



Staff-perceived barriers to nutrition intervention in substance use disorder treatment

David A Wiss^{1,*}, Lisa Russell² and Michael Prelip¹

¹Department of Community Health Sciences, Fielding School of Public Health, University of California Los Angeles, 650 Young Drive South, Los Angeles, CA 90025, USA; ²Janus of Santa Cruz, Santa Cruz, CA, USA

Submitted 1 July 2020; Accepted 28 September 2020; First published online 3 November 2020

Abstract

Objective: While organisational change in substance use disorder (SUD) treatment has been extensively studied, there is no research describing facility-wide changes related to nutrition interventions. This study evaluates staff-perceived barriers to change before and after a wellness initiative.

Design: A pre-intervention questionnaire was administered to participating staff prior to facility-wide changes ($n = 40$). The questions were designed to assess barriers across five domains: (1) provision of nutrition-related treatment; (2) implementation of nutrition education; (3) screening, detecting and monitoring (nutrition behaviours); (4) facility-wide collaboration and (5) menu changes and client satisfaction. A five-point Likert scale was used to indicate the extent to which staff anticipate difficulty or ease in implementing facility-wide nutrition changes, perceived as organisational barriers. Follow-up questionnaires were identical to the pre-test except that it examined barriers experienced, rather than anticipated ($n = 50$).

Setting: A multisite SUD treatment centre in Northern California which began implementing nutrition programming changes in order to improve care.

Participants: Staff members who consented to participate.

Results: From pre to post, we observed significant decreases in perceived barriers related to the provision of nutrition-related treatment ($P = 0.019$), facility-wide collaboration ($P = 0.036$), menu changes and client satisfaction ($P = 0.024$). Implementation of nutrition education and the domain of screening, detecting and monitoring did not reach statistical significance.

Conclusions: Our results show that staff training, food service changes, the use of targeted curriculum for nutrition groups and the encouragement of discussing self-care in individual counselling sessions can lead to positive shifts about nutrition-related organisational change among staff.

Keywords
Nutrition
Food service
Substance use disorder
Addiction
Treatment
Barriers
Organisational change

2018 US estimates suggest that over 20 million people over the age of 12 years had an alcohol or substance use disorder (SUD)⁽¹⁾. Moreover, the opioid crisis has reached epidemic proportions, with nearly a half million people dying from a drug-related overdose between 2000 and 2014 in the USA⁽²⁾. The Affordable Care Act of 2010 expanded Medicaid coverage as well as increased utilisation of private insurance for SUD⁽³⁾. Given that SUD is a chronic relapsing disease⁽⁴⁾, there is an urgent need for new approaches that improve delivery of treatment and enhance client self-management. Investigators have aimed to understand barriers in the implementation of evidence-based treatments such as medication-assisted

treatment (MAT) and motivational interviewing in SUD^(5,6). Lack of preparation and hesitation of providers to adopt and implement science-based innovations can be due to (1) limited understanding of potential benefits; (2) insufficient resources or expertise and (3) lack of tolerance/patience necessary for full maturation of pay-offs⁽⁷⁾. Other organisational change research has identified the need to reduce cynicism among employees through role modelling by transformational leaders⁽⁸⁾.

The Texas Christian University Treatment Model⁽⁹⁾ and the Organizational Readiness for Change instrument⁽¹⁰⁾ have been used to conceptualise and assess barriers involved in organisational change among SUD treatment

*Corresponding author: Email davidawiss@nutritioninrecovery.com

© The Author(s), 2020. Published by Cambridge University Press on behalf of The Nutrition Society



programmes. It has been suggested that programmes with the most reluctance to change are often the ones which would benefit most from new innovations⁽¹¹⁾. Roger's Diffusion of Innovation Theory proposes that the spread of novel concepts in a social system is dependent upon communication channels which rely on human capital⁽¹²⁾. Stage-based approaches include training, adoption and implementation⁽¹³⁾ which are influenced by staff attributes/attitudes, and levels of organisational stress⁽¹¹⁾. Prior to organisational change, it is critical to increase staff readiness and capacity for collective action⁽¹⁴⁾. Innovation is most likely to succeed when it involves expert facilitators leading to staff competence and self-confidence^(15,16). Studies have shown that cultural barriers should be overcome in order for new knowledge to successfully translate into alternative services⁽¹⁷⁾. Health promotion interventions require support (e.g. development of a wellness team) to increase capacity for sustainable change⁽¹⁸⁾.

Organisational culture (as influenced from upper management) and low levels of staff skills have been identified as barriers to the adoption of wellness initiatives among SUD treatment centres in the USA, such as smoking cessation services⁽¹⁹⁾. Efforts to convert treatment centres into tobacco-free environments have had mixed success⁽²⁰⁾. Traditionally, there exists a culture of 'first things first' in SUD treatment, which likely stems from *Alcoholics Anonymous* (originally published in 1939), suggesting that both smoking and sweets/candy can be helpful in early recovery. On the contrary, studies have shown that stopping smoking by the first year of sobriety positively predicts past-year abstinence⁽²¹⁾. The Addressing Tobacco through Organizational Change model includes on-site 3-d consultation with a trained expert and the formation of a leadership committee and tobacco work groups⁽²²⁾. Usage of the Addressing Tobacco through Organizational Change model has led to more favourable staff beliefs and client attitudes towards treating nicotine dependence and increased use of nicotine replacement therapy in residential treatment settings⁽²³⁾. In a review of forty-eight empirical studies related to the implementation of smoking cessation in SUD treatment settings, it was suggested that successful organisational change should target local 'champions' (persons committed to the implementation process) to work with management on planning and carrying out necessary changes⁽²⁴⁾.

