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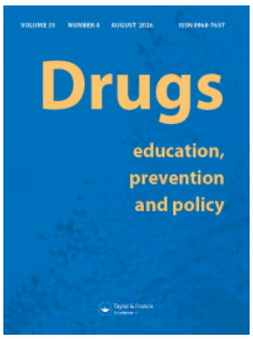
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Qualitative evaluation of a physical activity motivation intervention at a residential substance use disorder treatment facility

Sascha Thal[a,b], Nikos Ntoumanis[c,d,e], Stephen Bright[b,f], Eleanor Quested[a,b], Dominika Kwasnicka[g], Min Maung[b] and Bronwyn Myers[a,h,i]

[a]Physical Activity and Well-Being Research Group, Curtin enAble Institute, Curtin University, Perth, Australia; [b]Curtin School of Population Health, Curtin University, Perth, Australia; [c]Danish Centre for Motivation and Behaviour Science, University of Southern Denmark, Odense, Denmark; [d]Norwegian School of Sports Sciences, Oslo, Norway; [e]School of Sport, Exercise, and Rehabilitation Sciences, University of Birmingham, Birmingham, UK; [f]School of Medical and Health Sciences, Edith Cowan University, Perth, Australia; [g]Melbourne School of Population and Global Health, University of Melbourne, Melbourne, Australia; [h]Mental Health, Alcohol, Substance Use and Tobacco Research Unit, South African Medical Research Council, Tygerberg, South Africa; [i]Division of Addiction Psychiatry, Department of Psychiatry and Mental Health, University of Cape Town, Cape Town, South Africa

ABSTRACT

Background: Research on physical activity (PA) interventions for individuals with substance use disorders (SUDs) has yielded mixed findings regarding impact on substance use, mental health, and physical health. Low motivation, a common barrier in this population, can limit intervention effectiveness. This study evaluated the perceived effectiveness, feasibility, and acceptability of a motivational group intervention designed to enhance PA motivation among residents of a SUD treatment facility in Western Australia.

Methods: Semi-structured interviews were conducted with 10 intervention participants and five treatment facility stakeholders ($n = 15$). Data were analysed using inductive reflexive thematic analysis.

Results: This generated five key themes: (1) *Fostering Autonomous Motivation and Positive Change* outlines perceptions of enhanced PA motivation; (2) *Self-Monitoring Increased Motivation* reflected benefits of self-monitoring components; (3) *Meaningful and Motivating Content* described how specific elements increased PA motivation; (4) *Collective Support Through Connection* illustrated how social support enhanced relatedness and motivation; and (5) *Amplifying Impact Through Facilitator Collaboration* highlighted how facilitator dynamics supported motivation via relatedness and competence.

Conclusion: Overall, participants found the intervention acceptable, feasible, and effective in supporting autonomous motivation for PA. Findings can inform future intervention development to promote sustained PA motivation and long-term behaviour change in SUD treatment contexts.

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Introduction

In 2024 approximately 64 million people worldwide needed treatment for substance use disorders (SUDs; United Nations Office on Drugs and Crime, 2024). In 2022 and 2023, around 0.5% of the Australian population sought treatment for substance use related harms (Australian Institute of Health & Welfare, 2024) although the number of Australians requiring SUD treatment is estimated to be three to six times higher (Ritter & O'Reilly, 2025). SUDs present significant treatment challenges as they often co-occur with physical and psychological conditions (Ingram et al., 2023; Kingston et al., 2017; Wu & Blazer, 2014) and have high treatment attrition rates (Brorson et al., 2013).

Individuals with SUDs may experience health benefits from engaging in physical activity (PA). Benefits include improvements in respiratory capacity, cardiovascular function, neuromotor skills, flexibility, endurance, and physical strength (Giesen et al., 2015; Hallgren et al., 2017). However, the benefits of PA for substance use and mental health outcomes among people in SUD treatment are less clear. Some studies have reported improvements in mental health and reductions in cravings (e.g. Furzer et al., 2021; Piché et al., 2023) while others found no effects on mental

CONTACT Sascha Thal sascha.thal@curtin.edu.au Curtin University, Curtin School of Population Health, GPO Box U1987, Perth Western Australia, 6845.
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health or substance use outcomes (e.g. Thal et al., 2023a; Thompson et al., 2020). Although preliminary evidence suggests that engaging in PA within group settings may foster social support and related psychosocial benefits (Abrantes & Blevins, 2019; Christensen et al., 2006), the current body of research is highly heterogeneous, making it impossible to draw conclusive statements regarding whether certain types or formats of activities are more beneficial than others (Piché et al., 2023; Thal et al., 2023a; Thompson et al., 2020).

Ensuring that PA interventions incorporate effective behaviour change techniques may enhance the effectiveness of interventions for people with SUDs. Behaviour change techniques are single, active intervention components which modify behaviour (Marques et al., 2023). A recent review ($k = 61$; Thal et al., 2023a) identified *instruction on how to perform the behaviour, social support (unspecified), behavioural practice/rehearsal, problem-solving, pharmacological support, goal setting (behaviour), self-monitoring (behaviour),* and *biofeedback* as the most frequently used and promising behaviour change techniques (i.e. those associated with reductions in substance use or increases in PA, where the effect size is at least $d \geq 0.15$ for objective measures or $d \geq 0.36$ for self-reports) in PA interventions for individuals with SUDs. None of the studies included in this review used specific strategies for developing and sustaining motivation for PA.

Loss of motivation is a recognised barrier to sustained PA among people with SUDs (Abrantes & Blevins, 2019), limiting the potential of interventions to promote maintenance of PA (and associated benefits) post-treatment. Motivational Interviewing is an effective psychotherapeutic intervention for enhancing motivation for behaviour change (Miller & Rollnick, 2023). When applied in group contexts, Motivational Interviewing may improve readiness and self-efficacy to change (Mendel & Hipkins, 2002; Schmiege et al., 2009), problem awareness (Beadnell et al., 2012; Murphy et al., 2002), and engagement in SUD treatment (Lincour et al., 2002) and continuing care (Santa Ana et al., 2007). Although 16 behaviour change techniques overlap with Motivational Interviewing techniques (Hardcastle et al., 2017), these behaviour change techniques are rarely used in PA interventions for SUD populations (Thal et al., 2023a).

