1 **Building addiction recovery capital through online participation in a recovery**

2 **community**

3 **Abstract**

4   The study examines how online participation in a recovery community contributes to

5 personal journeys to addiction recovery. We investigate whether recovery capital building -

6 as indicated by increased levels and quality of online social interactions -  and markers of

7 positive identity development predict retention in a recovery program designed around

8 fostering community involvement for early stage recovery addicts.  We predicted that high

9 levels and quality of online participation on the group's Facebook page and positive identity

10 development predict retention in the program. To map how participants interact online we

11 conducted social network analysis (SNA) based on naturally occurring online data on the

12 Facebook page of a recovery community. We used computerised linguistic analysis to

13 conduct a sentiment analysis of the textual data (capturing social identity markers). We used

14 linear regression analysis to test whether our indicators of recovery capital predict program

15 retention. To illustrate our findings in the context of the recovery community, we also present

16 case studies of two key participants who moved from the periphery to the centre of the social

17 network. By conducting in-depth  interviews with these participants we were able to explore

18 personal experiences of social media usage in the context of their recovery journeys for group

19 members who have undergone some of the most significant changes since joining the

20 community. We found that retention in the program was determined by a) the number of

21 comment 'likes' and 'all likes' received on the Facebook page; b) position in the social

22 network (degree of centrality); and c) linguistic content around group identity and

23 achievement. In conclusion, positive online interactions between members of recovery

24 communities support the recovery process through helping participants to develop recovery

25 capital that binds them to groups supportive of positive change.

29 **Building addiction recovery capital through online participation in a recovery**

30 **community**

31

32 "…the longer people are on the Internet, the more likely they are to use the Internet to

33 engage in social-capital-building activities" (Kavanaugh and Patterson, 2001, p. 507)

34

35 **Introduction**

36 *Building recovery capital through social networks*

37 Traditional (offline) social networks are now recognised as helping make recovery more

38 sustainable (White and Kelly, 2010) by providing people with opportunities to develop their

39 recovery capital, i.e., "the sum total of one's resources that can be brought to bear on the

40 initiation and maintenance of substance misuse cessation" (Cloud and Granfield, 2009, p.

41 1972). Recovery capital can be developed through several avenues: a) building social capital

42 through developing and strengthening links with both group members (other people in

43 recovery), and outgroup members (reaching out to the broader community), referred to as

44 bonding and bridging capital respectively; and b) building community and cultural capital

45 (Best and Laudet, 2010; Groshkova et al., 2013). Based on the work of Robert Putnam (2001),

46 the concept of social capital has become a key theoretical framework around support and

47 resources and has been applied to addiction recovery populations (Cloud and Granfield,

48 2009). The accumulation of greater recovery capital is considered a marker of recovery

49 progress and a predictor of sustained recovery, therefore taking the form of a currency for

50 measurement in recovery research (Groshkova et al., 2013).

51 Being part of many supportive social networks of addiction recovery was shown to

52 have positive effects on wellbeing (Jetten et al., 2012; Litt et al., 2009; Longabaugh et al.,

53 1998; 2010). Here we aim to extend this evidence by examining the role of supportive *online*

54  *social networks* in helping people in recovery. We propose that online social networks can

55  assist recovery by helping build *recovery capital* at the same time supporting the

56  development of a positive identity. A positive identity can  in turn further support efforts to

57  maintain a drug-free lifestyle.

58

59  *Social identity in recovery*

60  While we know that supportive social networks are beneficial for recovery and help the

61  development of recovery capital, to understand the underlying processes we turned to

62  theoretical resources from social psychology, specifically to Social Identity Theory (SIT,

63  Turner et al., 1987; Turner, 1982). Increased recognition of the importance of developing

64  positive social identities in the recovery process stems from the SIT proposition that group

65  membership is fundamental to understanding adherence to the norms, values and rules of

66  social groups, in particular, identification and engagement with valued groups that shape

67  individuals' behaviour, through a desire to be a part of the group and therefore aspiring

68  members will increasingly adhere to its norms and values. Applied to health, these ideas lead

69  to developing a 'social cure' approach (Jetten et al., 2012) in which group belonging is

70  beneficial not only because it can provide access to emotional support and practical

71  assistance from other group members, but also through a direct (positive) influence on

72  behaviour.  The benefits of belonging to one or more groups are translated into positive

73  effects on health and wellbeing (Cruwys et al., 2013; 2014: Haslam et al., 2014).

