), 2015; Davidson et al., 2007, 2005; Farkas, Gagne, Anthony, & Chamberlin, 2005; O'Connell, Tondora, Croog, Evans, & Davidson, 2005; Onken et al., 2007).

The Recovery Knowledge Inventory is a tool that addresses staff attitudes and knowledge of recovery-oriented care. The Recovery Knowledge Inventory is a 20-item Likert scale that ranges from 1 (strongly disagree) to 5 (strongly agree) (Bedregal et al., 2006). The tool was developed in response to a statewide initiative in Connecticut to make behavioral health services recovery oriented (Bedregal et al., 2006). Due to this initiative, programs started to develop training and begin the shift toward a recovery orientation, which highlighted the need for quality assurance measures. To support these efforts toward a recovery orientation, the Recovery Knowledge Inventory was developed as an inventory to measure staff knowledge of and attitudes toward such an orientation. For the Recovery Knowledge Inventory, recovery was defined as a "redefinition of one's illness as only one aspect of a multidimensional sense of self, capable of identifying, choosing, and pursuing personally meaningful goals and aspirations despite one's mental illness" (Bedregal et al., 2006, p. 97). In development, the Recovery Knowledge Inventory was initially 36 items, however, it was reduced to 20 after removing items that were redundant and identified by stakeholders as not related to the concept of recovery (Bedregal et al., 2006). To initiate a recovery orientation, the researchers developed domains of the measure that include roles and responsibility of recovery, non-linearity of recovery, roles of self-definition and peers in recovery, and expectations regarding recovery.

The preliminary psychometric assessment included a Principal Component Analysis that yielded five components with eigenvalues greater than 1.0 criterion for retaining components; however, the items were force loaded on to four components. Eigenvalues for the remaining components were 4.96, 2.43, 1.35, and 1.21, respectively (Bedregal et al., 2006). The Cronbach's Alpha for the four domains was 0.81, 0.70, 0.63 and 0.47, respectively.

The developers of the Recovery Knowledge Inventory recognized its weak psychometric properties and mentioned the need for future validation studies. In response, two studies have explored the Recovery Knowledge Inventory's psychometric properties. Researchers in the Netherlands assessed such properties of the Recovery Knowledge Inventory on a Dutch sample ( $n=210$ ) of professionals (Wilrycx et al., 2012). The results of the study found the Recovery Knowledge Inventory to have a factor structure that was inconsistent with the model: Wilrycx therefore explored a new factor structure that reduced the inventory from 20 items to 14 and from four factors to one. The 14-item, single factor structure that was identified yielded a Cronbach's Alpha of 0.8 (Wilrycx et al., 2012). In the USA, Ofina and colleagues assessed the factor structure of the Recovery Knowledge Inventory using 929 mental health staff members in San Francisco County (Ofina et al., 2014). The researchers found the factor structure not only to be a poor fit for the model but a relative overlap between the factors. All of the studies that reviewed the Recovery Knowledge Inventory have determined that the factor structure of the measure is not a good fit for the model. With the exception of the original study, there are only two studies that have assessed the Recovery Knowledge Inventory.

### **3.0. Methods**

#### **3.1. Participants**

The sample for this study was drawn from aggregated data collected by the Garner & Associates between 2013 – 2018. The Garner & Associates is a community-based organization that offers services focusing on improving the quality of life and empowerment of individuals, and families in Houston, Texas. Health care professional clients in recovery were requested to complete a demographic and attitudinal questionnaire at the time of intake. Secondary data was used to generate a subset data file, targeting a systematic random sampling of  $n=200$ . Subsequently, the data collected was entered into the Statistical Package for Social Sciences (SPSS) and used to first find a factor structure using an exploratory factor analysis and second to use a confirmatory factor analysis to examine the proposed factor structure determined in the initial exploratory analysis. The respondents completed both the Recovery Knowledge Inventory and a demographic questionnaire. The demographic questionnaire identified the respondent's gender, ethnicity, highest degree earned, professional license, employment title, years working in behavioral health, percentage of time working with consumers face-to-face, and the population served.

