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Original Research

"It's a Life Thing, Not a Few Months Thing": Profiling Patterns of the Physical Activity Change Process and Associated Strategies of Women With Prediabetes Over 1 Year

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Key Messages

- A longitudinal qualitative analysis postprogram can uncover in-depth details on women's physical activity maintenance in the real world.
- Exploring and eliciting strategies to engage in physical activity during an intervention may promote continued engagement long term.
- Self-compassion and self-regulatory skills emerged as beneficial strategies for long-term maintenance of physical activity.

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ABSTRACT

Objectives: Engagement in regular physical activity (PA) is a cornerstone prevention strategy for individuals at risk of developing type 2 diabetes. Interventions targeting PA often fail to result in long-term behaviour changes. "Small Steps for Big Changes" is a 3-week diabetes prevention program that promotes PA behaviour changes in individuals with prediabetes through motivational interviewing-informed counselling.

Methods: In this study, we aimed to: a) profile patterns of women's perceived PA journey over 1 year and b) understand strategies used to engage in and maintain PA. Fourteen women (mean age, 60 years) engaged in 4 semistructured interviews (preprogram, postprogram and 3 and 12 months postprogram) over 1 year (56 total interviews). A trajectory approach was used, coupled with a deductive–inductive thematic analysis. Findings are presented descriptively and chronologically over 1 year.

Results: To address the first study aim, 4 patterns emerged: a) consistently inactive: minimal change; b) increase and maintenance of PA levels; c) peak in and maintenance of PA levels and d) consistently active: minimal increase, yet maintenance. Generally, women reported higher PA levels after completing the Small Steps for Big Changes program compared with preprogram levels. Related to the second aim, a range of facilitators and barriers were identified, as well as strategies used to facilitate engagement in and maintenance of PA over 1 year. Participants reporting more strategies to engage in PA were more likely to engage in PA. Commonly used strategies include being self-compassionate and practicing self-regulatory techniques (e.g. goal-setting, planning, self-monitoring).

Conclusions: Diabetes prevention programs that assist participants in utilizing relevant PA strategies during an intervention may witness long-term maintenance of PA behaviour.

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RÉSUMÉ

Objectifs : L'engagement dans une activité physique (AP) régulière est la pierre angulaire de la stratégie de prévention pour les individus exposés au risque de diabète de type 2. Les interventions qui visent à favoriser la pratique de l'AP n'aboutissent pas à des changements de comportement à long terme. Le programme "Small Steps for Big Changes" d'une durée de 3 semaines vise la prévention du diabète en encourageant les changements de comportement concernant la pratique de l'AP chez les individus atteints de prédiabète grâce au counseling par l'entretien motivationnel.

Méthodes : Dans la présente étude, nos objectifs étaient de : a) décrire le profil d'AP selon la perception des femmes au cours de 1 année; b) comprendre les stratégies utilisées pour s'engager dans la pratique de l'AP et la maintenir. Quatorze femmes (âge moyen, 60 ans) ont participé à 4 entretiens semi-structurés (avant le programme, après le programme, 3 et 12 mois après le programme) au cours de 1 année (au total, 56 entretiens). Nous avons utilisé une approche par trajectoire couplée à une analyse thématique déductive-inductive, et présenté les conclusions de façon descriptive et chronologique au cours de 1 année.

Résultats : Pour répondre au premier objectif de l'étude, 4 profils sont ressortis de l'analyse : a) régulièrement inactive : changement minime; b) augmentation et maintien des niveaux d'AP; c) les niveaux maximaux d'AP et leur maintien; d) régulièrement active : faible augmentation, toutefois maintien du niveau d'AP. Généralement, les femmes signalaient des niveaux plus élevés d'AP après la fin du Small Steps for Big Changes que les niveaux signalés avant le programme. En ce qui concerne le second objectif, nous avons déterminé un éventail de facilitateurs et d'obstacles, de même que des stratégies utilisées pour faciliter l'engagement et le maintien de l'AP au cours de 1 année. Les participants qui rapportaient plus de stratégies pour s'engager dans la pratique de l'AP étaient plus susceptibles de s'engager dans l'AP. Parmi les stratégies fréquemment utilisées figurait notamment le recours aux techniques d'autocompassion et d'autorégulation (p. ex. l'établissement d'objectifs, la planification, l'autosurveillance).

Conclusions : Les programmes de prévention du diabète qui contribuent à aider les participants à obtenir des stratégies d'AP appropriées durant l'intervention peuvent assurer le maintien à long terme des comportements concernant la pratique de l'AP.

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Introduction

Rates of diabetes are rising, with >4.2 million Canadians living with diabetes, and 1 in 5 Canadians living with prediabetes (1,2). Diet and exercise modification remain the foundation of diabetes prevention (3), preventing up to 80% of type 2 diabetes (T2D) cases (4,5). Physical activity (PA) is an important modifiable and preventive factor for individuals with prediabetes (6,7). Adhering to regular exercise can halt progression of prediabetes to T2D, reduce health-care costs and improve quality of life for individuals with prediabetes (8). However, adherence to PA is difficult (9,10); PA levels tend to drop after supervised exercise interventions (11). Suggestions have been made to have interventions with exercise specialists be continuous to help individuals with prediabetes maintain exercise levels (12). An alternative, more sustainable, solution is to deliver diabetes prevention programs that teach participants behavioural skills to support PA maintenance beyond program completion.

PA behaviour change has been shown to be even difficult for people living with prediabetes than the general population (13), as they face the self-regulatory challenges inherent to introducing PA and are at risk for a chronic condition (14). Given the known importance of self-regulatory skills (e.g. goal-setting, adjusting, coping with setbacks) for PA maintenance (15), many PA interventions target these skills (16). However, it is unclear how participants use these skills after intervention completion, particularly those at risk of a chronic disease, such as prediabetes.

Barriers and facilitators to PA maintenance have been explored specific to adults living with diabetes (17–19). Autonomous motivation (e.g. choice, enjoyment) has been shown to mediate the relationship between adults with T2D's self-efficacy to overcome exercise barriers and their exercise behaviour at 12 months postintervention (19). Similarly, motivation emerged as the most critical factor determining exercise behaviour during and after in one of the first qualitative studies exploring facilitators and barriers in individuals living with T2D during and after a supervised exercise program (N=16) (17). Specifically, participants appreciated the monitoring, encouragement and accountability provided by their trainer; however, they identified the need for better transition to the postprogram realities of less support and supervision. Comorbid conditions (e.g. sleep apnea, arthritis) were noted as a predominant barrier to regular exercise. Tulloch et al (12) extended this work by adopting a longitudinal approach with individuals living with T2D throughout a PA intervention. Perceived facilitators, to exercise over time in this sample (N=28) were social support from family and the trainer, anticipated future health benefits, a sense of well-being and perceived fitness improvements. Experiencing illness or injury, work commitments and inclement weather were highlighted barriers. Participants who maintained prescribed exercise levels noted the importance of strategies and enjoyment more frequently than those who did not maintain their exercise levels. Although these studies provided valuable insight into the facilitators and barriers for individuals living with T2D, conditions faced by individuals with prediabetes may differ (e.g. their risk perception, comorbid conditions and lack of symptoms). Thus, research is needed to understand perceived barriers and facilitators specifically for individuals living with prediabetes. Furthermore, these studies did not explore maintenance strategies or potential gender differences, despite evidence that suggests gender differences exist in PA behaviour change maintenance.