74      This approach was applied to addiction recovery in the Social Identity Model of

75  Recovery (SIMOR, Best et al., 2016) which proposes that recovery is associated with

76  transitioning from the more excluded social group membership of 'using groups' to groups

77  that are supportive of recovery, and by doing so transitioning to more positive values, beliefs,

78  attitudes and ultimately to behaviours. In this model, the transition from active addiction to

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79  recovery is a staged process that takes place over time, and through exposure to recovery

80  groups at a time of disenchantment with addiction lifestyles (with the ensuing dissonance

81  between addiction group membership and other valued life goals such as relationships and

82  parenting). Such dissonance experiences can loosen the bonds to groups involved in addictive

83  behaviours and support a gradual transition to engagement with recovery groups, and the

84  internalisation of their norms, values and rules. These ideas are consistent with findings from

85  the Alcoholics Anonymous (AA) literature where the importance of facilitating positive

86  changes in social networks through a move to health-promoting social networks have been

87  well-recognised (Kaskutas et al., 2002; Kelly et al., 2009; 2012).

88

89  *The role of online social interactions in recovery*

90  As new technologies enable a variety of ways of communication, the ways in which social

91  support in recovery is delivered and received has expanded to include online modes

92  (Moorhead et al., 2013; White and Dorman, 2001). From a social interaction point of view,

93  there are both advantages and limitations in using new technologies for communication.  The

94  access to social support is facilitated through online communication which  is particularly

95  useful in cases of social, geographical or mobility-related isolation (Rodham et al., 2009;

96  Savic et al., 2013). However, despite some evidence of similar outcomes (Shahab and

97  McEwen, 2009), it is still debated whether the quality of social support received online is

98  comparable with its face-to-face alternatives (Chung, 2013, Finfgeld, 2000). The ability to

99  interact online with people facing similar issues regardless of their physical proximity

100 promotes the creation of significantly broader, borderless 'online communities of support' that

101 can include not only those people recovering from addiction, but also their supporters and

102 advocates. Therefore, these communities have the potential not only to support individual

103 change, but also social change either as an alternative to or a supplement to face-to-face

104     support networks. As online social interactions become more common across all groups in

105     society, more evidence of significant health benefits linked to online engagement is emerging.

106     For example, recent research by Hobbs et al. (2016) based on a large US dataset (i.e., 12

107     million social media profiles) suggests that people who are well integrated in online social

108     networks such as Facebook are likely to have lower mortality rates.

109         As in many other areas of research, the use of technology in accessing support in

110     recovery has also opened new possibilities in terms of how we collect data in the field of

111     addiction recovery. The recognition that recovery is a dynamic and long-term process goes

112     hand in hand with more dynamic ways of approaching research which the use of new

113     technologies make possible. In agreement with Shneiderman's comments on 'Science 2.0',

114     that "traditional scientific methods need to be expanded to deal with complex issues that arise

115     as social systems meet technological innovation" (Shneiderman, 2008, p. 1349), here we

116     complement the use of more traditional scientific methods such as social network analysis

117     and the use of in-depth interviews, with approaches designed to capture the rich and dynamic

118     context of online interactions in the addiction recovery field (such as computerised linguistic

119     analysis that can be applied to large textual datasets). Conceptually, this allows us to test

120     Social Identity Theory and, in particular, the Social Identity Model of Recovery by mapping

121     changes in belonging and engagement in recovery-supportive groups as a consequence of

122     linguistic style and network location, and to map these predictors of social identity against a

123     recovery outcome, retention in a recovery community.

124

125     *Context of research*

126     We focus on a particular program in the UK, Jobs, Friends and Houses (JFH) - a recovery

127     initiative that incorporates social engagement and identity change supported by an

128     overarching process of building recovery capital.  JFH is a social enterprise that engages

129   addicts in early recovery in apprenticeships in building professions while working on the

130   renovation and construction of recovery housing in the north of England town of Blackpool.

131   Participants in the program are actively involved in employment and training, are provided

132   with recovery housing and many of them also attend recovery mutual aid meetings together

133   as a part of a lifestyle change program. The program illustrates particularly well some key

134   SIT principles, as social identity change is enabled by providing participants with a highly

135   visible and attractive 'ready-made' positive social identity (a previous publication has

136   outlined how the model of JFH incorporates SIT principles, Best et al., 2016). This positive

137   social identity is constructed around work and the re-invigoration of a deprived community

138   that has resulted in a strong sense of engagement and bonding among program participants

139   and staff members (Best, 2016). Individuals who engage with JFH are able to challenge their

140   own and others' negative perceptions and prejudices through the adoption of a uniform of

141   work and through engagement in activities in a group that contributes to and is positively

142   valued in the local community. A further research paper has shown how the actions of JFH

143   staff prevented a serious assault in the town and describes the impact on bonding capital

144   within the group and bridging capital to the wider community (Best, 2016).

145       As part of the building of the recovery community, JFH has set up a Facebook page to

146   perform two primary functions: to create a recovery-supportive online community for

147   participants; and to allow the outside world (including a range of community stakeholders) to

148   engage with JFH. The community together with its online platform provides an excellent

149   opportunity to examine the role of online social interactions in supporting recovery capital

150   development and the transitioning to a successful recovery identity, which in turn should

151   predict positive outcomes in terms of retention in the program.

