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The Assessment of Recovery Capital: Properties and psychometrics of a measure of addiction recovery strengths

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Abstract

Introduction and Aims. *Sociological work on social capital and its impact on health behaviours have been translated into the addiction field in the form of 'recovery capital' as the construct for assessing individual progress on a recovery journey. Yet there has been little attempt to quantify recovery capital. The aim of the project was to create a scale that assessed addiction recovery capital.* ***Design and Methods.*** *Initial focus group work identified and tested candidate items and domains followed by data collection from multiple sources to enable psychometric assessment of a scale measuring recovery capital.* ***Results.*** *The scale shows moderate test–retest reliability at 1 week and acceptable concurrent validity. Principal component analysis determined single factor structure.* ***Discussion and Conclusions.*** *The Assessment of Recovery Capital (ARC) is a brief and easy to administer measurement of recovery capital that has acceptable psychometric properties and may be a useful complement to deficit-based assessment and outcome monitoring instruments for substance dependent individuals in and out of treatment.* [Groshkova T, Best D, White W. The Assessment of Recovery Capital: Properties and psychometrics of a measure of addiction recovery strengths. *Drug Alcohol Rev* 2012]

Key words: addiction, recovery capital measure, assessment, psychometrics.

Introduction

Recovery is emerging as a new organising paradigm for policy and clinical practice within the addictions treatment arena in both the UK and the USA [1–4]. The Scottish Government's 'Road to Recovery' [2] states that recovery is the goal of all services, and the English strategy is equally explicit: 'A fundamental difference between this strategy and those that have gone before is that instead of focusing primarily on reducing the harms caused by drug misuse, our approach will be to go much further and offer every support for people to choose recovery as an achievable way out of dependency' [3]. These policy shifts reflect calls to shift the design of addiction treatment from models of acute and palliative care to models of assertive and sustained recovery management [5–7]. Operationalising the recovery concept within behavioural health systems transformation initiatives hinges on the ability to define recovery and measure recovery capital.

The UK Drug Policy Commission defined recovery as a process of 'voluntarily sustained control over substance use which maximises health and well-being and participation in the rights, roles and responsibilities of society' [8]. It further differentiated recovery stages as 'early sobriety' (first year), 'sustained sobriety' (1–5 years) and 'stable sobriety' (≥ 5 years). In the USA, the Betty Ford Institute Consensus Panel [9,10] defined recovery as 'a voluntarily maintained lifestyle characterised by sobriety, personal health and citizenship'.

The concepts of quality of life and recovery capital are also being cited within these recovery-focused policy and program initiatives. Quality of life influences both vulnerability for substance use disorders [11–14] and the outcomes of recovery initiation and maintenance effort [15,16]. Cloud and Granfield [17] have defined recovery capital as 'the breadth and depth of internal and external resources that can be drawn upon to initiate and sustain recovery from AOD

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[alcohol and other drug] problems'. White and Cloud [18] have undertaken a review of long-term recovery concluding that it is predicted more effectively on the basis of strengths rather than pathologies, indicating the need for stronger measures of recovery capital for people in long-term recovery.

Recovery capital measurement is not captured well by traditional outcome assessments, such as the Addiction Severity Index [19,20] or the Maudsley Addiction Profile [21], although some measures of recovery capital are beginning to be incorporated into instruments such as the Global Appraisal of Individual Need [22] and the Community Assessment Inventory [23]. Also, there is an emerging body of work on recovery capital [24], but this has been carried out with an exclusively alcohol-dependent cohort and the resulting scale has a strong spiritual component—potentially limiting its acceptability and applicability among a wider group of substance-dependent individuals. Historically, treatment outcome measures have focused on the reductions in symptoms and pathologies. While major outcome studies in the USA [25] and UK [26,27] have shown significant benefits of treatment in terms of reductions in substance use and related problems, they tell very little about the personal and social assets that aided recovery or about the quality of life in long-term recovery. New measurement instruments that focus in such dimensions are needed to reflect the shift towards models of recovery management and recovery-oriented systems of care.