There has been an increasing interest in the role of nutrition in SUD recovery, although to date there are only a handful of intervention studies, using different outcome measures^(25–31). Opioid and alcohol users can be considered at high nutritional risk^(32,33), yet most treatment centres do not offer any nutritional counselling or support⁽³⁴⁾. It is well established that SUD is associated with poor nutritional status, including malnutrition, and various forms of disordered eating, reviewed elsewhere⁽³⁵⁾. Reports from Canada have shown that injection drug use is associated with food insufficiency and food insecurity^(36–38). It is

common for individuals in early recovery to report gastrointestinal distress⁽³⁹⁾ and a strong preference for highly palatable foods low in fibre and nutrients⁽⁴⁰⁾. Poor intake of nutrients like *n-3* and dietary fibre has been linked to aggression and overall compromised mental health^(41,42). A recent systematic review and meta-analysis has shown that dietary improvement can reduce depressive symptoms, likely modulated by gastrointestinal microbiota⁽⁴³⁾.

A recent survey showed that less than a third of SUD treatment centres in Los Angeles offer any nutrition services⁽³⁴⁾. Some authors have suggested that individualised nutrition interventions may improve opioid treatment outcomes⁽⁴⁴⁾, yet the role of nutrition in SUD recovery remains understudied. Topics for educational groups in treatment settings have been proposed⁽⁴⁵⁾, and it has been shown that hands-on nutrition and culinary interventions can be done in small residential settings where there are financial constraints^(31,46). Considering the growing interest in developing nutrition-related programming for SUD, more research about programme design and implementation is warranted. To date, there are no studies assessing perceived barriers to nutrition-related organisational change in SUD treatment. Exploratory research on staff concerns/attitudes towards provision of novel nutrition interventions may inform future efforts to improve food service environments in SUD treatment centres.

The aim of the current study is to describe staff-reported barriers to organisational change involving implementation of a nutrition program in a setting where the majority of clients' treatment is publicly funded. Given that nutrition interventions in SUD treatment have been poorly described, very little is known about staff attitudes about nutrition, as well as perceived/actual barriers to institutional change, before and after facility-wide modification. This will be the first study to describe potential barriers to nutrition changes in a multisite non-profit SUD treatment centre. Given the biological plausibility that improving nutrition in early recovery has the potential to improve mental health and overall chances of recovery, the study of barriers to making nutrition-related changes can help to inform future intervention work.

Methods

Facility characteristic

Janus of Santa Cruz (JSC) is a non-profit SUD treatment centre in Northern California that primarily serves Medicaid beneficiaries. Their facilities include several levels of care: Driving Under the Influence services, Intensive Outpatient services, Withdrawal Management (in-patient) and Residential Treatment (with a separate Perinatal Unit for mothers and their custodial children 0–5 years of age), MAT, Sobering Center (short-term jail alternative), Lighthouse Counseling (outpatient therapy), Family Programs and sober living environments. Prior to the

conception of the study, JSC received two grants that supported policy and procedural changes, staff training and the implementation of additional practices to support multi-dimensional wellness during recovery from SUD, including a focus on nutrition. The objectives for JSC organisational changes related to the current study are two-fold: first is the implementation of a customised nutrition curriculum for individuals in SUD treatment, including menu changes; and second is to stimulate change of organisational culture through diffusing new information to staff and clients linking nutrition to both physical and mental health. The broader summary of the nutrition intervention at JSC is described in Fig. 1.

There are approximately 150 staff members at JSC. Baseline characteristics (collected in March 2019 by the human resource department) are: 49% white, 36% Hispanic, 10% mixed, 5% other; 62% female; 49% millennials, 28% generation X, 23% baby boomers; 80% paid hourly (*v.* salary). There was high staff turnover (34%) between March and November 2019 during which time the organisational changes began, which is not uncommon in treatment settings. November 2019 staff characteristics are similar with respect to ethnicity and gender but there was a slight increase in millennials (56%) relative to other generational groupings. Demographic characteristics were not collected due to anonymity concerns; we report this

data as an overall description of facility staff but not our final analytic sample.

Description of intervention

A consultant registered dietitian nutritionist (RDN) made site visits in March 2019 to meet with key staff, join the newly formed ‘wellness team’ and conduct a needs assessment on the food service operation. The official beginning of the facility-wide changes was marked by a half-day staff training, where the RDN presented emerging research related to ‘nutrition and mental health’ to the twenty JSC employees in attendance. The RDN facilitated an additional meeting for those staff (less than half) who expressed interest in facilitating nutrition groups (i.e. delivering content to JSC clients in the form of lecture, discussion/activity and hands-on skill building). Electronic curriculum was transferred to JSC, and staff ‘champions’ were identified to take the lead on delivering nutrition education. A separate meeting with two members of the food service team led to several recommendations related to increasing the fibre content of foods served (e.g. fruits, vegetables, whole grains, beans, nuts and seeds) and ways to increase their acceptability, designed to match the content of the curriculum. The RDN conducted a 1 h group with clients at the main residential campus which also included residents