152

153

154    *Rationale and approach* To examine the role of supportive online interactions in recovery, we

155    focus on understanding the intragroup and intergroup dynamics as a whole (looking at the

156    structure of the online social network), as well as changes in the 'agents' of the network

157    (looking at changes within individuals in the group). As such, the study necessitates a mixed-

158    methods approach. At the same time, the increased widespread use of technologies for online

159    communication enabled us to gain access to more data sources in more varied formats. We

160    make use of these affordances by using social network and textual data extracted from the

161    Facebook's group page that is complemented by qualitative data from in-depth interviews

162    with key agents in the network, and quantitative retention data. By using a diverse and

163    complementary range of data sources and a mixed methods approach (Denscombe, 2008) we

164    seek to be able to capture the complex and dynamic processes that underpin a successful

165    recovery journey – while the quantitative components of our study will provide structural

166    data and aggregated linguistic information regarding the online social interaction in the

167    recovery community, the qualitative data will give us an insight into the subjective

168    experience of positive change.

169         As a first measure of online engagement in the community of support we look at the

170    growth in the online activity as captured by the number of posts and comments on the

171    Facebook page. To examine how recovery capital is developed in the online community we

172    identity specific markers of recovery capital development by charting the first eight months

173    of activity in the JFH Facebook page in terms of its growth and change over this eight months.

174    We do so by examining the online community of support as made up of three primary groups

175    of members and the interactions between them: a) JFH program participants; b) JFH staff,

176    and c) external individuals (broader community members).

177    By examining the connections between the members of the online community and how they

178    change in the eight months of our investigation we are able to identify variations in the

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179    dynamics of the group at an internal level (intragroup). Social network analysis (SNA)

180    represents a comprehensive approach to understanding relational features in groups (i.e.,

181    contacts, ties, connections, group attachments and encounters that relate one group member

182    to another) so it provides an ideal tool to capture intragroup and inter-group dynamics and

183    communication in our online community (Scott, 2012). Theoretically, SNA can be seen as

184    derived from a form of social exchange theory (Emerson, 1976) and more recently it has been

185    linked to Putman's social capital theory (where social networks are seen as a specific form of

186    social capital). However, "SNA provides a vocabulary and set of measures for relational

187    analysis but it does not imply the acceptance of one particular theory (…)" (Scott, 2012, p.8).

188    For instance, the centrality of a group member in the network would denote increased

189    communications with the other group members – in SNA the more linkages an 'agent' has

190    the more central its position in the network would be.  This means that we can use centrality

191    coefficients derived from SNA as measures of the *quality of online engagement.* Centrality

192    coefficients can also be used to capture prototypicality (i.e., how representative a group

193    member is for the whole group), and influence within the group. Thus, SNA allows us to

194    identify those group members who have undergone the most change in their location in the

195    social network, reflected by movement from the periphery to the centre of the social network,

196    as shown in SNA maps. As a result, we were then able to validate and further examine how

197    recovery capital is developed by conducting in-depth interviews with two of the most

198    representative members of the group (identified as the most central agents in the online social

199    network towards the end of the eight months period from among the JFH participant cohort)

200    who were then identified and participated in in-depth interviews described below.

201            Changes in the social identity of the group members are captured through conducting

202    a computerised analysis of the language used by participants in their contributions to the

203    Facebook page. By using the computerised language analysis software LIWC (Linguistic

204    Inquiry and Word Count) we can identify the levels (and changes in these) of identification

205    with the recovery group (Pennebaker, 2011), emotions (Chung and Pennebaker, 2014; Gill et

206    al., 2008), and social and cognitive processes of the participants (Pennebaker et al., 2007;

207    2015).

208         Indicators of recovery capital and identity change are used to examine whether they

209    are predictive of retention in the program - retention data being accessed from the JFH

210    administrative team in the form of joining and departing dates for each member of the JFH

211    housing and employment program. As a positive outcome of recovery, we used program

212    retention as *duration of staying in the recovery program* because this has previously been

213    found to be associated to long-term positive recovery outcomes (Zhang et al., 2003). Across a

214    range of treatment outcome studies (e.g., the Drug Abuse Reduction Programme; Simpson

215    and Sells, 1990 in the US, and the National Treatment Outcome Research Study, Gossop et

216    al., 2001, in the UK), there is a strong evidence base that longer retention in specialist

217    treatment services is associated with better outcomes across a range of outcome indicators.

218    Similarly, for recovery-oriented mutual aid groups, Kelly (2016) has reported on the

219    importance of both the intensity and the extensity of meeting attendance on reductions in

220    substance use and improvements in psychological health.

221         Our approach can be divided into two parts: a) examining how recovery capital is

222    built through online interactions, at the same time investigating changes in social identity;

223    and b) testing whether online social engagement and the indicators of recovery capital and

224    social identity change predict retention outcomes.

