

Why you should read this article:

- To enhance your knowledge of contemporary evidence on exercise-based interventions to treat substance use disorder
- To understand the potential benefits of an exercise programme for people who misuse alcohol and/or drugs
- To encourage you to consider how exercise can be used to support recovery from substance use disorder

Substance use disorder: evaluating the effectiveness of the Addiction Recovery Coaching exercise programme

Gary Rutherford and Iain McGowan

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Correspondence

i.mcgowan@qub.ac.uk
@IainMcGowan1

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Abstract

Substance use disorder is a major public health issue and there is limited evidence of the effectiveness of current pharmacological and psychosocial treatment approaches. The Addiction Recovery Coaching (ARC) programme uses exercise in conjunction with mental health nursing interventions to support recovery from substance use disorder.

This article details a service evaluation undertaken to evaluate the effectiveness of the ARC exercise programme in a small sample of patients with substance use disorder. The intervention ran over six weeks and consisted of group exercise and one-to-one coaching sessions. Quantitative data were collected before, during and after the intervention using patient-reported outcome measures for recovery from drug and alcohol dependence, as well as clinical measures of anxiety and depression. Qualitative data were collected using a post-intervention online questionnaire.

The evaluation found improvements in patient-reported outcome measures, reductions in symptoms of depression and anxiety, and the development of positive social contacts between participants. These findings offer promising evidence supporting the addition of exercise regimens to ongoing mental health interventions for the treatment of substance use disorder.

Author details

Gary Rutherford, staff nurse, Western Health and Social Care Trust, Londonderry, Northern Ireland; Iain McGowan, senior lecturer, Education (Mental Health), School of Nursing & Midwifery, Queen's University Belfast, Belfast, Northern Ireland

Keywords

addiction, alcohol, behaviour change, clinical, exercise, health promotion, lifestyles, mental health, outcome measures, patients, patient outcomes, professional, public health, substance misuse

SUBSTANCE USE disorder is a major public health issue, globally and in the UK. In the UK, the annual incidence rate of alcohol dependence in general practice has been estimated to be 8.3 per 10,000 in males and 3.7 per 10,000 in females (Thompson et al 2017). In the year to the end of March 2019, there had been 18,053 hospital admissions for poisoning by drug use in England – a rate of 33 per 100,000 population. During the same period, it is estimated that around 1 in 11 (9.4%) adults aged between 16 and 59 years in England and Wales took an illicit drug – which equates to around 3.2 million people (NHS Digital 2019).

Treatments for substance use disorder range from managed access – for example, supervised heroin injection and managed alcohol programmes – to abstinence (Marchand et al 2018). Pharmacological and psychosocial approaches can be used independently or jointly to improve patient outcomes (Magill and Ray 2009, Jhanjee 2014). However, several systematic reviews have shown that there is limited evidence of the effectiveness of these approaches. For example, Klimas et al (2018) reviewed seven randomised controlled trials (RCTs) of psychosocial interventions to reduce alcohol consumption in illicit drug

users with concurrent problem alcohol use and found that talking therapies led to no difference in alcohol use. Leone et al (2010) undertook a Cochrane review into the use of gamma hydroxybutyrate (GHB) for the treatment of alcohol withdrawal syndrome and the prevention of relapse, concluding that there was insufficient evidence that GHB reduces rates of relapse compared with placebo or other pharmacological treatments.

Physical activity, particularly structured exercise, could be used as a non-pharmacological intervention in the treatment of drug addiction (Lynch et al 2013). Exercise has been found to have benefits for people with depression (Kvam et al 2016), anxiety (Stubbs et al 2017), schizophrenia (Rimes et al 2015) and dementia (Telenius et al 2015), but the evidence supporting its use in substance use disorder is limited. This article details a service evaluation that was undertaken by the authors to determine the effectiveness of a structured exercise programme to support recovery from substance use disorder.