Nutrition Intervention Summary				
Activities	Outputs	Outcomes		
<ul style="list-style-type: none"> Review /update current nutrition criteria Assess food and beverage offerings Assess barriers/facilitators to improving food and beverage offerings that meet guidelines Assess barriers/facilitators to client consumptions of food and beverage offerings that meet guidelines Collaborate with food vendors and food service staff, medical staff, counsellors, admin, etc. Develop recommended nutrition guidelines reflecting new evidence, experience, and identified barriers/facilitators Offer food and beverages that meet guidelines Offer staff training in nutrition in recovery and how to implement client education groups and individual nutrition counselling Offer client training in nutrition in recovery 	<ul style="list-style-type: none"> Site visit observations of food and beverage offerings Summary of perceived barriers to offering recommended foods and beverages Summary of perceived barriers to client consumption of recommended foods and beverages Guidelines for nutrition in recovery are available and communicated % of food and beverage options purchased, prepared, and available to clients that meet guidelines # staff trained in educating clients about nutrition in recovery, including use of motivational interviewing in individual counselling about nutrition # client treatment plans and progress notes that include nutrition goals # clients trained in nutrition in recovery 	Immediate <ul style="list-style-type: none"> Increased staff and client awareness of evidence-based nutrition guidelines Increased staff and client understanding of the plausible relationships between nutrition and mental health Increased staff self-efficacy with exploring and supporting nutrition as part of treatment planning and monitoring, as well as screening and referrals for possible eating disorder Increased staff and client willingness to prepare and consume more whole foods: fresh fruit & vegetables, whole grains, legumes, and water Improved staff and client knowledge, skills and confidence with planning and preparing budget-friendly and family-friendly recommended foods and beverages 	Intermediate <ul style="list-style-type: none"> Increased satisfaction and consumption of food and beverages that meet the guidelines Improved digestive, cognitive, and psychosocial functioning Shift in staff and client beliefs about the value and feasibility of addressing nutrition in recovery 	Long-Term <ul style="list-style-type: none"> Improved quality of life related to health and functioning Decreased morbidity and mortality from diet-related chronic disease

Fig. 1 Logic model for nutrition intervention in substance use disorder treatment



from the perinatal unit, intended to prepare them for new menu items and nutrition groups.

A second site visit took place in July 2019, with the goals to (1) discuss successes and challenges; (2) provide additional training to staff on self-care and role modelling; (3) educate staff on how to detect co-occurring eating disorder and use sensitive language about weight and diet; (4) empower staff to encourage self-care with their clients while staying in their scope of practice; (5) deliver additional curriculum content for use at the main campus and perinatal unit; (6) provide perinatal-specific nutrition curriculum and recommendations for community involvement in the construction of a grocery list at the perinatal unit and (7) provide a summary report of recommended facility-wide changes. The RDN also conducted a group with the clients to inform them to the 'why' nutrition-related changes were happening, and upcoming changes to expect. Since the initiative began in March 2019, the wellness team continued to meet every 2 weeks to discuss: tobacco cessation, nutrition programme, stress reduction, physical activity and other health-promoting recreational activities.

Recruitment, data collection and analysis

Study participants were recruited through verbal announcements at staff meetings, direct communication with supervisors and internal email communications. The pre-intervention questionnaire was administered at the beginning of the initial staff meeting (March 2019) before the 'nutrition for mental health' lecture conducted by the RDN. Completing the questionnaire was voluntary. It contained no identifiable information and was distributed after the study information sheet was read and understood. Attendees at the meeting who consented to complete the questionnaire were given adequate space and time to answer the questions in privacy. Any staff member who did not feel that their privacy was maintained was given the option to not participate. Twenty staff members completed the questionnaire, and over the course of the next 2 days, twenty additional questionnaires were collected from staff unable to attend the meeting through an anonymous online platform (Survey Monkey) with no identifiers (total pretest n 40).

The questionnaire was created specifically for this project because no tool to assess nutrition-related concerns in SUD treatment settings has been previously created or validated. The questions were designed to assess barriers related to the current intervention as well as potential future work, with four questions for each of the five domains: (1) provision of nutrition-related treatment; (2) implementation of nutrition education; (3) screening, detecting and monitoring; (4) facility-wide collaboration and (5) menu changes and client satisfaction. Domain scores were created using the means of the individual questions within that domain, separated by pre and post. Cronbach's α was used

to evaluate internal consistency of the items within each domain, analysed separately by pre and post.

A five-point Likert scale was used to indicate the extent to which staff anticipate difficulty or ease in implementing facility-wide nutrition changes, perceived as organisational barriers: (1) very easy to implement; (2) somewhat easy to implement; (3) neither easy nor difficult to implement; (4) somewhat difficult to implement and (5) very difficult to implement. Seven additional questions on nutrition-related attitudes were also assessed on a Likert scale: (1) strongly disagree; (2) somewhat disagree; (3) neither agree nor disagree; (4) somewhat agree and (5) strongly agree. An open-ended question was included: 'what do you anticipate will be the greatest benefit of implementing facility-wide nutrition changes?' Participants were also asked to identify the departments where they work.

The follow-up questionnaire (total post-test n 50) was administered between October and December 2019, 3 months after the second site visit and once implementation had commenced. This post-test was administered through the anonymous online platform and was identical to the pre-test with the exception of changed language from 'anticipate' (future tense) to 'experienced' (past tense). All quantitative analysis was conducted using STATA version 16⁽⁴⁷⁾, and statistical significance was set at $P=0.05$ for two-tailed t tests for analysing differences pre and post. Sensitivity analysis for missing data was conducted.

Results

Table 1 shows the different departmental affiliations at pre and post. The proportion of respondents from the main campus nearly doubled by post-test ($P=0.03$) which may be attributed to the fact that the post-test was exclusively electronic, several reminders were given, and managers were incentivised to encourage staff to complete the questionnaire. Respondents from the MAT clinic south

Table 1 Staff department affiliations

Location	Pre-test (n 40)	Post-test (n 50)	P -value*
DUI	3	4	0.930
IOP/OP	3	2	0.471
Main campus residential	11	25	0.030
Perinatal residential	11	13	0.873
MAT Clinic North	6	3	0.157
MAT Clinic South	8	1	0.005
Sobering centre	2	1	0.431
Lighthouse centre	2	3	0.837
Administration	8	7	0.448
Total†	54	59	

DUI, driving under the influence; IOP, intensive outpatient; OP, outpatient; MAT, medication-assisted treatment.

*Two-tailed t test.

†Totals higher because some employees are at multiple locations.

dropped significantly between pre and post ($P = 0.005$), which may have been because many MAT counsellors felt it was not relevant to them since they do not have opportunity to discuss nutrition with clients and the MAT clinic does not serve food (data not shown). Other differences by department affiliation of respondents were not significant.