The neglect of motivational determinants of PA behaviour in PA interventions in SUD settings is a significant limitation in existing literature. To address this gap, we co-designed a Motivational Interviewing and Self-Determination Theory (Ryan & Deci, 2017) informed group motivational intervention with people with lived or living experience of SUD treatment and SUD treatment stakeholders (such as clinicians and managers). The co-design process for the group motivational intervention has been detailed in a separate publication (Thal et al., 2025). Theory-driven interventions that are co-designed in partnership with key stakeholders are known to enhance the scientific rigour and effectiveness of interventions as well as their relevance for end-users (Harrison et al., 2023). Self-Determination Theory offers a useful framework for understanding PA motivation in the context of SUD treatment. Self-Determination Theory views motivation as operating on a continuum, from more controlled forms to more autonomous forms. Self-Determination Theory suggests that when the basic psychological needs for relatedness, competence, and autonomy are met, motivation tends to move along a continuum from amotivation and controlled motivation to more autonomous motivation, resulting in higher-quality motivation (Ryan & Deci, 2017). High levels of autonomous motivation are associated with PA and health behaviour change maintenance (Ntoumanis et al., 2021; Teixeira et al., 2012). Self-Determination Theory and Motivational Interviewing overlap conceptually, with both focusing on enhancing intrinsic drive for psychological integration and growth (Patrick & Williams, 2012).

In this study, we evaluated the initial implementation of this group motivational intervention to increase and maintain PA motivation among residents of a SUD treatment facility in Western Australia. The aim of this study was to describe intervention participants' and facility stakeholders' experiences of the group motivational intervention and their perceptions of its acceptability, feasibility, and effectiveness (Proctor et al., 2011). This study was part of a larger quantitative investigation (Thal et al., 2023b) that measured the effects of the group motivational intervention on PA, PA motivation, craving, and affect.

Methods

Study design

This qualitative study employed semi-structured interviews, framed within a constructivist epistemology, to explore participants' subjective experiences of the group motivational intervention (Denicolo et al., 2016). The study is reported according to the JARS-QUAL guidelines (Levitt et al., 2018). Ethics approval was obtained from the Human Research Ethics Committee of Curtin University (HRE2023-0544).

Positionality statement

As researchers, we recognise the influence of our positionality on data collection and analysis (Levitt et al.,

2018). The two authors involved in the collection, processing, and analysis of the data (ST and BM) are psychologists residing in Australia. ST is a white cis male of European descent, with five years of professional experience working with individuals affected by SUDs. BM is a white South African cis woman with 20 years of clinical and research experience working with people with lived and living experience of SUD. The author conducting the interviews (MM) is an Asian cis male who was studying psychology at honours level at the time of the interviews. All authors are advocates of PA, recognising its benefits for physical and psychological well-being. The reflexive practices we used to identify and assess the potential influence of our positionality on the research included reflective journaling, detailed notetaking, ongoing reflexive dialogues between BM and ST, and structured reflexive discussions within the research team.

Ontological and epistemological positions

For this study, we adopted a social constructivist perspective (Burr, 2015), recognising that reality is shaped through social interactions and contextual influences. Consequently, the data gathered from interviews and advisory group discussions reflect participants' cultural, social, historical, and political contexts. Likewise, our interpretation of the data is shaped by our own backgrounds and perspectives.

Our ontological stance aligns with relativism, acknowledging the existence of multiple, context-dependent realities. We seek to explore and interpret these diverse perspectives, understanding that knowledge and truth are socially constructed through lived experiences (Burr, 2015; Rassokha, 2022). These philosophical foundations informed our methodological approach, and our inductive data analysis is consistent with our social constructivist framework.

Study setting

The group motivational intervention was implemented at a facility in Perth, Australia, that provides a six-month residential treatment program for men with SUDs and comorbid mental health conditions. After completing this program, clients are offered 12 months of continuing outpatient care, managed by facility staff. This typically involves individual case work, complemented by participation in 12-step groups and access to a free gym membership for the duration of the continuing care period. Treatment as usual includes participation in a structured PA group program comprising four 30-minute walks, a 60-minute boxercise session, a 60-minute yoga session, and a 60-minute bootcamp session per week. Treatment as usual also includes individual and group counselling, psychoeducation, support work, 12-step group participation, mindfulness groups, and equine therapy. To be eligible for treatment at the facility, individuals were required to be male, at least 18 years of age, and meet criteria for any substance use disorder as defined in the DSM-5-TR (American Psychiatric Association, 2022). Admission was restricted for individuals with psychiatric comorbidities beyond depressive, anxiety, post-traumatic stress, or borderline personality disorders, as well as psychotic or bipolar disorders that were not stabilised. Entry was also not permitted for those who had experienced an acute relapse of mental illness symptoms within the previous three months, were non-adherent with prescribed medication, or presented with cognitive or physical impairments that could interfere with participation in therapy. Additional exclusion criteria included ongoing gender-affirming treatment, pending legal proceedings that might lead to incarceration, undisclosed criminal history, a history of sex offences or arson, and evidence of intoxication at intake (see Thal et al., 2023b).

Intervention

As mentioned, the co-designed group motivational intervention was informed by Self-Determination Theory (Ryan & Deci, 2017) and Motivational Interviewing principles (Miller & Rollnick, 2023). It incorporated promising behaviour change techniques for PA interventions in SUD populations (Thal et al., 2023a) alongside behaviour change techniques that correspond with Motivational Interviewing techniques (Hardcastle et al., 2017).

The group motivational intervention comprised twelve sessions, three individual sessions (sessions #1, #11, and #12) and nine sessions (sessions #2-10) delivered in a support group format (as per Wagner & Ingersoll, 2013). Initial individual meetings introduced group aims, confidentiality, and self-monitoring using activity trackers, while exploring participants' histories, goals, and values. Group sessions then focused on building rapport, discussing motives for PA, daily routines, and the consequences of sedentary behaviour. Key techniques included exploring ambivalence, aligning behaviour with personal values, strengths-based discussions, and envisioning future goals. Evidence-based models (e.g. Stages of Change) were introduced to frame behaviour change, and a peer worker shared lived experience to support engagement. Later sessions centred on concrete planning through SMART goals (i.e. specific, measurable, achievable, relevant,

and time-bound objectives that are widely used in behaviour change interventions to support goal setting and self-regulation), goal attainment scaling, and strategies for overcoming barriers, facilitated jointly with an exercise professional. The program concluded with commitment statements and small-step planning. A more comprehensive description of individual sessions can be found in the co-design study (Thal et al., 2025).