225                                    **Methods**

226    *Study participants*

227    The study population (total $N = 609$) consists of all participants in the online JFH Facebook

228    community and includes JFH program participants ($N = 23$), JFH staff ($N = 5$), and

229　community members ($N = 581$) who contributed to the online discussions over a period of

230　eight months since the establishment of the JFH Facebook page. Of the JFH program

231　participants, 91% were male and their ages ranged from 19 to 60 ($M = 34.57$, $SD = 10.86$);

232　32% left school with no qualifications, 26% had a high-school certificate, 16% A Level

233　(Advanced) Education Certificate, and 26% had other types of educational qualifications.

234　Regarding their employment status, 15% of the participants were never employed, 25% were

235　previously employed but no longer working, 45% employed for periods of time with breaks

236　in between, and 5% were in continuous employment.

237

238　*Outcome and predictor variables*

239　We seek to examine the effects of online engagement with a recovery community on

240　retention in a recovery program. Specifically, as predictors of retention, we examine the

241　following indicators:

242　　　- Overall levels of participation in the online community - captured by levels of

243　　　　online activity on the group's Facebook page (i.e., number of posts and comments

244　　　　made);

245　　　- Quality of participation in the online community - captured by centrality network

246　　　　coefficients derived from conducting social network analysis (SNA) by mapping

247　　　　the linkages between members of the online network through their online

248　　　　interactions (the underlying assumption is that, being a result of number and type

249　　　　of connections in the network, centrality coefficients capture the quality of online

250　　　　interactions); and

251　　　- Social identity markers - captured through word usage during the online

252　　　　interactions.

253

254    *Analytic strategy*

255    *1. Social network analysis (SNA)* – SNA is based on a conceptualisation of social structures

256    as a network with ties connecting members and channelling resources (Wetherell et al., 1994).

257    Therefore, we used the network coefficients of 'degree' centrality (i.e., the total number of

258    connections connecting a node, Scott, 2012) and 'betweenness' centrality (i.e., how much a

259    specific node can act as an intermediary between two other nodes, Scott, 2012) as indicators

260    of quality of online interaction. This choice of coefficients is based on the assumption that in

261    a social network, betweenness and degree centrality are the most relevant indicators of a

262    person's influence in the communication within the group (for example, the person with the

263    highest betweenness centrality will be the most influential communicator in the network).

264    SNA enabled us to identify those members of the online network that are the most influential

265    agents in the group (through their position in the network). The centrality coefficients were

266    calculated using the software R using the 'SNA' package, and were based on the online

267    activity and interactions on the group's Facebook page in the first eight months since its

268    creation. All interactions between two members within the Facebook group (i.e., commenting

269    on posts, liking posts, and liking comments) were classified as links (edges). The analysis

270    was divided by months (from month 1 to month 8) and includes all contributions during this

271    timeframe (i.e., posts, comments to posts, and likes of posts and comments). SNA maps were

272    also created using the R software using the igraph package.

273    *2. Computerised linguistic analysis* - Linguistic Inquiry Word Count (LIWC) software was

274    used for sentiment analysis of the online communications between the group members

275    (including staff members and broader community members). Online communication data in

276    the form of text was extracted from the group's Facebook page (all online text exchanges

277    between participants). LIWC is a linguistic analysis software package designed by social

278    psychologists James Pennebaker and colleagues (2015) to capture a number of linguistic and

psychological categories underpinning language. These categories include: use of various

function words, cognitive mechanisms, social processes, emotions, etc. The software was

used and validated in a range of health related contexts including alcohol consumption (Lowe

et al., 2013), depression (Baddeley et al., 2013; Rude et al., 2004), and suicide (Stirman et al.,

2001). The software's dictionary includes over 80 categories, but the most relevant in this

context are: achievement (given the core purpose of the group – to support members to

achieve sustainable behavioural change), collective (or social) identity (use of first-person

plural pronouns as opposed to first-person singular pronouns), as well as emotions such as

affect and positive emotions (as further indicators of the quality of the online engagement).

*3. Correlation and linear regression analyses* – in a first stage we conducted correlational

analysis on all key variables, followed by linear regression analysis with the following

variables entered as predictors:

- Network centrality coefficients (betweenness centrality and degree centrality);

- Number of posts and comments;

- Number of post likes given and received;

- Number of comment likes given and received;

- Number of all likes given and received;

- Client-Client comments received, given and total;

- Client-Staff  comments received, given and total;

- Total usage of LIWC categories in posts;

- Total usage of LIWC categories in comments;

- Total usage of LIWC categories in both posts and comments.

*4. Qualitative analysis* – the qualitative data obtained through the in-depth interviews with

the two group members selected on the basis of being the most prototypical/influential group

members in the social network (as indicated by SNA). The individuals who were identified as

304 central by the end of the study window who had been peripheral at the start were approached

305 to participate in an in-depth interview. We used a deductive approach broadly derived from

306 thematic analysis (Braun and Clarke, 2006), and framework approaches as described by Pope

307 et al. (2000). More specifically, we first familiarised ourselves with the data by independently

308 reading and re-reading the transcripts of the in-depth interview several times. To analyse the

309 data we used a thematic framework (i.e., comprising of the key concepts and themes by

310 which the data can be examined) a-priori drawn from our research questions. The outcome of

311 next step of the analysis was the classification of qualitative data into the relevant categories

312 and themes around the research question about how recovery capital is developed in the

313 program through experiences of both online and face-to-face interactions which were shared,

314 agreed upon and further refined collectively. The final themes were labelled, and the most

315 illustrative quotes for each theme were identified.