Staff who were unsure how to answer the question were instructed to leave the question blank. Seventy-four percent of respondents answered all questions (90% of staff on the pre-intervention questionnaire, and only 62% of the post-intervention). Missingness for each question ranged from 2.2 to 12.2% when combining pre and post ($n = 90$). For example, on the follow-up survey, 20% (10/50) staff skipped the question related to budgeting for new healthful menu items (q14, Table 2). For sensitivity analysis, mean values were imputed for all missing data and all tests were rerun; it was found that mean imputation did not change the significance of any of our results reported in Table 2 (data not shown). Therefore, our final analysis drops missing data.

Table 2 summarises our main findings. *t* Tests were conducted for individual questions as well as for each of the domains. Cronbach's α demonstrates that all domains

belong together based on $\alpha \geq 0.70$ ⁽⁴⁸⁾; however, the post-test for Domain 3 fell just below our threshold ($\alpha = 0.66$). Domain 1 suggests that perceived barriers related to the provision of nutrition-related treatment decreased from pre to post ($P = 0.019$). Two of the individual items (q4 and q5, discussed below) were significant in their increase of ease in implementation from before to after organisational change. The difference between pre-test and post-test means for Domain 2 (implementation of nutrition education) was not significant, but it is worth mentioning that it was the only domain to show higher levels of perceived difficulty from pre to post (discussed below). The difference between pre-test and post-test means for Domain 3 (screening, detecting and monitoring) was not significant, but one of the individual items (q3) showed an increase in ease of implementation pre and post (discussed below). The difference between means for Domain 4 (facility-wide collaboration) suggests that perceived barriers related to facility-wide collaboration decreased from pre to post ($P = 0.036$). None of the individual items was significant, although two of them (q1 and q13) trended towards significance. Data for Domain 5 (menu changes and client satisfaction) suggest that perceived barriers related to menu changes and client

Table 2 Staff-perceived barriers to change before and after nutrition-focused wellness initiative

Items on staff questionnaire separated by domain*	Pre-test ($n = 40$)		Post-test ($n = 50$)		<i>P</i> -value†
	Mean	SD	Mean	SD	
Domain 1: Provision of nutrition-related treatment	2.92	0.88	2.50	0.78	0.019
		$\alpha = 0.76$		$\alpha = 0.71$	
q4 Correcting nutritional deficiencies using real food	2.94	1.31	2.43	0.99	0.040
q5 Implementing nutritional change during detoxification period	3.21	1.23	2.60	1.05	0.017
q9 Addressing client reports of gastrointestinal disturbances	2.77	0.99	2.44	1.03	0.131
q18 Documenting nutrition goals into treatment plan and progress notes	2.77	1.11	2.63	1.11	0.589
Domain 2: Implementation of nutrition education	2.58	0.96	2.69	0.96	0.605
		$\alpha = 0.88$		$\alpha = 0.89$	
q2 Providing education on potential drug-nutrient interactions	2.47	1.06	2.72	1.09	0.290
q10 Training staff to teach basic nutrition science	2.67	1.22	2.96	1.15	0.264
q16 Teaching nutrition curriculum in group settings	2.42	0.97	2.42	1.16	0.996
q17 Implementing hands-on nutrition workshops (food demonstrations)	2.82	1.23	2.68	1.14	0.609
Domain 3: Screening, detecting and monitoring	3.05	0.78	2.77	0.73	0.082
		$\alpha = 0.70$		$\alpha = 0.66$	
q3 Proper monitoring of dietary supplement use	3.16	1.17	2.59	1.06	0.024
q7 Monitoring changes in clients' weights	2.87	1.13	2.84	0.95	0.904
q8 Screening and detection of eating disorders	3.12	1.02	2.90	1.10	0.316
q19 Client self-monitoring of progress on nutrition-related goals	3.13	0.98	2.77	1.07	0.115
Domain 4: Facility-wide collaboration	2.84	0.91	2.44	0.85	0.036
		$\alpha = 0.80$		$\alpha = 0.76$	
q1 Adequate communication between medical and non-medical staff regarding nutrition-related treatment	2.78	1.11	2.34	1.09	0.070
q11 Staff agreement on a unified nutrition approach/philosophy	2.76	1.10	2.57	1.11	0.416
q13 Effective collaboration between clinical team and food service team	2.78	1.18	2.33	1.04	0.065
q20 Implementing staff wellness groups	2.95	1.19	2.62	1.17	0.210
Domain 5: Menu changes and client satisfaction	3.01	0.87	2.58	0.87	0.024
		$\alpha = 0.83$		$\alpha = 0.84$	
q6 Addressing clients' food cravings	3.00	1.19	2.61	1.00	0.104
q12 Addressing client dissatisfaction with new healthful food options	2.97	1.00	2.60	1.04	0.093
q14 Budgeting for new healthful menu items	3.31	0.98	2.78	1.10	0.026
q15 Implementing new foods and more healthful menu items	2.77	1.09	2.27	1.15	0.047

*Means reported from scores regarding implementation on Likert scale: (1) Very easy; (2) Somewhat easy; (3) Neither easy nor difficult; (4) Somewhat difficult and (5) Very difficult.

†Two-tailed *t* test.

Table 3 Baseline nutrition attitudes by attendance at training*

	Attended training (n 20)		Did not attend (n 20)		P-value†
	Mean	SD	Mean	SD	
q21 Healthful eating is critical for maintaining sobriety	4.05	0.94	4.35	0.81	0.288
q22 People in early recovery should be able to eat what they want and should rather focus on staying sober	2.45	0.83	2.65	1.04	0.505
q23 Proper nutrition can improve quality of life in sobriety	4.70	0.73	4.80	0.41	0.598
q24 Nutrition is mostly important for those people with weight concerns or chronic disease	2.10	1.25	2.40	1.25	0.514
q25 Emphasis on nutrition is not warranted in an addiction treatment facility	1.60	0.94	2.25	1.21	0.065
q26 Focusing on nutrition can improve recovery outcomes	4.55	0.60	4.30	0.80	0.272
q27 Investing time and money into nutrition is a waste of precious resources	1.10	0.308	2.15	1.27	0.001

*Means reported from scores on Likert scale: (1) Strongly disagree; (2) Somewhat disagree; (3) Neither agree nor disagree; (4) Somewhat agree and (5) Strongly agree.
†Two-tailed *t* test.

satisfaction decreased from pre to post ($P = 0.024$). Two of the individual items (q14 and q15, discussed below) were significant in their increase of ease in implementation before and after organisational change.

