CHAPTER TWENTY THREE

Physical Activity Programming for Post-secondary Student Mental Health: Considerations for Research and Practice

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Abstract

Post-secondary students represent a population vulnerable to engagement in health-risk behaviours including insufficient sleep, poor nutrition, and limited physical activity (PA). Health-risk behaviours can compound mental health concerns and negatively impact student learning and campus engagement. Accordingly, there is increasing interest in alternative therapeutic approaches that are community-based and focus on reducing stress and encouraging self-care. Community-based PA programs can help to reduce symptoms associated with poor mental health, improve sense of belonging and sense of community, and improve social connections and support for students. The following chapter presents an overview of the growing evidence supporting the effectiveness of on-campus PA programming as a mental health management strategy. Grounded in behaviour change theory and implementation science, considerations for research and practice are presented. Lastly, implications for program implementation, evaluation, and future research are discussed.

Keywords: Post-Secondary Students, Physical Activity, Mental Health.

INTRODUCTION

Poor mental health among emerging adults (16-25 years of age) is a significant public health concern, and consequently, initiatives have been put in place to support their unique mental health needs (e.g., Mental Health Commission of Canada, 2021; Wiens et al., 2020). Emerging adulthood represents a critical life stage when symptoms of poor mental health and diagnosable mental illnesses most often develop (Fusar-Poli, 2019; Kessler et al., 2005; McGorry & Yung, 2020). While the burden of mental illness is evident across the life-course, the majority of diagnosable conditions have their peak onset during adolescence and emerging adulthood, typically by the age of 24 (Kessler et al., 2005; Pearson et al., 2013).

Post-secondary students represent a population of emerging adults vulnerable to experiencing mental health challenges given multiple factors associated with the transition to post-secondary school, including greater academic requirements, adjusting to the university community, and increased responsibilities for self-management and dealing with competing demands (e.g., social, personal and academic; Arnett, 2015; Linden et al., 2021; Marcotte et al., 2017). Indeed, mental health concerns are prevalent among students, and it is well-documented that post-secondary institutions are facing difficulties with preventing, identifying, and treating mental health challenges (American College Health Association, 2019; Jaworska et al., 2016; Xiao et al., 2017). Improved strategies for addressing post-secondary student mental health are therefore needed.

Addressing the Interconnectedness Between Mental Health and Physical Health

In an effort to better support student mental health, there has been a shift in the approach to mental health services on campus from paradigms focused on individual treatment toward those focused on mental health promotion and overall well-being in the campus community (Brunner et al., 2014; CACUSS & CMHA, 2013; MacKean, 2011; Ng & Padjen, 2019). This

shift has been increasingly implemented to support a healthy campus, and a whole system approach to health and well-being (see Dooris et al., 2014, 2020, 2021). Furthermore, the vision and objectives of the Okanagan Charter for Health Promoting Universities and Colleges (2015) outlines an international call to action to expand on systemic and ecological considerations to address factors impacting health and well-being at multiple levels (e.g., individual, group, community), beyond a focus on individual behaviour. As such, there is an identified priority to embed health into all aspects of campus culture to address evolving and ongoing issues pertaining to the mental health, well-being, flourishing, and thriving of post-secondary students.

The World Health Organization (1946) defines health holistically as reflecting "physical, mental, and social well-being and not merely the absence of disease or infirmity" (p. 1). From this perspective, and in-line with principles relevant to the Health Promoting Universities and Colleges movement (Okanagan Charter for Health Promoting Universities and Colleges, 2015), there is a need for holistic and integrative approaches to promote overall health and well-being among post-secondary students. One such approach is to intervene on risk factors that may be implicated in generating or further compounding symptoms associated with poor mental health and mental illness (Arango et al., 2018; Jacka et al., 2012). In particular, the interconnectedness between mental health and physical health is evident, and interventions targeting poor lifestyle behaviours (e.g., physical inactivity, insufficient sleep, poor diet) are supported as promising mental health promotion approaches among young adults (Fusar-Poli et al., 2021).

As outlined by Firth and colleagues (2019), health risk behaviours including smoking, sleep disturbance, physical inactivity, and dietary risks were elevated across a variety of mental illnesses and economic settings. Post-secondary students represent a population vulnerable to

engagement in many of these behaviours, such as inadequate sleep, low fruit and vegetable intake, and physical inactivity (Kwan et al., 2016). This is concerning because it can compound mental health concerns and increase risk for the development of physical health comorbidities (e.g., metabolic diseases, respiratory disease, musculoskeletal health) and premature mortality and morbidity (Firth et al., 2019; Dickerson et al., 2021; Iturralde et al., 2021). In addition, post-secondary students with a higher likelihood of engaging in multiple health-risk behaviours have been found to report significantly higher levels of stress (Kwan et al., 2016).

Comparatively, Beccaria and colleagues (2016) found that post-secondary students with greater engagement in health-promoting behaviours on average had improved self-care, social support, problem-focused coping skills, lower reported stress, and less intention to leave school. A systematic review conducted by Lisnyj et al. (2021) indicates that health-promoting behaviours may also be associated with greater personal and academic success among post-secondary students (e.g., being able to better balance home and school, having effective study habits, a higher GPA obtained, and academic persistence). Taken together, targeting modifiable health risk behaviours may be an effective holistic mental health intervention for addressing students' physical, mental, and social well-being.

