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Intervention Research

Development of a Novel Mind–Body Activity and Pain Management Program for Older Adults With Cognitive Decline

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Abstract

Background and Objectives: Chronic pain (CP) and cognitive decline (CD) often co-occur in older adults, which can reinforce a "disability spiral." Early interventions teaching pain coping skills and gradual increases in activity (walking) are needed to promote overall well-being and potentially delay further decline of cognition and daily functioning. The goal of this mixed-methods study was to guide the development of two mind–body activity programs for CP and CD which focus on increasing walking using time goals (*Active Brains*) or step count reinforced by a Fitbit (*Active Brains–Fitbit*).
Research Design and Methods: Older adults with CP and CD ($N = 23$) participated in a one-time focus group (four total) and completed measures of physical, emotional, and cognitive functioning. Qualitative analyses identified population-specific needs, preferences, and perceptions of proposed program skills. Quantitative analysis compared clinical characteristics to population norms and explored intercorrelations among treatment targets.
Results: Thematic analyses revealed six main themes: (1) challenges living with CP and (2) CD, (3) current walking, (4) technology (Fitbit) to increase walking, (5) perceptions of proposed program skills (e.g., mind–body, pain, and increased walking), and (6) program barriers and facilitators. Quantitative analyses showed that (a) participants had physical function below reference values and (b) higher self-efficacy correlated with higher cognitive, emotional, and physical functioning.
Discussion and Implications: Focus group participants were enthusiastic about the proposed program skills. Current work includes open pilot testing, qualitative interviews, and a small randomized controlled trial to optimize the programs and methodology in preparation for efficacy testing against an educational control.

Keywords: Activity, Chronic pain, Cognition, Focus groups, Mind–body, Walking

Chronic pain (CP) is common, costly, and challenging to treat (Glajchen, 2001; Institute of Medicine (US), 2011). Approximately one third of older adults in the community (Patel et al., 2013) report CP (Won et al., 2004). CP in older adults tends to be undertreated (Cravello et al., 2019; Westoby et al., 2009) and is associated with impaired physical and emotional function (Eggermont et al., 2014; Zis et al., 2017). Older adults with comorbid CP are two times more likely to also report cognitive decline (CD; Cravello et al., 2019; Westoby et al., 2009) defined as objective (confirmed by cognitive testing) or subjective decreases in cognitive performance that exceed normal aging (Grady, 2008; Jonker et al., 2000; Patel et al., 2013; Westoby et al., 2009). The comorbidity of CP and CD places individuals on a "disability spiral" of progressive worsening of physical, emotional, and cognitive function (Gagliese et al., 2018; Vlaeyen & Linton, 2012; Wideman et al., 2013). Addressing the CP–CD comorbidity is thus a public health concern.

To date, there are no evidence-based treatments to address the CP–CD comorbidity (Cravello et al., 2019). Pharmacological approaches are the first line of treatment for CP and CD (Lukas et al., 2013). However, medications for CD do not address pain (Cooper et al., 2013), and those for CP have limited efficacy (Cravello et al., 2019) and can further impair cognition (Wright et al., 2009). Nonpharmacological treatments such as mind–body and physical activity programs are effective in the treatment of CP (Ambrose & Golightly, 2015; Geneen et al., 2017; Goyal et al., 2014) and may also enhance cognition (Farhang et al., 2019a; Lautenschlager et al., 2019). Mind–body approaches focus on the mind, brain, body, and behavior connections to health and involve a range of practices such as meditation, relaxation, breathing, body movement (e.g., yoga, tai chi), and guided imagery (Wahbeh et al., 2008).

We previously developed a mind–body activity program for adults with CP focused on increasing walking by time goals (*GetActive*) or by step count aided by a Fitbit that provides monitoring and reinforcement of step count consistent with an individualized pacing plan (*GetActive–Fitbit*; Greenberg et al., 2019, 2020). Otherwise, both programs teach identical mind–body and pain coping skills. We found that both programs exceed a priori set benchmarks of feasibility, acceptability, and adherence (Greenberg et al., 2019, 2020) and have similar signals of improvement in emotional and physical function (Greenberg et al., 2019, 2020).