Generally, women tend to be less physically active than men (20). In a global study including 1.9 million participants, lower PA rates were found in women than men, with some of the highest levels of insufficient activity among women seen in North America (30% to 40% or more) (21). Despite the well-established value of making health-related behaviour changes to prevent or treat chronic conditions, women often do not maintain these changes, particularly PA (9). In one review, diet and exercise change

maintenance was less likely to be achieved in studies with women; however, the authors caveated that the majority of studies that involved women included individuals with chronic conditions (i.e. T2D), suggesting a possible interaction between gender and health status (22). Related to T2D, another study examined the lasting effects of the Diabetes Prevention Program on PA behaviour, and found women had significantly lower PA levels compared with men at 10 years postprogram (13.0 vs 20.6 metabolic equivalents of task hours per week, respectively) (9). Low PA rates in women are especially concerning in Canada, where 13% are estimated to be living with prediabetes (2).

Past research on PA maintenance has predominantly been quantitative (18), cross-sectional (17,18,23) or focused on individuals living with T2D (19). Despite evidence for using PA to aid in prevention and/or management of diabetes, most published PA interventions have been performed in a controlled research setting, are short in duration and lack long-term follow up (24). In a recent systematic review of behaviour change maintenance after PA and dietary interventions, the authors called for interventions to evaluate maintenance for longer durations, in particular beyond 24 weeks (22). In this study, we aimed to address these gaps by utilizing a longitudinal approach to understand PA engagement and maintenance strategies after involvement in a community-based diabetes prevention program. Qualitatively exploring women's experiences with PA over time can extend the research on PA facilitators and barriers and contribute to understanding strategies used to maintain PA levels, while also having implications for future intervention delivery. Thus, the purpose of this study was 2-fold: a) to profile patterns of women's perceived PA journey over 1 year in women who engaged in Small Steps for Big Changes and b) to understand strategies used to engage in and maintain PA. For the purpose of this study, journey was defined as the participants' experiences in their attempt to make and maintain PA behaviours over time.

Methods

Study context

A trajectory approach, used when a study aims to understand a small group of individual experiences over time, was employed (25). The accounts gathered aimed to capture moments of participants' lived experiences in a social world, influenced by dynamic interactions between contexts and individuals across time (26). Although all women were exposed to the same program curricula, each had unique experiences within and beyond the program. Gaining these insights across time can help capture rich, detailed descriptions of individual experiences of those at risk of developing T2D (27).

Small Steps for Big Changes: This study was part of a larger project where individuals with prediabetes participated in "Small Steps for Big Changes" (SSBC), a 3-week community-based diabetes prevention program in Canada. SSBC is a brief, social cognitive theory–based counselling program, delivered in an urban city in British Columbia, designed to facilitate and empower individuals to make dietary and exercise changes to lower risks of developing T2D. Evidence emerged for the efficacy and acceptability of a laboratory trial (28,29); thus, to optimize program reach and potential impact, SSBC was offered in a community site and has been effective (30). The program consists of 2 phases: a) six 1-hour sessions of counselling and PA training delivered over 3 weeks (40 minutes of counselling, 20 minutes of PA) and b) 12-month follow up. Program content consists of autonomy-supportive exercise and dietary goal-setting, action planning, self-monitoring and relapse prevention activities (31), followed by 20 minutes of exercise (high-intensity interval training [HIIT] or moderate-intensity continuous training). A motivational interviewing–informed counselling style is used (32). SSBC aims to foster autonomy and self-management through clients setting and independently working toward self-chosen goals between sessions. To support self-management beyond program engagement, clients are provided with a digital fitness tracker and access to a mobile self-monitoring application (app) used to monitor PA and heart rate. The follow-up phase consisted of an in-person check-in at 3 time-points over 1 year (1, 6 or 12 months).

Participants and procedure

Upon receiving ethical approval, individuals interested in SSBC participation were screened for eligibility as part of the larger study (see Bourne et al [29] full eligibility criteria). All female participants who were eligible for SSBC participation between May and December 2017 (N=38) were invited to participate in the qualitative substudy during the first program screening and, if interested, were contacted by telephone and/or e-mail. To be eligible for the current study, participants had to: a) be between 18 and 65 years old, b) be able to read and speak English, c) identify as a woman, d) have prediabetes (glycated hemoglobin 5.7% to 6.4%) (33) and e) have completed SSBC. Eighteen women engaged in the first interview (T1), yet 4 participants chose not to engage in the program due to health concerns (e.g., injury, illness), thus did not participate in the subsequent interviews. Thus, 14 Caucasian women were involved in this study at all 4 time-points (mean age, 60.07

Table 1
Participants' demographic information

Profile	Participant ID (pseudonym)	Age (years)	Highest level of education	Employment status	Marital status
1: Consistently inactive—minimal change in PA levels	P1	62	College diploma	Retired	Married
	P4	57	College diploma	FT	Single
	P14 (Marion)	64	University degree	Semiretired/PT	Single
2: Increase and maintenance in PA levels	P2	61	Postgraduate degree	Semiretired/PT	Married
	P3 (Lisa)	62	High school	FT	Divorced
	P6	61	University certificate	Retired	Married
	P10	48	College diploma	Semiretired/PT	Single
3: Peak in and maintenance in PA levels	P5	62	Retired	Retired	Married
	P7	65	High school	Retired	Married
	P8 (Louise)	62	Postgraduate degree	Retired	Single
	P9	65	High school	Retired	Married
	P12	58	University degree	Semiretired	Married
4: Consistently active—minimal increase and maintenance in PA levels	P11	51	University degree	FT	Married
	P13 (Susan)	63	University degree	Retired	Married

FT, full-time; *PA*, physical activity; *PT*, part time.
Note. All women identified as Caucasian.

[standard deviation, 5.05] years; range, 48 to 65 years, see Table 1 for participants' demographic information). All participants identified as living with prediabetes through routine bloodwork conducted at a medical laboratory.

