

Full length article

Recovery capital pathways: Modelling the components of recovery wellbeing

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ABSTRACT

Background: In recent years, there has been recognition that recovery is a journey that involves the growth of recovery capital. Thus, recovery capital has become a commonly used term in addiction treatment and research yet its operationalization and measurement has been limited. Due to these limitations, there is little understanding of long-term recovery pathways and their clinical application.

Methods: We used the data of 546 participants from eight different recovery residences spread across Florida, USA. We calculated internal consistency for recovery capital and wellbeing, then assessed their factor structure via confirmatory factor analysis. The relationships between time, recovery barriers and strengths, wellbeing and recovery capital, as well as the moderating effect of gender, were estimated using structural equations modelling.

Results: The proposed model obtained an acceptable fit ($\chi^2(141, N = 546) = 533.642, p < 0.001$; CMIN/DF = 3.785; CFI = 0.915; TLI = 0.896; RMSEA = 0.071). Findings indicate a pathway to recovery capital that involves greater time in residence ('retention'), linked to an increase in meaningful activities and a reduction in barriers to recovery and unmet needs that, in turn, promote recovery capital and positive wellbeing. Gender differences were observed.

Conclusions: We tested the pathways to recovery for residents in the recovery housing population. Our results have implications not only for retention as a predictor of sustained recovery and wellbeing but also for the importance of meaningful activities in promoting recovery capital and wellbeing.

1. Introduction

In recent years, there has been a gradual transition from an exclusively clinical definition of addiction recovery to something broader, incorporating not only control over substance use but also global health and active participation in communities (Betty Ford Institute Consensus Panel, 2007; UK Drug Policy and Commission, 2008). Following mental health recovery, there has also been increasing interest in differentiating between observable changes (substance use, offending, etc.) and experiential processes (such as changes in identity, quality of life and a sense of hope and belonging; Slade, 2010). Further, there is recognition that recovery is a journey and not an event, and that it takes around five years before recovery can be regarded as self-sustaining (Dennis et al., 2005). This concept of a journey was originally considered in terms of reduced likelihood of relapse (White, 2009) but has been reframed as involving the growth of recovery capital (Granfield and Cloud, 2001), defined as the sum of resources that an individual

can draw on to support their recovery pathway. As individuals progress through their recovery journey, so recovery capital should increase, which is likely to augment the chances of ongoing remission (Kelly and Hoepfner, 2015). Best and Laudet (2010) have argued that there are three domains for recovery capital – personal capital (qualities such as self-esteem and resilience), social capital (based on the networks and supports that the individual can draw on) and community capital (referring to the resources from the local community that can be accessed such as reasonable housing, training and employment opportunities).

This has prompted an increased interest in the idea of operationalising recovery capital. In 2013, based on extensive piloting in Scotland and England, Groshkova et al. published a paper reporting on the psychometrics of the Assessment of Recovery Capital (ARC). The 50-item instrument showed strong internal properties and correlated well with measures of quality of life and wellbeing.

However, there are limitations with the ARC as a standalone measure – it does not account for the community recovery capital domain

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that Best and Laudet (2010) identified as central to understanding long-term recovery pathways and it also offers little direction to addiction treatment professionals or peer recovery champions identifying the next stages of an individual's recovery journey, and so its application in treatment and recovery community organisations has been limited. For this reason, Best et al. (2016a; see also Best et al., 2016b) have developed the REC-CAP as a recovery capital battery of measures to create a more holistic assessment of recovery barriers and strengths, and that creates a profile that informs subsequent recovery care planning.

A critical question involves how this recovery intervention is designed to generate lasting effects (see Walton, 2014; Wilson, 2011) that become embedded in the structure of people's lives (see Kenthirarajah and Walton, 2015). Prior research has shown that retention in recovery residences contributes to continued abstinence (French et al., 1993), albeit with gender differences (Brady and Ashley, 2005; Marsh et al., 2004), and also creates the conditions to gain useful employment skills (Gómez et al., 2014), which in turn is a favourable factor in continued remission (Platt, 1995). In other words, retention in recovery residences provides residents with opportunities to redevelop purpose and identity that benefits their selves and (re)connects them to the world beyond the self (see Burrow and Hill, 2011; Damon et al., 2003; Yeager and Bundick, 2009; Yeager et al., 2012). Building on Lewin (1943) field-theory analysis, the present study argues that recovery is initiated by first targeting people's meaningful activities (identified in the REC-CAP as employment, education and volunteering) yet we also appreciate that multiple, interrelated forces influence the individual within a force field at any moment. Therefore, a lasting change will be the consequence of an equilibrium of forces between meaningful activities and context-specific barriers and needs.

Thus, the present study proposes a dose effect by which the longer the stay in recovery residences, the higher the increase in meaningful activities, and the lower the number of barriers to recovery (identified in the REC-CAP as accommodations risk, substance use, criminal justice involvement and lack of meaningful activities) and unmet needs (identified in the REC-CAP as help-seeking regarding drug treatment services, alcohol treatment services, mental health services, housing support, employment services, primary healthcare services and family relationships), resulting in increased recovery capital that may foster wellbeing. Since there are fundamental differences in pathways to recovery for men and women, with stronger effects of self-help participation on recovery for the latter (Grella et al., 2008), a second objective was to assess whether and to what extent gender was a moderating variable. Thus, the current paper examines three primary research questions:

1. What are the psychometric properties of the REC-CAP regarding its internal consistency and the relationships between observable variables and their underlying constructs (structure of recovery capital and wellbeing)?
2. In a population of participants from recovery residences, what are the effects of recovery enablers (time in residence and meaningful activities) and recovery weaknesses (barriers and unmet needs) on recovery capital and wellbeing?
3. Are there gender differences in the pathways to recovery for residents in the recovery housing population?

2. Methods

2.1. Participants

The eight recovery residences addressed in this study are spread across Florida and are all certified members of the Florida Association of Recovery Residences – FARR (USA), an accreditation body for recovery residences. FARR is an affiliate of the National Alliance for Recovery Residences (NARR), which has established a national standard for recovery residence certification. NARR's standard is built upon

the Social Model of Recovery Philosophy (SMRP) and emphasises gaining experiential knowledge, connection and peer support as the basic elements to create the framework for recovery (Wright, 1990). All recruit from either community treatment or criminal justice agencies and require abstinence, mutual aid meeting attendance, the acquisition or maintenance of meaningful employment and contribution to the wellbeing and upkeep of the residence.