Physical Activity as a Holistic Mental Health Intervention

To promote student mental health and well-being, alternative therapeutic approaches are needed that promote engagement in health-promoting behaviours, campus community involvement, and a more inclusive and caring sense of community (Dooris et al., 2014; Golightly et al., 2017; Ng & Padjen, 2017; Okanagan Charter for Health Promoting Universities and Colleges, 2015). Research examining student preferences for promoting health and well-being has demonstrated that students value choice in treatment approaches and express interest in alternatives to standard care, such as diet and physical activity (PA), rather

than psychotherapy or education (Baik et al., 2019; Cunningham et al., 2017; deJonge et al., 2020).

Of relevance to the current chapter, engagement in recreation opportunities (including physical recreation) has been suggested to promote recovery, improve a sense of community, and foster social connection among individuals with mental health concerns (Fenton et al., 2018; Gallant et al., 2020; Litwiller et al., 2017). Moreover, students have also identified PA and curricular activities as experiences within the broader university setting that promote mental health and well-being (Baik et al., 2019), and access to a recreation centre is an important service that contributes to a healthy campus climate (Jaworska et al., 2016).

In conclusion, there is a well-supported need to target modifiable health behaviours and develop multidisciplinary lifestyle interventions in mental health care (Firth et al., 2019). Importantly, on-campus physical recreation and PA programming opportunities may have a promising role in promoting a healthy campus climate. As such, the purpose of this chapter is to outline the evidence supporting the potential of PA for the treatment and management of mental health concerns, while drawing tangible links to the utility of this evidence within a post-secondary context for promoting student mental health and well-being.

Defining Physical Activity and Exercise

Physical activity can be defined as "any bodily movement produced by skeletal muscles that results in energy expenditure" (p. 126; Caspersen et al., 1985). It is complex and varies across patterns of accumulation or dimensions (frequency, intensity, duration, and mode), and different domains (occupational, domestic, transportation, leisure time; Strath et al., 2013). See Table 1 for definitions of the dimensions and domains to guide assessment of PA (Strath et al., 2013).

Exercise is a subcategory of PA that is "planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of physical fitness" (p.126; Caspersen et al., 1985). PA is used throughout the current chapter as a term that encompasses all forms of bodily movement and exercise. Where applicable and relevant, the mode, frequency, duration of engagement, and intensity of PA will be outlined to provide evidence-based considerations for the effectiveness of PA for the treatment and management of mental health concerns.

Table 1

Physical activity dimensions and domains

Physical activity dimensions	
Dimension	Definition and examples
Mode	Specific activity or the type of activity performed. Examples include walking, running, cycling. Mode can also be defined by the physiological and biomechanical demands/types of the activity (e.g., aerobic versus anaerobic activity, resistance or strength training, balance, and stability training).
Frequency	Number of sessions per day or per week. In the context of health promoting physical activity, frequency is often qualified as number of sessions (bouts) $\geq$ 10 min in duration/length.
Duration	Time (minutes or hours) of the activity bout during a specific time frame (e.g., day, week, year, past month).
Intensity	Rate of energy expenditure. It can be objectively quantified with physiological measures (e.g., heart rate, respiratory exchange ratio) or quantified by body movement (e.g., stepping rate). It can also be assessed subjectively by perceptual characteristics. For example, Rating of Perceived Exertion Scale (Borg & Noble, 1974) and Talk Test (Persinger et al., 2004).
Physical activity domains	
Domain	Definition and examples
Occupation	Work-related physical activity including heavy manual labor tasks, standing, and walking, carrying, or lifting objects.
Domestic	Physical activity relating to running a home or family relations including housework, yard work, childcare, chores, self-care, grocery shopping.
Transportation/utilitarian	Physical activity completed with the purpose of going somewhere including active commuting, walking, bicycling.
Leisure time	Physical activities that are not required as essential activities and are performed at the discretion of the person including recreational activities, sports, hobbies, leisurely walking, volunteer work.

Note: Table is adapted from Strath et al. (2013).

Evidence Supporting Physical Activity for the Treatment and Management of Mental Health

While research on the use of PA for addressing the mental health of post-secondary students in particular remains limited, a growing body of promising evidence indicates that it could play a role in the prevention and treatment of mental illnesses and mental health concerns generally. And importantly, PA is recognized as being a low-risk and cost-effective alternative approach for health and wellbeing (Piggin et al., 2017).

Of relevance to the post-secondary context, Lederman and colleagues (2017) have argued that formalized mental health interventions that focus on PA can be implemented cost-effectively, particularly when using community or university partnerships. Indeed, post-secondary contexts may offer natural advantages for large-scale implementation of PA programs for student mental health because they often have essential infrastructure (e.g., an integrated setting with access to recreational facilities and mental health services) and practical support (e.g., experts in diverse fields) to help develop, evaluate, and disseminate scalable evidence-based PA programs to support student mental health and well-being (Hunt & Eisenberg, 2010).

Evidence supports PA as an effective intervention across a range of mental health concerns, including both non-clinical (Pascoe et al., 2020; Rebar et al., 2015) and clinical (Ashdown-Franks et al., 2019; Bailey et al., 2018) populations**.** Namely, there is now a strong evidence-base that PA is an important factor in preventing both anxiety and depression: Schuch and colleagues (2018) conducted a review of prospective cohort studies and found that higher levels of PA protected against incident depression across the lifespan (i.e., youth, adults, and the elderly), and across Asia, Europe, North America, and Oceania. And in a methodologically similar study, higher levels of PA were found to protect against the emergence of anxiety

among youth, adolescents, and adults, after the adjustment of publication bias and regardless of factors such as age and sex (Schuch et al., 2019). It was particularly protective against posttraumatic stress disorder (PTSD) and agoraphobia (Schuch et al., 2019). Furthermore, a scoping review conducted among young people (aged between 12 and 26 years) showed support for PA as an effective mental health promotion strategy across a range of outcomes, including anxiety and depression symptoms, functioning, self-esteem, social skills, and stress (Pascoe et al., 2020). Taken together, the findings indicate the broad applicability and promising potential of PA as a mental health prevention and promotion strategy.