Before data collection, participants were informed of the study purpose, rights to confidentiality, anonymity and freedom to withdraw and provided written informed consent. All women participated in 4 semistructured interviews over ~1 year, in which the first interview took place between May and December 2017 (N=56 interviews; T1, baseline; T2, postprogram; T3, 3 months postprogram; T4, 12 months postprogram). To maximize participant convenience and minimize burden due to the study's longitudinal nature, in-person (n=6) or telephone (n=50) interview options were provided. Interviews lasted between 34 and 79 minutes ($mean_{time1}$, 56:34; $mean_{time2}$, 54:09; $mean_{time3}$, 45:37; $mean_{time}$, 58:08; $mean_{time}$ between first and fourth interview was 395 (standard deviation, 30 days; range, 365 to 462) days.

Four semistructured interview guides were developed based on program content and an extensive literature review (12,24). The first interview was used to build rapport and understand their previous and current PA engagement. The second interview explored program experiences (i.e. skills learned) and planned next steps. The first 2 interview guides were each piloted with 2 participants, resulting in slight modifications (addition/removal of question[s], question order). The third and fourth interviews explored participants' PA involvement, barriers, facilitators and associated strategies. Participants received a $20 gift card honorarium for each interview in which they participated.

Data analysis

All interviews were audio-recorded, transcribed verbatim, reviewed by the first author and sent to participants for member-checking (34). After review of their second transcript, 13 participants chose to not review remaining transcripts; 1 participant reviewed and approved all 4 transcripts. Interviews were analyzed using an inductive–deductive thematic analysis in a 2-stage process. First, transcripts were inductively coded to profile PA patterns based on participants' self-perceptions of PA engagement at each of the 4 time-points. Second, data were coded deductively into 3 categories: barriers, facilitators and strategies used to engage in PA. Based on this analysis, an inductive approach was used again to identify themes within each category using guidelines set forth by Braun et al (35) for identifying, analyzing and reporting themes within data. Investigator triangulation was used to assist with analysis, whereby the first and second authors independently coded transcripts and met to discuss interpretations. Several meetings took place with the third author throughout the analysis process to gain the perspective of an independent coder. As noted, a trajectory approach was used to analyze and present the data, providing a descriptive and chronological account over 1 year, commonly used to understand life experiences within a specific context. Strategies for rigour were applied to data preparation (i.e. interview guide piloting), collection (i.e. multiple time-points), analysis (i.e. member checking and investigator triangulation) and presentation of results (use of pseudonyms) (36).

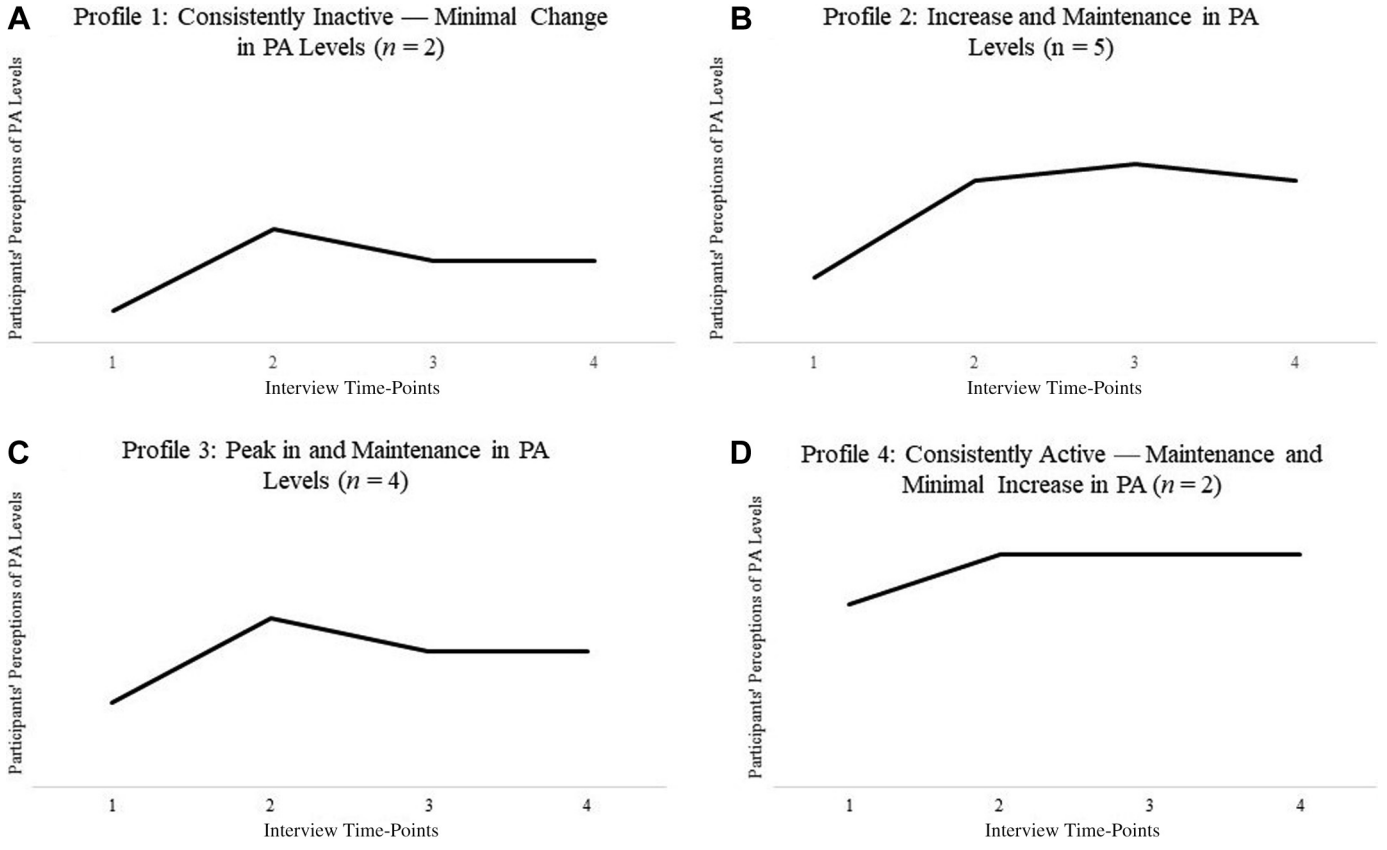


Figure 1. Four profile patterns of women's self-perceptions of physical activity engagement across 4 interview time-points over a 1-year period (1 = baseline, before program involvement; 2 = postprogram; 3 = 3 months postprogram; 4 = 12 months postprogram). *PA*, physical activity.

