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A cluster analysis of European life in recovery data: what are the typical patterns of recovery experience?

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ABSTRACT

Introduction: There is little research around recovery pathways and how they cluster together by individual and situational factors according to time in recovery.

Method: This paper uses a cluster analysis with data from the European Life in Recovery (LiR) survey to produce typologies of recovery pathways around stages of recovery: early (<1 year), sustained (1-5 years), and stable (>5 years). A secondary aim was to explore evidence of national variations among clusters.

Results: Cluster analysis identified five typologies of persons in recovery, broadly reflecting the three stages. 'Early Recovery' participants had the highest barriers and lowest strengths in recovery and were most likely to reside in Spain, Portugal and Poland. 'Sustained with residual barriers' participants were characterized by high strengths in active addiction but most barriers in recovery and mainly resided in the Netherlands and Belgium. 'Stable With Lower Recovery Support' reported higher barriers and lowest strengths in active addiction and were mainly from the Balkan countries. 'Stable With Higher Recovery Support' participants experienced the most barriers in active addiction but also the most strengths in recovery and were largely from the UK. 'Mixed With Fewer Barriers' showed the least barriers in recovery and the highest strengths in active addiction and were also mainly from the UK.

Implications: Structural and cultural factors (possibly including location) are essential in recovery journeys and that, while all recovery journeys are unique, are several clusters of characteristics can be identified as broadly consistent with the Betty Ford Institute stages approach of early, sustained and stable recovery.

Introduction

While recovery remains a contested concept (White, 2007), consensus definitions have been developed by the UK Drug Policy Commission (UKDPC, 2008) and the Betty Ford Institute Consensus Panel (2007). According to each of these definitions, recovery is a journey that involves three broad areas of change: control over substance use (or sobriety); improvements in health and wellbeing, and active participation in society. The Betty Ford Institute Consensus Group classifies recovery journeys into three stages: early recovery (up to one year); sustained recovery (between one and five years), and stable recovery (more than five years). Stable recovery is important as after five years of continuous sobriety, individuals can be regarded as having a 'self-sustaining' recovery (Best et al., 2020) with very low odds of relapse (Dennis et al., 2014). More recently, Ashford et al. (2019) have synthesised the core domains of recovery as improved physical and mental health and wellbeing, societal participation and

citizenship, abstinence, sobriety or controlled substance use, a productive and meaningful life, and reaching full potential.

According to the Surgeon General's Report 'Facing Addiction in America: The Surgeon General's Report on Alcohol, Drugs, and Health' (Substance Abuse and Mental Health Services Administration (US); Office of the Surgeon General (US), 2016), there are multiple paths to recovery, with individuals choosing their path based on particular social, cultural and personal needs and aspirations. The report asserts a strong evidence base for 12-step mutual aid groups and 12-step facilitation approaches, as well as support for educational settings and recovery housing, with other approaches lacking sufficient critical evidence. Similarly, in Sheedy and Whitter's (2013) review of the evidence for recovery-oriented systems of care (ROSC), they argue that substance use disorders are most effectively addressed through a chronic care management model that includes longer-term outpatient care, recovery housing, and recovery coaching and recovery management check-ups.

The emergence of a recovery science (Best and Hennessy, 2022) has been, in part driven, by the emergence of the concept of recovery capital (Cloud & Granfield, 2008), defined as the breadth and depth of internal and external resources available to support a person in their recovery journey. This concept has been operationalised through such measures as the Assessment of Recovery Capital (Groshkova et al., 2012) and the REC-CAP (Cano et al., 2017), with the latter in particular focusing not only on strengths but also on barriers to recovery and unmet needs.

In an attempt to understand the process of change from active addiction to recovery (Laudet, 2013), findings from the Life in Recovery (LiR) survey were first published in 2013 by the U.S. recovery advocacy organisation Faces and Voices of Recovery (FAVOR). This was the first national survey in the U.S. on recovery journeys, which used a cross-sectional, self-report survey to examine changes across five core life domains between time in active addiction and the period in recovery and found marked gender differences in pathways to recovery in relation to elevated rates of criminal justice involvement in men, and higher levels of unresolved psychological and emotional health issues in women. One of the key concluding comments in the report was the multiple ways that people get well in the United States. Subsequent LiR surveys consistently showed that there are consistent gains across a range of life domains and that the longer the person is in recovery, the greater their recovery capital in countries including Canada (McQuaid et al., 2017), Australia (Best et al., 2015; Elms et al., 2018), the UK (Best et al., 2015), and Belgium and the Netherlands (Martinelli et al., 2020), although each national survey has shown differences in magnitude and patterns of change.

The Canadian Centre on Substance Use and Addiction (CCSA, 2017) concluded that, while there are similarities to other national Life in Recovery surveys in broad patterns, there are also marked differences with, for instance, a much higher proportion of Canadian participants reporting successfully sustaining recovery at their first attempt (around 50%). The CCSA report also noted that there were marked variations within the sample in pathways to recovery and in the mechanisms of recovery used.