Literature review

This section presents an overview of the contemporary evidence on the use of exercise-based interventions to treat substance use disorder. PubMed was searched to identify relevant articles. Search terms used were 'addiction' OR 'substance use' AND 'exercise'. Only RCTs and systematic reviews were considered. Where appropriate, further evidence was obtained from the reference lists of articles.

Weinstock et al (2017) argued that exercise not only has benefits for co-morbid psychiatric conditions in people with substance use disorder, but could also be effective in reducing the rate of relapse. Taylor et al (2013) reported that exercise – even as little exercise as 15 minutes unstructured daily walking – reduced the urge to drink in a sample of 20 people with high alcohol consumption. They also found that exercise reduced anxiety and stress, both of which are associated with relapse in substance use disorder. While the small sample size means that the findings must be interpreted with caution, Taylor et al's (2013) study provides some evidence of the potential of exercise as an adjunct treatment for substance use disorder.

Three small-scale RCTs examined the effectiveness of exercise in substance use disorder (Dolezal et al 2013, Brown et al 2014, Cutter et al 2014).

Dolezal et al (2013) randomised 29 people undergoing residential treatment

for dependence to methamphetamine to an endurance and resistance training programme for three days per week over eight weeks ($n=15$) or health education without training ($n=14$). The authors reported a statistically significant improvement in general fitness as well as physiological changes that they claimed may enhance recovery from drug dependency (Dolezal et al 2013).

Brown et al (2014) randomised 48 alcohol-dependent, physically sedentary patients to a 12-week moderate-intensity group aerobic exercise intervention ($n=25$) or brief advice to exercise ($n=23$). Participants in the intervention group reported fewer 'drinking' and 'heavy drinking' days during treatment than participants in the advice group (Brown et al 2014).

Cutter et al (2014) found that, in patients maintained on methadone, active and sedentary video-game play reduced substance use, decreased stress and increased optimism.

A systematic review by Giesen et al (2015) examined 14 RCTs investigating the use of exercise in alcohol use disorder. The authors reported an overall positive effect of exercise on anxiety, mood, cravings and drinking behaviours. Although they noted that the evidence was of low quality, they concluded that exercise could be a feasible and safe adjunct to treatment for alcohol use disorder (Giesen et al 2015).

Muller and Clausen (2015) reported improvements in the overall quality of life of patients with substance use disorder living in long-term residential treatment facilities who enrolled in a ten-week group exercise programme. There were statistically significant differences in physical health, psychological health, social relationships and environmental quality of life between 24 patients who had taken part in the exercise programme and 11 patients who had not (Muller and Clausen 2015). In a three-year longitudinal study of 289 users of crack cocaine and/or heroin in an inner city environment, Laudet et al (2009) found that quality of life was a significant predictor of remission from illicit drug use.

The above studies are limited by small sample sizes, lack of follow up or short follow-up periods and other methodological limitations. They appear to focus on clinical outcomes, with minimal consideration of outcomes considered important by people themselves. However, they provide some evidence supporting the notion that structured exercise could be a useful adjunct to conventional treatments in people with substance use disorder.

Key points

- There is some evidence that structured exercise could be a useful adjunct to conventional treatments for substance use disorder
- The Addiction Recovery Coaching (ARC) exercise programme aims to provide a therapeutic environment that supports recovery from substance use disorder
- In a service evaluation of the effectiveness of the ARC programme, participants reported a reduction in their overall substance use and an increasing focus on self-care and relationships
- Clinically important reductions in symptoms of depression and anxiety were seen at the end of the ARC exercise programme

Addiction Recovery Coaching programme

The Addiction Recovery Coaching (ARC) programme was established in 2019. It consists of a combination of cardiovascular (aerobic) training, resistance training and one-to-one and group coaching. Its aim is to establish a therapeutic environment that supports recovery from substance use disorder, enabling participants to focus on improving their physical and mental well-being through physical activity, professional and peer support, and positive social connections. The structured exercise regimen in the ARC programme is individually tailored to each participant. The mental health nursing interventions used in the programme are underpinned by cognitive behavioural and person-centred approaches, and provided by the first author, who is a mental health nurse with experience of working in addiction settings, as well as a certified fitness instructor and personal trainer.