Table 2
Perceived barriers, facilitators and strategies and associated examples, identified over 1 year

	Construct	Examples
Barriers	Illness	Chronic (e.g. arthritis, bone spurs, bursitis) and acute (e.g. bronchitis, bladder infection, common cold)
	Injury	Broken bones, strained ligament, concussion
	Lack of motivation	Amotivation (lack of enjoyment, avoidance, fear of failure to maintain)
	Lack of time	Busy with work, volunteering commitments
	Negative and/or lack of social support	Lack of support from family, spouse unwilling to engage in PA with participants
	Negative environment	Living in a nonwalkable neighbourhood
	Not the right time	Moving, taking care of sick family member
	Self-doubt	Low self-efficacy
	Setting unrealistic goals	Long term, outside of participants' control
	Travel	Family reunion, wedding, honeymoon
	Weather	Snow, ice, cold/high temperatures, forest fires, smoke
Facilitators	Environment	Fitness centre in close proximity to home, lives close to hills, walking trails
	Experienced positive reinforcement/results	Weight loss, improved fitness, mobility, stamina, A1C
	Increased self-efficacy	Improved skills, built off success
	Knowledge gained during program	Goal setting, self-monitoring, HIIT
	Motivation	Autonomous (enjoyment, sense of energy, gratification, health benefits)
	Optimistic mindset	Exercise as a lifestyle, using diagnosis as an opportunity, potential for future health benefits
	Social support	Spouse, children, friends, neighbours, groups
Strategies	Applying learned knowledge/skills	HIIT, entering target heart rate zone
	Being self-compassionate	Self-kindness, reframing negative thoughts
	Integrating PA into daily life	Parking at the far end of a parking lot when shopping, walking all the store aisles
	Joining group/class	Walking group, barre class, bowling league, fitness class
	Planning for barriers	Booking hotels with fitness centres, creating back-up plans
	Scheduling PA into day/week	Booking it as an appointment, using an agenda, reviewing one's daily or weekly schedule to integrate PA
	Self-monitoring	PA tracking via apps, fitness tracker
	Setting attainable goals	Behaviour focused, short term
	Trying new PAs	Biking, swimming, running, resistance training, kayaking
	Using distractions during PA	Gamifying PA (e.g. Pokémon Go), photography, listening to music (e.g. making playlists)
	Utilizing social support networks	Accountability to others (e.g. personal trainer, physician); being physically active with spouse, child, neighbour; joining walking group; hired personal trainer

A1C, glycated hemoglobin; *HIIT*, high-intensity interval training; *PA*, physical activity.

Results

Participant PA profiles

Although SSBC targets both diet and exercise behaviour changes, to align with the study purpose, only PA-related strategies are outlined. Four profiles are presented (Figure 1); each curve demonstrates an illustration of the 4 profiles created from analyzing participants' self-perceptions of PA engagement at each time-point: a) consistently inactive: minimal change included women who described low PA levels before program engagement and slightly increased PA levels during programming, yet perceived to return to limited PA engagement postprogram (n=3); b) increase and maintenance in PA levels involved women who described low PA levels before program engagement, perceived to increase PA during the program and remained consistently physically active postprogram (n=5); c) peak in and maintenance in PA levels included women who described low PA levels before program engagement, perceived to increase PA levels during the program and remained physically active postprogram, yet at a slightly lower level compared to during the program (n=4); and d) consistently active: maintenance and minimal increase involved women who perceived themselves to be physically active before program engagement, increased slightly during the program and maintained this PA level until 12-month time-point (n=2). Each participant, regardless of profile, outlined barriers and facilitators related to PA engagement and maintenance (see Table 2). All participants, except those in Profile 1 (n=11), believed their PA levels to be at improved levels at 12 months (T4) compared with baseline (T1). Due to the breadth and depth of the longitudinal approach, and to allow for in-depth accounts of the associated strategies over time, a descriptive account of 1 participant's journey over 1 year is used as an example for each profile. Quotations are provided in what follows and in Table 3 to further illustrate each participant's journey for the 4 profiles.

Profile 1: Marion

Before SSBC, Marion had not exercised for 4 years; she broke her habit of regular aerobic activity and weights when she became divorced. In learning about SSBC, she intended "to get started on [exercise] right away, rather than waiting until we move into the house next spring" (T1). Through program participation, she learned that exercise could mean more than traditional forms, including snow-shovelling and packing boxes in preparation for her move. She found the fitness tracker to be a key motivator and purchased one to track her activity. She looked forward to moving into her new house where she could set up her fitness equipment and eliminate barriers to accessibility, comfort and convenience: "I'm not really a gym person. I've got an elliptical at home … but I can't use any of that [home] equipment until we move into our house" (T2). Once the program was complete, Marion sought out

Table 3
A selection of participants; quotes over 1-year that support identified strategies by profile.