Table 3 summarises the baseline nutrition attitudes at pre-intervention comparing staff members attending training *v.* those who did not, conducted *post hoc*. One of the questions (q27) about whether or not ‘investing time and money into nutrition is a waste of precious resources’ had higher levels of disagreement among those who attended training ($P = 0.001$). While the training was designed to be mandatory for clinical staff, it was difficult to enforce and it is clear that those who attended the training had different attitudes about nutrition compared with those who did not. We found this to be important because in the context of organisational change, the twenty staff members who showed up for the ‘nutrition for mental health’ lecture included our ‘champions’ and those responsible for diffusing these new innovations. This group (in theory) became the vehicle for dissemination and implementation. In other words, our data suggest that the twenty people who attended training may have been valuable as ‘human capital’ in the context of facility-wide nutrition change. Of course, some staff are needed for client care even during mandatory trainings; therefore, those who could not attend were asked to view the recording.

Table 4 summarises findings from the qualitative portion of our questionnaire, with verbatim responses to illustrate each theme. We did not observe major thematic changes from pre to post. At baseline staff anticipated the following thematic benefits: (1) improved overall health (‘feel better’); (2) improved brain health and recovery from SUD and co-occurring disorders (‘better cognition’ and ‘emotional stability’); (3) improved understanding and behaviours related to nutrition (‘knowing that we are reaching the highest standards for the clients’) and (4) improved staff health (‘we lead by example’). At post-test, there did appear to more specific knowledge about brain health (‘repair motivation/reward networks’ and ‘restoring good brain activity’) as well as evidence of implementation at

the perinatal unit (‘I have heard more talks and discussions from staff and clients. Every week the day after they do the group they talk about what they learned the grocery list has also reflected what they are learning’). Another theme we identified at post-test was ‘access to healthy foods’ where we found more evidence of programme implementation facility-wide (‘people are getting the opportunity to receive healthy food and address a lot of nutritional deficiencies’).

Discussion

Our results show that staff training, food service changes, the use of targeted curriculum for nutrition groups and the encouragement of ‘self-care’ discussion in individual counselling sessions can lead to positive changes about perceived barriers to nutrition-related organisational change among staff. Specifically, staff reported an increase in the ease of addressing nutritional deficiencies using real food and implementing nutritional change during detoxification period, both of which were part of the domain provision of nutrition-related treatment. Increasing collective efficacy about discussing nutrition with clients at JSC might explain these changes. Based on our open-ended questions, it appears that some of the staff were aware that nutrition can lead to ‘positive cognitive change’; however, there are concerns about staying within their scope of practice (data generated from discussion at staff trainings). Our results suggest that organisational change including ‘permission’ to encourage healthful eating (given during staff trainings) can change perception of difficulties in providing nutrition-related treatment.

The staff reported a perceived increase in the ease of implementation of monitoring dietary supplement use; however, the overall domain of screening, detecting and monitoring was not statistically significant, suggesting that the staff perceived low capacity for detecting other changes (e.g. weight status and eating disorder behaviour). It is worth noting that the increase in ease of monitoring supplement use is likely confounded by the

Table 4 Thematic analysis of staff survey responses about anticipated (pre-test) or observed (post-test) greatest benefits of facility-wide nutrition changes (*illustrative verbatim responses*)

Pre-test (n 36)	Post-test (n 28)
<p>Improved overall health</p> <ul style="list-style-type: none"> • <i>People will feel better.</i> • <i>Having healthier (staff and) clients.</i> <p>Improved brain health and recovery from substance use disorder/co-occurring mental and substance use disorders</p> <ul style="list-style-type: none"> • <i>Faster recuperation times. Better client health. Better cognition and ability to focus. Improvement in emotional regulation. Healthier behavioral patterns.</i> • <i>Better outcomes and emotional stability, or at least building a stable mental foundation, to assist with ability to engage more actively in the rest of recovery work and heal the brain.</i> <p>Improved understanding and behaviours related to nutrition</p> <ul style="list-style-type: none"> • <i>I believe that current kitchen management already does an amazing job. I believe that we need to implement education weekly in order to encourage the behavior and good habits.</i> • <i>Healing for our clients that are stuck in a very unhealthy fast food and sugar diet cycle.</i> • <i>Knowing that we are reaching the highest standards for the clients we serve and seeing clients benefit from having healthy nutrition and being taught about the importance of healthy foods for the body.</i> • <i>Mothers learning about healthy nutrition that will break unhealthy habits for their children and families.</i> <p>Improved staff health</p> <ul style="list-style-type: none"> • <i>Health eating for everyone, we lead by example.</i> • <i>Staff being able to personally benefit and becoming a healthier agency.</i> 	<p>Improved overall health</p> <ul style="list-style-type: none"> • <i>Better overall health for clients.</i> • <i>Benefits to the health and wellbeing of the clients.</i> <p>Improved brain health and recovery from substance use disorder/co-occurring mental and substance use disorders</p> <ul style="list-style-type: none"> • <i>I think that eating for recovery is vitally important to get the brain to function properly for general stability and to repair motivation/reward networks.</i> • <i>Healthy people and restoring good brain activity.</i> <p>Improved understanding and behaviours related to nutrition</p> <ul style="list-style-type: none"> • <i>A benefit of implementing facility wide nutrition changes is that the residents/ clients and staff members all seem to be more aware of what they eat. We all try to implement some of the things we learned and try to be a healthier version of ourselves.</i> • <i>By implementing this into the program I have heard more talks and discussions from staff and clients. Every week the day after they do the group they talk about what they learned the grocery list has also reflected what they are learning.</i> <p>Access to healthy foods</p> <ul style="list-style-type: none"> • <i>People are getting the opportunity to receive healthy food and address a lot of nutritional deficiencies.</i> • <i>Creating an opportunity for healthy eating.</i>