Sessions took place in a designated room at the treatment facility and were facilitated by a psychologist (ST) trained in Motivational Interviewing and group counselling. A personal trainer with lived experience of SUD treatment co-facilitated six of the nine group sessions. Each session lasted approximately 60 minutes and included a brief (1–2 minute) burst of PA. These sessions were immediately followed by the personal trainer–led (treatment as usual) bootcamps, which the psychologist attended. Participants were asked to self-monitor their daily step counts (using Fitbits provided as part of the group motivational intervention) and to complete daily questionnaires about their PA motivation, craving, and affect using iPads. The intervention materials and measurement tools are available in the study protocol (Thal et al., 2023b).

Participants

All individuals admitted to the treatment facility during the study period were eligible for inclusion and were invited to participate either at the commencement of the study or upon later admission to the facility. Participation was entirely voluntary. Convenience sampling was used to recruit 10 intervention participants and five facility stakeholders (see Table 1). All 10 intervention participants who remained in the study at the end of the intervention period were invited for an interview and agreed to participate. Stakeholders included administrators, health professionals, and peer support workers who were directly involved in providing care to participants during the intervention period. They closely accompanied and observed participants throughout the process, giving them unique insight into how the intervention was received. On average, participants were 41.1 years old ($SD = 9.6$). As many researchers argue that statistical generalisability is not relevant to qualitative research (Braun & Clarke, 2021), we reject the concept of saturation from a neo-positivist perspective. Instead, we highlight how the study's focused research aims and specific sample allowed for rich, meaningful participant insights, indicating high information power (Malterud et al., 2016).

Table 1. Sociodemographics of intervention participants (n = 10) and facility stakeholders (n = 5).

Intervention Participants	*n*	*M*	*SD*	Facility Stakeholders	*n*	*M*	*SD*
Age		41.9	9.7	Age		39.8	10.3
Ethnicity				Gender			
African	1			Male	5		
Indigenous	1			Ethnicity			
White-Australian	5			White-Australian	5		
Other	2			Currently Physically Active			
In a relationship				Yes	4		
Yes	2			No	1		
No	5			Employment			
Prefer not to say	1			Full-time	4		
Substances Used				Prefer Not to Say	1		
Alcohol	7			Job Role			
Benzodiazepines	2			Managing role	2		
Ecstasy/MDMA	1			Support worker	2		
Cannabis	4			Prefer Not to Say	1		
Methamphetamine	5			Years Employed			
Nicotine	7			≤1 year	1	2.4	1.3
Painkillers/Opioids	4			1–2 years	2		
Poly-Substance Use	7			2–3 years	0		
Alcohol & Nicotine	7			3–5 years	2		
Alcohol & Cannabis	4						
Nicotine & Cannabis	4						

Note. Data from two intervention participants is partially missing. Study participants could nominate more than one primary substance. Only the three most common polydrug combinations are reported here.

Procedure

Semi-structured interviews with intervention participants were conducted in person three days after the final group motivational session. Before the interviews, participants were briefed on the study by ST and had the opportunity to ask questions before providing written informed consent and completing a demographic questionnaire (see Supplementary Materials I and J). Next, ST presented them with an overview of their Fitbit activity data and questionnaire responses the study's quantitative component (results of which are reported in a separate publication). Facility stakeholders were emailed a link to the information sheet, consent form, and demographic questionnaire. Staff interviews were conducted via video call or telephone one to four weeks after the group motivational intervention concluded.

MM conducted all interviews, using interview guides tailored to each participant group and designed to be culturally safe and sensitive (see Supplementary Materials A and B for interview guides). These guides, developed by the research team, explored participants' experiences with PA and the group motivational intervention, and their perceptions of its effectiveness in enhancing PA motivation. Sample questions included: '*What aspects of the intervention, if any, do you feel have helped you change the way you feel or think about physical activity*?' and '*How confident are you that you will maintain your physical activity once you leave the*

treatment facility?.' ST delivered the group motivational intervention and thus had an existing relationship with all interview participants. MM, who had no involvement with the group motivational intervention delivery or prior relationship with the participants, conducted the interviews to increase the probability that study participants would share unbiased reflections regarding the group motivational intervention. On average, the interviews were 26 (IQR = 19.11) minutes in duration. All interviews were audio-recorded and transcribed verbatim using *Otter.ai*, with audio cross-checking performed for quality assurance. After the interviews, participants were asked if they wanted to receive feedback on the study's findings. Participants received a $35 supermarket voucher to thank them for their interview participation.

Data analysis

We used Braun and Clarke (2022) six phased approach to reflexive thematic analysis (RTA; Braun & Clarke, 2022) to explore the data and identify the intervention components that participants regarded as acceptable, feasible, and effective. We adopted a critical, inductive approach to data analysis, considering latent influences (such as societal norms and power dynamics) on participants' experiences, providing interpretations that extended beyond the participants' explicitly expressed views (Byrne, 2022). For the interpretation and contextualisation of the findings, we used definitions provided by Proctor et al. (2011). Acceptability refers to the degree to which intervention participants and stakeholders are satisfied with the program and its key features and feasibility describes the extent to which the intervention can be effectively implemented in a specific setting. In addition, we defined effectiveness as participants' subjective perception of whether, and to what extent, the intervention successfully increased their PA motivation – the intended outcome of the intervention.

During the initial data familiarisation phase, ST reviewed the audio recordings and transcripts, paying close attention to participants' expressions and communication styles. Preliminary notes were taken during this phase (Supplementary Materials C). In Phase two, ST thoroughly reviewed the transcripts, first applying semantic codes to meaningful information related to the perceived acceptability, feasibility and effectiveness of the group motivational intervention. The transcripts were revisited for latent coding to uncover insights beyond participants' explicit statements. Throughout the coding process, ST created diagrams to document initial thoughts about the connections between codes (Supplementary Materials D and E).

Initial themes were generated in Phase Three. ST and BM met weekly to discuss grouping and merging codes with shared content and perspectives to develop initial themes. This process was supported by an iterative review of the preliminary notes and diagrams from earlier phases, and reflective journaling (Supplementary Materials F). In Phase Four, these potential themes were reviewed, with evidence from each transcript mapped to the corresponding themes. In this phase, we developed a thematic map as a visual representation of the team's understanding of the relationships between themes and the analytic narrative the themes could convey. This thematic map was iteratively refined (Supplementary Materials G and H) through weekly discussions as our understanding of the themes progressed. During the discussions, special care was taken to minimise biased interpretations and ensure the relevance of the themes to the research question. ST then proceeded to define and name each theme (Phase Five), with input from BM to improve the clarity and distinctiveness of the themes and the emerging narrative. To ensure the themes were comprehensible to readers less familiar with the data, this process was repeated with the other co-authors. Finally, in Phase Six, ST and BM established logical connections among the themes to create an analytic narrative (Braun & Clarke, 2022).