Strategy	T1/2 quotes	T3/4 quotes
Profile 1: Marion		
Being self-compassionate	"I've got to be more mindful about myself and not beat myself up. At this moment, with this move, my exercise has been—instead of going to the gym, I've been packing boxes up 20 stairs. The thing is not to beat myself up; I'm doing other things." (T2)	"I think I just got lazy and let life get away with me, although I'm kind to myself because over the last couple of years I've got a lot on my plate, so I'm not really super hard on myself." (T4)
Self-monitoring	"Really what it showed me beyond a shadow of a doubt is, [participant name] I've gotta up the exercise." (T1) "But tracking is good to be mindful about, what am I doing, what have I made this commitment to myself about? That was my biggest takeaway." (T2)	"I'm not sure why I stopped using [app] … If there could be reminders because it's too easy to slide back into not using it. I found it very useful while I was doing it." (T4)
Profile 2: Lisa		
Being self-compassionate	"Yeah I always feel guilty about everything. My grandmother raising me always made me feel like I was responsible for things, so things were always my fault. So that's where the guilt comes in … I just feel worse and then I tend to be even worse to myself … kindness isn't a word that comes into my vocabulary very often." (T1)	"Well I used to beat myself up more in the past … [Now] I let things go, as far as, I'm not going to beat myself up over these things. It's not as big a deal to me anymore … You know tomorrow's another day and I can always make those choices tomorrow too. So, every day is a new opportunity to do well and better myself." (T4)
Gamifying PA	"I like to go for walks … but they're just number 505 on the list so they never get done … I just need to set aside a certain time block so that I could just tell everybody don't bug me, I'm doing this, leave me alone … it's something I enjoy and can see feasibly doing in my life in the future." (T1)	"Pokémon Go is helping me … it inspires me to keep going (laughter). I turn it on when I'm going for a walk. It tracks my distance because you have to walk like 5K to hatch an egg, so I'll have a few eggs on the go and I have to walk 0.7 [km] to hatch it so I can do that and then once that one's hatched then I have to walk another 1.3 to hatch that, I can do that. Breaking it down to little bits … It's a reward." (T3)
Scheduling PA into day/week	"I like to go walking, but I don't often make a point of doing it because my daughter takes up so much of my time and being a single parent, it's hard to juggle … I've thought about doing something for years and it's always 'I'll start tomorrow' and my daughter gets in the way and I put myself last … I never put myself first and I have to start doing that." (T1)	"Whenever I have to drive my kid to soccer, I usually go for a walk while she's doing that [soccer] so I'm not actually watching her activity anymore." (T4)
Setting attainable goals	"As long as I don't set goals that are too high then I might be able to do it long term I'm hoping … like my weights at 208; I'd like to get to 180 at least by the summer so that's kind of my goal, I'd like to be less but I don't want to set anything too difficult." (T1)	"Every day is a new opportunity to better myself. It's not this stressful weight I hold on my shoulders anymore—got to lose weight. Every year you'd make that list on December 31st; 'I'm going to lose this many pounds.' I don't make those lists anymore; it's just sad when you look at it later and didn't do it. I'm taking it one day at a time. That works better for me." (T4)
Profile 3: Louise		
Being self-compassionate	"[Trainer] tended to centre around, if something goes wrong or you make a bad choice; it's okay there's nothing you can do to undo that, what are you going to do now? I remind myself of that. The other is that it's something you're doing for yourself so that you can enjoy your life for years … [this is] the first day of the rest of my life. If I have a bad day it's okay; tomorrow's an opportunity to have a good day." (T2)	"In the past it's always been about body image. I've done lots of exercise programs, but I've never stuck to them in the long term. So it's like looking at achieving your short term goal versus having a long-term objective. This my lifestyle, this is how I'm going to achieve that. It's a very different perspective. It's made me more relaxed, more forgiving of myself; I don't feel regimented or regulated. I'm just making healthy choices." (T4)
Planning for barriers	"What changes is when I anticipate what's coming up in my life. You know like I was concerned last month over what would happen when I went on vacation and how that would affect my eating and would I have opportunities to exercise and that sort of stuff. For the most part it was pretty good, so I'm not concerned … I'll find hotels with a fitness centre." (T2)	"On vacation we selected hotels with gyms I could use, then we stayed at one … gym was really poor, so we'd go for walks. I didn't find it as good a workout, but you're moving—better than nothing. When I came home, I said, 'okay fine, back to the gym.' Typically, coming home from holidays has been my downfall, like, 'ugh I haven't been active' and I'm good right now." (T3)
Scheduling PA into day/week	"What I found was once you got out of the habit … because the sidewalks got slippery or something like that … once you got out of the habit you were really out of it. So that's what I'm really interested in is, 'okay, how am I going to find a way to maintain this and sustain this over the long term?'" (T1)	"My life doesn't suit that (going to fitness classes); I don't want anything else scheduled in my life. It's a lot easier for me to take control of that and just say, 'these are thing I have to do, this is where [exercise] fits in.'" (T4)

(continued on next page)

Table 3 (*continued*)

Strategy	T1/2 quotes	T3/4 quotes
Setting attainable goals	"I live at the top of a monster hill and to get anywhere I have to walk down it, which hurts my knees. At some point, I would like to do that, but I don't see that happening for a while." (T2)	"I used to say by the time you reach the top of that hill you want to rip your face off because you're breathing so hard. I can walk up that hill now." (T4)
Profile 4: Susan		
Applying learned knowledge/skills	"I live in a very hilly area so cardio here is no problem because you're mostly hill walking." (T2)	"We are going to change things up a bit one day of walking the other I'll snowshoe…to match the season and the intensity… The intensity is a big part of it. I always make sure that we schedule in some pretty tough hill walks." (T4)
Being self-compassionate	"At Christmas, I'm not critical about myself because I was kind of expecting it and I know I have the discipline to get back on track … I'm self-disciplined enough that I'm going to keep it up." (T2)	"I know I've contributed to [prediabetes], but I didn't do it on purpose. I have kept myself in better physical shape than most people my age so I feel good about where I am physically compared to a lot of people in my age group. So if I lapse occasionally, I just know I have to get back on track." (T4)
Trying new activities	"My husband and I, we both like hiking a lot, and we've got a walking group that…likes to do more challenging walks if you wanna call it that so we'll do Boucherie or Rose Valley or you know, the odd flat walk … Winter time, really got into snow shoeing." (T1)	"I need something besides walking. So I've already, and I know my upper body's not strong so I mean I've already got some people interesting in starting a kayaking group." (T3)
Utilizing social support networks	I need a social support (laughs). That's why I'm part of so many groups; yeah I've got the support around me." (T1)	"I am not very self-motivated about doing it; it works for me doing it with a group … surrounding yourself with likeminded people. They are people too who want to be in shape, feel better, stronger, stay healthier long and stay off the medical system so it has been a really good support unit." (T4)

social support from her daughter and partner and tried new forms of PA, including yoga and barre classes, which she thoroughly enjoyed. After 3 months, she experienced barriers including illness, an injury and a delayed moving date (T3). Marion recognized that the timing was not right for her, but was optimistic about re-engaging in PA: "going through this whole program has awakened me to exercise and reminded me how much I liked it. To avoid having diabetes, I've gotta get back into it" (T3). She used self-compassion as a strategy to recognize that she "had a lot on [her] plate" over the past few years. Once settled into her house, she planned to get a dog, which would help her to establish a PA routine and get back into the habit of using her home fitness equipment: "I really enjoy working out in my home gym, but we've been out of a house now for 3 years. I'm hoping that we're in our house in March, then I can get back to using my elliptical, StairMaster and rowing machine, which I really like" (T4).

Profile 2: Lisa

Lisa was a single mother to a 13-year old daughter, who struggled to find time for herself and set realistic goals, lacked social support and did not inherently enjoy or regularly engage in exercise: "I should ideally lose 100 pounds to get back to my ideal weight, but it seems like such an insurmountable mountain to climb that why even try?" (T1). After SSBC, she acknowledged "it was the kick in the butt [she] needed" and enjoyed it because she "got to choose what [she] wanted to do" (T2). She valued daily tracking using the app: "I'm reporting to someone; it's a motivational thing because you want to see good results each day" (T2). Despite her efforts, Lisa was no longer tracking her PA using the program-provided tools at 3 months. Yet, despite the aforementioned barriers, Lisa was able to find time to walk 40 minutes per day after breakfast and found creative strategies to motivate herself. For example, she would walk a round trip from her house to the local supermarket and would time herself to try to beat her time each trip: "It's like a test everyday just to monitor myself on how I'm feeling and doing" (T4). She also used a game-based app as a motivator to engage in PA. Throughout her journey, Lisa used self-compassion to recognize that she was worth the work and to not beat herself up if she missed an exercise bout. This led to her transition from setting unrealistic goals that were weight oriented to short-term goals that she was in control of achieving. One way she worked to do this was scheduling PA into her day by taking time for herself, even at her child's activities: "Whenever I have to drive my kid to soccer, I go for a walk while she's doing that, so I'm not actually watching her activity anymore" (T4). Despite her spike in PA during the program, Lisa was not able to maintain these levels in the long term, yet consistently engaged in 4 bouts per week, which was a higher level than baseline.