requirement for medication counts and discussions among management about the feasibility of continuing to include supplements in those medication counts. Therefore, we interpret these findings with caution. Supplements that were discussed in staff training include multivitamins, *n*-3 and probiotics; however, these are not typically covered by insurance therefore not implemented facility-wide (B-vitamins are often prescribed by medical staff). Given that SUD have been linked to malnutrition including low levels of micronutrients^(49–52), multivitamins are common practice in hospital-based detoxification programmes. *n*-3 in the form of fish oil has been linked to decreased impulsivity and aggression; however, the data linking *n*-3 to SUD are limited⁽⁵³⁾. Probiotics have shown efficacy in reducing depression, and possibly anxiety⁽⁵⁴⁾, and have shown promise in the treatment of alcoholic liver disease⁽⁵⁵⁾. Nutrition guidelines including supplement recommendations for different classes of substances have recently been published⁽³⁵⁾.

The overall domain of facility-wide collaboration was perceived to be easier after intervention; however, none of the individual items was statistically significant. This particular domain appears important based on the published literature, which suggests that identified transformational leaders should work across disciplines and with management in order to effectively carry out changes^(8,24). The domain of ‘menu changes and client satisfaction’ significantly increased in perceived ease of implementation pre and post. Specifically, budgeting

for new healthful items and implementing new foods and more healthful menu items were both perceived as easier to implement after the first few months of intervention. This domain is important since client satisfaction with the food appears to be a major barrier. The culture of ‘first things first’ which emphasises client ‘wants’ with respect to food over their long-term health ‘needs’ with respect to health is likely to be challenging trade-offs in future nutrition interventions in SUD settings.

Last, while the domain implementation of nutrition education and all of the items in that domain failed to reach statistical significance, this is the only domain that actually decreased in perceived ease of implementation. This could be related to the difficulty finding qualified staff to teach the nutrition education lessons. In other words, staff reported feeling under-prepared to deliver content. There was also a delay in getting larger televisions to use for the education materials, and the loss of a ‘champion’ staff member who was trained to conduct these groups. It does appear that the job of conducting nutrition education groups would be best filled by an RDN, but unless insurance covers dietitian services in SUD settings, it is unreasonable to expect SUD facilities to have such capacity. A recent article describing the potential role of the RDN in treatment settings has been published⁽⁴⁵⁾. The current study highlights barriers to implementation of nutrition education that may be useful for future intervention studies, where clearly more data are needed.



Limitations and conclusions

The findings of this analysis should be viewed in light of its limitations. To begin, our data were not paired which means our samples were not identical pre and post. Given the amount of staff turnover in these settings, we aimed to capture organisational characteristics rather than individual level data; however, our unmatched samples might have biased our findings. Since the survey was voluntary and staff was not randomly selected, there is potential for selection bias. This approach was our only viable option as this work was conducted in a real-world setting. There was inconsistent implementation of organisational change across the different sites. We had more post-test respondents at the sites where most of the changes took place. There was also more missing data at post-test which may have come from newly hired staff unsure how to answer certain questions. Because of potential anonymity concerns, we did not collect demographic data from staff, which limited our ability to analyse differences by other characteristics, such as age and gender. While the instruments we used was informally pretested, it was created specifically for this research purpose and has not been formally validated.

Despite these limitations, strength of our study is the relatively large size of the facility across its multiple sites. This permitted sufficient power for analysis of staff perceptions before and after organisational change. This is the first study to describe nutrition changes in a large non-profit SUD treatment centre. Despite known barriers to organisational change in SUD settings, nutrition interventions can be implemented and we have provided evidence that some staff-perceived barriers can decrease following organisational change. Specifically, barriers related to providing nutrition-related treatment, collaborating facility-wide and menu changes and client satisfaction all decreased following the wellness initiative. Our description of staff concerns/attitudes towards provision of novel nutrition interventions may inform future efforts to improve food service environments and teach nutrition classes in SUD treatment centres.

Given emerging evidence in the domain of nutritional psychiatry, improving nutrition in early recovery has the potential to improve mental health and overall chances of recovery, although to date there is limited support. Vulnerable populations including those who are food insecure need more attention amidst the addiction crisis. Addressing nutrition-related concerns may be of significant value to both physical and mental health. Empowering staff members as 'champions' to lead by example appears critical for diffusion of new knowledge in SUD settings. Future research should examine client barriers as well as satisfaction with nutrition-related changes, in both public and private treatment settings. In addition to documenting changes in biomarkers related to micronutrient status and inflammatory markers, intervention studies should

assess changes in depressive symptoms, anxiety, body image, disordered eating, food addiction, self-efficacy with shopping/cooking, and over longer periods of time, abstinence from alcohol and drugs. Nutrition interventions can also be an important part of harm reduction approaches aimed at decreasing food insecurity and increasing quality of life in those who are not abstinent. Overlooking the importance of food in SUD treatment contexts may be a missed opportunity for public health.