The sample included a variety of professionals within the Houston Metroplex area employed in mental health profession, including psychologists, psychiatrists, clinicians, registered nurses, administrative staff, clerical staff, and peer counselors. More than half of the respondents identified as female, held master's degrees, and worked as treatment providers for the adult population. The average years of experience with the mental health population was 12 years ( $M = 12.5$ ;  $SD = 9.27$ ). The ethnicities for the sample in the study were as follows: 44% ( $n= 88$ ) identified as Caucasian, 31.5% ( $n= 63$ ) Black/African American, 4% ( $n= 8$ ) Asian American, 10% ( $n= 20$ ) Latino/a, and 5.5% ( $n= 11$ ) Multi-Ethnic. It is noteworthy, the sample included a number of ethnicities outside the categories provided, responses were consolidated into categories; participants who listed coming from a Latin American Country were placed into the Latino/a category, and participants from a country within Asia (excluding Russia and India) were placed into the Asian-American category. All other responses were included in the " Multi-ethnic " category (See Table 1.)

**Table 1. Demographic Characteristics of Participants**

<b>Gender</b>	<i>n</i>	%
Male	58	29.0
Female	142	71.0
Total	200	100.0
<b>Ethnicity</b>		
Asian	8	4.0
Caucasian/White	88	44.0
African American/ Black	63	31.5
Latina/a	20	10.0
Multi-ethnic	11	5.5
Total	200	100.0
<b>Education</b>		
Master	117	58.5
Some college but not degree	6	3.0
Bachelor	51	25.5
PhD/PsyD/MD	26	13.0
Total	200	100.0

Note: n= 200

### 3.2. Instrumentation

The measure included the Recovery Knowledge Inventory and demographic questions. Recovery Knowledge Inventory is a self-report measure comprised of 20 items, on a five-point Likert-item scale ranging from 1 (strongly disagree) to 5 (strongly agree). The Recovery Knowledge Inventory is designed to assess staff members' attitudes toward, and knowledge of, recovery-oriented mental health treatment in order to identify the effectiveness of training toward such care (Bedregal et al., 2006). The creators of the Recovery Knowledge Inventory measurement instrument divided the concepts of recovery into four domains of understanding. The first domain, Roles and Responsibility of Recovery, assessed the staff's understanding of their role as clinicians relative to the patient. The second domain, Non-Linearity of Recovery, was designed to assess the clinician's understanding that recovery from mental illness is not a linear process, but rather a cyclical process. The third domain, Roles of Self-Definition and Peers in Recovery, focuses on the meaningful roles that mental health consumers can have beyond "patient" or "addict." The fourth and last domain, Expectations Regarding Recovery, was designed to assess a staff members' expectations of their consumers in the recovery process. With the four domains of understanding, Bedregal et al. (2006) endeavored to create a measure with high validity/reliability and accessible for staff members.

### 4.0. Data Analysis

An exploratory factor analysis (EFA) was chosen to determine the factor structure of the Recovery Knowledge Inventory, while a confirmatory factor analysis (CFA) further assessed the factor structure of the EFA. Exploratory factor analysis (EFA) is a statistical technique used to identify the underlying structure of a set of variables. In other words, its main goal is to identify the underlying relationships between indicator variables and their respective latent variables (Schreiber, Nora, Stage, Barlow, & King, 2006; Thompson, 2004).

Exploratory factor analysis makes certain assumptions regarding the data set. According to Reio, and Shuck, (2015), these assumptions include: There should be a bivariate distribution for each pair of variables with a possible linear relation between them and there should be no correlation between factors (common and specifics), and no correlation between variables from one factor and variables from other factors (no multicollinearity). In addition, each observed variable should be normally distributed. Although normality is assumed for unique factors in the model (they serve as regression errors), moderately skewed distributions are acceptable in CFA (Reio, & Shuck, 2015; Schreiber et al., 2006).