Profile 3: Louise

Regardless of Louise's "sedentary life," she had an optimistic mindset from the outset: "Let's say I do develop diabetes, despite SSBC; if I made lifestyle changes in advance, whatever changes I need to make will not be as huge as if I'd made none … more than anything it's an opportunity" (T1). Through program participation, she recognized the value of self-compassion and setting short-term goals that were feasible for her to work toward: "you didn't get here overnight and you're not going to change it overnight; make a few changes and see where that goes, then make a few more … being kind to myself is accepting that I want to change my life gradually" (T2). Louise also learned about HIIT and worked to incorporate it into her daily life. Over time, Louise recognized that her commitment to long-term PA meant hard work: "I think it will eventually become a habit, but right now I have to work at it" (T3), including proactive planning, such as holidays: "We selected hotels that had gyms I could use, we stayed at one and their gym was really poor, so we'd just go for a walk" (T3). For Louise, planning for barriers (e.g. winter weather, traveling) and going to the fitness centre in her

apartment (instead of a scheduled class) was imperative to maintenance because of her busy schedule. Louise recognized she struggled with exercise commitment and, to counter this, she engaged in daily bouts: "to be committed and to stay committed I make point of going [to the gym] everyday. Then if I miss a day, it's no big deal. If I miss too many days, it's hard to go back. Because I know that about myself, I just go all the time" (T4). To ensure this, Louise engaged in weekly planning every Monday to schedule her exercise into each day. Louise used a steep hill by her house as a marker for her achievement; after 1 year, she could climb the hill effortlessly.

Profile 4: Susan

Susan came into SSBC with high levels of PA; she had chosen to retire in Kelowna because she wanted to "maintain an active lifestyle" by hiking, cycling and snowshoeing regularly with her husband and a newcomers group (T1). From the outset, Susan was self-aware of enlisting social support as a main tool to ensure she met her weekly PA goals, "I need a social support. Absolutely" (T1). She noticed that, when snowshoeing: "there were a lot of people my age who were faster and stronger than I was; I wasn't happy about not being able to keep up with the faster part of the pack" (T1), and used this as an opportunity to set a behavioural goal. From engaging in SSBC, Susan learned about heart rate zones and HIIT and valued using the fitness tracker provided by the program: "I wear [fitness tracker] everyday … I love it … it tells you where your zone is when you're working out" (T2). She also felt she became one of the stronger individuals in her snowshoe group by incorporating what she had learned in SSBC about exercising in her heart rate zone and incorporating intensity: "Especially since we've started incorporating more hills … it's really nice to be able to keep up with the group and be one of the stronger ones" (T2). Susan continued to build on these performance improvements and tried new activities, including starting her own kayaking group and jogging, "I've even tried jogging again, I haven't jogged for years, but I'm actually surprised that the first time I did it, I went further … I could do more than I thought" (T3). Susan continued to use her neighbourhood environment to "schedule in tough hill walks" (T4) throughout the year and a purchased fitness tracker continued to be a motivator for her: "I'm more motivated; I never had a tracker watch before SSBC and didn't realize how much it keeps me honest … gives me that goal to keep working towards…and makes me more accountable" (T4). Susan anticipated time challenges (i.e. travel, hosting guests) and pre-emptively "scheduled it in" to ensure she met her goal of exercising 5 times per week. Susan felt her self-discipline gave her the confidence to maintain her PA levels in the long term, even in the face of slips.

Discussion

It has been estimated that >470 million people will be living with prediabetes worldwide by 2030 (37). In this study, we used a longitudinal trajectory approach of 14 women's engagement in and journey beyond a brief counselling PA program for individuals at risk of T2D. As maintenance of behaviour change is a complex phenomenon, using this approach allowed for an in-depth understanding of the context, facilitators, barriers and strategies encountered during women's journeys in a real-world context. This study adds to the limited research on understanding strategies used to engage in and maintain PA levels for women with prediabetes 1 year after engaging in an intervention. Overall, women perceived higher PA levels at 1 year postprogram compared with preprogram. Individuals who self-reported more strategies to engage in PA consistently acknowledged greater PA engagement.

All women believed they benefited from SSBC and discussed a renewed importance for prioritizing PA within their daily lives. Differences across profiles emerged in women's discussions of facilitators, barriers and strategies used to engage in PA. Although participants encountered barriers, women in Profile 1 were not able plan for and/or overcome their barriers by using new strategies to maintain PA engagement. In contrast, Profiles 2 through 4 incorporated strategies learned either from program engagement or finding an approach that worked for their life situation, to increase and maintain PA levels. Through the identification of specific strategies, this study extends Tulloch et al's (12) work that acknowledged, but did not specifically report, the use of strategies by PA maintainers.

Several of the identified strategies, apart from self-compassion, were intentionally targeted within SSBC to help participants develop self-regulatory skills. Specifically, SSBC aims to provide participants with opportunities to learn new knowledge (i.e. HIIT, target heart rate zones) and develop skills (i.e. self-monitoring, planning PA bouts, goal-setting) to enact learned information to obtain health benefits. The SSBC intervention content may have provided participants with tools that developed into strategies over the 1-year duration. Across all profiles and time-points postprogram, several discussed strategies aligned to behaviour change techniques taught through SSBC (e.g. scheduling, self-monitoring, goal setting) (31). Greater self-reported behaviour change techniques at 1 year after a diabetes prevention program have been associated with statistically significant decreases in body mass index (38). In particular, the use of cluster self-regulatory techniques has been shown to increase the effectiveness of diet and PA interventions (39). Study findings support the use of behaviour change counselling within a PA program to provide essential tools for individuals to utilize in their daily life post-program.

Although SSBC did not explicitly target self-compassion, it emerged as a predominant strategy across all profiles. Self-compassion can be defined as an orientation to care for oneself during times of struggle (40) and is composed of 3 integrated components: a) self-kindness—treating oneself with kindness instead of harsh criticism, b) mindfulness—being aware of one's feelings in a balanced manner without ruminating or disengaging from them and c) common humanity—realizing that one is not alone in a situation rather than isolated. Self-compassion has been identified as a promising strategy to include in behaviour change interventions for individuals with prediabetes, as newly diagnosed individuals are open to the approach, as they often have negative reactions, such as distress and guilt (41). Efforts to increase self-compassion have been successful in various populations, including people with T2D (42). All of the women spoke of adopting a kinder mindset over time and reframed negative thought processes, which is particularly valuable, as women tend to have lower levels of self-compassion than men (40). Behaviours requiring long-term commitment (e.g. PA) will encounter inevitable barriers; self-compassion may help individuals cope with common negative reactions and barriers to facilitate self-regulation while promoting behaviour change maintenance (15). Specifically, self-kindness can help individuals let go of days when eating or being physically active was not prioritized and help them get back on track instead of giving up. Individuals can be mindful by holding difficult thoughts and emotions in balanced awareness, such as acknowledging that they treated themselves to a favourite high-sugar snack, yet they do not ruminate over the decision. It is critical that individuals recognize that they are allowed to treat themselves once in a while and to use tomorrow as a fresh start. Finally, common humanity reminds individuals that they are not alone, and many other individuals experience the same difficulties in managing a

chronic condition. This study reinforces the role of self-compassion in PA maintenance for those at risk for developing T2D.