LiR was used as part of the REC-PATH study (Best et al., 2018) to screen people for inclusion who self-identified as being in recovery from illicit drugs for at least three months at the time of completing the survey. As an attempt to quantify the LiR tool into a replicable scale, the LiR survey was re-classified into the Strengths and Barriers Recovery Scale (SABRS) (Best et al., 2020). Given that SABRS assesses strengths and barriers both retrospectively (when 'in active addiction') and at the time of completion ('in recovery'), it can be used to assess changes in barriers and strengths. The first paper using this method showed marked gender differences in addiction and recovery pathways (Best et al., 2020). A second study (Best et al., 2021) demonstrated that higher recovery strengths and lower recovery barriers when in recovery were associated with having more intimate and familial relationships and larger and more recovery-oriented social networks.

The aim of the current LiR analysis is to understand whether specific segments of the respondent population emerge and to describe the characteristics of any emerging grouping based partly on the multiplicity of pathways to recovery. We seek to understand the 'universal' characteristics of recovery and what are shaped by local factors while also testing the stage model developed by the Betty Ford Institute Consensus Group of early, sustained and stable recovery (Betty Ford Institute Consensus Panel, 2007).

A hierarchical clustering approach has been adopted in the present study which has previously been developed in a variety of settings to assess the comorbid needs of persons accessing public health services (Ng et al., 2018; Nnoaham & Cann, 2020). This exploratory approach has been extended to understanding the comorbid needs of those in treatment (Sondhi & Leidi, 2021), the use of poppers within the gay community (Demant & Oviedo-Trespalacios, 2019) and segmentation of drinkers (Al-Hamdani et al., 2019). The present study extends the approach used by Bischof et al. (2007), examining clusters of people in natural recovery from alcohol addiction. Based on a large, international sample of persons in recovery from drug addiction, there are two primary conceptual questions addressed in this paper:

1. Which (clearly distinct) clusters can be identified around the three recovery stages of early, sustained, and stable recovery based on SABRS data and demographic characteristics?
2. What are the individual-level factors, including location, that generate clustered patterns of recovery pathway.
3. This approach should be considered exploratory through the generation of hypotheses (Everitt et al., 2011), where the aim is to uncover potential distinct groups and patterns.

Methods

Participants

The REC-PATH study was a collaboration between researchers in the UK, Belgium (Flanders), and the Netherlands and was designed to assess what 'Mechanisms of Behaviour Change for Recovery' (MOBCR) are represented in recovery journeys across the participating sites, and how these differed by gender (Best et al., 2018; Vanderplasschen & Best, 2021). The study focused on participants' experiences of engaging in five different MOBCR's:

1. 12-step mutual aid groups
2. Other peer-based recovery support services
3. Community-based treatment including substitute prescribing
4. Residential treatment including residence in a therapeutic community
5. 'Natural recovery' which refers to those who are recovered or in recovery without support or involvement from specialist treatment or peer-based mutual aid (Best et al., 2018).

To examine eligibility for the REC-PATH study, participants were asked to complete the LIR as a type of screening mechanism and it is the data from this completion of the LIR that forms the basis of this paper. One of the core aims was to ensure that sufficient sub-samples were recruited that populated each of the three Betty Ford Institute stages of early, sustained and stable recovery, and recruitment was monitored with this in mind (Vanderplasschen & Best, 2021). Participants were also asked how long they had been in recovery.

The target population was people who had once had a problem with illicit drugs (ie not including alcohol, prescription drugs or tobacco products but had been in recovery from that substance for at least the previous 90 days). Participants were asked if they fell into one of the following categories:

1. In recovery
2. Recovered
3. Used to have a drug problem but don't any more
4. In medication-assisted recovery
5. Other (which was an open-ended text box)

Measures

The aim of the introduction of the SABRS measure (Best et al., 2020) was to translate as many of the items of the LiR measure into a scale consisting of strengths and barriers as proxy indicators of positive and negative recovery capital as described by Cloud and Granfield (2008). These items relate to five domains (health, legal, finance, work, and family) both during active addiction, using retrospective recall, and during the period in recovery.

From the original 44 items in the U.S. LiR version, two had been removed from the Australian and UK versions as they did not apply ('did not have health insurance' and 'lost the right to vote'). For the SABRS scale, items were removed if they could only apply based on a previous event (e.g. a professional licence can only be restored if you have had one in the first place). A total of 32 items were included in the final SABRS, and 10 items were excluded. The items were then separated into strength and barrier items (15 strength items and 17 barrier items), both applying to the period of active addiction and recovery (Best et al., 2021). Examples of 'strengths' items included 'participate in family life,' 'exercise regularly,' 'have a GP,' and 'able to pay your bills.' Examples of barriers include 'have untreated emotional or mental health problems,' 'make regular visits to the emergency room' and 'have been arrested.' All items were endorsed if they applied to the respondent and so were coded as 0 or 1 based on yes/no answers (strengths scale ranged from 0-15, barriers scale ranged from 0-17).