There are similarities, with some nuances and heterogeneity, between the residences. First, all of them require residents to remain sober during their stay in the house. Second, attendance at 12-step meetings is considered and encouraged, yet it is not always mandated. Third, stays are usually long-term (more than 30 days), with some residences establishing curfews that usually depend on the stage of recovery. While some residences rely on Intensive Outpatient Programs (e.g., Service 3), others focus on Group Therapy (e.g., Service 5) or Empowerment Models (e.g., Service 8). Likewise, there is heterogeneity within residences. For example, Service 1 offers Partial Hospitalization, Intensive Outpatient Program (IOP), Outpatient (OP), and Individual Therapy. Finally, only Service 8 offers a Veterans Program, and only Service 7 is exclusive for women.

Participants were recruited through residence unit managers and were asked to complete the survey on a single occasion on a confidential basis, either alone or as a structured research interview administered by the unit manager, depending on the agreement reached between the project team and the service. Participants in the study were 546 people resident in one of eight recovery residences and so would have already completed any acute addictions treatment that they required (e.g., detoxification), and who agreed to take part in this study. The sample, evaluated once, was made up of 427 men, 114 women, and 5 people who did not report their gender, with an age range of 17–72 ($M = 33.42$, $SD = 11.17$). About 23% of participants reported substance use within the previous three months (see Appendix A Supplementary material in for further details).

2.2. Measures

2.2.1. Demographic information

Demographic information collected included age, gender, ethnicity, time in residence, and meaningful activities. Meaningful activities, adapted from the Treatment Outcome Profile (TOP; Delgadillo et al., 2013), were assessed by four dichotomous (“Yes” or “No”) items (“Are you currently working full-time?”, “Are you currently working part-time?”, “Are you currently at college or university or in other form of education, including on-line course work?”, “Are you currently volunteering?”). A composite score was calculated ($Mdn = 1$), a lower score indicating less meaningful activities.

2.2.2. Barriers to recovery

A total number of five barriers, also adapted from the TOP (Delgadillo et al., 2013), were considered and measured using dichotomous (“Yes” or “No”) items: (1) Accommodation risk, which was assessed by a composite of perceived risk of eviction and acute housing problems in the past 3 months; (2) any substance use in the past 90 days; (3) any risk taking (i.e., drug injecting); (4) any involvement with the criminal justice system (offending); (5) lack of meaningful activities (training or employment).

2.2.3. Services involvement and needs

This scale, which was developed for the REC-CAP and is not based on established measures, examined three themes: (a) Service involvement (“Are you currently engaged with this kind of service?”), (b) Satisfaction with the service (“If you are, are you satisfied with the service you are getting?”), (c) Unmet needs (“Do you need help or additional help in this area?”). Each theme was assessed for seven help-seeking domains (“Drug treatment services”, “Alcohol treatment services”, “Mental health services”, “Housing support”, “Employment

services”, “Primary healthcare services”, “Family relationships”), whose response scale was dichotomous (“Yes” or “No”). A composite score was calculated per theme ($Mdn_{involvement} = 3$; $Mdn_{satisfaction} = 7$; $Mdn_{unmetneeds} = 0$), a lower score indicating, respectively, less involvement, satisfaction, and unmet needs.

2.2.4. Recovery capital

Recovery capital was assessed using the 50-item Assessment of Recovery Capital (ARC; Groshkova et al., 2013). The personal aspect of the ARC ($\alpha = 0.88$) included five sub-scales each with five items for recovery experience, global health (psychological), global health (physical), coping and life-functioning, and risk taking. The social aspect of the ARC ($\alpha = 0.84$) comprises five sub-scales of five items for meaningful activities, housing and safety, citizenship/community involvement, substance use and sobriety, and social support. These results are in line with those of the original paper (see Groshkova et al., 2013), whose test-retest reliability yielded a substantial intra-class correlation coefficient for the ARC total score (ICC = 0.61).

2.2.5. Wellbeing rulers

Adapted from the World Health Organization's quality of life assessment (WHOQOL-BREF; Skevington et al., 2004), perceived quality of life and satisfaction was assessed by five items (“How good is your psychological health?”, “How good is your physical health?”, “How would you rate your overall quality of life?”, “How would you rate the quality of your accommodation?”, “How would you rate your support network?”). The response scaled from 0 (poor) to 20 (good).

2.3. Analysis

2.3.1. Statistical techniques

2.3.1.1. Preliminary analyses were conducted using SPSS statistics

24. First, Cronbach's alphas as a measure of internal consistency for both recovery capital and wellbeing were calculated to assess how much the items on each scale were measuring the same underlying dimension. Also, inter-item correlations were calculated for each subscale of the ARC (i.e., (a) Personal recovery capital: 1) REC – Recovery Experience, 2) PSY – Psychological Health, 3) PHY – Physical Health, 4) RISK – Risk Taking, 5) COPE – Coping and Life functioning; (b) Social recovery capital: 6) MA – Meaningful Activities, 7) SUS – Substance Use and Sobriety, 8) SS – Social Support, 9) HS – Housing and Safety, 10) CIT – Citizenship.) to determine whether multiple items within each sub-dimension of the ARC could be condensed into a composite. Secondly, an Exploratory Factor Analysis (EFA) was run, with Maximum Likelihood as the method of factoring and an oblique rotation, to determine whether recovery capital can be condensed into a single latent trait. Finally, a one-way ANOVA with Games-Howell post hoc test explored all possible pairwise comparisons in wellbeing between the eight residences.

2.3.1.2. Four confirmatory factor analyses (CFA) were conducted using AMOS 24.

The models tested included a single-factor model (wellbeing), as well as a hierarchical factorial structure (ARC scale) with a single second-order factor and two first-order factors. In both cases a simple structure CFA model was first tested. Next, each model was revised and re-specified by allowing correlated errors. The assessment of which errors should be correlated was based on the modification indices provided by AMOS, which are estimations that are attached to a fixed parameter and assess by how much the chi-square value will be reduced if the parameter is set free. Stemming from this, we only correlated errors for which there was a theoretical rationale, as follows.

2.3.1.2.1. *Wellbeing rulers.* Covariance was applied on residuals of a) psychological and physical health, since both constructs are interconnected and influence each other (Prince et al., 2007); b) quality of life and quality of accommodation, given that both aspects

are associated (Nelson et al., 2005); and c) quality of accommodation and support network, on the basis that interpersonal and community resources predict housing stability (Aubry et al., 2016).