In addition, structured and supervised PA (including both aerobic and resistance training), have been shown to be effective in the treatment and management of symptoms and health outcomes across a range of mental illnesses including depression (both major depression and pre and postnatal depression), anxiety and stress disorders, and schizophrenia (Ashdown-Franks et al., 2019). There is also limited emerging evidence of a positive impact of PA for people with bipolar disorder and alcohol use disorders (Ashdown-Franks, 2019). It is also an important intervention for general health benefits for individuals presenting with mental illness (e.g., prevention and management of non-communicable disease, positive effects on mental health, reduced blood pressure; Rosenbaum et al., 2018; Thornton et al., 2016). A meta-review of PA interventions and their impact on health outcomes for people with mental illness further indicate its therapeutic effects across major depressive disorders (MDD) and schizophrenia-spectrum disorders (Stubbs et al., 2018).

For MDD, consistent evidence has been found suggesting that PA can have beneficial effects comparable to psychotherapy and even antidepressant medications, and outperforms placebo control conditions in improving depressive symptoms, cardiorespiratory fitness, and quality of life (Stubbs et al., 2018). For schizophrenia spectrum disorders, PA has been found

to be effective in improving cognition, cardiorespiratory fitness, and psychiatric symptoms (Stubbs et al., 2018). Among individuals with clinical anxiety, it has also been shown to be effective for reducing symptoms (Aylett et al., 2018). Given the evidence, PA is supported as an effective holistic therapeutic approach for promoting physical and mental health, and as an effective symptom management strategy across a range of mental illnesses.

Integrating PA within Mental Health Care: Exercise Prescription, Referral and Clinical Practice Guidelines

Physical activity programming could be offered as an alternative therapeutic approach to support the mental health and well-being of post-secondary students. Further understanding strategies for the incorporation of PA programming among the range of intervention approaches available to students could improve campus-wide access to PA as a lifestyle intervention to help address the physical and mental health of students. One such strategy is to provide students with PA prescriptions or referrals to on-campus programming opportunities as part of routine mental health care (e.g., deJonge et al., 2020; Orchard 2020). A PA prescription ideally includes individualized PA and lifestyle goals that involves a written recommendation to reach PA guidelines (Thornton et al., 2016). A referral involves directing patients to a skilled allied health professional or to an appropriate community-based resource (Thornton et al., 2016).

Of relevance to supporting student uptake to PA as a mental health management strategy, research has demonstrated that students express a need for clinicians to give advice and support, including informational support and formalized referrals or prescriptions (deJonge et al., 2020). This is supported within the broader literature on adults with mental illness and the general population, in which health care professionals have been identified as important social influences for encouraging health behaviour change and engaging in PA (Firth et al.,

2016; Glowacki et al., 2017; Orchard, 2020; Thornton et al., 2016). Clinical practice guidelines provide further support for the role of mental health professionals in providing PA prescriptions and referrals. Particularly, PA is recognized as an evidence-based alternative mental health treatment approach, and clinical practice guidelines recommend its integration into routine mental health care (e.g., National Collaborating Centre for Mental Health, 2010; Ravindran, 2016; Malhi et al., 2021). For example, Malhi and colleagues (2021) recommend that evidence-based lifestyle interventions, including PA, should be integrated as an essential component of care in recovery from mental illness.

While the benefits of PA for improving health and well-being among individuals with mental health concerns are recognized, the evidence-base showing its effectiveness for managing depression is the most established. On both a global (WHO, 2019) and national level (Canadian Network for Mood and Anxiety Treatments [CANMAT]; Ravindran, 2016), PA is now recommended as a standard treatment for MDD. In Canada, PA is recommended as a first-line alternative treatment for mild to moderate depression, and as a second-line adjunctive treatment for moderate to severe depression (Ravindran, 2016). For those experiencing treatment-resistant depression, PA of moderate intensity has also been suggested as an effective and attractive adjuvant therapy (Mota-Pereira et al., 2011).

Currently, the CANMAT guidelines state that for PA to be effective, it should be supervised, undertaken at a moderate intensity for at least 30 minutes in duration, and performed at least 3 times a week for 9 weeks (Ravindran et al., 2016). Outside of Canada, the National Institute for Health and Care Excellence (NICE) in the United Kingdom recommends structured and supervised group PA programs as a low-intensity psychosocial intervention for individuals with persistent subthreshold depressive symptoms or mild-to-moderate depression (National Collaborating Centre for Mental Health, 2010). More specifically, NICE includes

structured and supervised group PA programs as an effective alternative to other low-intensity interventions, including guided self-help based on the principles of cognitive behavioural therapy, and computerised cognitive behavioural therapy. Taken together, PA is widely supported as an evidence-based alternative therapeutic approach and could be used to support the mental health and well-being of post-secondary students.