In other words, participants were asked the same 32 questions with the time frame of 'during active addiction' and 'in recovery' so that changes could be assessed, albeit retrospectively.

Four totals were then calculated based on the endorsement of items per scale, which were shown to have acceptable internal consistency (Nunnally, 1978):

1. Recovery strengths in active addiction (0-15) [α=0.73]
2. Recovery barriers in active addiction (0-17) [α=0.72]
3. Recovery strengths in recovery (0-15) [α=0.80]
4. Recovery barriers in recovery (0-17) [α=0.79]

In addition to the 32 strength and barrier items, there were questions relating to home location, which were aggregated into five groups (United Kingdom, Netherlands/Belgium, Spain/Portugal, Poland and the Balkans region which comprises Bosnia and Herzegovina, Serbia, Croatia and Montenegro. Demographic information included age, sex, education level, relationship status, number of dependent children and whether the respondent was a volunteer. Information was also asked on recovery status, including the age at first seeking help and substances misused, including alcohol and tobacco. The reasons for stopping drug use, reasons for being in recovery and services currently being accessed were also included in the schedule, as well as self-reported length of time in recovery. The recovery status of each respondent (early, sustained and stable) was determined based on self-report of time in recovery and composite scores on individual's addiction strengths/barriers and recovery strengths and barriers were calculated (details of each component is presented in Appendix 1).

Procedure

The Life in Recovery (LiR) survey was initially used as a recruitment and screening instrument for the REC-PATH study (Best et al., 2018) and participants were recruited through convenience sampling in the United Kingdom, the Netherlands, and Flanders (Belgium). Participants filled out the survey anonymously, but could chose to leave their contact information if they wished to participate in the further phases of the study. Parallel to this study, the LiR survey was translated into several other languages and was circulated to recovery agencies and individuals in the Recovered Users Network (RUN), predominantly but not exclusively consisting of organisations and individuals in Eastern Europe.

Ethical approval was obtained from Sheffield Hallam University in the UK, Ghent University in Belgium and Erasmus University Rotterdam in the Netherlands and the LiR survey was distributed through a link to SurveyMonkey (UK) or Qualtrics (all other countries), which was sent out to an extensive range of recovery groups and communities and treatment organisations across all participating countries. Using a snowballing technique, the SurveyMonkey or Qualtrics links were shared with others in recovery by participants through social media. In addition, hard copies were available for those who preferred this method of completion or who did not have access to the online version of the questionnaire (Best et al., 2018).

The data are based on self-report and the procedure for the REC-PATH study has been described in detail in Best et al. (2018) and in Martinelli et al. (2020). The recruitment procedure for the RUN sample is described in more depth by Best et al. (2020), with the RUN study method largely replicating the one used in the REC-PATH study and data collection for the RUN study occurring shortly after data collection for the

REC-PATH study. Table 1 presents an outline of the gender and country of residence sample sizes.

Data analysis

The respondent population (*n* = 1313) was segmented using a hierarchical cluster analysis in Stata v16 using Ward's linkage method (Großwendt et al., 2019). Hierarchical cluster analysis has a long-standing history, and the method is considered exploratory as it assumes no a priori knowledge of how the clusters would form within the dataset and may provide some initial points in which to develop a theoretical understanding of recovery, and therefore should not be considered definitive (McLachlan & Peel, 2004). An agglomerative hierarchical method starts with each survey respondent considered as a potential cluster and moves iteratively to create clusters of people with similar characteristics until a stopping criterion is achieved where the derived clusters may be considered similar. Ward's Linkage method links clusters that comprise the smallest increase in the error sum of squares in matrix form (Ward, 1963). The stopping rule for deriving the optimal number of clusters was established through examination of the F statistic (Calinski & Harabasz, 1974) and the Duda-Hart index (Duda et al., 2000). The clustering of groups is determined by each cluster's proximity of distance to other individuals within that cluster. As the online survey comprised a mixture of variable types (e.g. nominal such as the SABRS items, and interval), the Gower Index of Similarity was utilised.

Only six cases or 0.5% of the total sample did not fit into one of the five emergent clusters.). The final number of clusters was determined as five by using a stopping rule that combined two summary measures: maximising the pseudo-F statistic (3.14) and minimising the pseudo T-squared statistic (0.65). The segmentation was supplemented by the use of a multivariate analysis of variance (MANOVA) to determine any statistically significant differences between clusters.