Terminology

Some participants used the term 'addict' when describing themselves or others. We have retained this wording in direct quotes to accurately represent participants' voices; however, we acknowledge that this is a stigmatising term and not one we endorse. We recognise that such language reflects the internalisation of stigma by some participants, and we encourage the use of non-stigmatising terminology in research and practice.

Results

Five themes were generated from the interviews. (1) *Fostering Autonomous Motivation and Positive Change* outlines perceptions that the group motivational intervention enhanced participants' motivation for PA. (2) *Self-Monitoring Increased Motivation* highlights perceptions of the feasibility and acceptability of the self-monitoring components of the group motivational intervention and the benefits of self-monitoring for PA motivation. (3) *Meaningful and Motivating Content* describes other elements of the group motivational intervention that were perceived feasible, acceptable, and as increasing participants' motivation for PA. (4)

Collective Support Through Connection illustrates how relatedness support and social support within the group was thought to foster interpersonal connections and enhance motivation for PA. (5) *Amplifying Impact Through Facilitator Collaboration* depicts participants' views on how the collaboration between the two facilitators had synergistic positive effects on PA motivation through the satisfaction of relatedness and competence needs.

Fostering autonomous motivation and positive change

Overall, participants had a positive perception of the group motivational intervention: 'It made me realise, how beneficial physical activity is' (Participant 5). Several participants mentioned that the group motivational intervention increased their autonomous motivation to be physically active. Participant 8 felt '[…] a definite conviction that I owe it to myself and to anyone that I love to actually take some responsibility in my health and well-being.' Stakeholders observed that the group motivational intervention generally seemed to increase participants' autonomous PA motivation, though some showed little to no change:

> It has increased their motivation to be physically active on, on the whole […]. There were clients who, yes, did not appear to have much change in their desire, but […] the majority did. And then there was another minority at the very top end of that who started to experience pretty significant transformation in their physical well-being, were very motivated to keep up that desire. (Stakeholder 4)

Stakeholder 1 observed that individuals whose autonomous motivation remained unchanged appeared less fit and/or had more physiological comorbidities: 'I guess the only ones who didn't sort of jump out as super excited about it, were the ones that were in poorer health, or struggled to do physical activity.' This was confirmed by participant 1 who said: 'I couldn't do a certain exercise, and like, that kind of bummed me out.' Another participant suggested that persistent engagement in the group motivational intervention was required before benefits for autonomous motivation appeared:

> […] on the first few occasions, I was quite disassociated with the class and felt like that wasn't for me. But after completing a few more sessions, I definitely felt connected to the group and felt the value behind it. And so yeah, there was definitely a transformation through going consistently to those classes (Participant 8).

From the stakeholder's perspective, the group motivational intervention was perceived to increase participants' awareness of the importance of PA, including benefits for SUD recovery: 'Talking about the benefits of mental health and your overall well-being also linking into recovery […] gave them an understanding of why it's essential for recovery, and their well-being' (Stakeholder 3). The enhanced awareness and understanding of the importance of PA fostered the development of PA-centred core beliefs in some participants: 'I wasn't aware that I was holding that value in my, in my belief system, that it's actually a core belief that I've developed, and that exercise will help me to have a more productive and better life' (Participant 8). Although overall increases in motivation were emphasised, interview participants did not always provide sufficient detail to determine whether these increases reflected more autonomous (higher quality) or more controlled (lower quality) forms of motivation. In some cases, increased motivation may thus be of lower quality. The group motivational intervention's effects on overall PA motivation seemed to transfer to SUD treatment motivation: 'There's definitely a self-motivation there that hasn't been there before. And […] because they're more motivated there, they also then have the benefits of being motivated to the rest of the program' (Stakeholder 4). Some stakeholders thought this was also impacting positively on their client retention rates: 'You know, our retention rate of clients has improved, and maybe this project has helped […] we've had an unusually high retention in the last six months' (Stakeholder 5).

Overall, most interview participants were convinced that the group motivational intervention increased intervention participants' confidence in their ability to maintain PA post- treatment. As stakeholder 5 expressed: 'I received positive feedback from staff and clients. And my hopes, for the intervention were realised and so my confidence in the intervention and what we were trying to achieve, gained momentum […]. We're very, very keen for some form of intervention around this to continue, which I think is a testament to the intervention, the fact that we see it as becoming a valuable component to the program' (Stakeholder 5). Nevertheless, some participants had doubts about their ability to remain physically active after SUD treatment:

> I'm still under control here. The real test will come when you put lesser control out there, […] when you're out there, it's only you now (Participant 2).

Self-Monitoring increased motivation

Most participants viewed the use of Fitbits and daily questionnaires as feasible and acceptable. Many

described how their PA motivation was enhanced by self-monitoring:

> […] first of all, it started just as a watch. But then slowly it became the steps that you make. And then slowly it will buzz, and you look, it will be the activities that you've done in that day. So, you know it just gives you this morale and a bit of boost (Participant 2).

Participants also reported using the Fitbit to track their sleep, calorie expenditure, and heart rate, which were variables not targeted by the group motivational intervention.

Interestingly, some participant continued to use these tools after the study ended: 'It's definitely been a motivator for a lot of the individuals in the program. So those who were given Fitbits, and who are still in the program still are using them to this day to measure their PA and to motivate them to do more' (Stakeholder 4). Furthermore, increases in self-awareness were reported through PA self-monitoring: 'I think we're dealing with a client now who has increased awareness of the PA. […] So that's had a positive effect on our program because we are engaging with a client who is more mentally engaged and focused at the start of their day' (Stakeholder 4). The daily surveys also seemed to increase emotional self-awareness for some participants: 'It's especially being an addict, where we're only learning how to feel, again. We're only learning to how emotions make us act. And having a guide of how much you're feeling on that day was great. […] It was just a good realisation of, I'm getting back in touch with my emotions and my feelings and my self-awareness' (Participant 5).

Reportedly, PA self-monitoring led to competition among the participants: 'Yeah, you know, this is a stupid competition going on, you know, like, the numbers' (Participant 2), which was perceived as positive: 'it become [sic] a bit competitive who did the most steps on the Fitbit by the end of the end of the day. But yeah, it seems to be pretty positive overall' (Stakeholder 3). However, there was an awareness of the potential for PA self-monitoring to become unhealthy. These issues were discussed in the group sessions, emphasising the importance of a balanced approach to PA: 'You find these sessions are really good and physical exercise is really awesome. But then that can become the addiction. So, there's still a nice balance between the two' (Participant 6).