This article presents data on the development of a new instrument designed to measure recovery capital. The goal in the design process was to create a scale that could capture positive measures of personal and social resources, and thus to move from a 'diagnostic' instrument to an instrument that would help measure the individual's strengths and resources to meet their needs and aspirations in the next phase of their recovery journey.

Methods

Development of the Assessment of Recovery Capital

An initial item pool was developed, based on discussions with practitioners and service user groups about what the key areas of recovery were for them. From these discussions, and with reference to current academic literature describing addiction recovery, key domains were identified and questions agreed in discussions between the authors that were tested in focus groups and one-to-one interviews with people in various stages of recovery. An instrument was developed that consisted of 50 items in 10 domains—with each domain comprising five items assessing recovery strengths.

The initial version of the questionnaire was then piloted with a cohort of clients attending a community rehabilitation service in Edinburgh, Scotland. This was to determine completion time and ease of comprehensibility of the scale. Following this initial test, minor changes were made and the scale (available in online Supporting Information) was agreed for field-testing. Individuals completing the scale were required to tick only the boxes for statements that they agreed with and that described their experience on the day of assessment. Thus a score between 0 and 5 could be reached for each sub-scale, reflecting one recovery domain. The overall score was calculated by totalling the scores for each sub-scale, with higher Assessment of Recovery Capital (ARC) score indicating higher recovery capital.

Samples and data collection

Data were collected from two samples:

Treatment sample. Initial field-testing of the scale was carried out using data collected from 142 individuals engaging with four community rehabilitation services in Scotland between February and July 2010. Of these, 89 (62.7%) were men, 98 (69.0%) were white British and 44 (31.0%) were of other ethnicity. The average age at time of assessment was 35.2 (SD 12.3; range 17.3–62.7). Each individual was asked to indicate their substance of choice and 47 (35.3%) reported alcohol, 42 (31.6%) were drug clients and 44 (33.1%) indicated both alcohol and drugs.

From the original 'treatment' cohort, a random subsample ($n = 45$) was given the ARC scale to complete one week later, to assess the scale's test–retest reliability. This sub-cohort of participants were asked to use a unique identifier on both occasions so that data collected in the first week could be matched to data collected one week later.

Recovery sample. A second set of data was obtained from 176 individuals (average age 41.5 $\pm$ 9.1, range 19.0–69.0; male: 72%) in recovery groups and communities across England. In this sample, 56 individuals (31.7%) were in recovery from drugs only, 75 (42.7%) from drugs and alcohol and 45 (25.6%) from alcohol only. Recovery stage, i.e. early (< 5 years) and late (≥ 5 years), was defined on the basis of self-reported length of time in recovery (mean 40.2 $\pm$ 49.9 months; range 1–276). The majority (90.9%, $n = 160$) reported stable housing and just under half of the sample (47.2%, $n = 83$) was engaging with work or other meaningful activity. Recruitment criteria for the study participation and fuller 'recovery' sample description are provided elsewhere [28]. ARC was administered alongside other measures.

Validation measures

One additional scale was included in a random sub-sample of 'treatment' participants ($n = 72$) to validate ARC and two were available in the 'recovery' sample. These scales were chosen to include those that measured similar concepts to ARC—World Health Organization (WHO) quality of life assessment instrument (WHOQOL-BREF) [29,30] and the physical, psychological and quality of life items of the Treatment Outcome Profile (TOP) [31]. These measures took approximately 10 min to complete in the 'treatment' sample when given alone and around 45 min in the 'recovery' sample, where they were embedded in a larger instrument. Participants were offered £10 in the community treatment sample. No payment was made in the 'recovery' sample.

Statistical analyses

Means, standard deviations and analytical tests were calculated using IBM SPSS Statistics v19 (SPSS Inc., Chicago, IL, USA). Before analyses, the normality assumption was investigated, using Shapiro–Wilk test on each (sub-) sample.