2.3.1.2.2. *Recovery capital (ARC; Groshkova et al., 2013).* Covariance was applied on residuals of a) risk taking and coping and life functioning, since coping styles are associated with risk-taking behaviours (Khodarahimi and Fathi, 2016); b) recovery experience and citizenship, given that the former construct includes engagement with a network and having a purpose in life whereas the latter construct involves belonging to a community and contributing to others' purposes in their lives; and c) citizenship and housing and safety, on the basis that housing underpins citizenship (Nelson et al., 2012) and community participation (Rowe et al., 2001).

2.3.1.3. Structural equation modelling. Maximum Likelihood Estimation (SEM-MLE) was used to determine the relation between (a) observable indicators: time in residence, meaningful activities, barriers and unmet needs; (b) ARC scale; and (c) wellbeing. Then, a multiple-group analysis assessed whether the same SEM model was applicable for males as well as females (Multigroup modelling). This comparison tested for invariance across genders, which was defined with three degrees of stringency (as recommended by Byrne, 2001) and was examined with the χ^2 difference test and the ΔCFI . However, the former statistic is greatly sensitive to the sample size and less sensitive to a lack of invariance than ΔCFI (Cheung and Rensvold, 2002; Meade et al., 2008). In contrast, ΔCFI adjusts for the effect of the sample size by considering model degrees of freedom, which is a proxy for model size, and indicates invariance if its value is less than 0.01 (Cheung and Rensvold, 2002; Meade et al., 2008). Furthermore, when the sample size is greater than 200 and the ΔCFI indicates invariance significant χ^2 can be disregarded (Meade et al., 2008). Therefore, we concluded that ΔCFI outperforms the χ^2 , and thus we focused on the ΔCFI results.

2.3.2. Imputation of missing data

Treatment of missing data relied on the full information maximum likelihood (FIML) method and a stochastic regression imputation (Little and Rubin, 2002) – an option implemented in AMOS 24 for Windows 7. Briefly, this strategy combines available information in the dataset with statistical assumptions, sets the unknown model parameters equal to their maximum-likelihood estimates, and draws at random from the conditional distribution of the missing values given the observed values to impute values for each case (Auckland, 2015).

3. Results

3.1. Psychometric properties and structure of recovery capital and wellbeing

3.1.1. Psychometric properties

3.1.1.1. *Internal consistency.* Wellbeing in this study had a satisfactory level of internal consistency, as determined by a Cronbach's alpha of 0.78. This means that there is a high homogeneity between the items that make up the composite score of wellbeing, since each of these items correlates with each of the other items, and therefore the measure of wellbeing is reliable. Likewise, excellent internal consistency was also obtained for the ARC scale in the current study ($\alpha = 0.91$). Regarding the sub-dimensions of the ARC, 74% of the inter-item correlations ranged from 0.2 to 0.4 (as recommended by Briggs and Cheek 1986), which implies an optimal level of homogeneity between the items of each sub-dimension.

3.1.1.2. *Exploratory factor analysis.* Visual inspection of the scree plot to assess the factor structure of the 50 ARC items indicated that one factor should be retained, which explained 25.6% of the total variance. These results, which are compatible with those of the original study (see Groshkova et al., 2013), suggest that personal and social recovery capital can and should be condensed into a single latent trait.

Table 1
Fit Indices for Confirmatory Factor Analyses of alternative wellbeing models.

	χ^2	df	CMIN/DF	CFI	TLI	RMSEA
A1	103.394*	15	20.679	0.880	0.760	0.190
A2	4.586	2	2.293	0.997	0.984	0.049

* p-value < 0.05.

Bold values correspond to the re-specified model.

3.1.1.3. Confounders of wellbeing. A one-way ANOVA determined that wellbeing was statistically significantly different between the eight residences, Welch's $F(7, 72.125) = 3.713, p < 0.01$. Games-Howell post hoc analysis revealed statistically significant differences in wellbeing between Service 7 residents ($M = 87.13, SD = 10.66$) and those of a) Service 8 ($M = 80.09, SD = 16.07$), a mean difference of 7.04, $SE = 2.03, p = 0.019$; and b) Service 2 ($M = 75.18, SD = 10.66$), a mean difference of 11.95, $SE = 3.40, p = 0.021$

3.1.2. Structure of recovery capital and wellbeing

3.1.2.1. Wellbeing. A single-factor solution based on five dimensions of quality of life and satisfaction was first tested (Model A1). The results returned relatively poor CFI values and inadmissible CMIN/DF, TLI and RMSEA values (see Table 1). Given that the criteria for allowing correlated errors were met, the model was re-specified (Model A2) based on both the statistical (modification indices) and theoretical grounds. As can be seen in Table 1, all fit indices for the re-specified model (Fig. 1) were within the expected range.

3.1.2.2. Recovery capital. A hierarchical factorial structure with two first-order factors and a second-order factor was tested (Model B1). Identification at the upper-level of the model was ensured by constraining equals and to a non-zero value both first-order disturbance terms. This model revealed satisfactory CFI and TLI values but rather poor CMIN/DF and RMSEA values (see Table 2). Nevertheless, given that the two latter fit indices were higher than desired, and the criteria for allowing correlated errors were met, the model was re-specified (Model B2) on the basis of theoretical grounds and modification indices. The final re-specified solution (Fig. 2) showed an improvement in the model parameters, and all fit indexes were within an acceptable range (see Table 2).

3.2. Effects of recovery enablers and weaknesses on recovery capital and wellbeing

Once the recovery capital and wellbeing structures were assessed, we examined how time in residence influenced the relationship between overcoming barriers and needs as a necessary step to developing

Table 2
Fit Indices for Confirmatory Factor Analyses of alternative recovery capital models.

	χ^2	df	CMIN/DF	CFI	TLI	RMSEA
B1	242.478*	34	7.132	0.929	0.906	0.106
B2	118.551*	31	3.824	0.970	0.957	0.072

* p-value < 0.05.