The ARC programme is delivered independently of statutory services by ARC Fitness (arcfitness.co.uk), a not-for-profit, mental health nurse-led social enterprise based in Northern Ireland. Participants in the ARC programme may or may not receive treatment or support from NHS providers for their substance use disorder or any other physical or mental health condition. To the authors' knowledge, ARC Fitness is the first organisation in the UK to offer a structured exercise-based intervention as a treatment option for substance use disorder. The closest known equivalents are recovery programmes based on team sports, such as the programme offered by Phoenix Futures (phoenix-futures.org.uk/recovery-through-sport).

Aim

To evaluate the effectiveness of the ARC structured exercise programme in a small sample of patients with substance use disorder.

Method

Intervention

The ARC programme investigated in this service evaluation ran over six weeks in April–May 2019 and consisted of:

- » Twice weekly evening group exercise sessions lasting one hour.
- » Once weekly one-to-one addiction recovery coaching sessions lasting one hour.

Both types of activities took place at a local gymnasium to which participants had free access for the sessions. The aim of the group exercise sessions was to improve cardiovascular

fitness and muscular endurance through functional exercise, including strength and conditioning exercises, body weight exercises, high-intensity interval training and CrossFit-style workouts. In the coaching sessions, indoor climbing was used as a medium to provide individual support to participants, each of whom received tailored guidance and support to meet their individual recovery goals.

A closed group was created on WhatsApp with the purpose of engaging participants and encouraging them to interact with and support each other. Participants were encouraged to share their experiences via the group throughout the six-week intervention. The group encouraged discussions and the sharing of information; maintained contact and focus between group sessions; and fostered relationships between participants that supported their recovery.

Participants

Participants self-referred to the ARC programme, which they had heard of through advertisements on social media and/or by word of mouth. People were excluded from participating if their physical health was suboptimal. They were also excluded if they were unable to abstain from substance use for 48 hours; this is because alcohol use increases the risk of arrhythmias and other cardiovascular conditions, which can develop up to two days after heavy alcohol use (DrinkAware 2020); as a precaution, this exclusion criterion was applied to all participants, regardless of what substance they primarily used. Recruitment closed once six participants had been enrolled. This was a pragmatic decision reflecting the fact that the ARC programme is relatively new.

All participants had previously received treatment for alcohol and/or drug (illicit and/or prescription) use and were at various stages of recovery. Some participants may have been in statutory care, but this was not a prerequisite for participation. Those who were in statutory care may have been receiving other treatments, in which case the intervention was delivered as an adjunct to their normal care.

Data collection and analysis

Data were collected using quantitative and qualitative methods.

Quantitative data collection and analysis

Quantitative data were collected using three measures:

- » The Substance Use Recovery Evaluator (SURE) (Neale et al 2016) – a validated

patient-reported outcome measure for recovery from drug and alcohol dependence. It consists of 21 items categorised into five domains: substance use; material resources; outlook on life; self-care; and relationships. Increasing scores on the SURE denote improvement.

- » The Patient Health Questionnaire-9 (PHQ-9) (Kroenke et al 2001) – a brief nine-item, self-administered measure of the severity of depression. Scores range from 0 to 27 and higher scores indicate greater levels of depression.
- » The Generalised Anxiety Disorder-7 (GAD-7) (Spitzer et al 2006) – a brief seven-item self-report measure used to identify general anxiety disorder. Scores range from 0 to 21 and higher scores indicate greater levels of anxiety.

All three measures were completed by participants before the start of the programme, after each weekly group exercise, and after completion of the programme. Data were collated and analysed using SPSS version 25. Due to the small sample size, inferential statistical analysis was not deemed appropriate.