Reliability. Scale's test–retest reliability at 1 week was assessed using intra-class correlation coefficient (ICC), based on a sub-sample ($n = 45$). Prior to conducting and analysing the study, the interpretation of ICC results was determined as follows [32]: ICC < 0.00: poor correlation, ICC = 0.00–0.20: slight correlation, ICC = 0.21–0.40: fair correlation, ICC = 0.41–0.60: moderate correlation, ICC = 0.61-0.80: substantial correlation, and ICC > 0.80: almost perfect correlation.

Concurrent validity. Correlations between ARC scores and validated indicators of quality of life, psychological and physical health were calculated using Spearman's rank correlation coefficients. Based on the content of each sub-scale, we hypothesised that ARC would show strong, positive correlations with WHOQOL-BREF (and its sub-scales) [29,30] and TOP physical, psychological and quality of life items [31]. WHOQOL-BREF has demonstrated good to excellent psychometric properties of reliability (Chronbach's alpha: physical health 0.82; psychological health 0.81; environment 0.80; social relationships 0.68) and has performed well in initial tests of validity [33]. TOP has shown substantial test–retest reliability (ICC and Cohen's kappa ≥ 0.75 and 0.61 respectively), acceptable validity in comparison with a number of other instruments and has proven sensitive to detecting clinical change over time [31].

Factor structure and discriminant validity. The factor structure of ARC was examined via a principal component analysis [34]. The determination of a significant item factor loading was based on Kline's [35] criteria and set at a coefficient level of ≥0.40.

Logistic regression was used to establish discriminant validity, comparing ARC test measures between individuals from the 'recovery' sample who reported membership or not in any of the groups: (i) engaged in meaningful activity; and (ii) in stable housing.

Predictive validity. To determine and compare the sensitivity (SN) and specificity (SP) of ARC as an indicator of stable recovery and obtain its optimal cut-off scores, receiver operating characteristic (ROC) curve was plotted. Validity coefficients (SN, SP), and the area under the curve (AUC) and its associated 95% confidence interval (CI) were calculated. Optimal cut-off scores were determined by assessing the score, which combined maximum SN and optimal SP, using the Youden index (γ) [36,37].

Ethics

Participants were recruited following ethical approval from the ethics committee at the University of the West of Scotland (19 January 2010).

Results

Preliminary ARC data

Mean domain scores for the total clinical population studied were calculated (Table 2).

Test–retest reliability

In the second round of testing, 45 subjects responded, returning full completion of all questionnaire items. Shapiro–Wilk tests were significant for all ARC sub-scales, indicating lack of normalcy of the distribution. As the data were substantially negatively skewed, they were 'reflected' and then logarithmic transformations with base 10 were applied [38] to improve the normality of the variables, following which the distributions were 'reflected' again to restore the original order of the variables. The original means are reported as recommended by Grissom [39]. ICC (for each domain and for overall ARC) was used as a single measure for test–retest reliability.

Among our sample, reliability coefficients were generally satisfactory. On a subscale-level, the results indicated moderate (global psychological health, global physical health, meaningful activities, housing and safety, coping and life functioning) to substantial (substance use and sobriety, citizenship and community involvement, social support, risk-taking, recovery

Table 1. *ARC norms (SD) (*n *= 142); test–retest means (SD), reliability coefficients and 95% confidence interval (*n *= 45)*

	Mean (SD)	Test (SD)	Retest (SD)		95% confidence interval	
ARC domain	$n = 142$	$n = 45$		ICC	lower limit	upper limit
Substance use and sobriety	2.58 (1.43)	2.62 (1.52)	2.48 (1.30)	0.73	0.56	0.85
Global psychological health	3.44 (1.38)	3.42 (1.33)	3.50 (1.25)	0.60	0.36	0.76
Global physical health	3.24 (1.60)	3.21 (1.50)	3.24 (1.56)	0.50	0.23	0.70
Citizenship and community involvement	3.10 (1.70)	3.27 (1.47)	2.97 (1.65)	0.62	0.40	0.78
Social support	2.93 (1.67)	2.90 (1.59)	3.09 (1.61)	0.61	0.37	0.77
Meaningful activities	3.15 (1.47)	3.27 (1.42)	3.29 (1.33)	0.57	0.32	0.74
Housing and safety	2.87 (1.59)	2.79 (1.63)	2.76 (1.45)	0.58	0.34	0.75
Risk-taking	2.98 (1.33)	3.23 (1.32)	2.97 (1.32)	0.63	0.41	0.78
Coping and life functioning	3.31 (1.58)	3.25 (1.48)	3.30 (1.40)	0.57	0.36	0.74
Recovery experience	3.65 (1.63)	3.60 (1.30)	3.62 (1.66)	0.72	0.53	0.84
ARC total score	31.25 (11.54)	31.56 (10.30)	31.13 (9.17)	0.61	0.35	0.75