316 **Results**

317 *Descriptive statistics*

318 Overall online engagement was captured by computing the number of posts, comments and

319 likes made by staff, clients and community members. Table 1 illustrates a breakdown by type

320 of contribution made by each category of participant across our timeframe of eight months.

321 The counts indicate that the participants from the broader community are particularly active

322 in terms of comments and likes to the posts – which are mostly contributed by staff and

323 clients.

324

325 *Insert Table 1 about here*

326

327 General levels of activity on the Facebook group are shown in Table 2.

328

330

331

332

333     *Determinants of retention in the program*

334     We expected that retention would be associated with the indicators of recovery capital

335     development (quantity and quality of online interaction), and indicators of a positive recovery

336     identity development. In quantitative terms, online interaction was captured through the

337     number of: a) posts made; b) comments made; c) post likes received; d) comment likes

338     received; and e) all likes received. The quality of online interaction was captured by network

339     structure, that is, degree and betweenness coefficients, and linguistic indicators of positive

340     affect. In addition, different types of recovery capital were captured by: a) number of

341     connections (posts and comments) between members/clients (bonding capital); b) number

342     of connections between members and staff (internal level of support - bonding capital), and c)

343     number of connections between members and broader community/others (bridging

344     capital).The development of a positive social identity (identification with the recovery

345     community) was captured through the use of the pronoun 'we' and achievement words.

346     Retention in the program was coded in terms of total number of days in the program (range of

347     464 to 86 days).

348          Among indicators of online interaction, in-group validation as captured by the number

349     of likes received (for both posts and comments) is the strongest determinant of retention (see

350     Table 3). The position occupied in the social network by participants (the centrality in the

351     network) is also a good indicator of program retention. In particular, degree centrality is

352     significantly associated with retention. Regarding the content of communication, the

353     computerised linguistic analysis revealed that collective identity markers such as the use of

354    the pronoun 'we' in posts as well as achievement words (used in both posts and comments)

355    are the best determinants of retention in the program (see Table 3). Other marginally

356    significant predictors include affect and positive emotions words.

357

358                                    *Insert Table 3 about here*

359

360            We expected that these findings will be consistent with data collected through  in-

361    depth interviews. The participants in the interviews were selected based on the SNA based on

362    the online interaction between group members on the JFH's Facebook page. The two

363    interviewees have been identified as the most prototypical members of the community based

364    on their central position in the online network, and their transition from the periphery to the

365    centre of the network over the course of the eight months of the study. Figure 1 illustrates

366    configurations of the social networks for each of the eight months of our analysis. The

367    different types of network members are color-coded, so we can observe the dynamic

368    evolution of the network in our set timeframe – i.e.., the movement of the 'clients' from the

369    periphery to the centre of the network, and in particular the movement of the two selected

370    participants (identified as 614 and 93 in Figure 1).  We were able to identify the individuals

371    and ask them to participate in an interview about their social networks with both agreeing to

372    take part.

373            Both our participants were male, aged 30 and 45. Participant 1 started with JFH in

374    mid-January 2015, and in his own words, before joining the community, he was addicted and

375    homeless, living in a shelter. Participant 2 joined JFH from the start of the community

376    (01/11/2014), and before that he was "on the sick [Disability Living Allowance] and working

377    part-time - abstinent about one year - living in a recovery house - not a lot of support in the

378     house - working in services taking clients on prescriptions to the gym, 16 hours a week"

379     (Extract 1)

380

381                         *Insert Figure 1 about here*

382

383

384     *Qualitative data findings – Bonding capital: reaching to the other group members*

385     Bonding recovery capital refers to resources which are made available through linkages

386     between group members. In this context (of online social interaction), we found that our

387     interviewees value the availability of online means of communication with other group

388     members ('*live social connectivity*') and they see it an asset that supports their recovery:

389          Extract 2: "It's good, sometimes you get notifications like 'has anyone seen T?' - and

390          you get five phone calls. It is a really good support network (…) it's visible … it

391          reminds me that you are part of something" (P1)

392     Another aspect of online communication that is seen as supporting bonding recovery capital

393     development is the capacity of not only enabling live group interaction, but also continuous

394     access to relevant (potentially 'life saving') information and instant access to a supportive

395     network:

396          Extract 3: "JFH is not just 9-5; it continues - you get on with each other and you do

397          the messaging to support – it's about looking after each other whether you are in work

398          or not…(I) use it 24/7 - even during the day, it's like information at your finger-tips"

399          (P2)

400          Extract 4: **"(…)** It is a support page but it also puts information out there. It is a

401          support network - I am friends with everyone in JFH who has a Facebook account

402         (…). You get a lot of support - people recognise if you are not on, it is good because

403         you can interact with a lot of people quicker."(P2)

404

405     *Qualitative data findings – Bridging capital: reaching to the wider community*

406     Bridging capital in the context of recovery refers to those resources that are built based on

407     linkages with outgroup members, or the wider community in our case. Based on our

408     interview data, being part of an online recovery community helps build bridging recovery

409     capital through being able to *access wider support* which in turn further helps group members

410     to create a sense of hope in their recovery success:

411         Extract 5: "(…) what excites me more is when other people comment. It just gives me

412         a really good feeling. (…) It shows the support from the people who are out there.