Results

A summary of the characteristics of the LiR 2018 cohort (*n* = 1313) is presented in Table 1. Nearly two-thirds of the sample was recorded as male (65.0%, *n* = 854), with an average age of 40.3 years (range 18-74). There was a wide geographical distribution of respondents ranging from just under one-third (31.4%, *n* = 412) from Belgium/Netherlands, 27.7% (*n* = 364) from the UK and one-fifth from the Balkan countries of Bosnia and Herzegovina, Serbia, Croatia, and Montenegro (20.0%, *n* = 263). Smaller numbers were reported from Poland (6.0%, *n* = 79) and Spain/Portugal (5.0%, *n* = 66). Based on self-report, over half of the sample (57.1%, *n* = 754) defined themselves as 'in recovery,' with a further 19.1% (*n* = 251) reported as being 'recovered' from their addiction. Furthermore, 40.8% (*n* = 536) were recorded as in stable recovery, with 35.9% (*n* = 472) in sustained recovery and 23.2% (*n* = 305) in early recovery. The number of participants in each group is presented in Table 2 and Appendix 1.

The basic characteristics of the clusters are discussed below but outlined in full in Appendix 1. Univariate analysis of variance (ANOVA) tests showed that only two variables were not statistically significant (at p < 0.05) between the five clusters. These were 'natural recovery' (p = 0.095; which was extremely uncommon in this sample) and 'At what age did you first attempt to stop/seek help for your problem?' (p = 0.082). We assessed inter-cluster differences whereby the global F test indicated that some of the variables within our model have a statistically significant association with the five clusters and therefore can be shown to be distinct groupings (see Table 3).

Table 4 shows the reported changes in strengths and barriers from the 'active addiction' period to the current period in recovery. The terms 'highest' and 'lowest' are used comparatively – across the groups there are marked reductions and

Table 1. Sample size and country of residence (*n* = 1,313), valid totals only.

Characteristics	Number	Percentage
Gender		
• Male	854	65.0
• Female	459	35.0
Total	1,313	100.0
Residence		
• Balkans	263	20.0
• Belgium/Netherlands	412	31.4
• Poland	79	6.0
• Spain/Portugal	66	5.0
• UK	364	27.7
• Other Areas	129	9.9
Total	1,313	100.0
Recovery Status		
• Early Recovery	305	23.2
• Sustained Recovery	472	35.9
• Stable Recovery	536	40.8
Total	1,313	100.0
	Mean (SD)	Range
Average age	40.3 (10.5)	18-74
Addiction Strengths	4.71 (2.9)	0-15
Recovery Strengths	10.5 (3.3)	0-15
Addiction Barriers	8.6 (3.3)	0-17
Recovery Barriers	2.6 (2.3)	0-17
Average (mean) years in recovery	6.2 (7.7)	0-50

Table 2. Summary of cluster numbers (Ward's linkage method).

Cluster	Number	Percentage (%)	Main Country of Residence
Cluster 1 ('Early Recovery'); average length in recovery 1.5 years (4.0)	271	20.6	Spain Portugal Poland
Cluster 2 ('Sustained With Residual Barriers') average length in recovery 4.0 years (5.4)	287	21.9	Netherlands Belgium
Cluster 3 ('*Stable With Lower Recovery Support*') average length in recovery 8.8 years (7.2)	257	19.6	Balkans
Cluster 4 ('*Stable With Greater Recovery Support*') average length in recovery 10.4 years (8.4)	216	16.5	U.K.
Cluster 5 ('Mixed With Fewer Barriers in Addiction And Recovery'); average length in recovery 7.3 years (7.3)	276	21.2	U.K.

6 cases did not fit within a cluster (0.5%).

Table 3. MANOVA model of inter-cluster difference.

Test statistic	Value	F	p-value
Wilks' lambda	0.699	30.79	<0.0001
Pillai's trace	0.319	28.08	<0.0001
Lawley-Hotelling's trace	0.407	32.88	<0.0001
Roy's largest root	0.337	109.28	<0.0001

Table 4. Strengths and barriers in addiction and recovery.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	p-value
Addiction Strengths (mean)	4.5	5.3	3.9	4.2	5.6	<0.0001
Recovery Strengths (mean)	7.9	10.6	11.2	12.4	11.0	<0.0001
Addiction Barriers (mean)	8.5	8.2	9.1	9.8	7.7	<0.0001
Recovery Barriers (mean)	3.3	3.0	2.2	2.2	2.1	<0.0001

low levels of barriers in recovery in absolute terms, but we have used 'highest' and 'lowest' to describe the differences between the groups either in the 'active addiction' or in the 'in recovery' response windows.