The importance of treatment stakeholder buy-in for ensuring the groups, self-monitoring and daily questionnaires remained feasible was emphasised, particularly in relation to treatment activity scheduling: 'We had to move a couple of things around on a couple of days to navigate the group counselling and the one-on-one interactions.' (Stakeholder 2), as well as technical support: '[…] there was technical issues with the iPads to capture the data. And then getting the guys who come in to the, to the office at the end of the day to do their data upload, was also a bit of a challenge to get them into that routine to begin with' (Stakeholder 5).

Meaningful and Motivating content

Participants often highlighted their appreciation for the psychoeducation components of the group motivational intervention, which were delivered with the support of visual aids: 'I think these classes while they are informative were presented in a manner that was easy to understand and weren't complicated' (Participant 8). Only one participant remarked that they: '[…] knew all that already.' (Participant 7) and therefore reported feeling somewhat bored at times. Interviewees recommended that future iterations of the group motivational intervention also include information about nutrition, sleep, and exercise specific topics like appropriate breathing and heart rate, aligning with the additional features of the Fitbits some participants were using.

The participatory elements of the group motivational intervention were considered acceptable: 'I definitely feel the open platform of like having the guys participate in activities, or, like questionnaires and, and that really got them engaged in the program' (Stakeholder 1). The goal-setting exercise was perceived as particularly effective in enhancing autonomous motivation for PA:

> I think the best part for me was the SMART goals. And there was a sheet where we set you know, physical goals, I mean, looked at what we needed to do to achieve them, and the importance of. And I think just getting some more like clarity and awareness around why we're choosing to do it and how important it was to us was really, it was really motivational (Participant 10).

Participants frequently emphasised the importance of the personal trainer's assistance in setting small, achievable goals: 'More manageable goals, yep. That group definitely helped me with that. 'Cause for example, […] I wanted to do 100 push ups and 100 sit ups and 100 squats a day […] and [personal trainer] would say, it's not really manageable […]. So you're better off setting yourself a smaller goal' (Participant 5). According to participants, setting smaller goals that they achieved helped enhance and sustain their motivation. Furthermore, creating personalised change plans and committing to them in front of the group appeared to

significantly enhance participants' commitment to PA post-treatment: '[…] It made me, made me think of what I am going to do after rehab, and how to continue this physical activity. And […] I'll be riding my push bike to the gym, and back. And that is 100% commitment, that I'm making' (Participant 5).

Furthermore, participants appreciated that the group group motivational intervention was immediately followed by a group exercise session: 'I guess, going into it knowing that we're going to be doing bootcamp after the group, that kind of gets you motivated to do, you've got goals in your head, and you're thinking, by the end of the group, this is what you want to do' (Participant 10), indicating that the scheduling was feasible and acceptable and gave them an opportunity to practically apply the theoretical content of the group motivational intervention. Stakeholders shared this perception: 'It was good how they did the group counselling before bootcamp. […] So that they got the information […] focusing on the body, and mind and things like that. And then going actually into the exercise worked really well, because then they were focused on those things because it was fresh' (Stakeholder 2).

Collective support Through Connection

Another aspect of the group motivational intervention that positively influenced participants' experiences of the group motivational intervention was the supportive environment. This was facilitated by the co-creation of group guidelines during the first session which established a group atmosphere that was: 'Very respectful. You know, everyone at the very start, we outlined some group guidelines […] not to speak over each other, put our hand up if we're asking a question' (Participant 5). This positive group atmosphere likely satisfied participants' relatedness need and increased the group motivational intervention's acceptability since it was perceived as inclusive: 'everyone can participate at whatever level they were' (Participant 8), supportive: '[…] the thing that stood out the most was just a really kind of open supportive environment' (Participant 10), and safe: '[…] it was an open environment where you could ask questions and make yourself vulnerable and feel safe' (Participant 8). Stakeholders agreed: 'I think that everyone there was pretty supportive of each other and sort of all there for the same reasons. And yeah, like helped motivate each other' (Stakeholder 1).

According to intervention participants, the group context facilitated relatedness satisfaction: 'I really like being supported by people. And that's what there was a feeling of, you know, when [personal trainer] and [psychologist] were going through, you know, it was more than just the physical action, it's the emotional support as well' (Participant 10), which appeared to be of particular importance for individuals who were less fit:

> So sitting in a group environment and being vulnerable about where I am in reality in terms of my physical fitness, you know, being not very physically fit. It's hard to admit. And, yeah, I'm really grateful for the groups because I didn't realise how unfit I was […] I was able to take that back to the group and talk about it (Participant 8).

The group provided social support and encouragement for PA: 'They helped me just keep engaged with the, with the group and the men that we're working with, it's like an encouragement thing' (Participant 6), that extended beyond the group sessions into the daily routine at the treatment facility:

> I think it changed through the project, to be honest, especially in the gym environments, like the, you know, the teamwork, the camaraderie, you know, the supportiveness I definitely think that evolved and increased throughout the project. You know, and it was it was done in a positive way of like, everyone doing their best, everyone with an encouragement, you know, reaffirmation things like that (Stakeholder 3).

Through the provision of relatedness support, the group atmosphere fostered interpersonal connection and motivation for PA: 'And now I have a fond memory of what exercise could be and the connection I got from that group and I associate that I'm much more likely to go forward and do exercise, now' (Participant 8). This interpersonal connection may exhibit preventive effects against substance use and may be consolidated by group PA: 'Connection is the opposite to addiction. So, engaging in PA with other people, keeps you, keeps the connection with like-minded people, you're not going to fall back into your old addict mentality' (Participant 9).

Amplifying Impact Through Facilitator Collaboration

Participants also emphasised that the psychologist and the personal trainer with lived experience contributed significantly to fostering an open and safe group atmosphere and to the overall effectiveness and acceptability of the group motivational intervention:

> I feel like the facilitators of that group were able to provide a safe place for people to communicate and share their perceived realities and ideas, and feel respected. And there was definite trust formed over the weeks that I went, so that people were able to be

> vulnerable. And were able to take constructive criticism from [personal trainer] and [psychologist], in a way that was productive, and people weren't getting upset. So I think it was like a unity, that the group seems to be in cohesion all the time (Participant 8).