413         (…) It's like the ripple effect - instead of parents writing off their children, they are

414         starting to have some sense of hope" (P1)

415     The opportunity to reach to the wider community as a key resource to support recovery is

416     also mentioned:

417         Extract 6:  "It's like the wider community coming in. (…) It's about the recovery

418         community getting in touch with the wider community - and it's important that it is

419         about the wider community and them understanding - like that incident with the

420         woman" (reference to an incident when several members of the groups intervened and

421         saved a woman in a domestic incident)

422

423     *Qualitative data findings - Recovery social identity*

424     According to theories of addiction that draw on social identity theory (SIMOR and SIMCM),

425     developing a strong recovery identity is likely to enable a sustainable, long-term recovery

426     journey. Therefore, we looked for themes around identity development through the interview

427   data, and found that the importance of visibility of identity change as a way of helping others

428   in their recovery was highlighted:

429       Extract 7: "You will go out your way if you need to bring other people on board (…)

430       a lot of guys, it has given them hope. A lot of people are touched through addiction,

431       and now they can see that there is hope. They are looking at them differently and they

432       can see that there is hope. (…) Really important (to be seen as successful); we are

433       visible - we can recover and we can deal with everyday stuff - without individuals to

434       show that it does work, it wouldn't seem the same…Where you are now and where

435       you were two years ago…" (P1)

436   The visibility of being part of JFH (a positively valued social identity) comes with a sense of

437   pride in this identity – that further helps development and maintenance of the recovery

438   identity:

439       Extract 8: "Positive things - there was not one bad thing - we are trying to do our best

440       - public see it as a really good thing, Withnell Road - built up relationships - turned

441       people around (…) 261 properties coming on from the 14th of December"(P2).

**Discussion and Conclusions**

443   The study contributes to our understanding of group processes in addiction recovery by using

444   naturally occurring online data and subjecting this to SNA, standard statistical analyses, and

445   computerised linguistic analysis. These online data are supplemented by two case studies

446   where qualitative data from face-to-face in-depth key informant interviews are used to bridge

447   the gap between online activity and personal report and reflection on social networks. This

448   mixed methods approach has allowed unique insights into how online social networking and

449   social identity processes can affect retention in a recovery program. Our findings support the

450   proposition that program retention is significantly predicted by SNA centrality coefficients

451   such as degree (the more central people are in the online network, the longer they stay in the

452 program), indicating the importance of prototypicality in group engagement, and the dynamic

453 processes through which centrality and prototypicality are achieved.

454       Using computerised linguistic analysis, we found that retention in the group was not

455 only significantly predicted by the pronoun "we" use (a social identity marker – the more

456 they talk about 'we' the longer they stayed in the program), but also by the extent of

457 affirmation or ingroup validation – reflected in the number of comments and post 'likes'

458 received (i.e., other people liked their post), comment 'likes' received, and all 'likes' received.

459       The focus on retention as the dependent variable in this study is based on evidence

460 suggesting that not only recovery maintenance but also thriving is predicted by retention in

461 recovery groups (Zhang et al., 2003). The design has provided us with a new method of

462 measuring how group processes can impact upon retention with four aspects of network

463 location and social interaction predictive – being active in the network, being central in the

464 network, being positive about belonging to the network, and being endorsed by others for

465 contributions to the network, as well as dynamic changes in these things. These findings are

466 entirely consistent with the two social identity models of recovery. SIMOR (Best et al., 2016)

467 would suggest that the active participation and increased sense of belonging to recovery

468 groups is protective against involvement with using groups (and so relapse). Similarly, the

469 SIMCM (Frings and Albery, 2015), which focuses specifically on group processes and social

470 identification in therapeutic settings and in the wider community (including mutual aid

471 groups), have argued that active identification with the group (as indicated in our study by the

472 use of 'we' language) binds people to the group and to the resultant recovery values. It is

473 important to note that while collective personal pronoun use ('we') is predictive of retention,

474 individual personal pronoun ('I') was not. What this implies is that the salience of the group

475 and the individual's commitment and belonging are associated with greater endorsement by

476 the group and longer engagement in it. Our findings support the argument that developing a

477     sense of collective selfhood (a positive recovery identity) helps the recovery process. Our

478     findings provide some support for the SIMOR model in that linguistic analysis markers of

479     group belonging (use of we language) and SNA indicators of group centrality were predictive

480     of retention, suggesting that greater active identification with a recovery group and greater

481     prototypicality with a recovery group is associated with longer retention in that group. These

482     findings were also supported (as a form of triangulation) by the two in-depth interviews. The

483     design has allowed us to map the underlying processes of group immersion and how it is

484     experienced and why it was valued by our interview participants.