Bold values correspond to the re-specified model.

recovery capital, and what the relationship was with general wellbeing. The proposed model (Fig. 3) obtained an acceptable fit ($\chi^2 (141, N = 546) = 533.642, p < 0.001$; CMIN/DF = 3.785; CFI = 0.915; TLI = 0.896; RMSEA = 0.071). The results revealed that time in residence resulted in significantly increased number of meaningful activities, and decreased barriers to recovery that in turn were associated with lessening the number of unmet needs. Furthermore, having more meaningful activities and fewer barriers and unmet needs proved to be a significant pathway to developing the recovery capital that was associated with a significant improvement in wellbeing.

3.3. Gender comparison in the pathways to recovery (multigroup modelling)

Having found statistically significant differences in wellbeing between the residents of Service 7, all of whom are women and a) Service 2, all of whom are men, and b) Service 8, which includes both men and women, we examined whether the same SEM model applied across genders.

Firstly, we tested metric invariance. The results yielded $\Delta\chi^2_{(12)} = 23.803, p < 0.05$ and $\Delta CFI = -0.002$. Whereas the $\Delta\chi^2$ argues for non-invariance of the measurement model, the ΔCFI value contends that the measurement model is invariant. This result suggests that both genders respond to the items in a similar way, and therefore observed item differences are due to gender differences in the underlying latent construct. We next tested for scalar invariance. At this level, we found evidence for non-invariance as reported by $\Delta\chi^2_{(15)} = 133.037, p < 0.001$ and $\Delta CFI = -0.025$. Thus, following Byrne et al. (1989), the next task was to test for invariance relative to each subscale separately, yielding evidence of non-invariance in (1) the citizenship and housing and safety sub-dimensions of social recovery capital, as well as in (2) the quality of life, support network and quality of accommodation sub-dimensions of wellbeing. Therefore, we relaxed these equality constraints and retested the model, which then yielded evidence of invariance: $\Delta\chi^2_{(10)} = 36.658, p < 0.001$ and $\Delta CFI = -0.006$. These findings reveal that (a) individuals who have the same score on the latent construct, personal recovery capital, would obtain the same score on the observed sub-dimensions, regardless of their gender; (b) individuals who have the same score on the latent construct, social



Fig. 1. Confirmatory Factor Analysis of Quality of Life and Satisfaction (Wellbeing).

Note 1: Path coefficients are standardized estimates; all the regression coefficients are significant at the 0.05 level. Significant covariances are shown by double-headed solid lines.

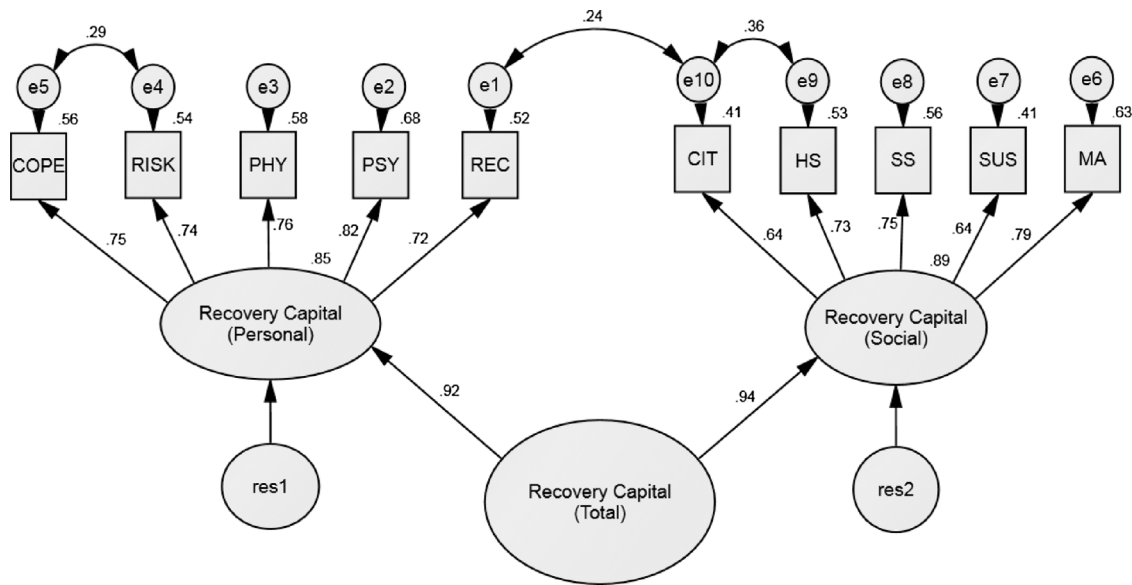


Fig. 2. Confirmatory Factor Analysis of Recovery Capital.

Note 2: Path coefficients are standardized estimates; all the regression coefficients are significant at the 0.05 level. Significant covariances are shown by double-headed solid lines.