We now report on a mixed-methods study aimed at adapting *GetActive* and *GetActive–Fitbit* for the unique needs of older adults with CP and CD. We conducted four focus groups to qualitatively identify population-specific needs, preferences, and perceptions of *mind–body* and *activity* skills. Focus group participants also completed quantitative measures of physical, cognitive, and emotional functioning for comparisons with population norms and exploration of associations between CP- and CD-relevant outcomes. We used this information to develop *Active Brains* and *Active Brains–Fitbit*, the first mind–body activity programs for older adults with comorbid CP–CD. We will iteratively refine both programs via an open pilot, exit interviews and a pilot randomized controlled trial before formal efficacy testing against an education control (Czajkowski et al., 2015; National Center for Complementary and Integrative Health [NCCIH], 2015; Supplementary Figure 16).

Methods

Participants and Procedures

Our Institutional Review Board (IRB; #2018P002152) approved all study procedures. Participants were recruited from the Pain Clinic at the Massachusetts General Hospital (MGH), IRB-approved advertisements, and referrals from MGH pain specialists and neurologists. We screened 32 potential participants. Of these, six declined participation and three had scheduling conflicts. The inclusion criteria were (a) age at least 60 years, (b) chronic, nonmalignant, musculoskeletal pain for more than 3 months (Merskey, 1994), and (c) self-reported CD (Molinuevo et al., 2017; Westoby et al., 2009). Exclusion criteria were (a) medical illness expected to worsen within 6 months (e.g., malignancy), (b) serious untreated psychiatric disorder or current substance abuse, (c) current suicidal ideation, (d) regular use of a digital monitoring device (e.g., Fitbit) within the last 3 months, (e) regular daily exercise for more than 30 min daily, and (f) inability to walk unassisted.

Older adults (Table 1) with CP and CD who met eligibility criteria (N = 23) participated in a one-time focus group between January 2019 and June 2019 (four groups total). The principal investigator, a clinical health psychologist who oversaw but did not lead the focus groups, approved all screenings prior to participation. Participants attended a 2-h visit at MGH that entailed (a) informed consent procedures, (b) a 60-min qualitative focus group, (c) completion of self-report questionnaires, and (d) administration of the Montreal Cognitive Assessment (MoCA; Nasreddine et al., 2005) by trained study staff. Participants were compensated $20 for the focus group and $20 for the quantitative measures. A full description of the focus group procedures can be found in Supplementary Materials.

Proposed Adaptations to *GetActive* and *GetActive–Fitbit*

Our program development followed an established methodology (Greenberg et al., 2019). Prior to the focus groups, our multidisciplinary team of psychologists, pain specialists, and neurologists proposed adaptations to the *GetActive* and *GetActive–Fitbit* manuals and to the study procedures based on clinical expertise and prior research (Buffum et al., 2007; Patel et al., 2013). We retained the mind–body, pain coping, and activity skills (goal setting and quota-based walking), because these skills are associated with improvements in emotional, physical, and cognitive functioning in older adults with CP or CD (Ambrose & Golightly, 2015; Farhang et al., 2019b; Goyal et al., 2014; Pain Management, 2020; Wetherell et al., 2011). We also proposed seven population-specific adaptations to the manuals and procedures: (1) education on the CP–CD comorbidity and cognitive reserve factors, (2) mindfulness meditations for cognitive lapses

Table 1. Descriptive Statistics for Participant Demographics

Demographics	Mean (± *SD*)	*SD*	*n* (%)
Age (years)	70.3 ± 12.7	60–85	
Years with CP	13.8 ± 12.7	2–50	
Gender			
Female			15 (65.2)
Male			8 (34.8)
Education			
High school diploma			3 (13.0)
Some college			3 (13.0)
Bachelor's degree			6 (26.1)
Postsecondary			11 (47.8)
Race			
Black			3 (13.0)
White			20 (87.0)
Marital status			
Single			5 (21.7)
Separated or divorced			8 (34.8)
Widow			2 (8.7)
Married			7 (30.4)
Other			1 (4.4)
Yearly income			
<10K			2 (8.7)
10–15K			8 (34.8)
15–25K			4 (17.4)
25–35K			4 (17.4)
35–50K			1 (4.4)
50–75K			1 (4.4)
>75K			3 (13.0)
Current diagnosis			
Anxiety			10 (43.5)
Depression			8 (34.8)
Types of pain diagnosis			
Back pain			12 (52.2)
Arthritis			6 (26.1)
Fibromyalgia			6 (26.1)
Leg pain			6 (26.1)
Nerve pain			5 (21.7)
Other (head, neck, etc.)			13 (56.5)