For scores on the PHQ-9 and GAD-7, minimal clinically important differences (MCIDs) were calculated using the distribution method (Rai et al 2015), where a difference in half the standard deviation (SD) is deemed to be clinically important (Rai et al 2015). The threshold for determining an MCID was 3.72 for the PHQ-9 and 3.20 for the GAD-7. The MCID is the threshold value of a change in score deemed to have an implication for clinical management (Sedaghat 2019).

Qualitative data collection and analysis

Qualitative data were collected using a post-intervention online questionnaire containing the following six open-ended questions:

- » How did you find the programme?
- » What did you find particularly useful/helpful and why?
- » What did you find least useful/helpful and why?
- » How would you compare your alcohol/drug use before and after the programme?
- » What changes do you think would make the programme better, if any?
- » Sum up your overall experience in one sentence.
- » If you had to describe ARC in three words, what would they be?

Responses to the questionnaire were collated and analysed to determine emerging themes.

Ethical considerations

Ethical approval was not sought, since guidance from the National Research Ethics Service indicates that it is not required for service evaluations (Health Research Authority 2013). However, being mindful of the need to adhere to ethical standards, the researchers applied the principles of informed consent, anonymity and participant safety throughout the evaluation.

Participants were assigned a unique reference number and their responses to the data collection tools were anonymised by the first author before data were sent for analysis to the second author. This enabled the researchers to follow each participant throughout the six weeks of the programme while maintaining their anonymity.

Participants were asked to sign an informed consent form, which contained information on the aim and procedures of the service evaluation, outlined the potential benefits and risks of participating, explained how to acquire the results of the evaluation and provided the researchers' contact details. Participants were assured that their participation was voluntary and that they could withdraw at any time with no negative effects on their ongoing care.

The safety of participants was paramount. Before the start of the intervention, each participant underwent a physical assessment to establish their baseline, which enabled the first author to tailor the exercise regimen to their needs. The physical and mental well-being of participants was continuously monitored throughout the six weeks of the intervention. No safety issues arose during that time.

Findings

Five men and one woman, all of whom had issues with the use of alcohol and illicit and/or prescription drugs, participated in the intervention. All six participants completed the intervention. Four of them attended all sessions while two participants missed one session each. All participants completed the three quantitative measures before the start of the programme, after every group exercise session they attended and at the end of the programme. All participants replied to the post-intervention online questionnaire.

Table 1 provides an overview of participants.

Quantitative findings

All six participants reported improvements in some or all domains of the SURE. Participants reported a reduction in their overall substance use and an increasing

Table 1. Overview of participants (n=6)

Participant	Gender	Age (years)	Substances used
1	Male	50	Alcohol, cocaine
2	Male	38	Alcohol, cocaine, 3,4-methylenedioxymethamphetamine (ecstasy)
3	Male	32	Alcohol, pregabalin, oxycodone hydrochloride, diazepam
4	Male	37	Alcohol, cannabis, pregabalin
5	Male	36	Alcohol, cannabis
6	Female	38	Alcohol, diazepam, hypnotics

focus on their self-care and relationships. Improvements in mean scores were evident in all domains of the SURE.

All participants reported clinically important reductions in depression and anxiety symptoms after the intervention. The mean PHQ-9 score decreased from 24.5 (SD=7.45) to 14 (SD=6.26) and the mean GAD-7 score decreased from 20.17 (SD=6.40) to 11.33 (SD=5.43).

Table 2 shows participants' scores before and after the intervention.

Qualitative findings

Three themes emerged from participants' responses to the post-intervention online questionnaire: benefits from peer support; increased motivation; and changing outlook on life.

Almost all the participants mentioned benefits of being in contact with other people in similar circumstances to themselves who were also trying to change their addictive behaviour; for example, participants reported:

'Meeting others in the same situation as myself which made me feel very comfortable' (Participant 1).

'Support I got from the group definitely got me through some of the toughest days I've experienced since being sober' (Participant 2).

Increased motivation to reduce substance use was reported by three participants; for example, one participant stated:

'I had been stuck for a few months between wanting change and terrified to do it. The programme helped me back into training and being social with people without drugs or alcohol' (Participant 3).