The personal trainer with lived experience was perceived as inspirational, serving as a role model: 'But having [personal trainer] there with [anonymised years of sobriety]. Such an inspiration. Thinking of what we could eventually be like' (Participant 5). Drawing on their lived experience, the personal trainer established an authentic connection with participants, inspiring hope, enhancing autonomous motivation for PA, and providing competence support: 'Yeah, [personal trainer] was able to, like connect with us on a, like a different level. He's been through the addiction [inaudible] and stuff. So then we see him as like someone to look up to, you know? […] Like he was an addict. Now, he's sober like, that to me was cool, so I can get back up there you know?' (Participant 7), even in less physically fit participants: 'I find [personal trainer] being quite inspirational. Because although I'm sick, I'm the worst one in the group. He still tries to encourage me' (Participant 4). This sentiment was shared by the stakeholders: 'I think it gave a lot of credibility to the project itself, being delivered by a person with you know, the background of addiction, as well as in recovery, and then also a personal trainer that is now thriving in that environment in his recovery' (Stakeholder 3).

The personal trainer's lived experience allowed them to adopt a more confrontational approach comparted to the psychologist: '[personal trainer] has a very unique way of connecting with residents here at [treatment facility] and was able to encourage and challenge people to a more of a degree than [psychologist]' (Participant 8). This confrontation was well-received as participants felt like it made them more accountable: 'Making you accountable, seeing through the lies; seeing through the deception and manipulation around that. That was very, it was very cool' (Participant 6), and enabled experience-based discussions around the risk of cross-addiction in relation to PA: 'Like [personal trainer], he's in recovery himself, he was able to sort of, like, you know, sort of let us know about those sorts of things and how careful, just obsessing over anything like gambling, sex, fitness, can all go down the same road if we're not careful' (Participant 9).

The psychologist was perceived as effective in facilitating the counselling-focused Motivational Interviewing elements of the group motivational intervention: 'Yeah, I think [psychologist]'s strength was getting people to really think on a deeper level. […] I think [psychologist] has a real good grasp of the emotional side of stuff. And what, what kind of what runs us. And […] he was trying to understand what was going on for us. I think that was what was helping the group progress' (Participant 10). The psychologist was perceived as compassionate and knowledgeable: 'It was [psychologist] was very respectful. Very compassionate, and it was good that he never had any trouble answering anyone's questions. He sort of, he knew what he was talking about' (Participant 5). Participants were motivated by the psychologist's participation in the group exercise sessions: '[…] what was motivating about it was that [psychologist] would actually join us for the bootcamp. So, I was like you know, it felt like he really cared' (Participant 5), and likely had positive effects on the therapeutic alliance. This notion was shared by the stakeholders: 'So it really helped with [psychologist] joining in the boot camp side of things as well' (Stakeholder 2).

In general, the facilitators were perceived to '[…] work really well with each other' (Participant 10) while they managed to establish a group atmosphere '[…] around empathy and acceptance and realistic goal setting and the facilitation of it was in a manner that was non-judgmental and was […]information sharing out of love and kindness rather than some kind of commandment' (Participant 8). Stakeholders shared this perspective: 'Yeah, so [personal trainer] and [psychologist], were both very professional but also super relatable in this environment. They definitely had a good feel for the room and who the client was. So, they did a great job of communicating and motivating' (Stakeholder 4). Above that, the collaboration between the psychologist and the personal trainer appeared to have a synergistic effect on PA motivation that extended beyond their individual contributions. The dynamic and collaboration between the facilitators appeared to increase the effectiveness of the action planning elements of the group motivational intervention:

> I feel that the dynamic was important because whilst, whilst [psychologist] who holds the science information behind exercise, [personal trainer] was more from the action side of exercise. […] So when we did the boot camps, I realised how unfit [I was], I was able to take that back to the group and talk about it. And [personal trainer] was able to come up with a plan to, and [psychologist] really to combat that in a way that gives me hope for the future in terms of actually getting involved in exercise and actually doing it (Participant 8).

The diverse professional and personal backgrounds and experiences of the facilitators enabled a broad range of topics to be addressed from multiple

perspectives which increased the acceptability of the group motivational intervention by ensuring participants felt equally heard and supported in PA, recovery, and emotional well-being: 'I think, when it comes to harder recovery questions, [personal trainer] can, like, answer that. And then he, like and then [psychologist] could answer the, you know, the physical exercise, the more the emotional, mental stuff, where [personal trainer] could bring in the recovery side of things, [what] was really good.' (Stakeholder 2).

Discussion

This study presents a qualitative exploration of participant experiences in a group motivational intervention for increasing and maintaining PA motivation among residents of a SUD treatment facility. The findings outline five themes that describe participants and stakeholders' evaluations of the extent to which aspects of the group motivational intervention were acceptable, feasible, and effective.

Importantly, participants described how the group motivational intervention content and structure enhanced their motivation for PA. Notably, their autonomous motivation for PA was increased in distinct cases as reflected in the *Fostering Autonomous Motivation and Positive Change* theme. Participants thought individuals whose autonomous motivation did not change during the group motivational intervention had more physiological comorbidities and/or were less fit. This finding aligns with evidence that poorer physical health and fitness serve as barriers to both PA and PA motivation in SUD populations (Horrell et al., 2020; Thal et al., 2024). Likewise, Chapman et al. (2024) reported that, across a range of mental health conditions, individuals with more autonomous motivation for PA engaged in higher levels of PA, whereas those with controlled motivation and amotivation reported lower levels. In addition, physical comorbidities were linked to reduced PA levels. From an Self-Determination Theory perspective, greater comorbidity and lower fitness may undermine perceptions of competence. A practical implication is that PA interventions for individuals with higher physiological burden should prioritise competence-supportive, individually tailored programming (e.g. graded progression, symptom-aware pacing). Future studies should also examine whether baseline fitness and comorbidity moderate changes in autonomous motivation during treatment.

The *Amplifying Impact Through Facilitator Collaboration* theme evidenced that the personal trainer's ability to motivate participants through autonomy supportive strategies (Teixeira et al., 2020), like *encouraging the person to experiment* and *self-initiate the behaviour*, may have mitigated some of the negative effects on autonomous motivation for PA associated with a lack of fitness and physical well-being. The support participants received from the group described in the *Collective Support Through Connection* theme also appeared to have attenuating effects on low levels of autonomous PA motivation. The application of the relatedness-support techniques (Teixeira et al., 2020) like *acknowledge and respect perspectives and feelings* and *use empathic listening* may have increased participants' experience of relatedness support and, in turn, relatedness satisfaction.