Note: CP = chronic pain; SD = standard deviation.

and focused attention, (3) development of compensatory cognitive strategies, (4) engagement in intellectually stimulating activities, (5) reinforcements to increase program adherence (e.g., reminders, audio recordings of skills), (6) simplification of manual language and visuals to enhance learning, and (7) decreased emphasis on cognition (e.g., removal of adaptive thinking skills). Our multidisciplinary team created a semistructured interview guide to explore our research question.

Qualitative Analyses

Our qualitative aim was to identify population-specific needs, preferences, and perceptions of *the proposed programs' skills*. We used the Framework Method (Gale et al., 2013) and a predominately *deductive* approach to qualitative analysis (Braun & Clarke, 2006) that allowed for flexibility in integrating novel information from focus group participants (Gale et al., 2013). Our semistructured interview script investigated the following a priori domains: (a) challenges of living with CP and CD, (b) current experience with physical activity and willingness to increase walking, (c) thoughts on using a Fitbit to reinforce walking goals, (d) perceptions of skills (e.g., mindfulness) to improve physical, emotional, and cognitive function, and (e) perceived barriers and facilitators to program participation. Given that treatments for comorbid CP and CD do not exist, we allowed for some *inductive* exploration of unexpected needs and preferences during the focus groups to enhance the population-specific adaptations to the program (Gale et al., 2013)

We followed the coding procedure for the Framework Method outlined by Gale et al. (2013) and best practice recommendations by the Qualitative and Mixed Methods Research Unit at MGH. First, all high-quality recordings were manually transcribed, verbatim by trained research assistants. The recordings were deidentified and coded using QSR International's NVivo 12 qualitative data analysis software (Richards, 2018). All transcripts were independently reviewed for accuracy and immersion with the content by the study lead investigators (A. Vranceanu and R. A. Mace). Second, the research assistants and lead investigators individually read all focus group transcripts, maintained reflective notes, and revisited the a priori interview domains. This provided a scaffold to identify nested subthemes that align with the overarching research question, while also allowing flexibility for additional codes to emerge (initially coded as "other" based on the work of Gale et al., 2013). Third, the research assistants independently conducted line-by-line deductive coding (Corbin & Strauss, 2008) of critical participant statements on one practice transcript. Fourth, we accommodated gaps identified by the independent raters (e.g., "Concerns about stigma" and "Lack of energy"), incorporated divergent viewpoints, and agreed on the final codebook to apply to remaining transcripts. Interrater reliability for the coding was excellent themes and subthemes (average Kappa = 0.94) and strong for all nodes identified by raters (average Kappa = 0.87). Remaining disagreements were resolved through consensus for the qualitative analyses. Fifth, we charted the qualitative data, balancing reduction with maintaining the sentiment and original context, to elucidate population-specific needs, preferences, and perceptions of program skills. Our sample was homogeneous (older adults with CP and CD), and we did not analyze sample substrata (e.g., young vs. old). Finally, our multidisciplinary team provided an expert review of the data to discuss the interpretation of the qualitative findings in the context of current research on CP and CD.

Quantitative Analyses

We compared measures of physical, cognitive, and emotional functioning to population norms and explored associations between program targets. Descriptive statistics were used to report demographics and participant characteristics. Independent sample *t* tests and Pearson correlations were used to explore associations between participants' CP and CD with their physical, emotional, and cognitive functioning. We interpreted the magnitude of correlations between measures as negligible (Pearson correlation coefficient, $r = 0.00–0.30$), small ($r = 0.30–0.50$), medium ($r = 0.50–0.70$), and large ($r > 0.70$) based on common guidelines (Mukaka, 2012).