The examination of each item's distribution found both data sets to be significantly skewed ( $p < 0.001$ ) on most items of the Recovery Knowledge Inventory. Prior to conducting statistical tests, it is important to consider whether the data analyzed follows the assumptions of normality. Table 2 presents the results of the Kolmogorov-Smirnov test for normality. The majority of the data did not follow a normal distribution as the results showed that  $p \leq 0.05$  level of significance and the  $H_0$  should be rejected indicating the observed distribution does not fit the normal distribution, which was confirmed by the Shapiro Wilks test.

Thus, appropriate remedial actions were made to transform the non-normal continuous data into normalized data by using the log 10 command in SPSS. Although the transformed data still showed a significance level less than .05, and the skewness and kurtosis were greater than +1 / -1 and larger than double of the standard error, the Normal Q-Q Plot indicated an improved approximation to normality (Rhemtulla, Brosseau-Liard, & Savalei, 2012).

#### 4.1. Preliminary Analysis

The literature suggests a ratio of 20 responses to each item in the measure when running a factor analysis; the sample size for both the data sets exceeded the recommended ratio (Onwuegbuzie & Daniel, 2003; Reio & Shuck, 2015; Rhemtulla et al., 2012). Missing data was accounted for in the estimation methods for the analyses.

**Table 1. Tests of Normality**

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SUM= Roles and Responsibilities of Recovery	.333	200	.000	.640	200	.000
SUM= Nonlinearity of Recovery	.324	200	.000	.733	200	.000
SUM= Roles of Self Definition and Peers in Recovery	.309	200	.000	.720	200	.000
SUM= Expectations	.470	200	.000	.529	200	.000

a. Lilliefors Significance Correction

#### 4.2. Exploratory Factor Analysis

The descriptive statistics of the factor analysis showed small differences between the means and standard deviations among the original twenty items. However, the correlation matrix table produced values less than .8 or greater than .8. Furthermore, Kaiser-Meyer-Olkin (KMO) and the Bartlett's Test of Sphericity had a value of .736, that was significantly greater than .5, which is the absolute minimum, and it was significant at  $p \leq .05$  level of significance. This indicated that the variables in the model were correlated significantly different than 0 (Thompson, 2004).

A series of decisions were made to come to a 10-item single factor structure by reviewing the eigenvalues, scree plot, factor loadings, reliability statistics and the qualitative consistency between items in each factor (Thompson, 2004). The eigenvalues found three factors above Kaiser's criterion of 1.0: 6.306, 2.472 and 1.325, respectively (Kline, 2011). The scree plot found a two-factor solution by reviewing in the curve in the line graph of eigenvalues (Figure 1). When first using a direct oblimin rotation, the component transformation matrix output indicated no presence of values greater than .32, or less than -.32, which called for changing the rotation to an orthogonal varimax method (Table 3). By using a varimax rotation, it minimizes the number of variables that have high loadings on each factor. This **method** simplifies the interpretation of the factors (Reio, & Shuck, 2015).

**Table 3. Component Correlation Matrix**

Component	1	2	3	4
1	1.000	-.047	.048	.031
2	-.047	1.000	.026	.025
3	.048	.026	1.000	.072
4	.031	.025	.072	1.000

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

The results of the Factor Analysis indicated there are four components explaining 86.1% of the variance in the model. Upon an examination of the factor loadings, thirteen items loaded above 0.4 on the first factor revealing the degree to which each item contributes to the meaning of the factor. Two items cross-loaded on two factors suggesting it provides meaning onto two separate factors and were removed. The second factor found five items with loadings above 0.4, however one cross-loaded with another factor, which resulted in a four-item factor. Cronbach's alpha for the second factor with four items was 0.55 and therefore it was not retained. The third factor found one item that loaded above 0.4 that cross-loaded with factor one and was not retained due to low number of items and cross loading (Reio, & Shuck, 2015).