A changing outlook on life was identified in the responses to the questionnaire and participants described feeling more positive about their life and about themselves. For example, one participant reported:

'Throughout the programme I felt more

in control of my addiction and drug use. By joining the programme and becoming more active I felt more positive' (Participant 1).

In response to the question asking them to describe the ARC programme in three words, participants cited words such as: 'life-changing', 'much needed', 'supportive', 'inspiring', 'positive', 'fun', 'brilliant', 'helpful', 'amazing', 'motivational' and 'productive'.

Discussion

Substance use disorder is a major public health issue in the UK. For adults with substance use disorder, National Institute for Health and Care Excellence (2007, 2011) guidelines support the use of brief interventions underpinned by a motivational focus, self-help programmes based on the 12-step model of Alcoholics Anonymous and Narcotics Anonymous, and contingency management including substitute prescribing.

The ARC structured exercise programme aims to provide a therapeutic environment that supports people to recover from substance use disorder. This evaluation of the ARC programme in a small sample of six participants produced encouraging results which support the addition of exercise regimens to ongoing mental health interventions for the treatment of substance use disorder. The ARC programme appears to have produced positive results for all participants in most or all domains measured, and participants developed positive social contacts with their peers.

The ARC programme appears to be a novel approach for supporting people with substance use disorder. The link between physical health and mental health is well established in the literature and has been recognised by various authors – for example, by Green and Barrett (2020). Therefore, it is reasonable to think that an approach to care that acts simultaneously on people's physical health and on their

mental well-being will have positive effects. It has been suggested that exercise replicates the rewards and reinforcement mechanisms found in substance use, the crucial difference being that regular engagement in substance use is detrimental to health, whereas regular engagement in exercise is beneficial (Smith and Lynch 2012). Exercise has also been shown to be effective in reducing anxiety and depression, which can have a co-morbid relationship with substance use (Abrantes and Blevins 2019). The findings of this evaluation support the notion that exercise has a positive effect on more than just one's physical health.

Peer support is a fundamental aspect of the ARC programme, as exemplified in the post-intervention feedback from participants. Tracy and Wallace (2016) reviewed ten studies on the benefits of peer support groups in the treatment of addiction and concluded that

there were limited data from which to draw conclusions. In contrast, the findings of this evaluation indicate that participants found peer support beneficial. This reflects research from the US, which identified benefits of peer support and engagement with peers for the recovery from substance use disorder (Ashford et al 2019, Blonigen et al 2020).

One of the three quantitative measures used in this evaluation – the SURE – is a patient-reported outcome measure. Patient-reported outcome measures differ from clinical-oriented or disease-oriented outcome measures in that they are developed from the patient's perspective (Devlin and Appleby 2010) and focus on outcomes that patients consider to be important in their daily life (Wu and Predmore 2019). Nelson et al (2015) suggested that many clinicians have an inadequate understanding of the effects

Table 2. Participants' scores before and after the intervention

	Time point	Substance Use Recovery Evaluator (SURE) domain score*					Total SURE score*	Patient Health Questionnaire-9 score [†]	Generalised Anxiety Disorder-7 score [‡]
		Substance use	Self-care	Relationships	Material resources	Outlook on life			
Participant 1	Before	15	7	9	6	4	41	33	19
	After	18	15	12	9	9	63	10 [§]	7 [§]
Participant 2	Before	18	14	12	9	9	62	16	15
	After	18	15	12	9	9	63	11 [§]	7 [§]
Participant 3	Before	16	11	12	9	8	56	25	28
	After	18	15	12	9	9	63	9 [§]	11 [§]
Participant 4	Before	13	5	8	5	3	34	30	25
	After	16	7	12	8	4	47	21 [§]	19 [§]
Participant 5	Before	15	13	11	7	8	54	15	11
	After	18	15	12	9	9	63	10 [§]	7 [§]
Participant 6	Before	17	6	10	9	5	47	28	23
	After	17	10	12	9	7	55	23 [§]	17 [§]
Mean score	Before	15.67	9.33	10.33	7.50	6.17	49	24.50	20.17
	After	17.50	12.83	12.00	8.83	7.83	59	14.00	11.33
Change in mean score		1.83	3.50	1.67	1.33	1.67	10.00	-10.50	-8.83