Notably, sustained intervention engagement seemed necessary to observe benefits for autonomous motivation. This indicates that repeated exposure to motivational strategies (e.g. goal setting) and need supportive techniques that foster an autonomy supportive environment may have facilitated an internalisation process – i.e. a shift from controlled to autonomous motivation for intervention participants, as highlighted by previous studies on motivation for health behaviour change (Ryan et al., 2022; Teixeira et al., 2020; Thal et al., 2024). Evidence of an internalisation process is further supported by the development of PA-centred core beliefs in intervention participants. Findings from the *Collective Support Through Connection* suggest that social support and the satisfaction of relatedness needs may have enhanced group motivational intervention engagement and thus increased autonomous motivation for PA. Additionally, the group motivational intervention's effect on PA motivation appeared to transfer to SUD treatment motivation and retention. However, it was not clear from the data whether this reflected a transfer of autonomous motivation specifically, or motivation in general. Findings from other studies suggest that fostering autonomous self-regulation in one health domain may enhance autonomous self-regulation in related domains. Mata et al. (2009) found autonomous PA motivation predicted eating self-regulation over 12 months. Intervention participants may have experienced a motivational spillover, where PA motivation enhanced SUD treatment motivation through recognition of PA's positive impact on their mental health.

Other strategies used in the group motivational intervention that enhanced autonomous PA motivation included self-monitoring of PA, as reflected in the *Self-Monitoring Increased Motivation* theme. *Self-monitoring* is an effective competence-support technique known to reinforce self-awareness and autonomous motivation (Teixeira et al., 2020). Some participants continued to self-monitor their PA after the study ended, suggesting the potential utility of this behaviour change technique for improving and sustaining PA and

PA motivation, as indicated by previous research (Samdal et al., 2017; Thal et al., 2023a). Furthermore, participants reported that PA self-monitoring increased self-awareness. The daily surveys, which were part of the quantitative measures (reported in a separate publication) rather than the group motivational intervention, also increased emotional self-awareness for some participants. This finding is significant as individuals with SUD often experience self-monitoring and self-reflection difficulties (Maracic & Moeller, 2021). Self-reflection is considered important for enhancing self-awareness and resilience (Ardelt & Grunwald, 2018). SUD treatment approaches like cognitive-behavioural therapy (Bennett-Levy, 2003), mindfulness-based interventions (Priddy et al., 2018; Witkiewitz et al., 2013), and Motivational Interviewing (Miller & Rollnick, 2023) seek to enhance emotional self-awareness (Maracic & Moeller, 2021). The incorporation of daily self-monitoring and self-reflection may have contributed to some of the group motivational intervention's positive effects on SUD treatment motivation and retention.

Participants generally experienced the psychoeducational and skills-based components of the group motivational intervention as feasible and acceptable. This is reflected in the *Meaningful and Motivating Content* theme. Co-designing the group motivational intervention with end-users, including people with lived and living SUD treatment experience, likely enhanced the intervention's feasibility and acceptability, and this reflects good practice in behaviour change intervention development (Colquhoun et al., 2017; Smith et al., 2023). During the co-design process, end-users identified the motivational challenges faced by this population and strategies for navigating these challenges. These strategies included providing *information about health/emotional consequences* (behaviour change techniques and important aspects of Motivational Interviewing; Hardcastle et al., 2017). They were deliberately included in the group motivational intervention and were well-received by participants. Similarly, *provide a meaningful rational* for behaviour change is an autonomy-supportive technique that fosters autonomous motivation (Teixeira et al., 2020). Scheduling the group motivational intervention immediately before a group exercise session was regarded positively as this provided an opportunity for *Behavioural practice/rehearsal,* another promising behaviour change technique in PA interventions in SUDs (Thal et al., 2023a), of the concepts discussed in the group motivational intervention. The goal-setting exercise, which focused on self-selected, short-term, and achievable goals, was regarded as effective in increasing PA motivation. Thal et al. (2023a) identified *goal-setting (behaviour)* as a promising behaviour change technique. Participants indicated that setting smaller, achievable goals helped to enhance and maintain their autonomous motivation. This is consistent with research indicating that individuals with SUDs prefer achievable short-term introjected PA goals (Thal et al., 2024), and that *provide choice* is an autonomy-supportive technique (Teixeira et al., 2020). The personal trainer was perceived to be acceptable and effective in delivering the goal-setting exercise, likely due to the use of competence-supportive techniques like *address obstacles for change, assist in setting optimal challenge, offer constructive, clear, and relevant feedback,* and *help develop a clear and concrete plan of action* (Teixeira et al., 2020). Creating personalised change plans and publicly committing to them appeared increase participants' commitment to PA post-treatment. This is not surprising as *Action planning* is an effective behaviour change technique for long-term PA promotion (Howlett et al., 2019) and an important aspect of Motivational Interviewing (Hardcastle et al., 2017).

The *Collective Support Through Connection* theme depicts how the socially supportive group atmosphere enhanced the acceptability of the group motivational intervention. Thal et al. (2023a) identified *social support (unspecified)* as a promising behaviour change technique for PA promotion. *Social support (emotional)* is recognised as a behaviour change technique, and by definition, was inherently present in the group motivational intervention, as Motivational Interviewing is a form of emotional support (Michie et al., 2013). Participants reported that the combination of emotional support and relatedness support fostered interpersonal connections and enhanced PA motivation. These findings align with those of Thal et al. (2024), who suggest that group-based PA can counteract the experience of isolation during SUD treatment. This, in turn, can foster autonomous motivation to engage in PA (especially for individuals experiencing amotivation), indicating that social support may play a pivotal role in facilitating an individual's transition from amotivation to autonomous motivation (see Ng et al., 2013). Participants thought that relatedness support could prevent the recurrence of substance use, a finding supported by the SUD literature (Polcin & Korcha, 2017). Furthermore, it may also help to mitigate some of the potential negative effects of self-monitoring, such as competitiveness, which were reported by several participants.

Participants also described how the facilitators contributed to the group motivational intervention's effectiveness and acceptability. As reflected in The *Amplifying Impact Through Facilitator Collaboration* theme the personal trainer

with lived experience was perceived as inspirational and authentic, serving as a credible source of competence-support techniques and a role model in this study. Research indicates that individuals in recovery from SUDs often possess authentic leadership qualities (Roop, 2022) with authentic leaders having the ability to inspire autonomous motivation in others (Maunz et al., 2024). The psychologist was perceived as effective in facilitating the counselling-focused Motivational Interviewing elements of the group motivational intervention. The psychologist's use of relatedness-support techniques like *acknowledge and respect perspectives and feeling, show unconditional regard,* and *use empathic listening* may have fostered relatedness and emotional support experienced by the participants. The combination of therapeutic expertise, physical fitness, and their participation in the group exercise likely contributed to the group motivational intervention's feasibility, acceptability, credibility, and overall motivational impact. In comparison, participants in a study on mindfulness-based cognitive therapy reported that interventions were perceived as more credible when the facilitator personally practiced mindfulness as well (Marks et al., 2023). The facilitators' collaborative efforts in fostering a safe environment for the intervention participants likely provided both competence and relatedness support, which may have further enhanced their autonomous motivation for PA. During the co-design of the group motivational intervention the need for multidisciplinary facilitators to co-facilitate key aspects was highlighted, reinforcing the role of co-design in improving intervention acceptability and effectiveness.

