

## Validating a Survey for Addiction Wellness: The Recovery Capital Index

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### Abstract

*Background:* Evaluating addiction wellness encompasses more than sobriety. The Recovery Capital Index (RCI), developed by Face It TOGETHER (FIT), measures addiction wellness using three domains and 22 components providing a comprehensive baseline and assessment of intervention effectiveness to allow for the tracking of client progress and to tailor support. The RCI is a holistic, person-centered metric irrespective of a person's treatment modality, recovery, or wellness pathway.

*Methods:* FIT and Sanford Research set a goal to validate the RCI's effectiveness to measure the factors associated with addiction wellness through a retrospective cohort study of FIT clients with the disease of addiction to alcohol and/or other drugs. Study cohort included 154 client intake records with corresponding RCI scores. The RCI was subjected to descriptive analyses using stacked barplots and side-by-side boxplots. The Cronbach and correlation coefficients were used to check the reliability and validity of the components within each domain. Differences of RCI against clients' characteristics were examined using Tukey's test of multiple comparisons of means.

*Results:* The validation process verified the design of the RCI domains – personal, social, and cultural capital. Variables significantly related to addiction wellness, based on the RCI, are: primary addiction, addiction identification, employment, and income. The RCI accurately described the individual's current state of recovery.

*Conclusions:* This project validated the RCI as a tool to measure addiction wellness. The RCI measures what it is intended to measure. The results allow FIT and Sanford Research to next validate the RCI instrument's predictive nature for measuring behavior change.

### Background

For as long as individuals have been surviving alcohol and other drug addiction (also understood as substance use disorder) – entering and maintaining “recovery” – there has lacked a method or instrument for measuring the broad and ambiguous concept of recovery. Generally, the use or non-use of a substance has been a leading or primary indicator of treatment and/or recovery success. With other indicators, such as employment, housing, and criminal justice involvement, the scope of measurement has been limited to a specific demographic – an underserved and less economically positioned population. Despite treatment providers, criminal justice, and other agencies' continued

reliance on abstinence as a measure of success (e.g., program completion, recovery, etc.), a mainstream acceptance of a more holistic measurement is prevailing, albeit, against competing definitions of recovery.

Two of the most respected organizations in the addiction field – Substance Abuse and Mental Health Services Administration (SAMHSA) and Betty Ford Institute (now Hazelden Betty Ford Foundation) – have illustrated the lack of consensus around the notion of recovery. SAMHSA defines recovery 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.”<sup>1</sup> The Betty Ford Institute Consensus Panel

defined recovery as “a voluntarily maintained lifestyle characterized by sobriety, personal health, and citizenship.”<sup>2</sup> With the merger of Betty Ford and Hazelden in 2014, Hazelden Betty Ford has taken on a recovery definition less tethered to sobriety; however, as a 12-step based treatment provider, sobriety is still a key indicator of success and wellness. SAMHSA, on the other hand, recognizes that, like many chronic illnesses involving internal and external factors, addiction recovery is not a zero-sum circumstance. SAMHSA supplemented its recovery definition and established four holistic dimensions that support a life in recovery:

1. Health: a process for overcoming or managing one’s disease(s), symptoms, or recovery as the individual makes informed, healthy choices that support physical and emotional wellbeing;
2. Home: having a stable and safe place to live;
3. Purpose: meaningful daily activities and the independence, income, and resources to participate in society; and
4. Community: relationships and social networks that provide support, friendship, love, and hope to the individual in recovery.<sup>1</sup>

While both SAMHSA and Hazelden Betty Ford have expanded their definition of recovery, it can be enhanced through the concept of recovery capital. Recovery capital attempts to establish a more interoperable definition to this notion of recovery. White and Cloud (2008) define recovery capital as “the breadth and depth of internal and external resources that can be drawn upon to initiate and sustain recovery from severe [alcohol and other drug] problems.”<sup>3</sup> Connecting this with SAMHSA’s definition of recovery, the recovery process requires the individual to use internal and external factors to advance their overall wellbeing. Best and Laudet (2010) define the individual’s recovery core as “lived experience of improved life quality and a sense of empowerment,”<sup>4</sup> implying that there is no single end goal. As with other chronic illnesses or health in general, addiction recovery is not a destination but an ongoing quest for a better life.

With a vested interest in understanding holistic addiction recovery, Face It TOGETHER (FIT) is a social entrepreneurial non-profit, based in Sioux Falls, South Dakota, working to solve the disease of addiction. FIT is using the above-mentioned concepts and definitions to explore recovery capital in terms of a change process. The focus is on determining if asset predictors can be identified for

intervention success or quality of life improvement. More critically, FIT is interested in understanding that if the asset predictors were known, could more relevant interventions be applied to maximize the growth of recovery capital, creating a compounding effect on overall quality of life. FIT provides peer-based recovery coaching to those struggling with addiction, in recovery, or the loved one of someone with the disease. The peer recovery coach, either a person with the disease or a loved one, is trained to use coaching techniques and their lived experience to guide others through the addiction wellness process. FIT peer recovery coaches, neither clinically trained nor 12-step sponsors, often supplement clinical treatment and assist clients with goal setting and navigation of systems and services.

**Recovery Capital Frameworks.** Recovery capital has its roots in the notion of social capital. Social capital has been defined as “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition.”<sup>5</sup> Generally, social capital has been a sociological concept attempting to give meaning to non-economic relationships across human interaction. Granfield and Cloud applied this concept of social capital to addiction recovery in 2001. The nearly 40 years’ worth of research on social capital have established a solid foundation upon which to build the notion of recovery capital.<sup>3,6,7</sup>

Conceptually, recovery capital is a logical model for defining a complex notion of wellness or the sum of resources necessary to initiate and sustain recovery from alcohol and other drug addiction. White and Cloud (2008) developed an early methodology for integrating recovery capital and problem severity assessments to determine appropriate levels of clinical care.<sup>3</sup> The Recovery Capital/Problem Severity Matrix provides a framework for determining level of care placement depending on the significance of the problem and the person’s corresponding recovery capital. While this is a laudable first step, measuring a person’s progress through wellness must go beyond care placement or even relapse risk, and focus on measuring all stages of the recovery process.