* Increasing scores denote improvement

† Higher scores indicate greater levels of depression

‡ Higher scores indicate greater levels of anxiety

§ Minimal clinically important difference (threshold for the PHQ-9 = 3.72; threshold for the GAD-7 = 3.20)

of disease on a person's daily life, while Devlin and Appleby (2010) commented that clinical indicators do not always capture what is important to patients. In keeping with a person-centred approach (Slater 2006), the researchers adopted a broader concept of recovery from substance use disorder, rather than recovery defined as abstinence only (Laudet 2007), and used outcomes identified as important by people with substance use disorder themselves, such as relationships, self-care and outlook on life. The researchers consider that the combination of patient-reported outcome measures (obtained by using the SURE) and clinical outcomes (obtained by using the PHQ-9 and GAD-7) is a strength of their service evaluation.

Limitations

The small sample size, absence of control group and lack of follow up are limitations of this service evaluation and mean that no definitive statements about the effectiveness of the ARC programme can be made. A further limitation was that the evaluation used an online questionnaire with open-ended

questions to collect qualitative data, which resulted in minimal data being collected, some participants providing only single sentences in response to questions. Further research into the effectiveness of exercise programmes in general, and the ARC programme in particular, is required.

Conclusion

The evidence base regarding the use of exercise-based interventions for substance use disorder is limited and appears to focus on clinical outcomes, with minimal consideration of outcomes considered important by patients themselves. The ARC structured exercise programme provides a novel approach for supporting people to recover from substance use disorder. An evaluation of its effectiveness in a small sample of six participants has shown improvements in patient-reported outcome measures as well as clinically important reductions in symptoms of depression and anxiety. This offers promising evidence that supports the addition of exercise regimens to ongoing mental health interventions for the treatment of substance use disorder.