Study strengths, limitations and future directions

This study is critically discussed in relation to Smith's (2018) forms of generalisability, which provide a comprehensive framework for understanding the relevance of qualitative findings. While we attempt to provide readers with extensive contextual details, evidence, and theoretical explanations of the realities captured in this research, the naturalistic generalisability of our study is likely limited. Future research could include member reflections (Smith & McGannon, 2018), in which participants are invited to reflect on and respond to the study findings, to encourage deeper insights into the findings. This was not feasible in the present study due to practical constraints related to timeframe and available resources.

We have sought to improve the transferability of our research (Smith, 2018) by incorporating testimonies and detailed descriptions of participants' experiences. While the ultimate assessment of the transferability of our findings rests with the readers, we highlight several strengths of our study that may be applicable to other contexts. First, self-monitoring strategies appeared effectively promote sustained autonomous PA motivation in many participants, suggesting their potential for integration into PA interventions across various contexts and populations. Second, the combination of Self-Determination Theory need-supportive techniques, behaviour change techniques, and Motivational Interviewing methods appears to work seamlessly, fostering autonomous PA motivation. Notably, there is considerable conceptual and practical overlap among these techniques. Finally, a multidisciplinary team of intervention facilitators seems to play a crucial role in satisfying participants' basic psychological needs, thereby increasing autonomous PA motivation. Beyond that, we recognise that SUD treatment contexts and available resources can vary significantly, and the evidence of feasibility in this study is specific to the setting in which it was implemented. For instance, treatment as usual at the SUD treatment facility included a PA program. Further, recruiting a personal trainer with lived experience of SUD and a psychologist who is physically fit may be challenging, potentially limiting the effectiveness of future attempts to deliver the group motivational intervention. However, the group motivational intervention is designed to be facilitated by a psychologist, a personal trainer, and a lived experience peer worker, meaning that having a personal trainer with lived experience may not be necessary. While physical fitness in the psychologist was not considered a prerequisite, the motivational impact of their participation in the PA sessions was perceived as important. Nonetheless, these factors should not constrain the synergistic effects of the facilitator collaboration. It is also important to note that there is considerable variation across treatment programs in Western Australia, across Australia, and internationally in the extent to which PA is prioritised and resourced. The facility where this study took place represents the higher end of PA integration within treatment as usual. While the motivational intervention itself is straightforward to replicate, reproducing the same level of PA programming and the associated staffing resources may be more difficult in other contexts. This variability should be considered when assessing the feasibility and generalisability of implementing the group motivational intervention more broadly.

We achieved analytical generalisation (Smith, 2018) by interpreting our findings using Self-Determination Theory – an established macro theory of motivation, and behaviour change techniques – a taxonomy for behaviour determinants. This analytical generalisation strengthens the validity of our analysis by grounding our explanation in well-established theoretical frameworks.

The intersectional generalisability (Smith, 2018) of our study is limited. We used convenience sampling to recruit individuals who participated in the group motivational intervention at a single SUD treatment facility. While we succeeded in including a diverse and representative sample, we acknowledge that we did not specifically recruit Aboriginal and/or Torres Strait Islander people, nor did our interviews focus on the unique motivations and needs of participants identifying as such. Future research could focus on samples composed entirely of Aboriginal and/or Torres Strait Islander participants to explore potential similarities and differences with our findings. This is particularly important given the disproportionate burden of substance use-related harms among Aboriginal and Torres Strait Islander peoples (Australian Institute of Health & Welfare, 2024) and the unique cultural strengths and needs that may shape motivation and engagement in PA. In addition, other underrepresented groups, such as women, culturally and linguistically diverse populations, and individuals with specific comorbid conditions, should be considered in future studies to examine the broader transferability of the intervention.

Lastly, future research could build on the insights gained from these interviews to design a refined iteration of the group motivational intervention. An updated version can incorporate critical feedback, such as using Fitbits to track additional variables like sleep, calorie expenditure, and heart rate, which were outside the scope of the original group motivational intervention. Similarly, the psychoeducational content of the sessions could be expanded to include topics on nutrition, sleep, and exercise-specific areas such as breathing techniques and understanding heart rate. These additions would align with the enhanced capabilities of the Fitbits that some participants were already using. However, these adaptations may not necessarily impact autonomous motivation for PA, a point that should be approached with caution and explored in future studies. Furthermore, individuals with more physiological comorbidities and/or lower fitness levels should receive additional, competence-supportive and individualised support, such as tailored exercise programmes, graded progression, and symptom-aware pacing adapted to their specific capabilities and needs.

Conclusion

Participants perceived the motivational intervention to be feasible, acceptable, and effective in increasing their autonomous PA motivation. The intervention's application of behaviour change techniques, including *social support (unspecified), social support (emotional), goal setting (behaviour), self-monitoring (behaviour), behavioural practice/rehearsal, action planning, information about health consequences, information about emotional consequences, and credible source* appeared to enhance intervention engagement and PA motivation. Future research in this field should leverage the strength of this intervention – such as self-monitoring, the integration of Self-Determination Theory need-supportive techniques, behaviour change techniques, and Motivational Interviewing methods, and a multidisciplinary team – while involving larger and more diverse samples and treatment contexts to enhance our understanding of interventions that promote lasting PA motivation and behaviour.

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Ethical approval

Ethics approval for this study was obtained from the Human Research Ethics Committee of Curtin University (HRE2023-0544). All procedures were conducted in accordance with national and international guidelines for research involving human participants (National Health & Medical Research Council, 2023). Informed consent was obtained from all participants prior to their involvement in the study.

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ORCID

Sascha Thal http://orcid.org/0000-0001-9028-9335
Nikos Ntoumanis http://orcid.org/0000-0001-7122-3795
Stephen Bright http://orcid.org/0000-0002-9001-032X
Eleanor Quested http://orcid.org/0000-0002-6211-9045
Dominika Kwasnicka http://orcid.org/0000-0002-5961-837X
Bronwyn Myers http://orcid.org/0000-0003-0235-6716

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to their containing information that could compromise the privacy of research participants.

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