To do this, Cloud and Granfield chartered, and expanded upon, a framework building on the social capital construct, which currently includes four components of recovery capital:

1. Social capital is defined as the totality of individual’s

relationship assets, including support and obligations to individuals and groups;

2. Physical capital is defined as the collection of tangible assets including finances, housing, food, or more aptly stated, basic human needs;
3. Human capital is defined as the less tangible of individual's assets such as problem solving skills, education, good health, and a general sense of hope; and
4. Cultural capital is defined as external aspects encompassing the individual's values, beliefs, and connection to other social or community specific norms.<sup>6-8</sup>

White and Cloud (2008) considered a more traditional and recovery oriented approach. Within their construct, building upon recovery capital as defined by Cloud and Granfield, the four components (Personal Recovery Capital, Family/Social Recovery Capital, Community Recovery Capital, Cultural Recovery Capital) are addiction-centered aspects specific to individuals with alcohol and other drug problems. White and Cloud assert that recovery capital is "linked to natural recovery, solution-focused therapy, strengths-based case management, recovery management, resilience and protective factors, and ideas of hardiness, wellness, and global health."<sup>3</sup>

**Recovery Capital Index.** These constructs of recovery and recovery capital provide a solid definition of the essence of addiction wellness: a lived experience of improved life quality and a sense of empowerment and purpose. Unfortunately, there are few effective and comprehensive measures for recovery from alcohol and other drug addiction. Moreover, most client outcomes are measured simplistically by the use or non-use of a substance and/or the completion of a time-limited clinical treatment program. FIT recognizes that addiction wellness encompasses much more than sobriety, so the organization took these constructs of recovery capital one step further to develop and validate an instrument that would provide insight into the individual's asset predictors for quality of life improvement.

The Recovery Capital Index (RCI) is a holistic, person-centered metric, irrespective of a person's treatment modality or recovery or wellness pathway, and can be used at all stages of the wellness process. Using a multidimensional score from 1 to 100 to measure an individual's addiction wellness, the RCI provides a comprehensive baseline and tracks intervention effectiveness, allowing

clinicians, peer coaches, and other care team members to follow individual progress to tailor intervention and support at any point in the continuum of care.

To construct the RCI, FIT built on the recovery capital foundational work of the field. The number of domains was reduced to three to better align physical and human capital and to ensure relevancy for its use with addiction sufferers and non-sufferers alike. The principles of Cognitive Behavioral Therapy and Motivational Interviewing are at the heart of the RCI's design.<sup>9</sup> The instrument incorporates previously validated metrics from other well-known resources, such as the Behavioral Risk Factor Surveillance System Questionnaire (BRFSS),<sup>10</sup> General Well-Being Schedule,<sup>11</sup> World Health Organization Quality of Life Spirituality, Religiousness, and Personal Beliefs Questionnaire (WHOQOL-SRPB),<sup>12</sup> and the PTSD CheckList - Civilian Version (PLC-C).<sup>13</sup>

The RCI is structured across three domains and 22 components, through 68 metrics (Figure 1). The instrument is implemented at intake and every 90 days following. The instrument is not weighted and presents each respondent with an individual raw score on a scale of 0 to 100. The RCI establishes a recovery capital baseline

**Figure 1. RCI construct**



that can be used to inform a peer recovery coach (or other care provider) and a person impacted by the disease of addiction about areas of concern or success that strategies and/or interventions can be built around. Further, the RCI measures individual progress over time, identifying and measuring the increase or decrease of recovery capital – internal and external resources or assets – in the person’s life. Over time, the RCI is intended to measure the effective change against various interventions or modalities of care as provided by FIT (or other care providers using the instrument).

The initial RCI instrument was developed by an external research and evaluation scientist using an expansive literature review, including identifying validated questionnaires in the public domain and possible constructs or models for framing the question set. The RCI framework was based on the Social Progress Index (SPI), a measurement for global social change.<sup>14</sup> The original RCI included more than 120 metrics, and was pilot tested with FIT peer recovery coaching clients in Sioux Falls, South Dakota. Based on those results, numerous questions were modified or eliminated. An additional validation review was conducted by an expert in psychology to establish the face content validation of the instrument. This review determined that the instrument was clearly organized and identified some content changes to ensure that the metrics were appropriately matched with what it was intending to assess, recovery capital.

The RCI is administered to all FIT clients at intake and every 90 days following. The most critical evaluation period is during the first three months. This time period usually involves the highest engagement and intensity for treatment and recovery. The recommended administration intervals are built into FIT’s proprietary digital health platform, AXIS; however, clinicians and care providers may administer or the client may request to complete the RCI at a greater frequency. The RCI is completed by the client on paper and the results are entered by FIT team members into AXIS with a protocol to ensure accuracy by double checking each response entered. Reports and dashboards on the RCI, through AXIS, provide real-time, trending, and longitudinal analysis of the data. All data is collected, stored, and analyzed by FIT in compliance with HIPAA and other privacy and security regulations.

In 2017, FIT began a collaboration with researchers at Sanford Research in Sioux Falls, South Dakota, to conduct further validation of the criterion of the instrument to

ensure that it is measuring what is supposed to be measuring. The purpose of this article is to describe this validation study.