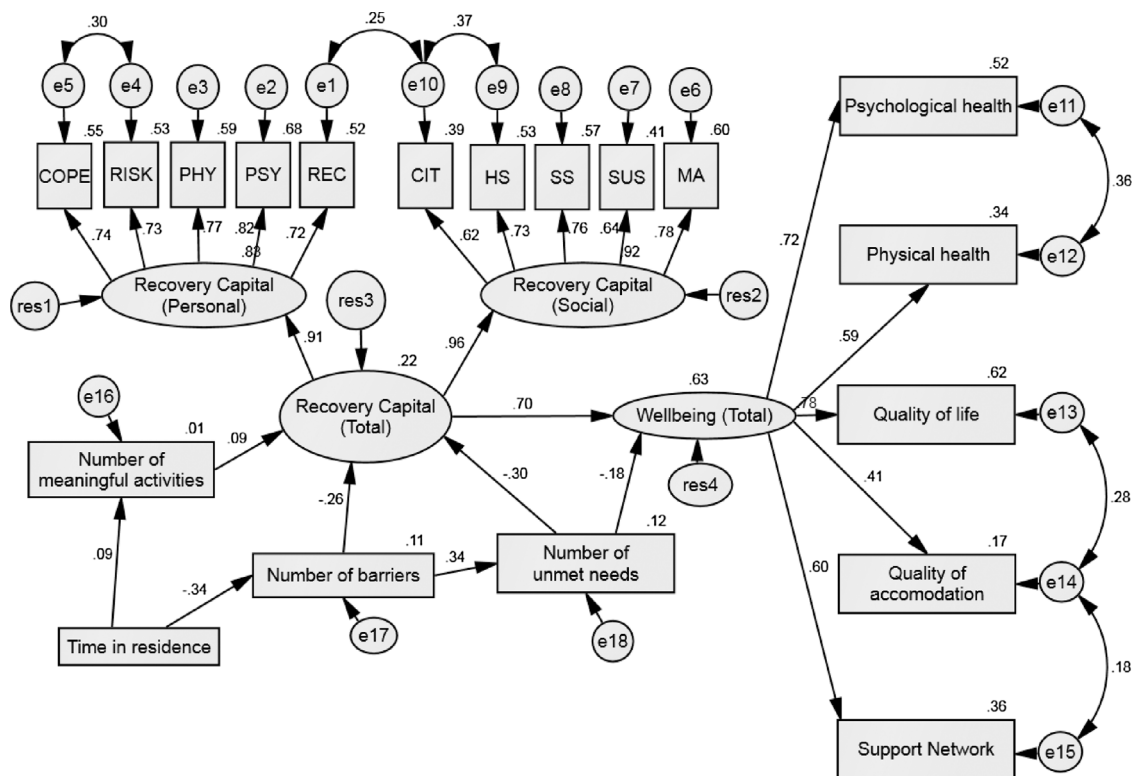


Fig. 3. Pathway to developing recovery capital and wellbeing.

Note 3: Path coefficients are standardized estimates; all the regression coefficients are significant at the 0.05 level. Significant covariances are shown by double-headed solid lines.

recovery capital, would not obtain the same score on the citizenship and housing and safety sub-dimensions because these are also gender-based; (c) individuals who have the same score on the latent construct, wellbeing, would not obtain the same score on quality of life, support network and quality of accommodation sub-dimensions as these are also gender-based. Holding freely estimated the mentioned gender-based sub-dimensions (Table 3), the final step consisted of testing whether the factors were interrelated in the same way across genders. The results (Fig. 4) suggest that the regression paths in the specified model are equivalent between genders: $\Delta\chi^2_{(10)} = 20.168, p < 0.05$ and

$$\Delta CFI = -0.002.$$

4. Discussion

4.1. Psychometric properties and structure of recovery capital and wellbeing

The REC-CAP has shown strong psychometric properties, building on the previously reported findings of the Assessment of Recovery Capital (Groshkova et al., 2013) and so suggesting the utility of the instrument in both research and recovery residence settings (with the

Table 3
Differences between genders in the measurement intercepts (structural weights model).

		Males		Females		z-score
		Estimate	P	Estimate	P	
Personal recovery capital	REC – Recovery Experience	4.673	0.000	4.673	0.000	0.000
	PSY – Psychological Health	4.435	0.000	4.435	0.000	0.000
	PHY – Physical Health	4.423	0.000	4.423	0.000	0.000
	RISK – Risk Taking	4.052	0.000	4.052	0.000	0.000
	COPE – Coping and Life functioning	3.816	0.000	3.816	0.000	0.000
Social recovery capital	MA – Meaningful Activities	4.251	0.000	4.251	0.000	0.000
	SUS – Substance Use & Sobriety	4.421	0.000	4.421	0.000	0.000
	SS – Social Support	4.163	0.000	4.163	0.000	0.000
	HS – Housing & Safety	4.341	0.000	4.828	0.000	6.58***
	CIT – Citizenship	4.446	0.000	4.654	0.000	2.502**
Wellbeing	Support Network	17.589	0.000	19.232	0.000	6.034***
	Quality of Accommodation	16.002	0.000	18.179	0.000	6.645***
	Quality of Life	16.345	0.000	17.926	0.000	6.607***
	Physical Health	16.512	0.000	16.512	0.000	0.000
	Psychological Health	16.854	0.000	16.854	0.000	0.000

Notes: *** p-value < 0.01, ** p-value < 0.05; * p-value < 0.10.

latter suggesting application in a broader range of recovery support services). Furthermore, analysis confirmed a hierarchical factorial structure made up of a second-order factor (recovery capital total), composed of the two first-order factors: (1) personal recovery capital composed of recovery experience, psychological health, physical health, risk taking, and coping and life functioning; and (2) social recovery capital, comprising meaningful activities, substance use and sobriety, social support, housing and safety, and citizenship. Likewise, analysis for the wellbeing rulers (adapted from [Skevington et al., 2004](#)), revealed a single-factor (wellbeing), linked to support network, quality of accommodation, quality of life, physical health, and psychological health. The ability of recovery capital to predict wellbeing was also confirmed, suggesting that this construct is associated with positive wellbeing in a recovery residence population. This is reflected in the standardized path coefficient when considering the direct effect of total recovery capital on wellbeing.

4.2. Effects of recovery enablers and weaknesses on recovery capital and wellbeing

Our core aim in this study was to test the hypothesis that the longer participants spent in recovery residences, the better their recovery enablers and the less salient would be the barriers to recovery (observed variables), thereby increasing recovery capital that in turn would enhance wellbeing (latent variables). In line with this hypothesis, our results suggest that the recovery journey requires more than spending time as residents. Instead, this study suggests significant mediational effects of both meaningful activities and addressing acute barriers to recovery on recovery capital. These findings parallel the work done with Oxford Houses (i.e., [Jason and Ferrari, 2010](#); [Jason et al., 2007](#)), which suggests that length of stay is related to better outcomes if it is long enough to provide an adequate dose of recovery resources. Stemming from this, we argue that recovery-oriented services should focus on building recovery capital by developing meaningful activities (e.g., employment and education, as well as volunteering and community engagement) because this may be necessary to build recovery capital through empowering individuals by building skills and resources (with resulting improvements in self-esteem and self-efficacy), that makes their time in residence meaningful and valuable. Moreover, while fulfilling unmet needs remains significant to building up recovery capital and improves wellbeing, this study suggests that a strengths-based recovery plan is essential based on building recovery resources through meaningful activities, to kick-start personal and social capital and to generate wellbeing. Conversely, in line with previous research

(see [Best and Laudet, 2010](#)), our findings highlight the role of time in residence as a basic requirement for addressing barriers and unmet needs to create the space for building capital, thus acknowledging the importance of removing ‘negative recovery capital’ factors ([Cloud and Granfield, 2008](#)) that act as barriers to recovery, which hinder the satisfaction of needs.