References

- Abrantes AM, Blevins CE (2019) Exercise in the context of substance use treatment: key issues and future directions. *Current Opinion in Psychology*, 30, 103-108. doi: 10.1016/j.copsyc.2019.04.001
- Ashford RD, Meeks M, Curtis B et al (2019) Utilization of peer-based substance use disorder and recovery interventions in rural emergency departments: patient characteristics and exploratory analysis. *Journal of Rural Mental Health*, 43, 1, 17-29. doi: 10.1037/rmh0000106
- Blonigen DM, Harris-Olenak B, Kuhn E et al (2020) Using peers to increase veterans' engagement in a smartphone application for unhealthy alcohol use: a pilot study of acceptability and utility. *Psychology of Addictive Behaviors*. doi: 10.1037/adb0000598
- Brown RA, Abrantes AM, Minami H et al (2014) A preliminary, randomized trial of aerobic exercise for alcohol dependence. *Journal of Substance Abuse Treatment*, 47, 1, 1-9. doi: 10.1016/j.jsat.2014.02.004
- Cutter CJ, Schottenfeld RS, Moore BA et al (2014) A pilot trial of a videogame-based exercise program for methadone maintained patients. *Journal of Substance Abuse Treatment*, 47, 4, 299-305. doi: 10.1016/j.jsat.2014.05.007
- Devlin NJ, Appleby J (2010) Getting the Most out of PROMs: Putting Health Outcomes at the Heart of NHS Decision-making. kingsfund.org.uk/sites/default/files/Getting-the-most-out-of-PROMs-Nancy-Devlin-John-Appleby-Kings-Fund-March-2010.pdf (Last accessed: 13 January 2021).
- Dolezal BA, Chudzynski J, Storer TW et al (2013) Eight weeks of exercise training improves fitness measures in methamphetamine-dependent individuals in residential treatment. *Journal of Addiction Medicine*, 7, 2, 122-128. doi: 10.1097/ADM.0b013e318282475e
- DrinkAware (2020) Can Alcohol Affect Sports Performance and Fitness Levels. drinkaware.co.uk/facts/health-effects-of-alcohol/lifestyle/can-alcohol-affect-sports-performance-and-fitness-levels (Last accessed: 13 January 2021).
- Giesen ES, Deimel H, Bloch W (2015) Clinical exercise interventions in alcohol use disorders: a systematic review. *Journal of Substance Abuse Treatment*, 52, 1-9. doi: 10.1016/j.jsat.2014.12.001
- Green L, Barrett D (2020) EBN perspectives, mental health. *Evidence-Based Nursing*, 23, 1, 11-14. doi: 10.1136/ebnurs-2019-103224
- Health Research Authority (2013) Defining Research. clahrc-eoe.nihr.ac.uk/wp-content/uploads/2014/04/defining-research.pdf (Last accessed: 13 January 2021).
- Jhanjee S (2014) Evidence based psychosocial interventions in substance use. *Indian Journal of Psychological Medicine*, 36, 12, 112-118. doi: 10.4103/0253-7176.130960
- Klimas J, Fairgrieve C, Tobin H et al (2018) Psychosocial interventions to reduce alcohol consumption in concurrent problem alcohol and illicit drug users. *Cochrane Database of Systematic Reviews*. Issue 12, CD009269. doi: 10.1002/14651858.CD009269.pub4
- Kroenke K, Spitzer RL, Williams JB (2001) The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16, 9, 606-613. doi: 10.1046/j.1525-1497.2001.01609606.x
- Kvam S, Kleppe CL, Nordhus IH et al (2016) Exercise as a treatment for depression: a meta-analysis. *Journal of Affective Disorders*, 202, 67-86. doi: 10.1016/j.jad.2016.03.063
- Laudet AB (2007) What does recovery mean to you? Lessons from the recovery experience for research and practice. *Journal of Substance Abuse Treatment*, 33, 3, 243-256. doi: 10.1016/j.jsat.2007.04.014
- Laudet AB, Becker JB, White WL (2009) Don't wanna go through that madness no more: quality of life satisfaction as predictor of sustained remission from illicit drug misuse. *Substance Use & Misuse*, 44, 2, 227-252. doi: 10.1080/10826080802714462
- Leone MA, Vigna-Taglianti F, Avanzi G et al (2010) Gamma-hydroxybutyrate (GHB) for treatment of alcohol withdrawal and prevention of relapses. *Cochrane Database of Systematic Reviews*. Issue 2, CD006266. doi: 10.1002/14651858.cd006266.pub2
- Lynch WJ, Peterson AB, Sanchez V et al (2013) Exercise as a novel treatment for drug addiction: a neurobiological and stage-dependent hypothesis. *Neuroscience and Biobehavioral Reviews*, 37, 8, 1622-1644. doi: 10.1016/j.neubiorev.2013.06.011
- Magill M, Ray LA (2009) Cognitive-behavioral treatment with adult alcohol and illicit drug users: a meta-analysis of randomized controlled trials. *Journal of Studies on Alcohol and Drugs*, 70, 4, 516-527. doi: 10.15288/jsad.2009.70.516
- Marchand K, Beaumont S, Westfall J et al (2018) Patient-centred care for addiction treatment: a scoping review protocol. *BMJ Open*, 8, 12, e024588. doi: 10.1136/bmjopen-2018-024588
- Muller AE, Clausen T (2015) Group exercise to improve quality of life among substance use disorder patients. *Scandinavian Journal of Public Health*, 43, 2, 146-152. doi: 10.1177/1403494814561819
- National Institute for Health and Care Excellence (2007) Drug Misuse in Over 16s: Psychosocial Interventions. *Clinical guideline No. 51*. NICE, London.
- National Institute for Health and Care Excellence (2011) Alcohol-Use Disorders: Diagnosis, Assessment and Management of Harmful Drinking (High-Risk Drinking) and Alcohol Dependence. *Clinical guideline No. 115*. NICE, London.
- Neale J, Vitoratou S, Finch E et al (2016) Development and validation of 'SURE': a patient reported outcome measure (PROM) for recovery from drug and alcohol dependence. *Drug and Alcohol Dependence*, 1, 165, 159-167. doi: 10.1016/j.drugalcdep.2016.06.006