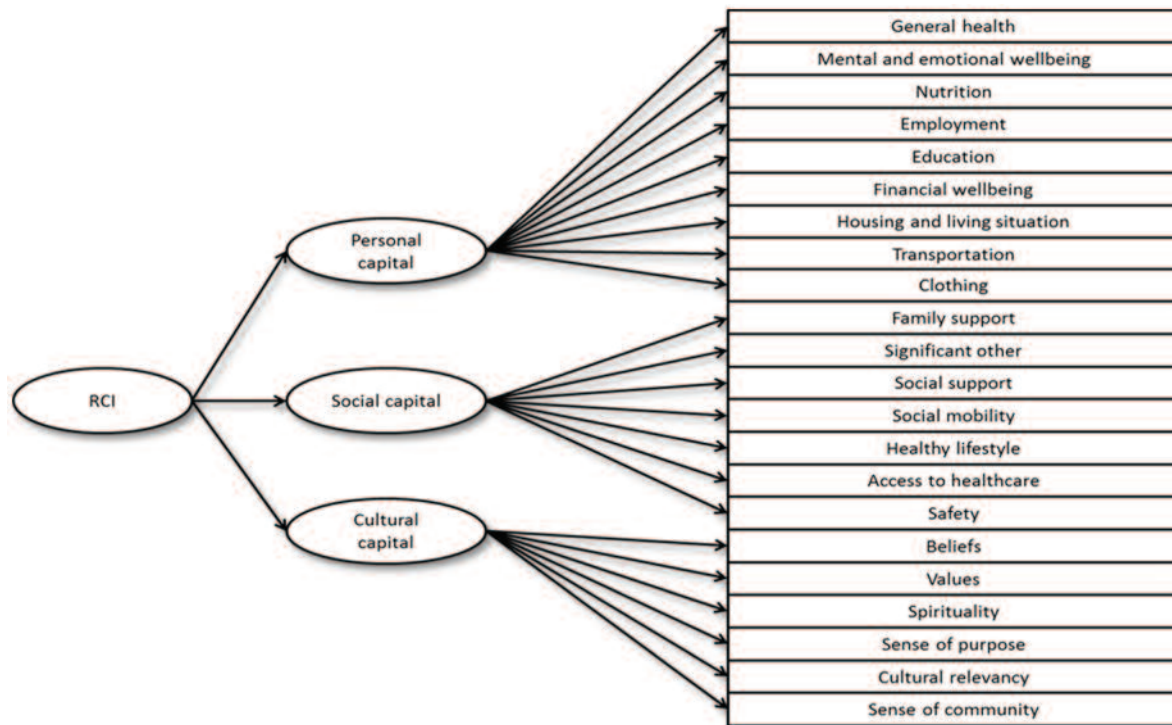
## Methods

**Study Design and Measures.** Since this study was a retrospective cohort study of FIT clients with the disease of addiction to alcohol and/or other drugs, all of the available clients in AXIS, FIT’s proprietary database, were included. RCI score, along with the client demographic and addiction-specific information, were collected and combined to provide validation materials of the RCI.

Client characteristics were collected through FIT’s demographic and intake survey instrument, which included an option to clients to decline answering any of the questions. Employment status was a current representation of the client’s state of employment (e.g., full-time, unemployed, etc.) and annual income level following the categories used by the U.S. Census (e.g., no income to over \$150,000). Education level followed the categories used by the U.S. Census measuring from no schooling to advanced degrees. Legal status described the client’s involvement with the criminal justice and judicial systems (e.g., no legal issues, current or past incarceration, etc.). The addiction-specific items included: treatment-counseling status (i.e., in treatment – out-patient, in treatment – residential or in-patient, not in treatment or counseling) and the client’s self-identified primary and secondary addiction (e.g., alcohol, cocaine, heroin, marijuana, prescription drugs, methamphetamine, etc.).

The RCI was based on three primary domains shown to play an integral role in an individual’s ability to get well from addiction: personal, social, and cultural capitals. Within these three domains were 22 separate components (Figure 2). The component framework was modeled on the Social Progress Imperative’s SPI, developed to holistically measure social and environmental factors – not economic factors – that contribute to the social progress of a country.<sup>14</sup> Countries were made up of individual lives that have “basic human needs”, require “foundations of wellness”, and seek “opportunity” for growth. FIT studied the various components of the SPI – nutrition, basic medical care, shelter, access to basic knowledge, health and wellness, personal rights, and access to advanced education – and the data or surveys that populated the various components. The SPI was a validating framework at a much larger scale of the concepts behind recovery capital and the components or

Figure 2. Components of the RCI



assets key to an individual's positive addiction wellness.

Like the SPI, the RCI was designed to measure outcomes not identify inputs. While there remains a need to advance the evidence behind various modalities of addiction treatment and peer recovery coaching, little evidence exists on the actual outcome or outcomes of a person's life impacted by addiction. The RCI was designed to establish a comprehensive picture of a complex web of outcomes relating to a person's wellness that is achieved over time.

**Data Analyses for Index Validity and Reliability.** The quality of data sets for RCI score and intake information was examined using descriptive statistics such that missing values were detected and removed. Data imputation was not performed due to a lack of prior information regarding the associations between RCI and clients' characteristics that is required to construct the imputation algorithm.

As a first step to determine the validity of the RCI, we ensured that all items met basic criteria for sufficient variability, such that they could discriminate sensitively between individuals on the underlying construct. The 68 initial items were subjected to descriptive analyses using stacked barplots. The distributions of components within each capital were illustrated using boxplots.

Secondly, the Cronbach was used to check the reliability of the subscales within each capital. Spearman correlation matrix of the subscales within each capital was performed to examine the content validity. Furthermore, inter-capital correlations were conducted to test the construct validity whether a unique index could be representative of multiple domains.

Finally, differences of RCI against various client characteristics were examined using Tukey's test of multiple comparisons of means. This analysis was used to understand the sensitivity of the RCI on key risk and demographic factors. A p value of less than 0.05 was considered significant in the aforementioned tests.