Acknowledgements

Acknowledgements: Not applicable. *Financial support:* The authors would like to recognise sources of financial support for nutrition programme activities: SAMHSA CSAT Residential Treatment for Pregnant and Postpartum Women Grant (En Junto: Mamas y Familias) and California Tobacco Control Program Behavioral Health and Wellness Grant (Janus Tobacco Project). The views of the authors do not necessarily represent those of the funding agencies. Funding agencies had no role in the design, analysis or writing of this article. *Conflict of interest:* D.A.W. is the founder and owner of Nutrition in Recovery LLC which provides nutrition services to substance use disorder treatment facilities. Such services (e.g. staff training) were rendered to Janus of Santa Cruz during the time this study was conducted. *Authorship:* All authors participated in the conception of the study and contributed to the final manuscript. D.A.W. formulated the research question and design of the study, L.R. helped with the data collection and M.P. oversaw the project. *Ethics of human subject participation:* This study was conducted according to the guidelines laid down in the Declaration of Helsinki, and all procedures involving study participants were approved by the Institutional Review Board at the University of California Los Angeles. Written informed consent was obtained from all subjects.

References

1. Substance Abuse and Mental Health Services Administration (SAMHSA) (2019) *Key Substance Use and Mental Health Indicators in the United States: Results from the 2018 National Survey on Drug Use and Health*. <https://www.samhsa.gov/data/sites/default/files/cbhsq-reports/NSDUH-NationalFindingsReport2018/NSDUH-NationalFindingsReport2018.pdf> (accessed February 2020).
2. Rudd RA, Aleshire N, Zibbell JE *et al.* (2016) Increases in drug and opioid overdose deaths – United States, 2000–2014. *Morb Mortal Wkly Rep* **64**, 1378–1382.
3. Saloner B, Antwi YA, Maclean JC *et al.* (2018) Access to health insurance and utilization of substance use disorder treatment: evidence from the affordable care act dependent coverage provision. *Health Econ* **27**, 50–75.
4. Dennis M & Scott C (2007) Managing addiction as a chronic condition. *Addict Sci Clin Pract* **4**, 45–55.



5. Lundgren L, Chassler D, Amodeo M *et al.* (2012) Barriers to implementation of evidence-based addiction treatment: a national study. *J Subst Abuse Treat* **42**, 231–238.
6. Lundgren L, Amodeo M, Chassler D *et al.* (2013) Organizational readiness for change in community-based addiction treatment programs and adherence in implementing evidence-based practices: a national study. *J Subst Abuse Treat* **45**, 457–465.
7. Simpson DD (2009) Organizational readiness for stage-based dynamics of innovation implementation. *Res Social Work Prac* **19**, 541–551.
8. Bommer WH, Rich GA & Rubin RS (2005) Changing attitudes about change: longitudinal effects of transformational leader behavior on employee cynicism about organizational change. *J Organ Behav* **26**, 733–753.
9. Simpson DD (2004) A conceptual framework for drug treatment process and outcomes. *J Subst Abuse Treat* **27**, 99–121.
10. Lehman WEK, Greener JM & Simpson DD (2002) Assessing organizational readiness for change. *J Subst Abuse Treat* **22**, 197–209.
11. Simpson DD (2002) A conceptual framework for transferring research to practice. *J Subst Abuse Treat* **22**, 171–182.
12. Rogers EM (2003) *Diffusion of Innovations*. New York: Free Press.
13. Simpson DD & Flynn PM (2007) Moving innovations into treatment: a stage-based approach to program change. *J Subst Abuse Treat* **33**, 111–120.
14. Foster-Fishman PG, Nowell B & Yang H (2007) Putting the system back into systems change: a framework for understanding and changing organizational and community systems. *Am J Commun Psychol* **39**, 197–215.
15. Kitson AL (2008) The need for systems change: reflections on knowledge translation and organizational change. *J Adv Nurs* **65**, 217–228.
16. Austin MJ & Claassen J (2008) Impact of organizational change on organizational culture: implications for introducing evidence-based practice. *J Evidence-based Soc Work* **5**, 321–359.
17. Hernández-Mogollón R, Cepeda-Carrión G, Cegarra-Navarro JG *et al.* (2010) The role of cultural barriers in the relationship between open-mindedness and organizational innovation. *J Organ Change Manag* **23**, 360–376.
18. Saunders RP, Evans AE, Kenison K *et al.* (2012) Conceptualizing, implementing, and monitoring a structural health promotion intervention in an organizational setting. *Heal Promot Pract* **14**, 343–353.
19. Knudsen HK, Studts JL, Boyd S *et al.* (2010) Structural and cultural barriers to the adoption of smoking cessation services in addiction treatment organizations. *J Addict Dis* **29**, 294–305.
20. Jessup MA (2007) Organizational change in a perinatal treatment setting: integration of clinical practice and policies on tobacco and smoking cessation. *J Psychoactive Drugs* **39**, 461–472.
21. Tsoh JY, Chi FW, Mertens JR *et al.* (2010) Stopping smoking during first year of substance use treatment predicted 9-year alcohol and drug treatment outcomes. *Drug Alcohol Depend* **114**, 110–118.
22. Ziedonis DM, Zammarelli L, Seward G *et al.* (2007) Addressing tobacco use through organizational change: a case study of an addiction treatment organization. *J Psychoactive Drugs* **39**, 451–459.
23. Guydish J, Ziedonis D, Tajima B *et al.* (2011) Addressing tobacco through organizational change (ATTOC) in residential addiction treatment settings. *Drug Alcohol Depend* **121**, 30–37.
24. Knudsen HK (2016) Implementation of smoking cessation treatment in substance use disorder treatment settings: a review. *Am J Drug Alcohol Abuse* **43**, 215–225.
25. Sason A, Adelson M, Herzman-Harari S *et al.* (2018) Knowledge about nutrition, eating habits and weight reduction intervention among methadone maintenance treatment patients. *J Subst Abuse Treat* **86**, 52–59.
26. Barbadoro P, Ponzio E, Pertosa ME *et al.* (2011) The effects of educational intervention on nutritional behaviour in alcohol-dependent patients. *Alcohol Alcohol Oxf* **46**, 77–79.
27. Cowan J & Devine C (2012) Process evaluation of an environmental and educational nutrition intervention in residential drug-treatment facilities. *Public Health Nutr* **15**, 1159–1167.
28. Cowan J & Devine C (2013) Diet and body composition outcomes of an environmental and educational intervention among men in treatment for substance addiction. *J Nutr Educ Behav* **45**, 154–158.
29. Grant L, Haughton B & Sachan D (2004) Nutrition education is positively associated with substance abuse treatment program outcomes. *J Acad Nutr Diet* **104**, 604–610.
30. Lindsay A, Warren C, Velasquez S *et al.* (2012) A gender-specific approach to improving substance abuse treatment for women: the Healthy Steps to Freedom program. *J Subst Abuse Treat* **43**, 61–69.
31. Wall-Bassett E, Robinson M & Knight S (2016) ‘Moving Toward Healthy’: insights into food choices of mothers in residential recovery. *Glob Qual Nurs Res* **3**, 1–11.
32. Coulbault L, Ritz L, Vabret F *et al.* (2019) Thiamine and phosphate esters concentrations in whole blood and serum of patients with alcohol use disorder: a relation with cognitive deficits. *Nutr Neurosci*, 1–12. doi: 10.1080/1028415X.2019.1652438.
33. Richardson R & Wiest K (2013) A preliminary study examining nutritional risk factors, body mass index, and treatment retention in opioid-dependent patients. *J Behav Health Serv Res* **42**, 401–408.
34. Wiss DA, Schellenberger M & Prelipl ML (2019) Rapid assessment of nutrition services in Los Angeles substance use disorder treatment centers. *J Commun Health* **44**(1), 88–94.
35. Wiss DA (2019) The role of nutrition in addiction recovery: what we know and what we don't. In *The Assessment and Treatment of Addiction: Best Practices and New Frontiers*, pp. 21–42 [I Danovitch and LJ Mooney, editors]. Elsevier. doi: 10.1016/B978-0-323-54856-4.00002-X.
36. Werb D, Kerr T, Zhang R *et al.* (2010) Methamphetamine use and malnutrition among street-involved youth. *Harm Reduct J* **7**, 5.
37. Anema A, Wood E, Weiser SD *et al.* (2010) Hunger and associated harms among injection drug users in an urban Canadian setting. *Subst Abuse Treat Prev Policy* **5**, 20.
38. Strike C, Rudzinski K, Patterson J *et al.* (2012) Frequent food insecurity among injection drug users: correlates and concerns. *Bmc Public Health* **12**, 1058.
39. Leppert W (2015) Emerging therapies for patients with symptoms of opioid-induced bowel dysfunction. *Drug Des Devel Ther* **2015**, 2215–2231.
40. Hardy R, Fani N, Jovanovic T *et al.* (2018) Food addiction and substance addiction in women: common clinical characteristics. *Appetite* **120**, 367–373.
41. Meyer BJ, Byrne MK, Collier C *et al.* (2015) Baseline *n-3* index correlates with aggressive and attention deficit disorder behaviours in adult prisoners. *PLoS One* **10**, e0120220.
42. Ramin S, Mysz MA, Meyer K *et al.* (2019) A prospective analysis of dietary fiber intake and mental health quality of life in the Iowa Women's Health Study. *Maturitas* **131**, 1–7.
43. Firth J, Marx W, Dash S *et al.* (2019) The Effects of dietary improvement on symptoms of depression and anxiety: a meta-analysis of randomized controlled trials. *Psychosom Med* **81**, 265–280.