Overall, a single factor was retained with eleven items. With the single factor structure, qualitative meaning of each item was reviewed for its homogeneity. Ten of the eleven items originated from the first two factors of the original Recovery Knowledge Inventory: Roles and Responsibility in Recovery and Non-linearity of the Recovery Process. Item number five qualitatively differed most from the other items as it originated from factor four, Expectations Regarding Recovery and focused on client's capacity to engage in the recovery process. Due to the qualitative differences between question number five and the other items, question five was removed from the first factor.

After assessing for statistical and qualitative consistency, ten out of the twenty original items were retained. The questions retained in the final ten items capture of process of recovery by addressing the steps to achieve recovery, its trajectory, and those involved in the process. The single factor was named "Recovery Process". The ten items yielded strong reliability with  $\alpha = 0.83$ .

**Table 4. Factor Loadings for Exploratory Factor Analysis with Varimax Rotation of Recovery Knowledge Inventory**

Questions No.	Component			
	1	2	3	4
1	0.00	0.49*	0.32	0.02
2	<b>0.52</b>	0.31	-0.01	-0.01
3	-0.11	0.36	0.36	0.01
4	0.33	-0.13	-0.13	0.37
5	<b>0.53</b>	0.09	-0.38	0.00
6	<b>0.42*</b>	<b>0.43*</b>	0.04	-0.03
7	0.74	0.00	-0.09	-0.03
8	-0.01	<b>0.72</b>	<b>-0.40</b>	0.01
9	<b>0.55</b>	0.19	-0.11	0.00
10	<b>0.64</b>	0.25	-0.02	0.05
11	<b>0.58</b>	0.38	-0.01	-0.02
12.	0.14	<b>0.64</b>	-0.03	-0.02
13	<b>0.53*</b>	-0.06	<b>0.44*</b>	-0.01
14	0.64	-0.02	0.20	0.03
15	<b>0.54</b>	0.01	-0.01	0.08
16	0.00	0.30	0.05	<b>0.99</b>
17	0.57	-0.11	0.26	0.14
18	<b>0.73</b>	0.16	0.00	-0.03
19	0.64	-0.18	0.03	0.17
20	0.26	<b>0.50</b>	0.05	-0.03

Note. \* Indicates a cross-loaded item. Boldface refers to the items above 0.40.