**Protections.** This instrument validation study was reviewed by the Sanford Health Institutional Review Board on Oct. 4, 2017, identified as not human research, and exempt from a full review. Assessments used in this retrospective review were non-identifiable and collected through FIT clients as part of the coaching program that they consented to participation in. The FIT informed consent is for participation in services and ongoing assessment and to inform and identify processes for data collection, secure storage, and release of information

following additional consent. Clients also consent to periodic assessment or evaluation of their recovery or wellness progress through questionnaires. Clients are informed that their participation is “optional” and that any information collected and stored will be held confidential, securely stored, and may be used to assist FIT in evaluating our services.

## Results

**Study Cohort.** A total of 303 clients’ retrospective, since 2016, intake data were retrieved from the database. Of those, 154 had corresponding RCI scores. Cohort was selected from all clients of FIT’s addiction management center who had participated in coaching (in person or phone) and completed at least one RCI. Clients represented in the study cohort typically had some college education;

were employed full time and made less than \$75,000 annually; and were either free from or currently working through legal issues. These clients typically identified as being in recovery; had either completed none or were currently working through out-patient or individual counseling; and reported alcohol as their primary addiction (Table 1).

**Descriptive Analyses of RCI.** The variability of clients’ responses to each item in the RCI was visualized using stacked barplots (Figure 3). The total width of any bar was equal to the total number of each item responses. Most of the items had responses covering all five categories and had very small proportion of “Neutral” answers. It is also worth noting that some of the item responses were dominated by “agree” or “strongly

**Table 1. Study cohort demographics and intake variables**

|                             |  | % of cohort |
|-----------------------------|--|-------------|
| Primary Addiction           | Alcohol  | 62.9        |
|                             | Cocaine  | 0.5         |
|                             | Other  | 2.2         |
|                             | Heroin   | 2.2         |
|                             | Marijuana  | 6.5         |
|                             | Methamphetamine                                    | 20.4        |
|                             | Prescription                                       | 5.4         |
| Addiction Identification    | Struggling   | 29.8        |
|                             | In Recovery  | 68.0        |
|                             | NA   | 2.2         |
| Treatment Counseling Status | In treatment, out-patient or individual counseling | 43.4        |
|                             | In treatment, residential or in-patient            | 9.2         |
|                             | Not in treatment or counseling                     | 43.9        |
|                             | NA   | 3.5         |
| Legal Status                | Current legal issues                               | 42.5        |
|                             | Previous legal issues                              | 4.4         |
|                             | No legal issues                                    | 50.5        |
|                             | NA   | 2.6         |
| Employment                  | Unemployed   | 24.5        |
|                             | Other  | 4.4         |
|                             | Full-time  | 52.2        |
|                             | Part-time  | 12.5        |
|                             | Unknown  | 6.5         |
| Income Level                | Less than \$25,000                                 | 43.4        |
|                             | \$25,000 - \$75,000                                | 25.4        |
|                             | More than \$75,000                                 | 7.5         |
|                             | Unknown  | 16.2        |
|                             | Decline  | 7.5         |
| Education                   | No diploma   | 5.7         |
|                             | High school diploma or equivalent                  | 18.4        |
|                             | Some college, no degree                            | 25.5        |
|                             | Post-secondary degree                              | 30.7        |
|                             | Advanced degree                                    | 6.1         |
|                             | Unknown  | 10.1        |
|                             | Decline  | 3.5         |