4.3. Gender comparison in the pathways to recovery (multigroup modelling)

In this study, we also tested the moderating effect of gender. Our results show that both recovery capital and wellbeing have the same meaning across groups. This is reflected in the constrained factor loadings (measurement weights) equal across groups (invariance). However, our results also found partial invariance of subscale intercepts. As noted above, women in our study tended to give higher scores in responses to (a) the ‘citizenship’ and ‘housing and safety’ sub-dimensions of social recovery capital, as well as in (b) the quality of life, support network and quality of accommodation sub-dimensions of wellbeing. Gender-based differences have been observed in prior studies. For example, [Kelly and Hoepfner \(2013\)](#) argue that behaviour change for women is less associated with changes in social networks and more to do with the growth in abstinence self-efficacy. Likewise, women usually score lower in quality of life ([Lev-Ran et al., 2012](#); [Puigdollers et al., 2004](#)). Thus, it could also be the case that specific norms apply to this group, thus “biasing” the outcomes in their recovery journey.

After allowing for the mentioned partial invariance, this study does not find differences in any path coefficient between males and females. While this means that the effect of increasing enablers and removing barriers to recovery on building up recovery capital and wellbeing remains equivalent across genders, it is noteworthy that meaningful activities became marginally significant when analysing the results separately for males and females. We believe it is worth highlighting the history of offending for males prior to engaging with treatment ([NTA, 2010](#)), while women's drug use is more likely to be associated with a history of depression, physical health problems and trauma caused by sexual abuse at the hands of men ([Messina and Grella, 2006](#)). Thus, we suggest and leave open the question about whether there are generic meaningful activities that prompt recovery capital regardless of gender, and suggest the need for further exploration of gender-specific meaningful activities that may differentially support recovery journeys.

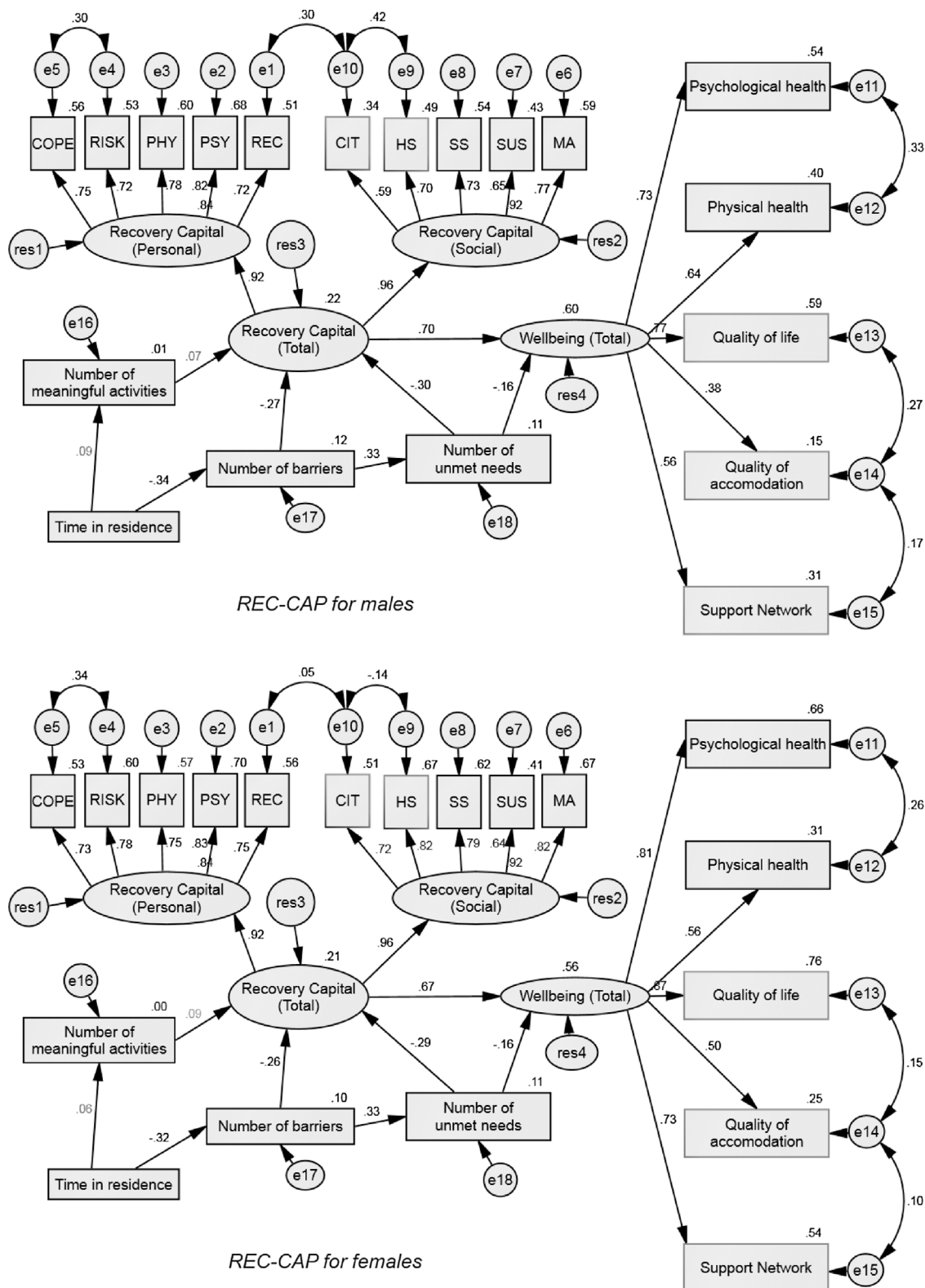


Fig. 4. Gender differences in pathways to developing recovery capital and wellbeing. Note 4: Path coefficients are standardized estimates; all the regression coefficients are significant at the 0.05 level or marginally significant at the 0.10 level (light grey coefficients). Significant covariances are shown by double-headed solid lines. Grey edges indicate significant gender differences in the measurement intercepts.

4.4. Limitations and future research

In this study, we have assessed service involvement and needs with a bespoke scale, not previously validated, whose aim is to assess what unique needs individuals are facing during their recovery journey, as

well as the extent to which the help received suffices to support the recovery journey. However, this part of the instrument is not adapted from an existing validated scale, which leaves unresolved the question of construct validity. On this matter, future research should consider adapting an existing validated scale such as the adult version of the

Camberwell Assessment of Need (CAN; Slade et al., 1999), to assess clinical and social needs. Also related to validity issues, the operationalization of the citizenship sub-dimension suggests that this measure should be theoretically related to social networks, yet further investigation is needed to shed light on the convergent validity between these two constructs. Likewise, more research is also needed to clarify the convergent validity between quality of accommodation and housing and safety. Further research is also needed to clarify whether and the extent to which the gender-specific norms that our findings suggest are due to methodological flaws (i.e., men are overrepresented in population surveys aimed at creating psychometrical tools), gender-specific recovery pathways (see Grella et al., 2008), different socio-historical impact of their drug use (see Messina and Grella, 2006), or idiosyncratic differences due to their socialization process as females.