*Figure 1 Scree Plot of RECOVERY KNOWLEDGE INVENTORY Eigenvalues.*

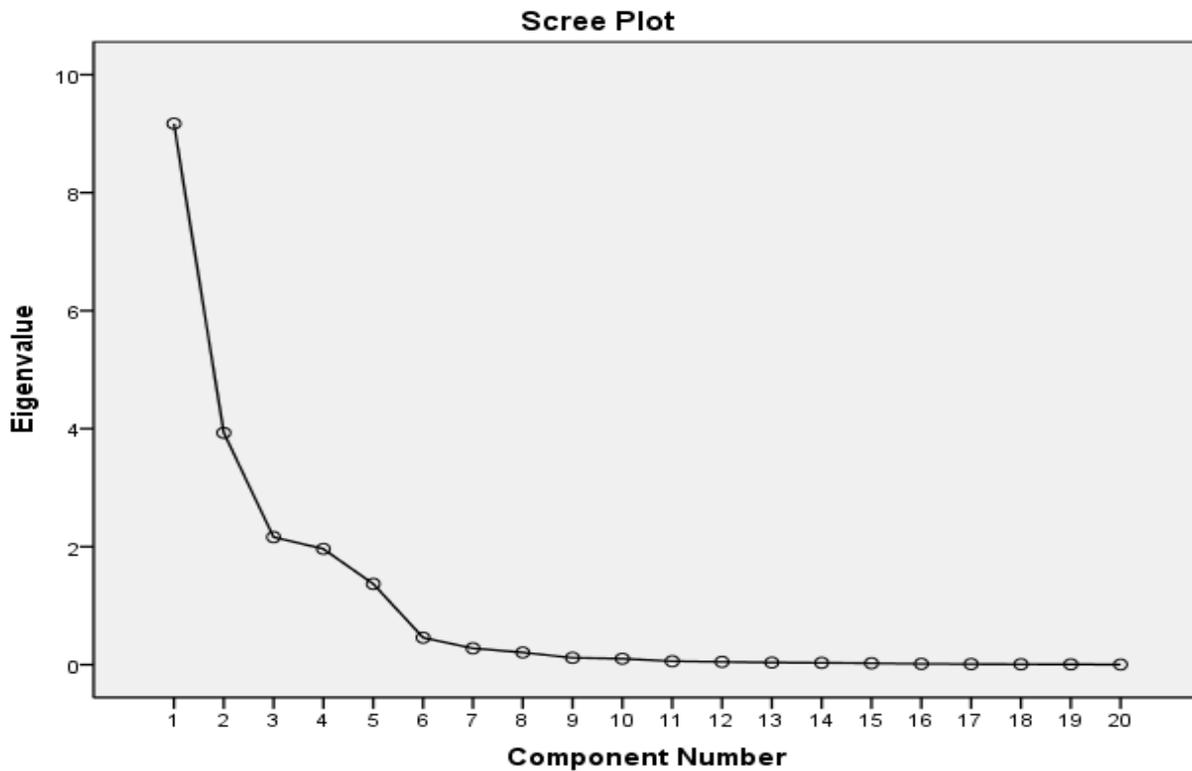


Figure 1.0. The curve of the slope determines the factors to retain and which to remove. The factors after the curve's elbow are not retained in the model. (Thompson, 2004)

**4.3. Confirmatory Factor Analysis**

The 10-item factor was first examined using Sample 2, with MLR as the estimation method. The new 10-item model reached a good model fit with Root Mean Square Error Approximation (RMSEA) = 0.055, Comparative Fit Index (CFI) = 0.945, Tucker-Lewis Index (TLI) = 0.929, and Standardized Root Mean Residual (SRMR)= 0.038 (Schreiber, Nora, Stage, Barlow, & King, 2006). Half of the model-fit indices meet the criteria for their respective tests except for TLI and CFI (Table 5) (Schreiber et al., 2006). The CFI is just below the cutoff criteria while TLI was further from the cutoff criteria (Reio, & Shuck, 2015).

All ten items loaded significantly and strongly on the factor, with loadings that ranged from 0.72 to 0.52 (Table 6). Standardized loadings provided in Table 7 indicate internal homogeneity within the model. The reliability for the ten remaining items yielded a Cronbach's alpha of 0.83, indicating strong reliability. Despite not meeting the cutoff criteria for both index scores, the data appears to be a good fit for the sample.

Table 5. Cutoff Criteria for Goodness of Fit Indices

Goodness of Fit Indices	Cutoff criteria for the goodness of fit statistics	Goodness of fit tests found a single factor model
Comparative Fit Index (CFI)	CFI ≥ .95	CFI = 0.945
Standardized Room Mean Residual (SRMR)	SRMR ≤ .08	SRMR=0.04
Tucker-Lewis Index (TLI)	TLI ≥ .95	TLI = 0.929
Root mean square error of approximation (RMSEA)	RMSEA < .06	RMSEA = 0.055

(Schreiber et al., 2006)

**Table 6. Recovery Process 10-items Standardized Loadings**

2. People receiving psychiatric/substance abuse treatment are unlikely to be able to decide their own treatment and rehabilitation goals.	0.53
7. Recovery in serious mental illness/substance abuse is achieved by following a prescribed set of procedures.	0.68
9. It is the responsibility of professionals to protect their clients against possible failures and disappointments.	0.58
10. Only people who are clinically stable should be involved in making decisions about their care.	0.66
11. Recovery is not as relevant for those who are actively psychotic or abusing substances.	0.57
14. There is little that professionals can do to help a person recover if he/she is not ready to accept his/her illness/condition or need for treatment.	0.53
15. Recovery is characterized by a person making gradual steps forward without major steps back.	0.51
17. Expectations and hope for recovery should be adjusted according to the severity of a person's illness/condition.	0.52
18. The idea of recovery is most relevant for those people who have completed, or are close to completing, active treatment.	0.72
19. The more a person complies with treatment; the more likely he/she is to recover.	0.53