Figure 3. Stacked barplots of three capitals

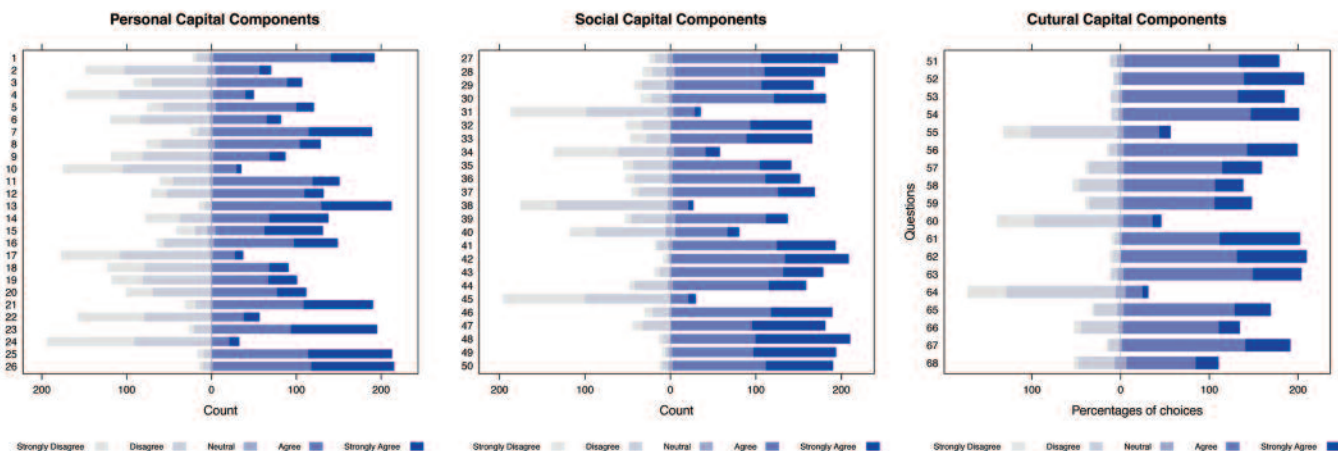


Figure 4. Boxplots of RCI components

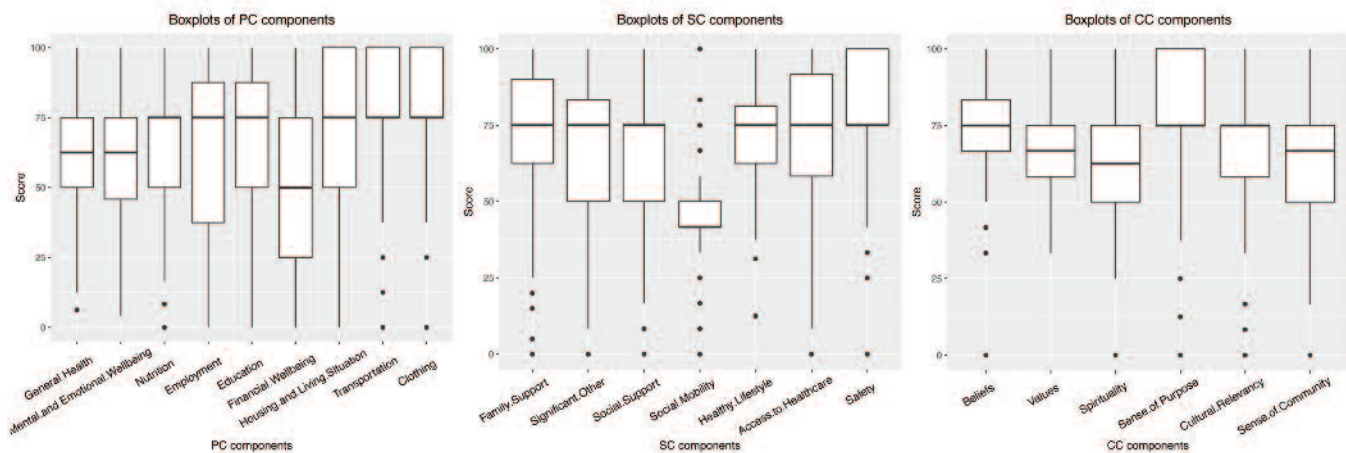
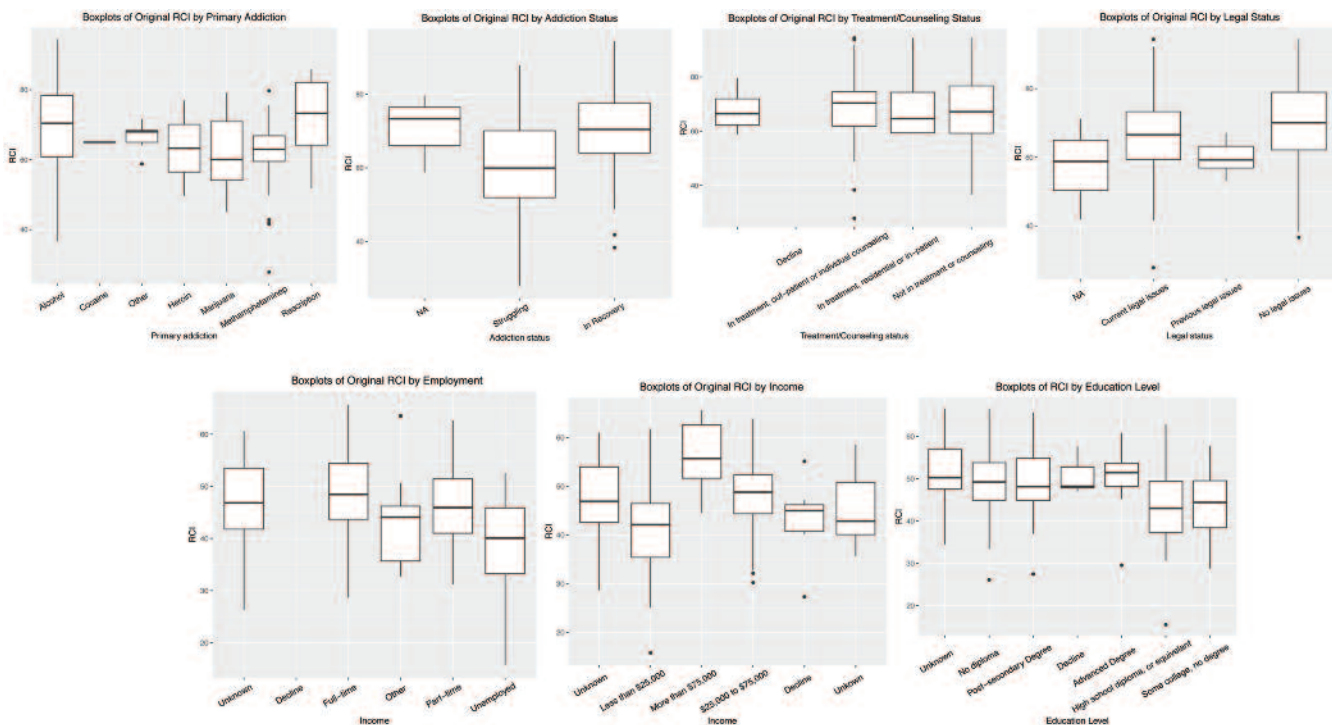