44. Cunningham PM (2016) The use of sobriety nutritional therapy in the treatment of opioid addiction. *J Addict Res Ther* **7**, 282.
45. Wiss DA, Schellenberger M & Prelip ML (2018) Registered dietitian nutritionists in substance use disorder treatment centers. *J Acad Nutr Diet* **118**, 2217–2221.
46. Moore K, Gray V, Wiss D *et al.* (2016) Hands-on nutrition and culinary intervention within a substance use disorder residential treatment facility. *J Acad Nutr Diet* **116**, A20.
47. StataCorp (2017) *Stata Statistical Software*. Release 16. College Station, TX: StataCorp LLC.
48. Tavakol M & Dennick R (2011) Making sense of Cronbach's alpha. *Int J Medical Educ* **2**, 53–55.
49. Islam SN, Hossain KJ & Ahsan M (2001) Serum vitamin E, C and A status of the drug addicts undergoing detoxification: influence of drug habit, sexual practice and lifestyle factors. *Eur J Clin Nutr* **55**, 1022–1027.
50. Hossain K, Kamal MM, Ahsan M *et al.* (2007) Serum antioxidant micromineral (Cu, Zn, Fe) status of drug dependent subjects: Influence of illicit drugs and lifestyle. *Subst Abuse Treat Prev Policy* **2**, 12.
51. Mannan SJ, Azad MAK, Ullah A *et al.* (2011) Investigation of serum trace element, malondialdehyde and immune status in drug abuser patients undergoing detoxification. *Biol Trace Elem Res* **140**, 272–283.
52. Ross LJ, Wilson M, Banks M *et al.* (2012) Prevalence of malnutrition and nutritional risk factors in patients undergoing alcohol and drug treatment. *Nutr Burbank Los Angeles Cty Calif* **28**, 738–743.
53. Bozzatello P, Brignolo E, Grandi ED *et al.* (2016) Supplementation with *n*-3 fatty acids in psychiatric disorders: a review of literature data. *J Clin Medicine* **5**, 67.
54. Smith KS, Greene MW, Babu JR *et al.* (2019) Psychobiotics as treatment for anxiety, depression, and related symptoms: a systematic review. *Nutr Neurosci*, 1–15. doi: 10.1080/1028415X.2019.1701220.
55. Hong M, Han DH, Hong J *et al.* (2019) Are probiotics effective in targeting alcoholic liver diseases? *Probiotics Antimicro* **11**, 335–347.