Throughout their journeys, many participants transitioned from using interpersonal strategies (e.g. social support) postprogram (T2) to intrapersonal strategies (e.g. goal setting, self-monitoring) in the latter part of their journeys (T3/4). For example, social support was identified as a pertinent strategy at T2, but was perceived to play a less dominant role later on. This finding is in contrast to previous findings where social support, specifically from trainers, was a main theme (17,23). Having the program focus on fostering autonomy and using home days to practice real-world PA, may have decreased dependency on trainers and opened opportunities for participants to discover PA opportunities within and beyond the program setting. Empowering people to gain control over making healthy lifestyle decisions has been found to be valuable in successful behaviour change (43). Walking was identified by all participants as a frequently engaged PA; however, participants also tried other activities (e.g. yoga, barre, kayaking) and used creative strategies associated with walking (e.g. mobile apps, neighbourhood hills, timing PA engagement) that worked for them. This transition from inter- to intrapersonal strategies may explain a change in motivation (e.g. accountability to health, intrinsically motivated) or increases in self-regulation of PA engagement over time. Future research should continue to explore the types (i.e. intra- vs interpersonal) of strategies used to engage in PA overtime.

Limitations, future directions and practical implications

There are some study limitations that warrant consideration. First, the sample represents a small homogeneous cohort of Caucasian women from one Canadian city. Knowing that prediabetes affects individuals living in all social classes, ethnic origins and genders (44,45), more research is needed to replicate such work in more diverse samples to further explore these constructs. Second, although booster sessions and continued contact with exercise specialists have been recommended to improve long-term exercise capacity (46), the longitudinal study nature utilized may have inadvertently acted as a booster for participants, triggering reflection and potential behaviour change through increasing motivation and accountability. Third, researchers were involved in SSBC, which enabled them to develop a foundational understanding of program content and procedures (34), yet should acknowledge the potential for bias. However, it should be noted that the researcher who facilitated the interviews was responsible solely for research and evaluation of the program and was not directly responsible for program delivery, and thus had no interaction with participants before data collection. The gap between 3- and 12-month interviews facilitated potential for recall bias. Future research with a longitudinal approach should consider a 6-month follow-up interview. Finally, despite the SSBC program completion rate being high (95%) (30), there is still value in gaining insight from those who dropped out of the program, as those participants could provide a valuable perspectives. Future research should work to qualitatively explore participants who withdraw from diabetes prevention programs to better understand their experiences.

This work contributes to expanding understanding of PA maintenance, a challenge in PA intervention work. Study findings can be used to inform future behaviour change interventions to help with PA maintenance. Exploring and eliciting strategies to engage in PA during an intervention may promote continued engagement long term. Researchers and health-care professionals who are developing and/or delivering diabetes prevention programs can incorporate such strategies. Within an intervention, providing learning opportunities to foster valuable knowledge and skills for clients to be able to influence their prediabetes outcome once an intervention ends is critical for maintenance. In sum, integrating self-regulatory behavioural skills, behaviour change techniques, and autonomy-supportive intervention delivery can help women at risk of developing T2D foster necessary skills for PA self-management and long-term behaviour change.

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Author Disclosures

Conflicts of interest: None.

Author Contributions

C.B., T.D. and M.E.J. contributed substantially to the conception and design of the project; C.B. and T.D. were involved in the acquisition, analysis and interpretation of the data; C.B. drafted the article; and all authors revised the manuscript critically for important intellectual content and gave final approval of this version to be published.

References

1. Diabetes Canada. Diabetes 360°: A framework for a diabetes strategy for Canada; 2018. https://www.diabetes.ca/DiabetesCanadaWebsite/media/Advocacy-and-Policy/Diabetes-360-Recommendations.pdf. Accessed March 7, 2020.
2. Rosella LC, Lebenbaum M, Fitzpatrick T, Zuk A, Booth GL. Prevalence of prediabetes and undiagnosed diabetes in Canada (2007–2011) according to fasting plasma glucose and HbA1c screening criteria. Diabetes Care 2015;38:1299–305.
3. Tabák AG, Herder C, Rathmann W, Brunner EJ, Kivimäki M. Prediabetes: A high-risk state for diabetes development. Lancet 2012;379:2279–90.
4. Knowler WC, Barrett-Connor E, Fowler SE, et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. N Engl J Med 2002;346:393–403.
5. Wadden TA, Webb VL, Moran CH, Bailer BA. Lifestyle modification for obesity: New developments in diet, physical activity, and behavior therapy. Circulation 2012;125:1157–70.
6. Colberg SR, Sigal RJ, Fernhall B, et al. Exercise and type 2 diabetes: The American College of Sports Medicine and the American Diabetes Association: Joint position statement. Diabetes Care 2010;33:e147–67.
7. Sigal RJ, Kenny GP, Boulé NG, et al. Effects of aerobic training, resistance training, or both on glycemic control in type 2 diabetes: A randomized trial. Ann Intern Med 2007;147:357–69.
8. Bilandzic A, Rosella L. The cost of diabetes in Canada over 10 years: Applying attributable health care costs to a diabetes incidence prediction mode. Chronic Dis Inj Can 2017;37:49–53.
9. Rockette-Wagner B, Storti KL, Dabelea D, et al. Activity and sedentary time 10 years after a successful lifestyle intervention: The diabetes prevention program. Am J Prev Med 2017;52:292–9.
10. Kerrison G, Gillis RB, Jiwani SI, et al. The effectiveness of lifestyle adaptation for the prevention of prediabetes in adults: A systematic review. J Diab Res 2017;2017:8493145.
11. Larson HK, McFadden K, McHugh T-LF, Berry TR, Rodgers WM. When you don't get what you want—and it's really hard: Exploring motivational contributions to exercise dropout. Psychol Sport Exerc 2018;37:59–66.
12. Tulloch H, Sweet SN, Fortier M, Capstick G, Kenny GP, Sigal RJ. Exercise facilitators and barriers from adoption to maintenance in the diabetes aerobic and resistance exercise trial. Can J Diabetes 2013;37:367–74.
13. Geiss LS, James C, Gregg EW, Albright A, Williamson DF, Cowie CC. Diabetes risk reduction behaviors among us adults with prediabetes. Am J Prev Med 2010;38:403–9.
14. Schulman-Green D, Jaser SS, Park SS, Whittemore R. A metasynthesis of factors affecting self-management of chronic illness. J Adv Nurs 2016;72:1469–89.
15. Terry ML, Leary MR. Self-compassion, self-regulation, and health. Self Identity 2011;10:352–62.