Table 2. Spearman correlation matrix of 9 subscales

|                                   | Health and Wellness | Knowledge and Skills | Basic Human Needs | Family and Home | Social Network | Health Activities and Environment | Social Values | Spirituality and Purpose | Community Connectedness |
|-----------------------------------|---------------------|----------------------|-------------------|-----------------|----------------|-----------------------------------|---------------|--------------------------|-------------------------|
| Health and Wellness               | 1.00                | 0.48                 | 0.47              | 0.29            | 0.31           | 0.44                              | 0.30          | 0.50                     | 0.42                    |
| Knowledge and Skills              | 0.48                | 1.00                 | 0.55              | 0.28            | 0.16           | 0.47                              | 0.18          | 0.30                     | 0.37                    |
| Basic Human Needs                 | 0.47                | 0.55                 | 1.00              | 0.42            | 0.22           | 0.59                              | 0.25          | 0.34                     | 0.41                    |
| Family and Home                   | 0.29                | 0.28                 | 0.42              | 1.00            | 0.37           | 0.47                              | 0.20          | 0.25                     | 0.36                    |
| Social Network                    | 0.31                | 0.16                 | 0.22              | 0.37            | 1.00           | 0.32                              | 0.32          | 0.34                     | 0.49                    |
| Health Activities and Environment | 0.44                | 0.47                 | 0.59              | 0.47            | 0.32           | 1.00                              | 0.51          | 0.46                     | 0.57                    |
| Social Values                     | 0.30                | 0.18                 | 0.25              | 0.20            | 0.32           | 0.51                              | 1.00          | 0.58                     | 0.54                    |
| Spirituality and Purpose          | 0.50                | 0.30                 | 0.34              | 0.25            | 0.34           | 0.46                              | 0.58          | 1.00                     | 0.52                    |
| Community Connectedness           | 0.42                | 0.37                 | 0.41              | 0.36            | 0.49           | 0.57                              | 0.54          | 0.52                     | 1.00                    |

Figure 5. Boxplots of RCI by categories of different clients' characteristics



agree”, such as items 1 and 7, while others were overshadowed by “disagree” or “strongly disagree” answers, like items 2 and 4. This observation was consistent with survey design, in which not every item was written with “strongly agree” being a positive response. The distributions of 22 components within three capital domains, as introduced in the background section, were visualized in Figure 4. The nine components of personal capital had overall higher variability than those in the other two capitals, indicating that clients had more varied thoughts over personal capital components, with “Employment”, “Financial Wellbeing”, and “Housing and Living Situation” being three of the most varied components. “Social mobility” had the least variability among the components, reflecting the fact that clients experienced similar social mobility issues.

**Correlations of Subscales.** The Cronbach’s of the 9 subscales was 0.88, suggesting that these subscales had relatively high internal consistency. In addition, Spearman correlation matrix of subscales was presented in Table 2. All p values were less than 0.05. While these variables with high intercorrelations could measure one underlying variable, which is called a “factor,” these

Table 3. Spearman correlation matrix of the three capitals

|                  | Personal Capital | Social Capital | Cultural Capital |
|------------------|------------------|----------------|------------------|
| Personal Capital | 1.00             | 0.54           | 0.47             |
| Social Capital   | 0.54             | 1.00           | 0.56             |
| Cultural Capital | 0.47             | 0.56           | 1.00             |

correlation coefficients were not extremely high which indicates that any two of the variables were measuring slightly different aspects of the “factor.” In addition, inter-factor correlations of the three capitals were conducted and shown in Table 3. These moderate positive relationships with correlation coefficient around 0.5 verified the design of three capitals measuring different aspects of RCI.

**Comparison of RCI Responses Based on Demographics.**

The distributions of RCI against each of the demographic variables were first visualized by the side-by-side boxplots (Figure 5), which illustrated the capability of RCI to capture both similarities and differences among categories of individual variable. For example, RCIs of clients addicted to prescription were overall higher than those of whom addicted to marijuana, while similar to the those in alcohol addiction group. To further examine and quantify the