485         By using a staged mixed-method approach, we found that retention outcomes can be

486     understood as a process of fostering social identity change that is also supportive of recovery

487     capital development. While indicators of specific types of capital (bonding and bridging)

488     were only marginally significant, we found that both the specific model of recovery

489     community (build around participation and social engagement) and the use of technology

490     enhanced positive recovery outcomes. Our findings explain how these two elements effected

491     psychological change in the JFH participants as also evidenced in the qualitative reports of

492     the two individuals who were interviewed following their identification as having

493     transitioned from the periphery to the centre of the group. Thus, there is a clear sense that the

494     adoption of the values of the group, identifying oneself strongly with it and being endorsed

495     widely for one's contributions has a positive impact on centrality (and so influence over the

496     group) and on the likelihood of enduring involvement with the group. These findings were

497     also present in the narratives described in the case studies. For instance, these narratives

498     highlight the importance of establishing positive identities and making the achievements

499     associated with these identities visible in the broader community – that in turn supports

500     recovery through creating a sense of pride and hope, and that may challenge exclusionary and

501     stigmatising attitudes and beliefs.

502    This has important implications for recovery group participation, both face-to-face

503    and online. To encourage new group members to engage effectively in recovery groups, it is

504    critical that they are endorsed and supported to feel that they are part of the group and that

505    their contributions to the group are acknowledged and valued. It would also imply that those

506    whose views are not endorsed and supported by other group members are more likely to

507    become peripheral and as a result to drop out of the recovery group. What is clear from the

508    findings is that this transition from the periphery to the centre of a social network (and the

509    reverse) is a gradual process and that there may be opportunities for group coordinators to

510    identify and prevent drop-out from groups through endorsement and support for group

511    identification, and including and assertively engaging new members of the network.

512    *Limitations of the research*

513    Our findings are based on an in-depth case-study of intragroup dynamics in a specific

514    recovery community, therefore they are not meant to be extrapolated to other groups and

515    populations and no inferences can be drawn about the prevalence of the relationships

516    observed beyond JFH. Further research should be conducted to replicate the methodology

517    and approach in other recovery communities, and assess outcomes of different approaches

518    based on comparisons between different communities (based on different approaches to

519    recovery). While retention is recognised in specialist addiction treatment services as a proxy

520    indicator of outcomes, it is an assumption of the paper that the same is true of online recovery

521    groups, and the impact will need further testing with prospective outcome analysis including

522    a more diverse range of indicators (e.g., levels of recent substance use/abstinence, well-being

523    measures, etc.). We describe two case studies that include findings derived from in-depth

524    interviews conducted with only two group members selected because they undertook

525    significant changes in their position in the online social network - reflecting a positive

526    recovery journey. A broader and more diverse sample would have been ideal but including

527    participants with less positive trajectories would have raised ethical issues around the use of

528    data from open social media sites and the linking of these online data to personal data.

529    Further examination of other individuals who moved from the centre to the periphery of the

530    online network (in other online communities) represents another research option that needs to

531    be explored in future studies.

532    *Recommendations for future research*

533    This study has used a mixed methods approach to study in real time the changes that take

534    place in a recovery community that are underpinned by processes of social networking, social

535    identity and recovery capital development. We have established that online engagement

536    represents an effective way of supporting the process of recovery. More research is needed,

537    however, to identify the socio-economic and individual factors that facilitate or hinder the

538    engagement with online forums in the first place. We have determined that there are three key

539    factors that determine retention in the recovery group that relate to centrality and

540    commitment to the group and to endorsement by other members of the group. These findings

541    provide a basis for further research to examine group dynamics using online naturally

542    occurring data to asses a combination of 'fit' with  the values of the group and the resulting

543    affirmation by fellow group members for the possibility of interventions to prevent drop-out

544    by peripheral members of recovery communities and groups.