Physical Activity to Target Help-Seeking Behaviour, and Campus Community Engagement and Retention

Based on supporting clinical practice guidelines, on-campus PA programs could be offered as low-intensity psychosocial interventions that students experiencing mild-to-moderate mental health concerns could be referred to. Drawing on stepped care frameworks, offering low-intensity psychosocial interventions that target well-being, self-care, and self-management strategies may be important for alleviating the demand for higher intensity services, reducing help-seeking stigma, and expanding the diversity of treatment approaches to meet the needs of students across a range of concerns and personal preferences (Cornish, 2020; Stunden et al., 2020; Walsh, 2011). For example, Stunden and colleagues (2020) have suggested that low-intensity sources of mental health support including self-help and wellness activities may be an effective approach to facilitate help-seeking behaviour among post-secondary students.

Students experience a wide-range of barriers to help-seeking behaviour, spanning institutional (e.g., long wait-times and access to health insurance and coverage), sociocultural (e.g., factors related to gender and ethnicity), and personal contexts (e.g., a lack of perceived need, beliefs about treatment effectiveness; Dunley & Papadopoulos, 2019). As such, understanding on-campus PA programming as an effective and acceptable mental health intervention that may appeal to student groups otherwise reluctant to seek care (e.g.,

international students, men, Indigenous students) is an important research avenue (Srivastava & Srivastava, 2019).

On-campus physical recreation programs have the potential to promote mental health, well-being, and community engagement among diverse student groups such as undergraduate and graduate students, international students, and Indigenous students (e.g., Kilgo et al., 2016; Rosa et al., 2021; Van Dyk & Weese, 2019; Yan & Cardinal, 2013). For example, international students describe PA as a coping strategy to manage stress associated with acculturation and as a way to facilitate social connections and meaningful engagement within the campus community (Glass et al., 2014; Rosa, 2019). Campus recreation programs, including sport and PA, may also play an important role in increasing Indigenous student engagement and retention by providing opportunities to develop friendships, increase socialization, and develop a sense of accomplishment and pride (Van Dyk & Weese, 2019). In turn, these attributes could help to facilitate academic success (Van Dyk & Weese, 2019).

Furthermore, among individuals with mental illness, PA interventions are supported as a socially inclusive, non-stigmatizing, and effective way to promote mental health recovery (Fenton et al., 2018; Gallant et al., 2020; Litwiller et al., 2017). This is important because students cite stigma as a predominant barrier to the utilization of campus mental health services (Eisenberg et al., 2012; Goodman, 2017). Lastly, socialized masculine norms including self-reliance and emotional control have been suggested to negatively impact attitudes toward help-seeking and mental health service utilization. Within a post-secondary context, it has been consistently reported that women are more likely than men to seek help for mental health issues (Dunley & Papadopoulos, 2019). Researchers have suggested that men may find tangible solution-focused approaches such as improving diet or increasing PA as more appealing than traditional help-seeking avenues (Sagar-Ouriaghli et al., 2019). However, limited research has

been conducted on PA programming as a low-intensity intervention to target help-seeking behaviour among at-risk student groups. Future research is warranted to address the role of PA programming as an inclusive and non-stigmatizing approach to support student mental health across diverse student groups (e.g., age/generation, race, gender, ethnicity, socioeconomic status, sexual orientation).

Among the general student population, the benefits of on-campus PA programming for student mental health are increasingly being recognized, and yet there is a paucity of PA intervention research that has specifically been tailored to the post-secondary context. However, the research that has been done has been positive and provides support for the integration of PA programming into mental health support services. Specifically, supervised PA counselling interventions (i.e., PA training combined with motivational interviewing and behaviour change techniques) tailored towards students' needs and preferences have been found to be effective in reducing symptoms of depression and anxiety (McFadden et al., 2017; Muir et al., 2020). Similarly, deJonge and colleagues (2021) demonstrated that one-on-one, individualized, and supervised interventions that combined PA training and behaviour change techniques (e.g., goal setting, developing action plans, monitoring barriers and enablers to goals) can effectively reduce symptoms of anxiety, depression, and psychological distress. Research also provides support for the effectiveness of peer-supported PA programming in decreasing symptoms of distress and depression among students (Keeler et al., 2019). More broadly, engagement in post-secondary recreational programming, including PA, has been associated with reductions in symptoms of anxiety, depression, as well as of psychological distress (Fenton et al., 2018). Taken together, research provides support for the effectiveness of PA interventions in improving a range of symptoms associated with poor mental health among students.

Student perceptions also situate PA as a valuable self-care and stress-reduction approach (deJonge et al., 2020; Kirsh et al., 2016; Yzer & Gilasevitch, 2019). Stress reduction approaches may be of particular relevance and importance to the university student population, many of whom may not have diagnosed mental illness but nonetheless be experiencing high levels of stress. For instance, qualitative reports from university students self-identifying with mental health problems have described the utility of PA as a self-management strategy to reduce stress (Kirsh et al., 2016). The students identified PA as a strategy to divert their attention away from stressful feelings, and that it contributed to a sense of accomplishment. Furthermore, PA has been listed as students' most preferred stress reduction activity among a range of other activities including music and other arts, time spent with pets, planning, and media consumption (Yzer & Gilasevitch, 2019). Koschel et al. (2017) also demonstrated that a university-based PA programming event aimed at reducing stress among students approaching final exams was effective in reducing perceived stress. Similarly, including short bouts of PA within a lecture on campus has also been shown to help mitigate stress and enhance well-being (Koulanova, Maharaj, et al., 2018; Koulanova, Sabiston, et al., 2018). As such, PA has been discussed by students as a good well-being, self-care, and stress reduction strategy, and intervention research supports the effectiveness of PA programs in improving symptoms associated with poor mental health.