ARC, Assessment of Recovery Capital; ICC, intra-class correlation coefficient.

Table 2. *Correlations between ARC and other scales*

	r; P-value			
ARC domain	Physical QOL	Psychological QOL	Social QOL	Environmental QOL
Substance use and sobriety	0.67^{c}	0.70^{b}	0.47^{a}	0.72^{c}
Global psychological health	0.81^{d}	0.81^{d}	0.74^{c}	0.81^{d}
Global physical health	0.87^{d}	0.84^{d}	0.74^{c}	0.82^{d}
Citizenship and community involvement	0.50^{a}	0.62^{c}	0.34^{ns}	0.45^{c}
Social support	0.77^{d}	0.75^{d}	0.70^{c}	0.73^{c}
Meaningful activities	0.71^{c}	0.72^{c}	0.65^{c}	0.65^{c}
Housing and safety	0.70^{c}	0.73^{c}	0.54^{a}	0.76^{d}
Risk-taking	0.76^{d}	0.76^{d}	0.53^{a}	0.75^{d}
Coping and life functioning	0.85^{d}	0.85^{d}	0.78^{d}	0.84^{d}
Recovery experience	0.60^{b}	0.64^{c}	0.43^{b}	0.69^{c}
ARC total score	0.83^{d}	0.84^{d}	0.69^{b}	0.82^{d}

$^{ns}P > 0.05$; $^{a}P < 0.05$; $^{b}P < 0.01$; $^{c}P < 0.001$; $^{d}P < 0.0001$. ARC, Assessment of Recovery Capital; QOL, quality of life.

experience) degrees of reliability, and there was substantial correlation for the total ARC score also (Table 1).

Concurrent validity

Shapiro–Wilk tests were non-significant for psychological and environmental WHOQOL-BREF, confirming that these data were sufficiently normal and significant for physical and social QOL variables. The latter were transformed before applying correlation analysis.

In a random sub-sample ($n = 72$) of the 'treatment' cohort and in the 'recovery' sample ($n = 176$), as hypothesised, all areas of recovery strengths as measured by ARC showed significant positive relationship to WHOQOL physical and psychological dimensions. Citizenship and recovery experiences were not significantly associated with social life quality, and citizenship did not show significant positive association with environmental quality of life. There were statistically significant positive associations between the overall ARC score and all four measures of WHOQOL (Table 2).

The exploration of ARC concurrent validity was supplemented with a mapping of ARC physical and psychological sub-scales and the total ARC score against corresponding items from TOP. There were statistically significant correlations in the expected direction between ARC physical and psychological health subscales and TOP physical health ($r = 0.35$; $P < 0.0001$), and psychological ($r = 0.39$; $P < 0.0001$) items, and

between ARC total score and TOP quality of life ($r = 0.40$; $P < 0.0001$) item.

Discriminant validity

Logistic regression contrasted ARC test scores among recovering individuals who reported (i) engagement or not in work or other meaningful activity; and (ii) stable housing or not. After adjustment for gender and age, for work or other meaningful activity the factors retained were: ARC global physical health [Exp(B) = 2.44; 95% CI 1.26–4.73] and recovery stage [Exp(B) = 5.62; 95% CI 1.61–19.45]; for stable housing: ARC housing safety [Exp(B) = 1.87; 95% CI 0.98–3.56].