The cluster analysis identified five segments that can be seen to be linked with the three recovery stages:

Cluster 1, 'Early Recovery': ($n = 271$, 20.6%) This cluster reported the highest average rates of barriers in recovery for the five clusters, although still significantly reduced from the period of active addiction (mea $n = 3.3$), and the lowest average rates of strengths in recovery (7.9), consistent with the early days of recovery. This cluster was characterized by participants who were most likely to be male (80.8%), most likely to be primary-level educated only (25.8%), most likely to be single (66.8%) and most likely to be residing in Spain/Portugal (17.7%) or Poland (11.4%). This was the youngest cluster (mean age = 39.8), with the highest rates of stating that cocaine had ever been a problem (69.0%), buprenorphine (28.4%), and methadone (46.5%) as problematic substances. Participants in this cluster were most likely to report current issues with housing (11.4%), eviction (10.0%), and the criminal justice system (15.1%), suggesting ongoing barriers to their recovery journeys. This cluster was the most likely grouping to have accessed 12-Step groups (50.0%), Therapeutic Communities/Residential Rehabilitation (64.9%), and Medication-Assisted Therapy (17.7%).

Cluster 1 was labelled the 'Early Recovery' cluster as the grouping of the youngest participants and those most likely to be in the early stage of recovery (59.0%).

Cluster 2, 'Sustained with residual barriers' ($n = 287$, 21.9%) This cluster was characterized by highest strengths in addiction (mea $n = 5.3$), but also with the highest levels of residual barriers in recovery (mean = 3.0).

This was the cluster most likely to be secondary school educated (62.0%), to have been offending in the last 30 days (10.1%) and to reside in the Netherlands/Belgium (86.1%). This cluster was likely to be cohabiting (19.9%) or divorced (15.7%) and likely to be employed part-time (24.7%) or volunteering (38.3%). This group was likely to report financial issues as a motive to stop their drug use (55.1%) and cited mental health reasons to change their substance use patterns (91.3%). This group was characterized by the shortest time compared to other groups from their first attempt to stop/seek help to their stated age (an average of four years). Cluster 2 was labelled the 'Sustained with residual barriers' cluster as the group with the highest proportion of participants (54.4%) in sustained recovery (i.e. between 1-5 years of recovery time) but with ongoing issues around addiction treatment, mental health and ongoing involvement with the justice system.

Cluster 3, 'Stable With Lower Recovery Support" ($n = 257$, 19.6%) This cluster was characterized by a high average number of barriers in addiction (mea $n = 9.1$) and the lowest average of strengths in the active addiction phase (mea $n = 3.9$).

Participants in this group were most likely to be educated to secondary school level (58.4%), to be married (45.9%) and to have dependent children (54.5%). They were the most likely to be working full-time (63.4%) or part-time (25.3%) in the last 30 days, and were most likely to reside in the Balkans (53.7%). They were also characterized by the highest rates of ever having a perceived problem with a variety of illicit drugs (heroin (80.5%); amphetamines (68.9%); ecstasy (63.0%); cannabis (83.0%)), and high rates of ever using methadone (45.1%). They were the most likely to state that they were currently accessing no services (52.5%) and this was the youngest cluster when they first attempted to stop/seek help for their problem (mean age = 24.6).

Cluster 3 in this study was labelled the 'Stable With Lower Recovery Support' cluster as the grouping who reported high levels of stable recovery (i.e. to have more than five years of recovery time, 68.1%).and with the lowest levels of service involvement at the time of the LIR assessment

Cluster 4, 'Stable with greater recovery support' ($n = 216$, 16.5%) was characterized by the highest rates of barriers when in active addiction (9.8), but with the highest rates of strengths in recovery (mea $n = 12.4$). Cluster 4 had the highest proportion who had completed higher education (71.8%), and was the most likely cluster to be cohabiting (22.2%) and to reside in the UK (69.4%). This cluster was most likely to have had perceived problems with alcohol (77.8%) and crack cocaine (49.1%). This was the oldest cluster when they first attempted to stop/seek help for their problem (mean age = 45.4), with a short time from their first attempt to stop/seek help to their stated age (4.4 years). This cluster was the most likely to use or access non-12-step mutual aid recovery pathways (18.1%) and to have had more treatment episodes (mea $n = 2.9$).

Cluster 4 had the highest proportion of participants in stable recovery (73.6%), yet had come from the most barriers in active addiction to the highest strengths in recovery.

Cluster 5 'Mixed: With Fewer Barriers In Addiction and Recovery' ($n = 276$, 21.2%) This cluster included participants with the highest average level of strengths in the active addiction phase (mean = 5.6), the lowest average of barriers in active addiction (mean = 7.7), and the lowest average number of barriers in recovery (mean = 2.1).

This was the oldest cluster (mean age = 60.4), and participants were most likely to reside in the UK (46.7%), very likely to have completed higher education (70.7%), and most likely to be divorced (15.9%). These participants were most likely to be volunteering in the last 30 days (41.7%) and a large proportion reported ever using alcohol (72.5%).

Cluster 5 was labelled the 'Mixed: With Fewer Barriers In Addiction and Recovery' cluster as this was the only cluster which contained a mixture of recovery stages.