**Table 4. Results from Tukey's test of multiple comparisons of means**

|                                  |  | Difference                  | 95% confidence interval |              | P value     |
|----------------------------------|--|-----------------------------|-------------------------|--------------|-------------|
| Primary Addiction                | cocaine vs. alcohol  | -5.08                       | -42.52                  | 32.36        | 1.00        |
|                                  | other vs. alcohol  | -3.59                       | -19.17                  | 11.98        | 0.99        |
|                                  | heroin vs. alcohol   | -6.78                       | -33.35                  | 19.79        | 0.99        |
|                                  | marijuana vs. alcohol  | -8.70                       | -21.55                  | 4.16         | 0.41        |
|                                  | <u>methamphetamine vs. alcohol</u>   | <u>-8.47</u>                | <u>-15.84</u>           | <u>-1.11</u> | <u>0.01</u> |
|                                  | prescription vs. alcohol   | 1.38                        | -11.48                  | 14.24        | 1.00        |
|                                  | other vs. cocaine  | 1.48                        | -38.80                  | 41.76        | 1.00        |
|                                  | heroin vs. cocaine   | -1.70                       | -47.38                  | 43.97        | 1.00        |
|                                  | marijuana vs. cocaine  | -3.62                       | -42.93                  | 35.69        | 1.00        |
|                                  | methamphetamine vs. cocaine  | -3.39                       | -41.26                  | 34.48        | 1.00        |
|                                  | prescription vs. cocaine   | 6.46                        | -32.85                  | 45.77        | 1.00        |
|                                  | heroin vs. other   | -3.19                       | -33.63                  | 27.26        | 1.00        |
|                                  | marijuana vs. other  | -5.10                       | -24.76                  | 14.55        | 0.99        |
|                                  | methamphetamine vs. other  | -4.88                       | -21.47                  | 11.71        | 0.98        |
|                                  | prescription vs. other   | 4.97                        | -14.68                  | 24.63        | 0.99        |
|                                  | marijuana vs. heroin   | -1.92                       | -31.07                  | 27.24        | 1.00        |
|                                  | methamphetamine vs. heroin   | -1.69                       | -28.87                  | 25.49        | 1.00        |
|                                  | prescription vs. heroin  | 8.16                        | -21.00                  | 37.31        | 0.98        |
|                                  | methamphetamine vs. marijuana  | 0.23                        | -13.85                  | 14.30        | 1.00        |
|                                  | prescription vs. marijuana   | 10.08                       | -7.50                   | 27.66        | 0.61        |
| prescription vs. methamphetamine | 9.85   | -4.22                       | 23.92                   | 0.36         |             |
| Addiction Identification         | Struggling vs. NA  | -9.61                       | -26.36                  | 7.13         | 0.37        |
|                                  | In Recovery vs. NA   | 0.68                        | -15.84                  | 17.20        | 0.99        |
|                                  | <u>In Recovery vs. Struggling</u>  | <u>10.29</u>                | <u>5.81</u>             | <u>14.78</u> | <u>0.00</u> |
| Treatment Counseling Status      | In treatment, out-patient or individual counseling vs. NA                                      | 0.91                        | -16.22                  | 18.04        | 1.00        |
|                                  | In treatment, residential or in-patient vs. NA   | 0.53                        | -18.18                  | 19.25        | 1.00        |
|                                  | Not in treatment or counseling vs. NA  | -0.45                       | -17.58                  | 16.67        | 1.00        |
|                                  | In treatment, residential or in-patient vs. In treatment, out-patient or individual counseling | -0.38                       | -9.51                   | 8.76         | 1.00        |
|                                  | Not in treatment or counseling vs. In treatment, out-patient or individual counseling          | -1.36                       | -6.53                   | 3.80         | 0.90        |
|                                  | Not in treatment or counseling vs. In treatment, residential or in-patient                     | -0.99                       | -10.11                  | 8.13         | 0.99        |
|                                  | Legal Status   | Current legal issues vs. NA | 9.31                    | -9.92        | 28.54       |
| Previous legal issues vs. NA     |  | 2.66                        | -19.91                  | 25.24        | 0.99        |
|                                  | No legal issues vs. NA   | 12.97                       | -6.21                   | 32.15        | 0.30        |
|                                  | Previous legal issues vs. Current legal issues   | -6.65                       | -19.53                  | 6.23         | 0.54        |
|                                  | No legal issues vs. Current legal issues   | 3.66                        | -1.26                   | 8.58         | 0.22        |
|                                  | No legal issues vs. Previous legal issues  | 10.31                       | -2.50                   | 23.12        | 0.16        |
|                                  | Employment   | Full-time vs. Unknown       | 2.69                    | -3.37        | 8.75        |
| Other vs. Unknown                |  | -2.07                       | -11.69                  | 7.54         | 0.98        |
| Part-time vs. Unknown            |  | 0.22                        | -7.18                   | 7.62         | 1.00        |
| <u>Unemployed vs. Unknown</u>    |  | <u>-6.91</u>                | <u>-13.73</u>           | <u>-0.08</u> | <u>0.05</u> |
| Other vs. Full-time              |  | -4.76                       | -13.24                  | 3.71         | 0.53        |
| Part-time vs. Full-time          |  | -2.47                       | -8.32                   | 3.37         | 0.77        |
| <u>Unemployed vs. Full-time</u>  |  | <u>-9.60</u>                | <u>-14.70</u>           | <u>-4.50</u> | <u>0.00</u> |

Table 4. Results from Tukey's test of multiple comparisons of means

|            |  |        |        |       |      |
|------------|--|--------|--------|-------|------|
| Employment | Part-time vs. Other  | 2.29   | -7.19  | 11.77 | 0.96 |
|            | Unemployed vs. Other   | -4.83  | -13.87 | 4.20  | 0.58 |
|            | Unemployed vs. Part-time                                       | -7.13  | -13.76 | -0.49 | 0.03 |
| Income     | Less than \$25,000 vs. Unknown                                 | -6.06  | -11.51 | -0.61 | 0.02 |
|            | More than \$75,000 vs. Unknown                                 | 8.68   | 0.63   | 16.73 | 0.03 |
|            | \$25,000 to \$75,000 vs. Unknown                               | 0.74   | -5.26  | 6.73  | 1.00 |
|            | Decline vs. Unknown  | -3.83  | -13.05 | 5.38  | 0.84 |
|            | Unknown vs. Unknown  | -1.88  | -11.52 | 7.77  | 0.99 |
|            | More than \$75,000 vs. Less than \$25,000                      | 14.74  | 7.30   | 22.18 | 0.00 |
|            | \$25,000 to \$75,000 vs. Less than \$25,000                    | 6.80   | 1.65   | 11.94 | 0.00 |
|            | Decline vs. Less than \$25,000                                 | 2.23   | -6.46  | 10.91 | 0.98 |
|            | Unknown vs. Less than \$25,000                                 | 4.18   | -4.96  | 13.33 | 0.77 |
|            | \$25,000 to \$75,000 vs. More than \$75,000                    | -7.94  | -15.79 | -0.10 | 0.05 |
|            | Decline vs. More than \$75,000                                 | -12.51 | -23.03 | -2.00 | 0.01 |
|            | Unknown vs. More than \$75,000                                 | -10.56 | -21.45 | 0.34  | 0.06 |
|            | Decline vs. \$25,000 to \$75,000                               | -4.57  | -13.60 | 4.46  | 0.69 |
|            | Unknown vs. \$25,000 to \$75,000                               | -2.61  | -12.09 | 6.86  | 0.97 |
|            | Unknown vs. Decline  | 1.96   | -9.82  | 13.73 | 1.00 |
| Education  | No diploma vs. Unknown   | -5.93  | -14.87 | 3.01  | 0.43 |
|            | Post-secondary degree vs. Unknown                              | -3.02  | -11.52 | 5.48  | 0.94 |
|            | Decline vs. Unknown  | -2.24  | -16.29 | 11.82 | 1.00 |
|            | Advanced degree vs. Unknown                                    | -2.04  | -12.65 | 8.58  | 1.00 |
|            | High school diploma, or equivalent vs. Unknown                 | -8.60  | -17.38 | 0.18  | 0.06 |
|            | Some college, no degree vs. Unknown                            | -7.97  | -16.62 | 0.67  | 0.09 |
|            | Post-secondary degree vs. No diploma                           | 2.91   | -4.03  | 9.85  | 0.87 |
|            | Decline vs. No diploma   | 3.69   | -9.48  | 16.87 | 0.98 |
|            | Advanced degree vs. No diploma                                 | 3.89   | -5.52  | 13.31 | 0.88 |
|            | High school diploma, or equivalent vs. No diploma              | -2.67  | -9.95  | 4.62  | 0.93 |
|            | Some college, no degree vs. No diploma                         | -2.04  | -9.17  | 5.08  | 0.98 |
|            | Decline vs. Post-secondary degree                              | 0.78   | -12.09 | 13.66 | 1.00 |
|            | Advanced degree vs. Post-secondary degree                      | 0.98   | -8.01  | 9.97  | 1.00 |
|            | High school diploma, or equivalent vs. Post-secondary degree   | -5.58  | -12.31 | 1.15  | 0.18 |
|            | Some college, no degree vs. Post-secondary degree              | -4.95  | -11.51 | 1.60  | 0.27 |
|            | Advanced degree vs. Decline                                    | 0.20   | -14.16 | 14.56 | 1.00 |
|            | High school diploma, or equivalent vs. Decline                 | -6.36  | -19.42 | 6.70  | 0.77 |
|            | Some college, no degree vs. Decline                            | -5.74  | -18.71 | 7.24  | 0.84 |
|            | High school diploma, or equivalent vs. Advanced degree         | -6.56  | -15.82 | 2.70  | 0.35 |
|            | Some college, no degree vs. Advanced degree                    | -5.94  | -15.07 | 3.20  | 0.46 |
|            | Some college, no degree vs. High school diploma, or equivalent | 0.62   | -6.29  | 7.54  | 1.00 |