16. Cradock KA, ÓLaighin G, Finucane FM, Gainforth HL, Quinlan LR, Ginis KAM. Behaviour change techniques targeting both diet and physical activity in type 2 diabetes: A systematic review and meta-analysis. Int J Behav Nutr Phys 2017; 14:18.
17. Casey D, De Civita M, Dasgupta K. Understanding physical activity facilitators and barriers during and following a supervised exercise programme in type 2 diabetes: A qualitative study. Diabet Med 2010;27:79–84.
18. Wycherley T, Mohr P, Noakes M, Clifton P, Brinkworth G. Self-reported facilitators of, and impediments to maintenance of healthy lifestyle behaviours following a supervised research-based lifestyle intervention programme in patients with type 2 diabetes. Diabet Med 2012;29:632–9.
19. Sweet SN, Fortier MS, Guerin E, et al. Understanding physical activity in adults with type 2 diabetes after completing an exercise intervention trial: A mediation model of self-efficacy and autonomous motivation. Psychol Health Med 2009;14:419–29.
20. Craft BB, Carroll HA, Lustyk MKB. Gender differences in exercise habits and quality of life reports: Assessing the moderating effects of reasons for exercise. Int J Lib Arts Soc Sci 2014;2:65–76.
21. Guthold R, Stevens GA, Riley LM, Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016: A pooled analysis of 358 population-based surveys with 1.9 million participants. Lancet Global Health 2018;6: e1077–86.
22. Fjeldsoe B, Neuhaus M, Winkler E, Eakin E. Systematic review of maintenance of behavior change following physical activity and dietary interventions. Health Psychol 2011;30:99–109.
23. Penn L, Dombrowski SU, Sniehotta FF, White M. Participants' perspectives on making and maintaining behavioural changes in a lifestyle intervention for type 2 diabetes prevention: A qualitative study using the theory domain framework. BMJ Open 2013;3:e002949.
24. Matthews L, Kirk A, MacMillan F, Mutrie N. Can physical activity interventions for adults with type 2 diabetes be translated into practice settings? A systematic review using the re-aim framework. Transl Behav Med 2013;4:60–78.
25. Grossoehme D, Lipstein N. Analyzing longitudinal qualitative data: The application of trajectory and recurrent cross-sectional approaches. BMC Res Notes 2016;9:136.
26. Denzin N, Lincoln Y. The Sage Handbook of Qualitative Research. 5th edn. Los Angeles: Sage, 2018.
27. Ritholz MD, Beverly EA, Weinger K. Digging deeper: The role of qualitative research in behavioral diabetes. Curr Diab Rep 2011;11:494–502.
28. Jung ME, Bourne JE, Beauchamp MR, Robinson E, Little JP. High-intensity interval training as an efficacious alternative to moderate-intensity continuous training for adults with prediabetes. J Diab Res 2015;2015:191515.
29. Bourne JE, Little JP, Beauchamp MR, Barry J, Singer J, Jung ME. Brief exercise counseling and high-intensity interval training on physical activity adherence and cardiometabolic health in individuals at risk of type 2 diabetes: Protocol for a randomized controlled trial. JMIR Res Protoc 2019;8:e11226.
30. Bean C, Dineen TE, Locke SR, Bouvier B, Jung ME. An evaluation of reach and effectiveness of a diabetes prevention lifestyle behaviour change program in the community. Can J Diabetes; 2020. In press.
31. MacPherson MM, Dineen TE, Cranston KD, Jung ME. Identifying behaviour change techniques and motivational interviewing techniques in a diabetes prevention program situated in a community site. Can J Diabetes; 2020. In press.
32. Miller WR, Rollnick S. Motivational Interviewing: Helping People Change. New York: Guilford Press, 2012.
33. American Diabetes Association. Type 2 diabetes risk test 2019. https://www.diabetes.org/risk-test. Accessed February 13, 2020.
34. Burke S. Rethinking 'validity'and 'trustworthiness' in qualitative inquiry: How might we judge the quality of qualitative research in sport and exercise sciences? In: Smith B, Sparkes AC, editors. Routledge Handbook of Qualitative Research in Sport And Exercise. New York: Routledge, 2016, pg. 352–62.
35. Braun V, Clarke V, Hayfield Terry G. Thematic analysis. In: Liamputtong P, editor. Handbook of Research Methods in Health Social Sciences. New York: Springer, 2019, pg. 843–60.
36. Smith B, McGannon KR. Developing rigor in qualitative research: Problems and opportunities within sport and exercise psychology. Int Rev Sport Exerc Psychol 2017;11:1–21.
37. Whiting DR, Guariguata L, Weil C, Shaw J. IDF diabetes atlas: Global estimates of the prevalence of diabetes for 2011 and 2030. Diabetes Res Clin Pract 2011; 94:311–21.
38. Hankonen N, Sutton S, Prevost AT, et al. Which behavior change techniques are associated with changes in physical activity, diet and body mass index in people with recently diagnosed diabetes? Ann Behav Med 2015;49: 7–17.
39. Greaves CJ, Sheppard KE, Abraham C, et al. Systematic review of reviews of intervention components associated with increased effectiveness in dietary and physical activity interventions. BMC Public Health 2011;11:1–12.
40. Neff KD. Self-compassion: An alternative conceptualization of a healthy attitude toward oneself. Self Identity 2003;2:85–101.
41. Strachan SM, Bean C, Jung ME. "I'm on the train and I can't stop it": Western Canadians' reactions to prediabetes and the role of self-compassion. Health Soc Care Commun 2018;26:979–87.
42. Friis AM, Consedine NS, Johnson MH. Does kindness matter? Diabetes, depression, and self-compassion: A selective review and research agenda. Diabetes Spectr 2015;28:252–7.
43. Neff KD, Vonk R. Self-compassion versus global self-esteem: Two different ways of relating to oneself. J Pers 2009;77:23–50.
44. Andersson S, Ekman I, Lindblad U, Friberg F. It's up to me! Experiences of living with pre-diabetes and the increased risk of developing type 2 diabetes mellitus. Prim Care Diabetes 2008;2:187–93.
45. Kautzky-Willer A, Harreiter J, Pacini G. Sex and gender differences in risk, pathophysiology and complications of type 2 diabetes mellitus. Endocr Rev 2016;37:278–316.
46. Yip WC, Sequeira IR, Plank LD, Poppitt SD. Prevalence of pre-diabetes across ethnicities: A review of impaired fasting glucose (IFG) and impaired glucose tolerance (IGT) for classification of dysglycaemia. Nutrients 2017;9: E1273.