Table 3. *Loadings of ARC subscales on a single factor*

ARC domain	Factor 1
Substance use and sobriety	0.78
Global psychological health	0.74
Global physical health	0.74
Citizenship	0.54
Social support	0.66
Meaningful activities	0.73
Housing and safety	0.55
Risk-taking	0.54
Coping and life functioning	0.78
Recovery experience	0.76

ARC, Assessment of Recovery Capital.

Factor structure

After performing principal component analysis, 57% of the variation could be accounted for by the first linear component (factor). To test the null hypothesis that the original correlation matrix was an identity matrix, Bartlett's test of sphericity was used. The test was significant ($\chi^2 = 820.7$, $P < 0.0001$), with Kaiser-Mayer-Olkin measure of sampling adequacy at 0.6, both indicating the appropriateness of factor analysis. The analysis extracted one factor (Table 3).

Sensitivity and specificity

Sensitivity (SN) and specificity (SP) values for different cut-off points were computed and a ROC curve (Figure 1) was constructed to determine the best cut-off to choose. The estimated ROC curve had an AUC of 0.890 (95% CI 0.84–0.94), a value close to 1, indicating ARC's high concurrent validity with stable recovery ($\geq$ 5 years).

The hypothesis was tested whether the AUC was greater than 0.5, that is whether using ARC to predict recovery stage is better than chance alone. The AUC = 0.89 (95% CI 0.84–0.94) ($P < 0.0001$), suggesting that ARC does help to predict recovery stage.

Furthermore, using SN and SP values for different cut-off points of ARC total score, Youden indices were calculated for a range of possible cut-off points. According to the ROC curve above and guided by the J-values, the optimal cut-off level yielding maximal SN and SP

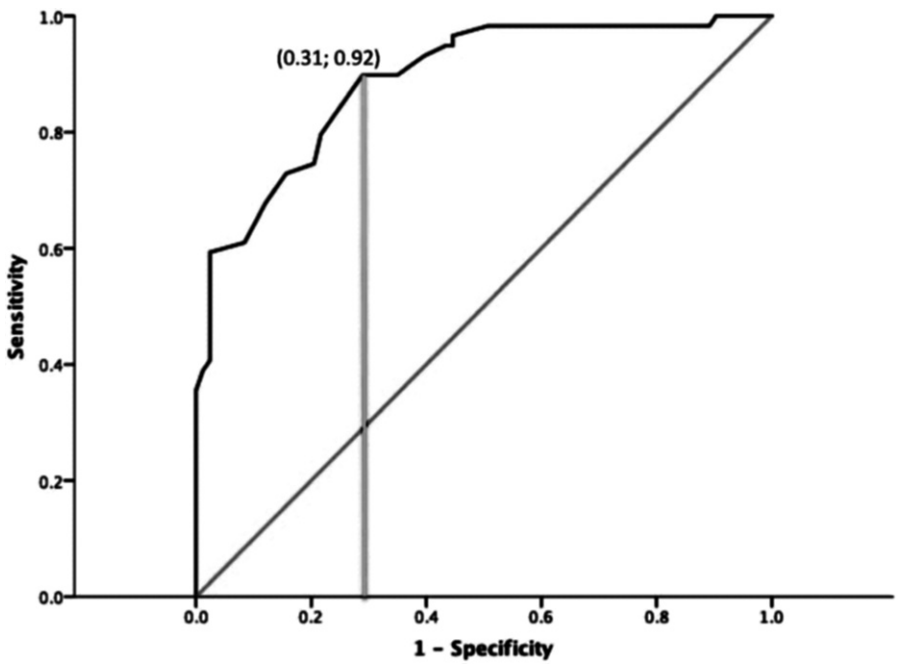

Figure 1. *ROC curve of ARC total score and recovery stage. ARC, Assessment of Recovery Capital; ROC, receiver operating characteristic.*

for predicting stable recovery was an ARC score of 27.5 (SN = 92%; SP = 69%, at $\mathcal{J} = 0.61$).