A second limitation of this study is the inclusion of a voluntary sample. Although every individual who was a resident of recovery residences was approached as a potential participant, the final sample was made up of people who self-selected into the study, and we do not have data on refusals to participate, although there were almost no failed completions or spoiled instruments. Furthermore, it remains unknown how many people declined participating and the predictors of non-participation, which posits a risk of volunteer bias and thus a challenge to the external validity of our findings. This is important insofar as a biased sample might mislead the interpretation of the association between predictors and outcomes of interest, thus failing to underpin the rationale for an adequate care during the recovery journey. Future research should prioritise probability sampling methods, such as anonymised stratified random sampling, which can be used to ensure representativeness of a heterogeneous population. Likewise, the current study used cross-sectional self-report measures, and so we do not have outcome assessments of the predicted models developed. The incorporation of a longitudinal perspective assessing growth at multiple points in time would help to evaluate temporal stability of recovery capital and the dynamics of wellbeing changes over time, and this is something we plan to do in future studies in this population. Subsequent publications will assess changes over time and will further attempt to link these to objective measures of change.

5. Conclusions

The main contribution of this study is that it starts to identify mechanisms for how recovery capital changes in recovery housing settings, with clear evidence of a retention effect mediated by engagement in meaningful activities. The REC-CAP possesses good psychometric properties and provides a solid basis for understanding long-term recovery pathways. Therefore, our findings underpin the rationale for prospective social and health interventions, thus offering direction to addiction treatment professionals, based on the repeated assessment of recovery resources and the use of recovery capital profiles to build long-term recovery plans (Best et al., 2016a). The implications for recovery-oriented treatment and support services are clear. If recovery capital is a strength-based scientific way to map growth and change, it needs to be flexible enough to create strengths-based recovery plans that take into account specific mechanisms for specific people, and thus maximise recovery outcomes when charting individuals' growth and needs in their recovery journey. This study also sets the ground for critically engaging with social policy issues. In particular, it raises the notions of citizenship and quality of life as potential analytical tools to critically examine how to articulate sustainable mechanisms to prevent and improve the social situation of people transiting their recovery journey. Finally, this research provides evidence that supports the need to consider gender in order to generate knowledge that could effectively guide interventions and policies in the context of recovery.

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Contributors

The manuscript has been read and approved by all named authors and there are no other persons who satisfied the criteria for authorship that are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

Conflict of interest

No conflict declared.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.drugalcdep.2017.09.002>.

References

- Aubry, T., Duhoux, A., Klodawsky, F., Ecker, J., Hay, E., 2016. A longitudinal study of predictors of housing stability, housing quality, and mental health functioning among single homeless individuals staying in emergency shelters. *Am. J. Commun. Psychol.* 58, 123–135.
- J. Auckland, IBM SPSS Amos 24 Users Guide 2015. Available at: <https://goo.gl/wD1KqW>.
- Best, D., Laudet, A.B., 2010. *The Potential of Recovery Capital*. Royal Society for the Arts, London.
- Best, D., Edwards, M., Mama-Rudd, A., Cano, I., Lehman, J., 2016a. Measuring an individual's recovery barriers and strengths. *Addict. Prof. Mag* (Retrieved from). <https://goo.gl/k3XrjY>.
- Best, D., Irving, J., Collinson, B., Andersson, C., Edwards, M., 2016b. Recovery networks and community connections: identifying connection needs and community linkage opportunities in early recovery populations. *Alcohol. Treat. Q.* 35, 2–15.
- Betty Ford Institute Consensus Panel, 2007. A working definition from the Betty Ford Institute. *J. Subst. Abuse Treat.* 33, 221–228.
- Brady, T.M., Ashley, O.S., 2005. Women in Substance Abuse Treatment: Results from the Alcohol and Drug Services Study (ADSS). Substance Abuse and Mental Health Services Administration, Office of Applied Studies, Rockville, MD.
- Briggs, S.R., Cheek, J.M., 1986. The role of factor analysis in the development and evaluation of personality scales. *J. Pers.* 54, 106–148.
- Burrow, A.L., Hill, P.L., 2011. Purpose as a form of identity capital for positive youth adjustment. *Dev. Psychol.* 47, 1196–1206.
- Byrne, B.M., Shavelson, R.J., Muthen, B., 1989. Testing for the equivalence of factor covariance and mean structures: the issue of partial measurement invariance. *Psychol. Bull.* 105, 456–466.
- Byrne, B.N., 2001. *Structural Equation Modeling with AMOS*. Lawrence Erlbaum Associates, Rahwah, NJ.
- Cheung, G.W., Rensvold, R.B., 2002. Evaluating goodness-of-fit indexes for testing measurement invariance. *Struct. Equ. Model.* 9, 233–255.
- Cloud, W., Granfield, R., 2008. Conceptualising recovery capital: expansion of a theoretical construct. *Subst. Use Misuse* 43, 1971–1986.
- Damon, W., Menon, J., Bronk, K.C., 2003. The development of purpose during adolescence. *Appl. Dev. Sci.* 7, 119–128.
- Delgado, J., Payne, S., Gilbody, S., Godfrey, C.A., 2013. Psychometric properties of the Treatment Outcomes Profile (TOP) psychological health scale. *Ment. Health Subst. Use* 6, 140–149.
- Dennis, M.L., Scott, C.K., Funk, R., Foss, M.A., 2005. The duration and correlates of addiction and treatment careers. *J. Subst. Abuse Treat.* 28, S51–S62.
- French, M.T., Zarkin, G.A., Hubbard, R.L., Rachal, J.V., 1993. The effects of time in drug abuse treatment and employment on posttreatment drug use and criminal activity. *Am. J. Drug Alcohol Abuse* 19, 19–23.