Considerations and Recommendations to Translate Research into Practice

Physical activity is supported as an effective and acceptable intervention for improving the mental health of post-secondary students and has the advantage of being a low-stigma and cost-effective approach, with minimal side effects (deJonge et al., 2020; Gallant et al., 2020; Lederman et al., 2017; Litwiller et al., 2017; Mason & Holt, 2012; Piggin et al., 2017). Despite the evidence supporting the effectiveness of PA programming for mental health, the integration

of PA within routine campus mental health care is yet to be widely implemented due to prevalence of barriers to its widespread implementation in real-world post-secondary campus contexts.

Some existing barriers highlighted in the current research include institutional factors related to a lack of tailored programming opportunities and resources to promote mental health; barriers to participant engagement (e.g., lack of support, low mood, low energy); and the beliefs and perspectives that mental health professionals hold towards PA as a mental health management approach (e.g., deJonge et al., 2020, 2021; Glowacki et al., 2017, 2019; Way et al., 2018). For example, research has demonstrated that mental health professionals hold beliefs that limit the incorporation of PA within mental health care, such as the belief that patients cannot overcome barriers to engage in PA, that discussing PA is not part of their professional role, and that exercise is not a legitimate treatment approach (Glowacki et al., 2019; Radovic et al., 2018; Way et al., 2018). Accordingly, resources and strategies to overcome these barriers must be developed. Drawing on recent empirical evidence, the following recommendations are provided as potential practical and research considerations for improving the translation of effective PA programming opportunities into real-world campus contexts.

Dose of physical activity: A need for pragmatic intervention approaches. Within the treatment and management of mental illness, a meta-review and position statement conducted by Stubbs and colleagues (2018) recommends that the most effective and engaging interventions include those that are (1) delivered by qualified exercise professionals (as opposed to mental health staff), and (2) delivered at moderate to vigorous intensity PA, or at an intensity required to achieve physical fitness (e.g., cardiorespiratory fitness). These recommendations are consistent with CANMAT guidelines for using PA as an alternative depression treatment (Ravindran et al., 2016). Physical activity interventions are most effective

when supervised by a qualified exercise professional on campus (this could be a partnership with athletics and recreation staff and/or Kinesiology students), undertaken at a moderate intensity (e.g., moderate-level exertion with increased heart rate and challenged conversation with others, such as fast walking, cycling, playing casual sports), for at least 30 minutes in duration, and performed at least 3 times a week for 9 weeks.

Despite recommendations that focus on supervised and moderate-vigorous intensity PA, the optimal dose (i.e., type, frequency, duration, and intensity) required to achieve therapeutic response remains largely understudied. Given this uncertainty, there is an emerging trend of *affect-based* PA prescription (Belvederi Murri et al., 2019; Ladwig et al., 2017), which aims to ensure that prescribed PA creates pleasant affective experiences. As outlined by White and colleagues (2018), PA that is enjoyable, personally relevant, and voluntary is associated with positive affect. Importantly, Ekkekakis (2017) has suggested that achieving pleasant affective experiences during PA is central to engagement and helps to form good PA habits.

Promoting pleasant affective experiences during PA may therefore be key to overcoming participant barriers to PA. This is further suggested by research showing that among individuals with mental illness, factors related to mood and enjoyment are the most common barriers to PA (e.g., low mood, lack of energy, lack of enjoyment), as well as the most common facilitators of it (e.g., positive mood, enjoyment, distraction; Glowacki et al., 2017). To improve the acceptability and effectiveness of PA interventions for mental health treatment on campus, it may be critical to promote preference-based, enjoyable activities to assist in overcoming barriers to PA engagement among young adults (e.g., a lack of motivation and enjoyment; Parker et al., 2021). Flexible and diverse approaches may therefore be ideal to support student mental health PA initiatives on campus.

Establishing pragmatic and scalable methods for delivering PA as a treatment for mental illness has been recommended as a strategy to optimize treatment reach (Stubbs et al., 2018). Of relevance to applications on campuses, systematic reviews and meta-analyses show that experimental evidence has been mainly focused on structured and supervised aerobic PA (Bailey et al., 2018; Rosenbaum et al., 2014; Schuch et al., 2017), with limited research into pragmatic programs including yoga, tai chi, exercise counselling and other life-style interventions (Rosenbaum et al., 2014). Further research is therefore needed to understand the dose of PA required to achieve therapeutic benefits, and towards the development of pragmatic and patient-preference intervention approaches to help facilitate the implementation of scalable PA interventions in real-world contexts.

Structured, supervised, and person-centered programming approaches. In order to provide the context in which post-secondary based PA programming may provide the best mental health outcomes, structured, supervised, and person-centered programming approaches are needed. Indeed, considerable barriers to PA uptake and adherence among individuals with mental health concerns are often reported, including limited confidence, low motivation, fatigue, and heightened anxiety in public spaces (e.g., Firth et al., 2016; Glowacki et al., 2017). As such, students simply being prescribed or referred to engage in PA is unlikely to lead to mental or physical health benefits (Rebar & Taylor, 2017). Rather, the prescription should be tailored to maximize an individuals' uptake, which may be a function of a combination of factors such as their past experiences, their current state, and the activity context (Rebar & Taylor, 2017). It has been suggested that the quality of the PA experience, rather than simply engaging in it, is what determines mental health outcomes from it (Lambert et al., 2018). For this reason, post-secondary activity providers should consider how different individuals may experience unique contextual barriers to activity initiation and maintenance, and how poor

mental health may exacerbate such barriers (Rebar & Taylor, 2017). In line with contemporary emphases around the importance of a person-centred approach in mental health care (Blomqvist et al., 2018; Grassi et al., 2019; Quirk et al., 2020), PA interventions for those with mental health difficulties should be adaptable to individual preferences to promote autonomy, enjoyment, skill mastery, and a sense of belonging (Biddle & Mutrie, 2007; White et al., 2018).