Discussion

Based on a large international sample of individuals in recovery from an addiction to illicit (and licit) drugs, this paper

identified five clearly defined clusters distinguishable by recovery length (largely supporting the Betty Ford Institute taxonomy of stages), strengths and barriers to recovery, demographic characteristics and variations in perceived changes in strengths and barriers from active addiction to recovery. There is also evidence that patterns in the clustering of recovery characteristics exist that suggests that contextual factors including the levels and types of treatment provision, cultural characteristics and socioeconomic factors are important considerations in any modelling of recovery factors and predictors.

This study has extended the utilisation of hierarchical clustering approaches previously to describe segments within clinical settings (Ng et al., 2018; Nnoaham & Cann, 2020) including substance use treatment (Sondhi & Leidi, 2021). The hierarchical clustering approach revealed a number of distinct trajectories between the clusters, illustrating marked patterns of change in strengths and barriers at different stages of recovery. Four of the five clusters identified map onto the Betty Ford Institute Consensus Panel (2007) stage model (with one cluster each for Early and Sustained Recovery and two for Stable Recovery, and only the fifth 'mixed' group not fitting into this framework). Country of residence was a key marker in the distinct trajectories that emerged from the clusters, and may provide further support for the idea that recovery pathways are shaped in part by contextual factors such as access to mutual aid groups and to recovery-supportive drug policies (Bellaert et al., 2021), but also supportive peers and role models, although much further research is needed to test this adequately.

Being educated, employed, having parental responsibility and being older appeared to be key supports for those in clusters at the stable stage of recovery. For Cluster 3 there are consistent improvements in higher education (69.2% in Early Recovery to 74.8% in Stable Recovery), parental responsibility (7.7% in Early Recovery to 44.0% in Stable Recovery) and full-time employment (7.7% in Early Recovery to 67.9% in Stable Recovery). Cluster 5 is slightly different as it straddles the Sustained and Stable stages, but appears to consist of people who fewer barriers to recovery in the active addiction phase and the recovery phase, suggesting a different recovery trajectory for this cluster. Whereas mental health, recent criminal justice involvement, having less time since stopping the use of drugs and first seeking help and being younger in age appeared to contribute to having a greater number of barriers in recovery, and not surprisingly, were mainly identified in those in early recovery in Cluster 1, i.e. for people early in their recovery journeys.

Cluster 1 also had the lowest recovery strengths and the highest recovery barriers and so is akin to a 'pains of recovery' cluster in line with findings that demonstrate more barriers than the other clusters and fewer strengths, as would be expected in the early recovery stage (Best et al., 2020; Patton et al., 2022). This pattern is to be expected given the recency from which the person has left behind a lifestyle that is also significantly marred by drug addiction, and where the challenges of prolonged withdrawal and changes in identity and lifestyle may be the most challenging.

The older and stable cluster with the strongest trajectory of growth (Cluster 4: Stable With Greater Recovery Support) showed the highest number of barriers to addiction and the highest number of recovery strengths at the recovery stage. It highlights the possibility of a 'rebound' effect, an inverse relationship between barriers and strengths in early and stable recovery (Best and Hennessy, 2022). The push and pull factors dynamically interact over time to enable a person's life to rebound from one of addiction to increased well-being, human flourishing and contribution, and this cluster suggests that the Stable group outlined in the Betty Ford Consensus document should not be seen as a homogenous group (they are represented in three clusters in the current analysis) nor should we conceive of growth as ending at the five-year point.

The 'Sustained With Residual Barriers' cluster (Cluster 2) represents the sustained stage of recovery as being 'in transition' within the recovery journey. That is, during the four-year duration of this stage, the number of barriers begins to reduce, and the number of strengths increases, but given the estimated five-year duration to stable recovery, this may involve considerable ongoing pains of recovery and may require further analysis to test how linear this stage may be, and may involve continuing support to address residual impacts of a drug-using lifestyle, including justice and health issues. This potentially explains why this cluster experiences the highest number of residual barriers in recovery which are related to for example, criminal justice involvement and mental health. The sustained stage of recovery is a significant transition period which is crucial to help aid entry to stable recovery. The magnitude of the transformation evident in cluster 4 (Stable With Greater Recovery Support) rebounding from having the highest rates of barriers in addiction and yet evolving to attain the highest number of strengths in recovery, appears to suggest that the depth of addiction deficits is not a barrier to recovery capital building in long-term and stable recovery.

The hierarchical clustering approach included a comparison between persons in recovery from different (Bellaert et al., 2021) countries and as such extends the reach to consider the impact of structural factors at the level of the country in which the recovery journey is taking place. The five clusters had distinct differences between them including country of residence, with Clusters 1 and 2 in particular linked to specific countries and regions suggesting that there are systemic factors (that may include lack of availability/accessibility of peer mutual aid groups) that may be a barrier to recovery progress. While this assumption is inevitably tentative at this stage, and we don't know anything about the country of residence during addiction (only at the time of completion of the questionnaire), this finding provides interesting early indications that there are contextual factors that shape pathways to recovery and we should not assume universality in how this is achieved. An earlier analysis of the SABRS data by Best et al. (2021) has also suggested that there may well be cultural/national differences in recovery pathways. Prospective comparative research is essential in the area of recovery capital (Best and Hennessey, 2022) as part of a broader international assessment of recovery pathways for different groups and populations, and will be essential to extend our understanding of the cultural parameters for addiction recovery.