We assessed the following domains: (a) pain intensity at rest and with activity (Numerical Rating Scale; Farrar et al., 2001), (b) self-efficacy despite the pain (Pain Self-Efficacy Questionnaire [PSEQ]; Nicholas, 2007), (c) cognitive functioning (MoCA; Nasreddine et al., 2005 and Everyday Cognition scale-12 [ECog-12]; Farias et al., 2011), (d) physical function (PROMIS Physical Function; Stone et al., 2016; World Health Organization Disability Assessment Schedule [WHODAS; Üstün et al., 2010]; the Physical Activity Scale for Individuals with Physical Disabilities [PASIPD; Washburn et al., 2002]), (e) emotional function (PROMIS Anxiety [v1.08a] and PROMIS Depression [v1.08b]; Pilkonis et al., 2011, 2014), and (f) social function (PROMIS Emotional Support [4a; Hahn et al., 2014] and UCLA Loneliness Scale [UCLA-8; Russell et al., 1978]). Full details on the measures are presented in Supplementary Materials.

Results

Qualitative Findings

Thematic analyses revealed six central themes across the four focus groups (Table 2).

Theme 1: Challenges of living with CP

Participants noted that pain affected their physical, emotional, and social functioning. Most participants indicated that CP significantly limited their physical activity. For one participant, fluctuations in pain and the inability to anticipate changes posed "one of my biggest challenges," because "it differs from day to day, but it is always there." The onset of physical disability in response to CP was described as an identity shift for many participants ("I was athletic all of my life") and greatly reduced their functional independence.

Participant reports and within-group behaviors were consistent with depression, guilt, anxiety, fear, and discouragement in the context of pain. These emotions, in turn, led to decreased self-worth, a social withdrawal, or avoidance of activity. Nevertheless, participants voiced a strong willingness to develop coping strategies for CP.

Theme 2: Challenges of living with CD and CP

Participants reported a variety of cognitive challenges including forgetfulness, difficulties with decision making, disorganization, disorientation, inattention, and confusion. The co-occurrence of CP and CD further affected physical functioning. More specifically, several participants reported difficulty concentrating due to pain, which interfered with activities of daily living and led to dependence on others. Notably, some patients reported that CD hindered their adherence to CP treatment by forgetting medications and recommendations from doctors' visits.

Nearly all participants expressed frustration with their CD and noted that it negatively affected their emotional and social functioning. Many participants felt depressed from cognitive lapses and anxious about worsening decline. Participants endorsed stigma for their CD which exacerbated emotional and physical difficulties. Others endorsed shame because of their CD—specifically, referencing ways it affects their social relationships. CD was attributed to missing appointments, tardiness, forgetting details, and reliance on loved ones. Consequently, several participants attributed social isolation to CD.

Theme 3: Current experience with physical activity and walking

Participants generally shared positive views on physical activity including its benefits for health. Participants identified walking as their predominant form of daily exercise. Participants described walking as physically engaging, a motivator for independence with transportation, an opportunity for social interactions, and a facilitator of valued activity (e.g., volunteering). Most pertinent to the programs, participants recognized that walking helped them manage their CP. Participants also noticed that walking can provide a positive distraction from worries about CD. For participants who disliked exercise, walking emerged as a compromise between the relative barriers and benefits of walking.

Several participants identified the challenges of getting active due to CP, CD, and older age. The decline in functional mobility and independence discouraged participants from exercising. Participants also acknowledged the effort required to initiate and maintain exercise regimens due to pain and despite the benefits from walking. Additional personal barriers were low motivation, fear of injury or getting lost, dependence on others, and embarrassment from exercising incorrectly. Environmental barriers included poor weather conditions and access to fitness centers or equipment.

Theme 4: Technology to increase walking and reinforce the programs

Participants supported the use of a Fitbit to increase their walking. Participants believed that using a Fitbit had the potential to encourage step count goal setting, monitor their progress in the group, increase motivation, and provide useful exercise cues. Some participants had negative views about technology including the use of a Fitbit or a general lack of interest in the technology.