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689 **Table 1**

690 Descriptive statistics of JFH Facebook page activity across the eight time periods, cumulative

691 numbers in parenthesis

| | | Month 1 | Month 2 | Month 3 | Month 4 | Month 5 | Month 6 | Month 7 | Month 8 |
|---|---|---|---|---|---|---|---|---|---|
| All | Posts and comments | 382 | 388 (770) | 579 (1349) | 369 (1718) | 530 (2248) | 581 (2829) | 796 (3625) | 674 (4299) |
| | Post likes give | 1167 | 878 (2045) | 1856 (3901) | 1440 (5341) | 1880 (7221) | 1756 (8977) | 2667 (11644) | 1857 (13501) |
| | Comment likes given | 784 | 970 (1604) | 825 (2429) | 171 (2600) | 634 (3234) | 970 (4204) | 825 (5029) | 171 (5200) |
| Staff | Posts and comments | 129 | 106 (235) | 170 (405) | 96 (501) | 185 (686) | 176 (862) | 227 (1089) | 316 (1405) |
| | Post likes give | 188 | 147 (335) | 302 (637) | 209 (846) | 385 (1231) | 372 (1603) | 567 (2170) | 511 (2681) |
| | Comment likes given | 168 | 303 (471) | 237 (708) | 69 (777) | 168 (945) | 303 (1248) | 237 (1485) | 69 (1554) |
| Clients | Posts and comments | 145 | 155 (300) | 214 (514) | 132 (646) | 208 (854) | 286 (1140) | 419 (1559) | 253 (1812) |
| | Post likes give | 365 | 252 (617) | 415 (1032) | 303 (1335) | 549 (1884) | 529 (2413) | 898 (3311) | 576 (3887) |
| | Comment likes given | 143 | 318 (461) | 235 (696) | 33 (729) | 143 (872) | 318 (1190) | 235 (1425) | 33 (1458) |
| Other | Posts and comments | 108 | 127 (235) | 195 (430) | 141 (571) | 137 (708) | 119 (827) | 150 (977) | 105 (1082) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Post likes give | 614 | 479 (1093) | 1139 (2232) | 928 (3160) | 946 (4106) | 855 (4961) | 1202 (6163) | 770 (6933) |
| Comment likes given | 473 | 349 (672) | 353 (1025) | 69 (1094) | 323 (1417) | 349 (1766) | 353 (2119) | 69 (2188) |

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694 **Table 2**

695 Connections made in JFH Facebook page broken down by type (bonding vs. bridging),

696 cumulative numbers in parenthesis

| | Month 1 | Month 2 | Month 3 | Month 4 | Month 5 | Month 6 | Month 7 | Month 8 |
|---|---|---|---|---|---|---|---|---|
| All connections | 834 | 581 (1415) | 809 (2224) | 469 (2693) | 597 (3290) | 577 (3867) | 617 (4484) | 419 (4903) |
| Connection: post-comments | 140 | 126 (266) | 139 (405) | 105 (510) | 136 (646) | 120 (766) | 186 (952) | 108 (1060) |
| Client-to-client (bonding) | 93 | 54 (147) | 40 (187) | 106 (293) | 192 (485) | 200 (685) | 465 (1150) | 192 (1342) |
| Staff-to-client (bonding) | 48 | 40 (88) | 36 (124) | 74 (198) | 128 (326) | 126 (452) | 279 (731) | 176 (907) |
| Other-to-client (bridging) | 115 | 96 (211) | 118 (329) | 282 (611) | 250 (861) | 240 (1101) | 615 (1716) | 275 (1991) |
| Connection: post-likes | 528 | 429 (957) | 590 (1547) | 328 (1875) | 461 (2336) | 398 (2734) | 567 (3301) | 295 (3596) |
| Client-to-client | 23 | 40 (63) | 20 (83) | 38 (121) | 41 (162) | 109 (271) | 198 (469) | 87 (556) |
| Staff-to-client | 7 | 9 (16) | 2 (18) | 13 (31) | 31 (62) | 50 (112) | 67 (179) | 59 (238) |
| Other-to-client | 14 | 11 (25) | 9 (34) | 30 (64) | 25 (89) | 29 (118) | 63 (181) | 19 (200) |
| Connection: comment-likes | 385 | 256 (641) | 1029 | 1223 | 1458 | 1746 | 1973 | 2193 |
| Client-to-client | 115 | 82 (197) | 108 (305) | 61 (366) | 127 (493) | 151 (644) | 172 (816) | 78 (894) |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Staff-to-client | | 113 | 119 | 44 | 89 | 140 | 114 | 107 |
| | 123 | (236) | (355) | (399) | (488) | (628) | (742) | (849) |
| Other-to-client | | 109 | 109 | 52 | 61 | 68 | 68 | |
| | 52 | (161) | (270) | (322) | (383) | (451) | (519) | 25 (544) |

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699  **Table 3**

700  Retention time as predicted by Facebook page activity, network statistics, and LIWC

701  categories

| Variable | $B$ | $SE$ | $\beta$ | $R^2$ |
|---|---|---|---|---|
| Comment likes received | .43 | .18 | .47[*] | .22 |
| Likes received (all) | .08 | .03 | .43[*] | .18 |
| Comment-like difference | 1.09 | .50 | .43[*] | .19 |
| Network degree | .01 | .001 | .43[*] | .18 |
| LIWC We (Post) | 3.89 | 1.76 | .43[*] | .19 |
| LIWC Achievement (Post) | .56 | .26 | .43[*] | .18 |
| LIWC Achievement (All) | .14 | .07 | .42[*] | .17 |

702  [*] $p < .05$

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