The results of this study should take into account several limitations. Hierarchical clustering as a method assumes no a priori knowledge of the structure of the dataset, and due to the likelihood of overlap across segments, this may include variability in how the data are interpreted. Therefore, different interpretations of the datasets may exist.

Being 'in recovery' was self-defined by participants at the time of answering the survey. There is no consensual definition of recovery, but participants' subjective definitions may have affected how they answered the survey, making it difficult to draw objective conclusions on their meaning of recovery. This process also means that those in the stable clusters will only comprise those who still see themselves as in recovery at that stage of their journey and so we are unable to comment on those who have lapsed or have rejected the recovery label. Similarly, it is important to note that the Life In Recovery survey was not designed for measurement of strengths and barriers in the way it was used in SABRS, and there is a further leap in equating those strengths and barriers with the concept of positive and negative capital as originally framed by Cloud and Granfield (2008).

Further, while the statistical analysis provided evidence of five distinct clusters, the names we have attributed to each are much more clumsy and contingent and our hope is that, as recovery science evolves and develops, these 'place holders' are replaced with more conceptually driven category labels. However, Valentine (2010) defined recovery as something personal and that 'you are in recovery if you say you are.' Allowing participants' own interpretations of whether they are in recovery could be seen as a strength. Further, when answering the survey, participants in recovery looked at their addiction phase in retrospect, and therefore it is possible that participants were subject to inaccurate responses. However, a real strength of this study is the similar proportion of participants that fell into each cluster, as this resulted in five distinct groupings. Further, another strength is that only six cases or 0.5% of those surveyed did not fit into one of the emergent clusters demonstrating the ability of the method to differentiate between these populations. While this study is based on self-report, this paper offers a preliminary model for testing in other settings using other methods to assess recovery pathways.

Differences in the clusters relating to the stage of recovery reveal a minimum of a five-year period is needed for consolidated changes to have occurred in the number of barriers and strengths evident in the lives of participants. The profile of strengths and barriers are distinctly different at various stages of recovery and therefore regular reviews of recovery plans are needed to monitor the important changes occurring, but moreover need to take into account and plan for the potency of longer-term push and pull relationships between strengths and barriers. Similarly, research evaluations of the effectiveness of treatment, rehabilitation or related interventions that focus on short term follow up windows are unlikely to accurately reflect the dynamic push and pull interactions operating between barriers and strengths at different stages within the recovery journey.

Conclusion

The findings in this present study describe five distinct clusters of participants that differ in recovery stages, ranging from earliest in recovery to most stable in recovery. The identification of these clusters not only increases understanding of characteristics and associations between the groupings, but provides a way to individualise recovery supports, with the potential for improving outcomes for those in recovery from substance addictions. Creating multiple pathways helps people to move away from narrow views of 'the right way' and should form the basis for a more sophisticated model of change over time. A person possesses more recovery strengths and fewer recovery barriers across a range of life domains the longer they are in recovery. Therefore, future research is needed into how residual barriers and those evident in early recovery can be overcome sooner and more effectively, including an exploration of potential push and pull dynamics interacting at different stages of the recovery journey.

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Appendix 1

Table A1. Cluster summary.