### 05. Discussion

Recovery can be defined as “A process of change through which individuals improve their health and wellness, live a self-directed life, and strive to reach their full potential” (ARC, 2015, p. 3). Recovery-oriented care is important because it addresses the stigma associated with SMI, uses a holistic approach, and focuses on community integration to reduce recidivism. As discussed earlier, the concept of recovery-oriented care has gained a considerable amount of momentum, with many programs transitioning toward recovery-oriented treatment. During the transition process, measuring the use of recovery-oriented practices among mental health staff and practitioners has become essential to evaluating programmatic change. Bedregal, O’Connell, and Davidson collaborated with the state of Connecticut to create the Recovery Knowledge Inventory with the goals of measuring the attitudes of mental health practitioner and staff and their knowledge of recovery-oriented care (2006).

The Recovery Knowledge Inventory is a 20-item self-report measure that assesses the attitudes and knowledge of recovery-oriented care (Bedregal et al., 2006). Previous research indicated that further research on the measure’s psychometric properties were needed (Bedregal et al., 2006; Ofina, Ja, Prentiss, & Cooper, 2014; Sklar, Groessl, O’Connell, Davidson, & Aarons, 2013). Beyond the original article and the Dutch Recovery Knowledge Inventory validation study, there is no existing literature about the Recovery Knowledge Inventory’s factor structure. The present study reassessed the psychometric properties of the original Recovery Knowledge Inventory to find a factor structure that is a good fit for a model with an American sample.

### 6.0 Findings and Implications

To determine the factor structure of the Recovery Knowledge Inventory, an Exploratory Factor Analysis (EFA) was conducted to confirm the factor structure found from the initial EFA. The results indicate that the four-factor model proposed by the developers was not the best fit and in fact, half of the questions loaded onto one factor. The “Recovery Process”, a single factor structure consisting of ten items, was found to be the best fit for the data. The items that were omitted from the single factor structure did not “fit” with the other ten items conceptually or statistically. The omitted items did not consistently measure the same concept within the definition of recovery. The results of the EFA also found a second factor; however, there were not enough items in that factor, and it yielded a low Cronbach’s alpha of 0.55.

The items in the second factor were consistent with the original authors’ factor III: Self-definition and Peers in Recovery, but due to the properties of the factor, it was not retained. The omission of ten questions and presence of a possible second factor would suggest that the concept of recovery is not fully captured with the single factor structure. An addition of a second factor would require adding new questions that specifically loaded on to that factor. Despite the omission of the second factor, the single factor model is consistent with the findings from the study by Wilcryn et al., (2012), which found fourteen items loading onto a single factor versus the ten found in the current analysis.

One possible explanation for the differences in results could be attributed to the differences between the sample demographics and/or sample size.

The findings impact both providers and recipients of mental health treatment. Understanding the process of therapy can also improve provider expectations in consumer treatment and address the impact of stigma on consumer care. The questions retained in the analysis capture the instillation of hope in recovery, importance of self-determination, recovery- readiness, risk taking, and inclusion of illness into treatment. The concepts retained in the 10-item solution are both consistent with the model of recovery and is a brief tool that can capture core concepts of the model. The 10-item measure can provide the opportunity to identify staff members in need of training or supervision on recovery-oriented care. While there is more to the model, this tool can be best used as an initial assessment of basic recovery concepts. In addition, the improved efficiency and accuracy of the Recovery Knowledge Inventory enhances methods of evaluating staff members and therefore improves quality of treatment, which in turn improves quality of life for the consumer's and their families. Quality treatment also contributes to reducing recidivism rates and can therefore improve the community's perception of SMI care. Overall, the development of this measure can contribute to improvement in treatment, training and measurement.