A person-centred approach to PA, in comparison to approaches that do not prioritize individual preferences, values, and needs, is preferred by individuals with mental illness and has been identified as a strategy for mental health care providers to optimize the incorporation of PA in mental health care (Fortier et al., 2020; Hoffman et al., 2015). This approach considers individual motivational issues and preferences in order to maximize participant engagement and adherence, and to reduce withdrawal rates (Lederman et al., 2017; Firth et al., 2017). Quirk and colleagues (2020) further describe the flexible and tailored provision of PA as one that should consider each individual's "family situation, social circumstances…medication, motivation, available support, and cost of the activity" (p. 16). Moreover, they emphasize the need to provide choice, autonomy, and promote enjoyment when supporting PA initiation (Quirk et al., 2020). Of importance, PA experiences that provide autonomy are more likely to improve affect and mood than those that do not involve choice or align with individuals' interests (Gagne, 2003; Puente & Anshel, 2010; Wilson et al., 2006).

Within the post-secondary context, support for an individualized approach has also been underscored. In a qualitative exploration of university students seeking treatment for depression, Omran (2016) found that it was important to tailor PA sessions to each individuals' motivation and ability for them to be able to surmount PA-related barriers . And recent research examining a PA program for university student mental health echoed these findings and highlighted the importance of an individualized approach that accounts for participants' ability

levels, interests, and needs (deJonge et al., 2021). Importantly, an individualized approach allowed for rapport development, improved PA-related confidence, and reduced PA-related anxiety (deJonge et al., 2021).

Combined interventions: Physical activity and behaviour change strategies. In addition to providing structured, supervised, and tailored PA interventions, the incorporation of behaviour change strategies is also vital for achieving mental health benefits, enhancing autonomous motivation towards PA engagement, and for initiating and maintaining PA engagement (Michie et al., 2018; Michie et al., 2013; Lederman et al., 2017). Behaviour change strategies to consider when designing and implementing PA interventions can include creating goals and developing action plans to engage in PA, advising on and arranging social support, monitoring progress, providing feedback, and developing coping plans to prevent relapse (National Institute for Health and Care Excellence, 2014). Importantly, the techniques implemented should align with the individuals' needs and preferences (National Institute for Health and Care Excellence, 2014).

The importance of combining PA provision with behaviour change strategies is well documented (see Fibbins et al., 2020; Parker et al., 2016; Thomas et al., 2020; Lederman et al., 2017). This combination could facilitate behavioural processes that are important for experiencing mental health benefits and for using PA to manage symptoms. For example, one PA intervention tailored toward post-secondary students with poor mental health incorporated PA training and behaviour change strategies in each weekly session such as goal setting, self-monitoring, action-planning, and overcoming barriers (deJonge et al., 2021). The program was structured with an emphasis on behaviour change strategies and was identified by participants as key to maintaining their engagement with PA, creating a daily routine that prioritized mental and physical health, and explicating positive links between PA and mental health (deJonge et

al., 2021; for an outline of core delivery features for the program, see Table 2). Moreover, research suggests that using PA to manage mental health also helps to maintain PA engagement (Hargreaves et al., 2017). Accordingly, incorporating behaviour change strategies in PA interventions to help facilitate routine building (e.g., action planning) and the benefits of PA on mood and symptoms (e.g., self-monitoring) may be particularly important for achieving mental health benefits and adherence to PA.

Interventions that combine behaviour change with PA are also increasingly being situated within the theoretical framework of behavioural activation (e.g., Chartier & Provencher, 2013; Parker et al., 2016; Thomas et al., 2020; Veale, 2008). Behavioural activation is a component of cognitive behavioural therapy that aims to highlight the impact of behaviours on mood and symptoms through engaging with sources of positive reinforcement, setting task-focused goals, and activity tracking (Chartier & Provencher, 2013; Veale, 2008). As such, interventions that combine PA training with behaviour change strategies may be particularly relevant for integrating PA interventions within behavioural activation frameworks in mental health care. A recent systematic review suggested that PA interventions for mental health and well-being may be a viable alternative to psychological therapies, provided that behavioural activation approaches (e.g., behaviour change strategies including self-monitoring of PA and mood, psychoeducation on the relationship between PA and mood) are incorporated in the study design (Thomas et al., 2020). The incorporation of behaviour change strategies may therefore be particularly relevant to behavioural activation frameworks in mental health care on post-secondary campuses.