Variable	Cluster 1 (%)	Cluster 2 (%)	Cluster 3 (%)	Cluster 4 (%)	Cluster 5 (%)	p-value
National factors (primary country(ies) listed)						
Resident UK	11.1	5.6	15.2	69.4	46.7	<0.0001
Resident Balkans (Balkans comprises Bosnia and Herzegovina, Serbia, Croatia and Montenegro)	31.7	2.1	53.7	3.2	8.3	<0.0001
Resident Netherlands Belgium	13.7	86.1	10.9	14.8	24.6	<0.0001
Resident Spain/Portugal	17.7	0.7	1.2	0.5	4.0	<0.0001
Resident Poland	11.4	2.8	8.6	3.7	3.3	<0.0001
Age	39.8	40.5	40.8	49.8	60.4	<0.0001
Male	80.8	65.9	56.0	64.4	57.6	<0.0001
Secondary school education	51.3	62.0	58.4	24.1	25.7	
Higher education	14.4	27.9	31.5	71.8	70.7	<0.0001
Primary education	25.8	9.4	9.3	3.7	2.9	<0.0001
Single (relationship)	66.8	48.8	21.0	28.7	35.9	<0.0001
Cohabiting	11.8	19.9	12.5	22.2	15.6	<0.0001
Married	7.0	8.4	45.9	31.9	24.6	<0.0001
Divorced	7.7	15.7	12.8	9.7	15.9	p=0.013
Dependent children	26.2	31.4	54.5	38.4	31.2	<0.0001
Acute housing need (last 30 days)	11.4	2.1	3.1	4.2	4.3	<0.0001
Eviction (last 30 days)	10.0	1.0	1.2	3.2	1.1	<0.0001
Offending (last 30 days)	2.6	10.1	1.9	3.7	1.4	<0.0001
CJS (last 30 days)	15.1	6.3	1.2	3.2	2.2	<0.0001
Employed Full Time (last 30 days)	14.0	30.0	63.4	59.3	47.8	<0.0001
Employed Part Time (last 30 days)	11.	24.7	25.3	17.6	19.2	<0.0001
Volunteer	14.8	38.3	35.8	35.2	41.7	<0.0001
At what age did you first attempt to stop/seek help for your problem	29.7	36.5	24.6	45.4	39.8	ns
Natural Recovery	4.1	5.6	5.1	3.7	8.1	ns
Alcohol (Ever)	62.7	63.4	67.7	77.8	72.5	p=0.001
Heroin (Ever)	62.7	18.5	80.5	59.3	17.8	<0.0001
Cocaine (Ever)	69.0	61.3	64.2	58.3	34.8	<0.0001
Crack (Ever)	36.9	15.7	22.2	49.1	13.4	<0.0001
Amphetamines (Ever)	59.0	53.3	68.9	56.0	34.4	<0.0001
Ecstasy (Ever)	56.1	35.2	63.0	43.5	29.7	<0.0001
Cannabis (Ever)	72.0	58.9	83.3	66.2	53.3	<0.0001
Methadone (Ever)	46.5	7.7	45.1	42.6	9.4	<0.0001
Buprenorphine (Ever)	28.4	2.1	16.7	22.2	2.9	<0.0001
Tobacco (Ever)	85.6	70.4	87.9	83.3	64.5	<0.0001
Reason to Stop Drug Use						
• Marital	59.0	64.5	43.2	76.9	55.4	<0.0001
• Financial	18.8	55.1	19.8	59.3	23.9	<0.0001
• Employment	11.1	39.7	2.3	51.9	26.4	<0.0001
• Legal	12.9	16.4	6.6	37.0	12.3	<0.0001
• Physical Health	38.0	42.9	23.7	62.5	40.2	<0.0001
• Mental Health	66.1	77.4	47.5	88.9	68.1	<0.0001
• Religion	7.7	5.2	7.0	18.5	11.2	<0.0001
• Other Reasons	7.0	10.8	26.8	10.2	11.2	<0.0001
Reasons to Stay in Recovery						
• Marital	64.9	82.6	44.7	92.1	42.8	<0.0001
• Financial	21.8	68.6	16.0	75.0	12.3	<0.0001
• Employment	22.9	67.2	16.3	79.6	18.5	<0.0001
• Legal	12.5	22.6	4.7	38.9	1.8	<0.0001
• Physical Health	49.1	74.6	28.0	87.0	35.9	<0.0001
• Mental Health	71.6	91.3	36.6	92.1	56.5	<0.0001
• Religion	23.2	26.5	40.1	56.5	35.1	<0.0001
• Other Reasons	9.2	13.9	40.9	18.5	32.6	<0.0001
Currently Accessing						
• 12-Step	17.8	30.3	12.5	50.0	47.8	<0.0001
• Non-12 Step	9.6	7.3	1.2	18.1	15.2	<0.0001
• Therapeutic Communities (TC)/Residential Rehabilitation (RR)	64.9	12.9	3.9	9.3	6.2	<0.0001
• Outpatient (OP) treatment	15.1	22.3	2.3	6.5	10.9	<0.0001
• Medication-Assisted Treatment (MAT)	17.7	6.6	1.9	8.8	2.9	<0.0001
• Websites	4.8	8.4	1.6	18.1	12.7	<0.0001
• Smartphone apps	3.0	9.1	1.2	12.5	14.9	<0.0001
• Social Media	3.3	15.3	0.8	23.6	23.9	<0.0001
• No services	4.4	21.3	52.5	19.9	19.9	<0.0001
Early Recovery	59.0	19.5	8.6	6.0	18.8	<0.0001
Sustained Recovery	35.4	54.4	23.3	20.4	41.3	<0.0001
Stable Recovery	5.5	26.1	68.1	73.6	39.6	<0.0001
Addiction Strengths (mean)	4.5	5.3	3.9	4.2	5.6	<0.0001
Recovery Strengths (mean)	7.9	10.6	11.2	12.4	11.0	<0.0001
Addiction Barriers (mean)	8.5	8.2	9.1	9.8	7.7	<0.0001
Recovery Barriers (mean)	3.3	3.0	2.2	2.2	2.1	<0.0001