uneven distributions of RCIs within categories of these variables, we performed pairwise comparison using Tukey's test of multiple comparisons, (results shown in Table 4). The pairs of categories within each variable were underlined if their means were significantly different ( $p$  value  $< 0.05$ ) from each other in Table 4. If any of the pairs were different, we concluded that the corresponding variable was significantly associated with RCI. Overall, the variables that were significantly associated with RCI are: primary addiction, addiction identification, employment, and income.

### Discussion

The RCI is an innovative tool, which is now a validated instrument based on this research, that was developed in South Dakota, a state that is no stranger to innovations in the alcohol and drug space. In 2005, the state of South Dakota implemented use of twice daily breathalyzers for DUI offenders. During the first five years of the program that included "swift, certain, and modest sanctions for violations," repeat DUI arrests were reduced by 12 percent.<sup>15</sup> The RCI measures what it is supposed to measure and accurately describes the current state of recovery for the individual taking the assessment. The results of the validation steps taken so far have also provided FIT with the information needed to further define its instrument implementation structure.

There are numerous screening tools specifically designed to identify the presence or risk of alcohol or other drug addiction. Many of these tools have been standardized and used across clinical settings. Because the recovery or wellness journey is not generally managed or monitored in the same clinical proximity or interest, no tools have emerged to measure addiction wellness. As addiction care continues to be integrated into mainstream healthcare and chronic disease management programs, such an instrument or standard will be required to ensure the tracking of outcomes in an outcomes-driven reimbursement system.

The most prominent manifestation of the disease of addiction is the use of a substance. Clinical trials for community and clinical-based interventions largely focus on the use or non-use of a substance as the primary success indicator for that modality – essentially ignoring myriad of symptoms associated with the illness. If interventions continue to be designed and delivered to cease use, individuals will see use or non-use as the beginning and the ending of addiction wellness. As the ASAM definition

of addiction<sup>16</sup> and SAMSHA definition of recovery<sup>1</sup> clearly indicate, addiction and addiction wellness have significantly more relevant variables. The RCI provides the holistic measurement that is relevant at any point in the continuum of care (e.g., before or after clinical care). The RCI is designed to give the provider of care (clinical or peer) momentary assessments of a person's addiction wellness, as well as a longitudinal perspective when administered over a long period of time. More importantly, the instrument allows the provider and person impacted by the disease to focus in on areas of that person's life that need new or continued attention.

Since beginning this validation project, FIT has modified its protocol for administering the RCI along with another instrument that measures risk for clients. By administering these instruments on the same day, we believe we can move forward with validating the predictive nature of the RCI to determine if it will measure behavior change (e.g., increased connectedness, decreased legal issues, harm reduction, increased hopefulness, etc.). FIT intends to move forward with shortening the instrument length after we further our validation work. We also intend to use the instrument – short or long form – in combination with previous RCI responses, intervention activity, demographic data, and natural language from other communication to prescribe interventions (including intensity), establish coaching plans, and predict outcomes (as determined by previous performance of similar clients). Looking to the future, we will continue to explore opportunities to publish results of our validation activities as an effort to build on the addiction-related body of knowledge.

### REFERENCES

1. SAMHSA. SAMHSA's working definition of recovery: 10 guiding principles of recovery. Publication PEP 12-RECDEF. 2012.
2. The Betty Ford Institute Consensus Panel. What is recovery? A working definition from the Betty Ford Institute. *J Subst Abuse Treat.* 2007;33(3):221-8.
3. White WL, Cloud W. Recovery capital: a primer for addictions professionals. *Counselor.* 2008;9:22-7.
4. Best D, Laudet A. The Potential of Recovery Capital. *RSA Proj.* 2010;1-6.
5. Portes A. Social capital: its origins and applications in modern sociology. *Annu Rev Sociol.* 1998;24(1):1–24. Retrieved from [www.annualreviews.org/doi/10.1146/annurev.soc.24.1.1](http://www.annualreviews.org/doi/10.1146/annurev.soc.24.1.1).

*Please note: Due to limited space, we are unable to list all references. You may contact South Dakota Medicine at 605.336.1965 for a complete listing.*

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