- Nelson EC, Eftimovska E, Lind C et al (2015) Patient reported outcome measures in practice. *BMJ*. 350, g7818. doi: 10.1136/bmj.g7818
- NHS Digital (2019) Statistics on Drug Misuse, England, 2019. <https://digital.nhs.uk/data-and-information/publications/statistical/statistics-on-drug-misuse/2019/final-page-copy> (Last accessed: 18 January 2021.)
- Rai SK, Yazdany J, Fortin PR et al (2015) Approaches for estimating minimal clinically important differences in systemic lupus erythematosus. *Arthritis Research and Therapy*. 17, 1, 143. doi: 10.1186/s13075-015-0658-6
- Rimes R, de Souza Moura AM, Lamego MK et al (2015) Effects of exercise on physical and mental health, and cognitive and brain functions in schizophrenia: clinical and experimental evidence. *CNS & Neurological Disorders Drug Targets*. 14, 10, 1244-1254. doi: 10.2174/1871527315666151111130659
- Sedaghat AR (2019) Understanding the minimal clinically important difference (MCID) of patient-reported outcome measures. *Otolaryngology – Head and Neck Surgery*. 161, 4, 551-560. doi: 10.1177/0194599819852604
- Slater L (2006) Person-centredness: a concept analysis. *Contemporary Nurse*. 23, 1, 135-144. doi: 10.5172/conu.2006.23.1.135
- Smith MA, Lynch WJ (2012) Exercise as a potential treatment for drug abuse: evidence from preclinical studies. *Frontiers in Psychiatry*. 2, 82. doi: 10.3389/fpsy.2011.00082
- Spitzer RL, Kroenke K, Williams JB et al (2006) A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of Internal Medicine*. 166, 10, 1092-1097. doi: 10.1001/archinte.166.10.1092
- Stubbs B, Vancampfort D, Rosenbaum S et al (2017) An examination of the anxiolytic effects of exercise for people with anxiety and stress-related disorders: a meta-analysis. *Psychiatry Research*. 249, 102-108. doi: 10.1016/j.psychres.2016.12.020
- Taylor AH, Oh H, Cullen S (2013) Acute effect of exercise on alcohol urges and attentional bias towards alcohol related images in high alcohol consumers. *Mental Health and Physical Activity*. 6, 3, 220-226. doi: 10.1016/j.mhpa.2013.09.004
- Telenius EW, Engedal K, Bergland A (2015) Long-term effects of a 12 weeks high-intensity functional exercise program on physical function and mental health in nursing home residents with dementia: a single blinded randomized controlled trial. *Physical functioning, physical health and activity. BMC Geriatrics*. 15, 158. doi: 10.1186/s12877-015-0151-8
- Thompson A, Wright AK, Ashcroft D et al (2017) Epidemiology of alcohol dependence in UK primary care: results from a large observational study using the Clinical Practice Research Datalink. *PLoS One*. 12, 3, e0174818. doi: 10.1371/journal.pone.0174818
- Tracy K, Wallace SP (2016) Benefits of peer support groups in the treatment of addiction. *Substance Abuse and Rehabilitation*. 7, 143-154. doi: 10.2147/SAR.S81535
- Weinstock J, Farney M, Elrod NM et al (2017) Exercise as an adjunctive treatment for substance use disorders: rationale and intervention description. *Journal of Substance Abuse Treatment*. 72, 40-47. doi: 10.1016/j.jsat.2016.09.002
- Wu AW, Predmore ZS (2019) Patient-reported outcomes: toward better measurement of patient-centered care in CKD. *Journal of the American Society of Nephrology*. 30, 4, 523-525. doi: 10.1681/ASN.2019020169