Discussion

The project aim was to develop an easy-to-administer instrument that could chart levels of recovery capital in individuals at different stages of their recovery journey. The result was a scale consisting of 50 items assessing recovery strengths, made up of 10 sub-scales of five items each. This scale takes around 5–10 min to complete and was found to be acceptable to participants in a range of treatment and non-treatment settings during the piloting and testing phase.

In terms of the psychometric properties of the instrument a range of tests were carried out with two populations—the first a primarily 'treatment' group and the second a cohort of individuals who regarded themselves as being 'in recovery'. ICC was used as the measure of reliability with substantial reliability reported for the overall scale and all of the sub-scales rating at either moderate or substantial reliability, suggesting that the scale is a consistent indicator of recovery strengths and resources among substance users in recovery. Concurrent validity was assessed for the 'treatment' population by comparing the results to WHOQOL scale [29,30] with the overall score on ARC correlating at above 0.8 with all four of the sub-scales from WHOQOL measure. Also, validity was assessed for the 'recovery' group by comparing scores on the ARC with the TOP [31]. There were strong correlations between ARC subscales and the TOP physical and psychological health items and the overall ARC score correlated positively with the single TOP item measure of quality of life.

Furthermore, analysis would suggest that there is a single underlying factor of recovery capital with factor analysis identifying a single dimension accounting for 57% of the variance and loadings for each of the sub-scales ranging from 0.54 to 0.78. The ability was also tested of ARC to identify those who had reached a point of self-reported 'stable recovery', based on the Betty Ford Consensus Panel description of stages of recovery, and the AUC was 0.89, suggesting that the instrument was highly successful in discriminating individuals in later stages of recovery from those earlier in their recovery journeys. This is reflected in the positive predictive values reported at different total ARC scores when treated as cut-off points. This suggests that the ARC can be used to help assess where clients are in their recovery journeys and what their growth needs are likely to be as they progress.

There are still important outstanding questions to be answered about both the predictive validity and the ability of ARC to direct individuals towards appropriate forms of intervention. There is also a major conceptual challenge around assessing the relationship between changes in the harms and pathologies assessed by mainstream research and clinical measures, and the profile of positive recovery resources measured by ARC. Nonetheless, for non-acute treatment settings, such as rehabilitation provision and aftercare, ARC is more likely to provide a more useful indicator of their effectiveness than instruments such as the Maudsley Addiction Profile [21] or the Opiate Treatment Index [40], particularly in the post-acute phases of treatment, as it measures the growth of positive strengths and provides a positive focus for peer and therapeutic interventions that focus on meaningful gains rather than the management and reduction of harms.

A major limitation of the study is around the lack of verification of self-reported recovery. Furthermore, there is a need to verify the instrument with biomarkers such as blood-borne bio-identifiers or brain imaging signatures of recovery as well as replicating it across different clinical and recovery support settings and among individuals in different cultural contexts. There is also work to be done on how useful clinicians find the ARC in drawing up care plans and determining the priorities in ongoing client support and engagement.

The need for a measure that assesses recovery capital is driven not only by the policy changes in the UK [2,3] that have brought recovery to greater prominence, but also by a shift in our understanding of the goals of treatment and long-term inclusion and well-being [41,42]. ARC offers a model for mapping and measuring the positive changes in personal and social capital that can be applied in both clinical and research settings and which will allow a quantification of what White and Cloud [18] have argued is the strongest predictor of long-term recovery from substance dependence.

ARC covers a broad range of domains that are critical to recovery at successive stages of the process and is applicable to 'recovery paths' including, but not limited to treatment. It can therefore be useful in quantifying resources available to individuals, as well as interventions and support needs. At the time of writing, the work around the instrument is ongoing and some aspects of it will be critical to quantifying recovery outcomes. Most notably, a future investigation is likely to address how ARC could be used in combination with pathology-focused instruments. Looking at individual recovery capital in tandem with symptom profiles, including environmental factors, will illuminate how recovery capital and problem severity/complexity interact to influence type and level of treatment placement, as well as predicting response to particular levels of care via post-intervention recovery outcome.

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Supporting information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Assessment of Recovery Capital (ARC).
Appendix S2. Technical appendix: estimating the number of participants for the analyses.

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