Table 2

Program delivery features of an effective and acceptable physical activity program targeting students seeking mental health support

Core delivery features	Description

One-on-one and individually tailored		Activity sessions were supervised and individually tailored towards participants preferences, goals, and needs. Participants met one-on-one with a certified personal trainer.
6-session program		Participants met with a trainer once per week, for a total of 6 weekly sessions.
1-hour sessions		
	30-minutes of physical activity	Participants engaged in 30-minutes of physical activity geared towards their preferences, goals, and needs
	30-minutes of behaviour change coaching	In addition to engaging in physical activity, each session comprised of 30-minutes of physical activity behaviour change coaching, whereby program participants set weekly physical activity goals, assessed goal progression, developed action plans, explored barriers and enablers to goals, and set cues or prompts for self-directed physical activity.

Note: The effectiveness and acceptability of the physical activity program is outlined in deJonge et al. (2021).

Enhance efforts to develop collaborative partnerships. Key stakeholders involved in the mental health care of post-secondary students express a lack of knowledge of the effectiveness of PA as an evidence-based therapeutic approach and the PA programming and resources that may be available to students (deJonge et al., 2020). This is consistent with the broader literature suggesting that healthcare professionals tend to be unaware of the therapeutic potential for PA, and lack knowledge of its supporting evidence and guidelines (Radovic et al., 2018; Way et al., 2018). This knowledge gap is important to address because mental health professionals are important stakeholders and sources of support in the promotion of PA for individuals with mental health concerns (e.g., deJonge et al., 2020; Glowacki et al. 2017).

Collaborating with PA professionals is increasingly being identified as important for improving mental healthcare professionals' knowledge and awareness of PA monitoring and prescription, PA programming and resources, and physical health (e.g., Fibbins et al., 2019; Furness et al., 2018). Yet, research has suggested that PA professionals report limited competence in supporting the needs of individuals with mental health concerns and insufficient

theoretical and practical knowledge to promote PA in mental health contexts (e.g., limited knowledge of effective communication strategies to maintain motivation and confidence, symptoms and clinical presentation of mental illness, stigmatization of people with mental illness; Andrew et al., 2019; Sørensen et al., 2020). Further developing training opportunities and understanding strategies to facilitate collaborative efforts between PA professionals and mental health care professionals may be necessary to bridge this divide. Post-secondary campuses offer a natural ecosystem of PA and mental health care that could be garnered for improving PA literacy among clinicians, and mental health care literacy among PA professionals.

Moreover, building support for and inspiring effective collaborations and relationships to mobilize knowledge and action for health promotion, both on and off-campus, was identified as a call to action in the Okanagan Charter for Health Promoting Universities and Colleges (Okanagan Charter for Health Promoting Universities and Colleges, 2015). Notably, working collaboratively to implement and evaluate mental health initiatives and programs has been suggested to be important for creating more tailored and relevant programs (Green & Johnson, 2015). Enhancing collaborative efforts among on-campus mental health stakeholders (e.g., mental health professionals, academic advisors, residential life professionals), PA professionals (e.g., athletics and recreation staff, intramural sport, varsity coaches and athletes, and Kinesiology, Physical Education, and Recreation students) and researchers may thus be required to develop more tailored and effective PA programs to support post-secondary student mental health.

Develop education and training opportunities to promote the benefits of PA for mental health, campus engagement, and academic success. Extensive evidence attests to the benefits of PA across outcomes including mental health, campus engagement and academic

success. To help enhance awareness of these benefits, training and education opportunities should be provided to both students and stakeholders involved in their mental health care (Michie et al., 2011). Student engagement in on-campus PA programs has been found to be associated with academic success and greater student retention, and may help students in their transition to post-secondary education by enhancing campus community engagement and fostering a sense of belonging and social inclusion (Boones et al., 2021; King et al., 2021; Wilson et al., 2021; Sanderson et al., 2017). The effectiveness of PA as a mental health management and treatment strategy has been shown in both non-clinical (Pascoe et al., 2020; Rebar et al., 2015) and clinical populations (Ashdown-Franks et al., 2019; Bailey et al., 2018). Given the positive influence of PA on the mental health, well-being, and academic success of post-secondary students, training and education opportunities should be developed to take advantage of these benefits.

Tools and principles to help facilitate the integration of physical activity into mental health care. The "FITT" principles of PA can also be used to guide the development of tailored PA recommendations for individuals with mental health concerns (American College of Sports Medicine, 2013). These principles outline that one should be guided to consider the Frequency (F), Intensity (I), Time/Duration (T), and Type (T) of PA, and should account for individual preferences, needs, PA history, physical health co-morbidities, and available resources. Students must be guided to engage in structured, supervised, and enjoyable PA in order to achieve mental health benefits and sustain engagement. Furthermore, professional support and accountability may be important for the initiation of PA, while meaningful and enjoyable PA experiences may be important for PA maintenance.

Exercise is Medicine® (EIM) is a global initiative managed by the American College of Sports Medicine that provides national leadership for promoting PA as a chronic disease

prevention and management strategy, and aims to increase the number of health care providers who are assessing, prescribing, and counselling patients in PA (NOTE 1). To promote clinical uptake, EIM-Canada developed the PA prescription and referral tool to assist health care providers in giving formal advice for PA uptake (Frémont et al., 2014). The PA prescription was designed to guide both health care providers and patients through the FITT principles (frequency, intensity, type, and time), and the referral process to a qualified PA professional (Frémont et al., 2014). To prescribe PA in clinical care, practical steps recommend clinicians to: (i) ask about PA at every consultation; (ii) include a written prescription building towards accumulating PA guidelines (or individualized PA goals); (iii) encourage patients to measure and record their PA (e.g., with a pedometer, smart phone, or pen and paper); (iv) to refer to physicians, physiotherapists, clinical exercise physiologists, kinesiologists or certified fitness instructors when appropriate; and (v) follow-up with the patient to chart progress, set goals, solve problems, and identify and use social support (Thornton et al., 2016).