- Gómez, D., Jason, L.A., Contreras, R., DiGangi, J., Ferrari, J.R., 2014. Vocational training and employment attainment among substance abuse recovering individuals within a communal living environment. *Ther. Commun.* 35, 42–47.
- Granfield, R., Cloud, W., 2001. Social context and natural recovery: the role of social capital in the resolution of drug associated problems. *Subst. Use Misuse* 36, 1543–1570.
- Grella, C.E., Scott, C.K., Foss, M.A., Dennis, M.L., 2008. Gender similarities and differences in the treatment relapse, and recovery cycle. *Eval. Rev.* 32, 113–137.
- Groshkova, T., Best, D., White, W., 2013. The assessment of recovery capital: properties and psychometrics of a measure of addiction recovery strengths. *Drug Alcohol Rev.* 32, 187–194.
- Jason, L.A., Ferrari, J.R., 2010. Oxford house recovery homes: characteristics and effectiveness. *Psychol. Serv.* 7, 92–102.
- Jason, L.A., Davis, M.I., Ferrari, J.R., 2007. The need for substance abuse after-care: longitudinal analysis of Oxford House. *Addict. Behav.* 32, 803–818.
- Kelly, J.F., Hoepfner, B., 2013. Does Alcoholics Anonymous work differently for men and women? A moderated multiple-mediation analysis in a large clinical sample. *Drug Alcohol Depend.* 130, 186–193.
- Kelly, J.F., Hoepfner, B., 2015. A biaxial formulation of the recovery construct. *Addict. Res. Theory* 23, 5–9.
- Kenthirajah, D., Walton, G.M., 2015. How brief social-Psychological interventions can cause enduring effects. In: Scott, R.A., Kosslyn, S.M. (Eds.), *Emerging Trends in the Social and Behavioral Sciences: An Interdisciplinary, Searchable, and Linkable Resource*. John Wiley and Sons, Inc., New York, NY, pp. 1–15.
- Khodarahimi, S., Fathi, R., 2016. Mental health, coping styles, and risk-taking behaviors in young adults. *J. Forensic Psychol. Pract.* 16, 287–303.
- Lev-Ran, S., Imtiaz, S., Taylor, B.J., Shield, K.D., Rehm, J., Le Foll, B., 2012. Gender differences in health-related quality of life among cannabis users: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Drug Alcohol Depend.* 123, 190–200.
- Lewin, K., 1943. Defining the field at a given time. *Psychol. Rev.* 50, 292–310.
- Little, R.J., Rubin, D.B., 2002. *Statistical Analysis with Missing Data*. Wiley, Hoboken, N.J.
- Marsh, J.C., Cao, D., D'Annunzio, T., 2004. Gender differences in the impact of comprehensive services in substance abuse treatment. *J. Subst. Abuse Treat.* 27, 195–204.
- Meade, A.W., Johnson, E.C., Braddy, P.W., 2008. Power and sensitivity of alternative fit indices in tests of measurement invariance. *J. Appl. Psychol.* 93, 568–592.
- Messina, N., Grella, C., 2006. Childhood trauma and women's health outcomes in a California prison population. *Am. J. Public Health* 96, 1842–1848.
- National Treatment Agency for Substance Misuse, 2010. *Breaking the Link: The Role of Drug Treatment in Tackling Crime*. Public Health, England, London.
- Nelson, G., Clarke, J., Febraro, A., Hatzipantelis, M., 2005. A narrative approach to the evaluation of supportive housing: stories of homeless people who have experienced serious mental illness. *Psychiatr. Rehabil. J.* 29, 98–104.
- Nelson, G., Goering, P., Tsemberis, S., 2012. Housing for people with lived experience of mental health issues: Housing first as a strategy to improve quality of life. *Community Psychology and the Socio-Economics of Mental Distress: International Perspectives* 191–205.
- Platt, J., 1995. Vocational rehabilitation of drug abusers. *Psychol. Bull.* 117, 416–433.
- Prince, M., Patel, V., Saxena, S., Maj, M., Maselko, J., Phillips, M.R., Rahman, A., 2007. No health without mental health. *Lancet* 370, 859–877.
- Puigdollers, E., Domingo-Salvany, A., Brugal, M.T., Torrens, M., Alvaros, J., Castillo, C., Magri, N., Martin, S., Vasquez, J.M., 2004. Characteristics of heroin addicts entering methadone maintenance treatment: quality of life and gender. *Subst. Use Misuse* 39, 1353–1368.
- Rowe, M., Kloos, B., Chinman, M., Davidson, L., Cross, A., 2001. Homelessness, mental illness, and citizenship. *Soc. Policy Adm.* 35, 14–31.
- Skevington, S.M., Lotfy, M., O'Connell, K.A., 2004. The World Health Organization's WHOQOL-BREF quality of life assessment: psychometric properties and results of the international field trial. *Qual. Life Res.* 13, 299–310.
- Slade, M., Thornicroft, G., Loftus, L., Phelan, M., Wykes, T., 1999. *CAN Camberwell Assessment of Need*. The Royal College of Psychiatrists, London.
- Slade, M., 2010. Mental illness and wellbeing: the central importance of positive psychology and recovery approaches. *BMC Health Serv. Res.* 10, 10–26.
- UK Drug Policy Commission, U.D.P., 2008. *The UK Drug Policy Commission Recovery Consensus Group: A Vision of Recovery*. UK Drug Policy Commission. HM Government, London (Available at: <https://goo.gl/a6nWXq>).
- Walton, G.M., 2014. The new science of wise psychological interventions. *Curr. Dir. Psychol. Sci.* 23, 73–82.
- White, W., 2009. Peer-Based Addiction Recovery Support: History, Theory, Practice, and Scientific Evaluation. Great Lakes Addiction Technology Transfer Center and Philadelphia Department of Behavioural Health and Mental Retardation Services, Chicago, IL.
- Wilson, T.D., 2011. *Redirect: The Surprising New Science of Psychological Change*. Little, Brown and Company, New York, NY.
- Wright, A., 1990. No title. In: Shaw, S., Borkman, T. (Eds.), *Social Model Alcohol Recovery: An Environmental Approach*, pp. 7–10.
- Yeager, D.S., Bundick, M.J., 2009. The role of purposeful work goals in promoting meaning in life and in schoolwork during adolescence. *J. Adolesc. Res.* 24, 423–452.
- Yeager, D.S., Bundick, M.J., Johnson, R., 2012. The role of future work goal motives in adolescent identity development: a longitudinal mixed-methods investigation. *Contemp. Educ. Psychol.* 37, 206–217.