## References

- Advancing Recovery Collaborative (ARC). (n.d.). Retrieved April 6, 2015, from: <http://www.cibhs.org/advancing-recovery-collaborative-arc>
- Armstrong, N. P., & Steffen, J. J. (2009). The Recovery Promotion Fidelity Scale: Assessing the organizational promotion of recovery. *Community Mental Health Journal, 45*(3), 163–170
- Battersby, L., & Morrow, M. (2012). Challenges in implementing recovery-based mental health care practices in psychiatric tertiary care. *Canadian Journal of Community Mental Health, 31*(2), 103–11
- Bedregal, L. E., O'Connell, M., & Davidson, L. (2006). The Recovery Knowledge Inventory: Assessment of Mental Health Staff Knowledge and Attitudes about Recovery. *Psychiatric Rehabilitation Journal, 30*(2), 96–103. <http://doi.org/10.2975/30.2006.96.103>
- Davidson, L., O'Connell, M. J., Tondora, J., Lawless, M., & Evans, A. C. (2005). Recovery in serious Mental Illness: A New Wine or Just a New Bottle? *Professional Psychology: Research and Practice, 36*(5), 480–487. <http://doi.org/10.1037/0735-7028.36.5.480>
- Davidson, L., Tondora, J., O'Connell, M. J., Kirk, T. J., Rockholz, P., & Evans, A. C. (2007). Creating a recovery-oriented system of behavioral health care: Moving from concept to reality. *Psychiatric Rehabilitation Journal, 31*(1), 23–31. <http://doi.org/10.2975/31.1.2007.23.31>
- Farkas, M., Gagne, C., Anthony, W., & Chamberlin, J. (2005). Implementing Recovery Oriented Evidence Based Programs: Identifying the Critical Dimensions. *Community Mental Health Journal, 41*(2), 141–158
- Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed). New York: Guilford Press
- Moran, G. S., Zisman-Ilani, Y., Garber-Epstein, P., & Roe, D. (2014). Adaptation and psychometric assessment of the Hebrew version of the Recovery Promoting Relationships Scale (RPRS). *Psychiatric Rehabilitation Journal, 37*(1), 31–36. <http://doi.org/10.1037/prj0000043>
- Ofina, M., Ja, D. Y., Prentiss, D., & Cooper, B. (2014, August). *Attitudes and Knowledge of Recovery-oriented Care with Community Mental Health Providers: An analysis of the Recovery Knowledge Inventory (RKI)*. Poster session presented at the American Psychological Association, Washington D.C.
- O'Connell, M., Tondora, J., Croog, G., Evans, A., & Davidson, L. (2005). From Rhetoric to Routine: Assessing Perceptions of Recovery-Oriented Practices in a State Mental Health and Addiction System. *Psychiatric Rehabilitation Journal, 28*(4), 378–386.
- Reio, T. G., & Shuck, B. (2015). Exploratory Factor Analysis Implications for Theory, Research, and Practice. *Advances in Developing Human Resources, 17*(1), 12–25. <http://doi.org/10.1177/1523422314559804>
- Rhemtulla, M., Brosseau-Liard, P. É., & Savalei, V. (2012). When can categorical variables be treated as continuous? A comparison of robust continuous and categorical SEM estimation methods under suboptimal conditions. *Psychological Methods, 17*(3), 354–373. <http://doi.org/10.1037/a0029315>
- Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., & King, J. (2006). Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review. *The Journal of Educational Research, 99*(6), 323–338. <http://doi.org/10.3200/JOER.99.6.323-338>
- Sklar, M., Groessl, E. J., O'Connell, M., Davidson, L., & Aarons, G. A. (2013). Instruments for measuring mental health recovery: A systematic review. *Clinical Psychology Review, 33*(8), 1082–1095.
- Thompson, B. (2004). *Exploratory and confirmatory factor analysis understanding concepts and applications* (1st ed). Washington, DC: American Psychological Association. <http://osearch.ebscohost.com.library.alliant.edu/direct.asp?db=pzh&jid=%22200413115%22&scope=site>
- Wilrycx, G., Croon, M. A., van den Broek, A., & van Nieuwenhuizen, C. (2012). Psychometric properties of three instruments to measure recovery. *Scandinavian Journal of Caring Sciences, 26*(3), 607–614. <http://doi.org/10.1111/j.1471-6712>