Exercise is Medicine has also been expanded to *Exercise is Medicine on Campus* (EIM-OC), with a mission to foster collaborative relationships and leadership between PA, health, and other disciplines on campus, and to promote PA as a critical component for improving the health and well-being of the campus community (Winters et al., 2015) (NOTE 2).

Glowacki and colleagues (2019) have also developed an evidence-informed *Exercise and Depression Toolkit* (NOTE 3), which provides resources for health care providers working with adults with depression to promote PA as an accessible treatment option. Specifically, the toolkit provides a guide to facilitate conversation and decision-making and contains various resources to promote engagement in PA including a mood and activity diary, goal setting, weekly schedule, and positive self-statements.

Effective and acceptable PA intervention delivery models for student mental health. deJonge and colleagues (2021) have published a PA and behavioural change supportive program that may be adapted and used on other post-secondary campuses. As a result of major public health restrictions resulting from the COVID-19 pandemic, this program is currently being offered in an online capacity to students all over the world. The program has also been delivered with adjunctive group-based programming (following completion of the individualized, tailored, supportive program for 6-weeks, students can join a group of 'graduates' for further PA programming), and adaptations are being considered for peer-mentoring as a partnership with kinesiology students. In fact, this approach is used at another Canadian university (University of Western Ontario), where upper-level kinesiology students delivering PA support to students experiencing depression symptoms. This model is a 10-week peer-to-peer PA mentoring program that incorporates group-based PA (with groups of 4 to 5 students) and psychoeducation on self-compassion (Sick et al., 2019). Furthermore, the PA program described by deJonge et al. (2021) was also originally shared with a smaller Canadian campus (Windsor) and uses a one-on-one and individualized approach that incorporates behaviour change coaching and physical activity training (Muir et al., 2020).

Taken together, a range of delivery models can be implemented to support the mental health and well-being of post-secondary students (see Table 3). Research has demonstrated the effectiveness of one-on-one and individually tailored programs, group-based programs, and physical recreation programs (e.g., intramurals or sport-based programs; deJonge et al., 2021; Keeler et al., 2019; Muir et al., 2020; Sick et al., 2019). In addition, sessions can effectively be implemented by certified personal trainers, undergraduate/graduate kinesiology students, or recreational professionals and/or sport coaches. As supported by the research synthesized in the section *Combined interventions: Physical activity and behaviour change strategies*,

programs that incorporate PA training in addition to techniques for promoting mental health and behaviour change may be particularly effective. Future research and efforts are needed to determine effective and feasible delivery methods to enhance the scalability and replicability of PA programs, and there is a particular need to ascertain the optimal frequency, intensity, time, and type of PA interventions for the treatment and management of mental illness (Stubbs et al., 2018).

Table 3

Components of effective physical activity delivery model

Program characteristics	-One-on-one and individually tailored -Group-based -Intramural or sport-based programs
Physical activity session facilitator	-Certified personal trainer -Recreation professionals or sport coaches -Peer-led (e.g., kinesiology graduate or undergraduate student)
Techniques to promote mental health and behaviour change	-Behaviour change coaching (i.e., incorporation of strategies including goal setting, goal progression, action plans, barriers and enablers to goals, settings cues, and prompts for self-directed physical activity) -Psychoeducation on self-compassion and the benefits of physical activity for mental health

IMPLICATIONS AND CONCLUSIONS

Campus-wide comprehensive and integrated approaches are needed to address the complex mental health needs of students given the highly intertwined nature of mental health and physical health conditions which share multiple biological, social, economic, and behavioural risk factors (Iturralde et al., 2021). On-campus PA programming could be provided as a holistic approach to support post-secondary students' mental, physical, and social well-being. Indeed, PA programming has been demonstrated to be effective in improving a broad

range of symptoms associated with poor mental health (e.g., low mood, fatigue, lack of motivation, anhedonia) and is advocated for as a critical intervention for improving the mental and physical health of individuals with mental health concerns.

Initiatives like Exercise is Medicine and clinical practice guidelines advocate for the integration of PA as part of mental health care, but the translation of PA programming for mental health into real-world contexts, such as post-secondary campuses, is lacking. To support the implementation and scalability of PA programming for post-secondary student mental health, several recommendations have been offered. First, future work is needed to advance our understanding of barriers and facilitators to collaborative efforts between PA professionals and mental health professionals on diverse campuses. Secondly, future work should develop tailored and scalable PA programs for student mental health to improve their availability and accessibility. Thirdly, the impact of recreation and sport opportunities (e.g., intramurals, group fitness classes) on mental health, and specific delivery and participation models used across campuses of various sizes and demographic targets, needs to be better understood. Lastly, training and education opportunities should be developed to enhance awareness of evidence-based PA practices for both mental health professionals and PA professionals, in order to facilitate the incorporation of PA programming among the range of intervention approaches available to support student mental health.

NOTE 1: Resources to prescribe PA in clinical practice including a prescription form can be found on the EIMC website (https://www.exerciseismedicine.org) under health care provider resources.

NOTE 2: Winters et al. (2015) outline five steps to launching EIM in your campus. For more information, see https://www.exerciseismedicine.org/about-eim/committees/on-campus.

NOTE 3: Instructions on how to use the toolkit are included in the toolkit document and is free to download at https://exerciseanddepression.ca.

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