Table 2. Focus Group Themes and Exemplar Quotes From Participants and Proposed Adaptations

Theme	Subtheme	Example quotes
1. Challenges of living with CP	Physical activity	*Good days and bad days:* "When I do exercise I come out feeling powerful and well, but I revert."
	Mood	*Anger/frustration:* "I'm just so angry because I can't do all the things that I like to do and so she [my wife] sent me to anger management because she thought maybe I should go." *Depression:* "The pain is something I had to learn to live with but living with it can be very depressing and can bring you down and you do not want to get up and go places."
2. Challenges of living with CD and CP	Social relationships	*Dysregulation:* "And it makes my daughter crazy because she has to deal with me … I cry a lot and scream at my husband." *Fear of offending others:* "They're insulted because I do not remember them and it's driving me nuts." *Stigma:* "I feel shame if my friends see me in a lower state of being able to do things […] I do not want them to see me like that because I do not want them to worry." *Difficulty coordinating:* "That it's going to interrupt your schedule and that you're going to have to manage that socially and say well I thought I was going to make it, but I can't." *Isolation:* "I do not have any friends, I'm so isolated. My pain is so severe."
	Mood	*Anxiety:* "I'll forget something and then I'll get very anxious about it and upset and think I have Alzheimer's." *Frustration:* "I'm so frustrated and it makes me cry … it's very frustrating for me sometimes."
	Cognitive symptoms	*Forgetfulness:* "Sometimes I'll forget a word, mostly it'll come back when I close my eyes like my neurologist says to do, but sometimes just, it's just, it's like I'll lose a word." *Disorientation:* "I went for extensive testing and I was told that I have mild cognitive impairment with particular difficulties in the area of spatial memory and things like sense of direction." *Executive dysfunction:* "I have particular difficulty keeping my possessions organized." *Inattention/distractibility:* "My mind races all the time."
3. Current experiences with physical activity and walking	Positive	*Helps pain:* "The pain is always there, but I notice that if I am able to get myself up and outside that it does feel a little better." *Walking:* "We walk yeah, everyday twice and my husband does it once, so I do it three times, which means I get about an hour and a half of walking every day."
	Negative	*CP interferes:* "I think the experience of being tired because you have to manage a lot of things and a lot of normal day to day things are harder than they used to be." *CD interferes:* "You know I could be getting ready to go out for a walk and doing this or that around the house and by the time I'm getting out the door I forgot where I was going."
	Barriers to increasing physical activity	*Internal (Fear of injury):* "I'm worried about falling" *External (Weather):* "So, the winter. The rain, you know, I go out in rain, but if it's icy, I fall all the time."
4. Technology to increase walking and reinforce the programs	Positive	*Interested:* "I do not remember exactly what I did yesterday or how far the dog and I walked. Having something concrete like that makes a lot of sense."
	Negative	*Challenges with technology:* "Like I hate technology, you get all tied up in it, and it doesn't work, and you do not know why and there's nobody to ask."

Table 2. Continued

Theme	Subtheme	Example quotes
5. Mind–body, pain, and physical activity skills to improve cognitive, emotional, and physical function	Mindfulness	*Positive views:* "There's an increased power to doing meditation with other people. It's almost like there's a cumulative effect and sometimes it's quite profound." *Negative views:* "I'm not a big believer in mindfulness or yoga or all these other recent fads."
	Activity pacing	*Positive views:* "If we try and change things to fast, then we end up back in a hole again."
	Skill reinforcements	*Involving a group member:* "I used to have somebody I used to walk with all the time, and we would motivate each other."
	Positive psychology	*Gratitude:* "I went into grace and forgiveness. And that's been really helpful." *Self-compassion:* "Self-compassion […] my pain you know, lessened, because I opened up more emotionally to the people, and uh the people, with very good direction, part of it the facilitator, made it a great experience for me." *Negative views:* "Sometimes I need to be hard on myself in order to push myself forward."
6. Potential barriers and facilitators to program participation	Barriers	*Low motivation to do the homework:* "I was in that before. Something like that, doing assignments. And it was really dumb, I couldn't do them." *Transportation:* "Well getting here every week might be difficult."
	Facilitators	*Virtual sessions:* "Yeah or different ways of continuing the program and checking in digitally or something like that." *Involving a loved one:* "Although I identify as a patient, she also has somewhat difficulties, so I would see it as being very helpful to her."

Note: CD = cognitive decline; CP = chronic pain.

Participants agreed that skill acquisition and motivation could be further enhanced by receiving text message reminders about homework and listening to recordings of session content available online. Participants also inquired about access to virtual sessions to mitigate the barriers to in-person participation discussed below.

Theme 5: Mind–body, pain, and walking skills to improve cognitive, emotional, and physical function

Participants were generally receptive to a program that teaches mind–body skills and encourages increased walking. They widely endorsed positive views of mindfulness skills and conveyed familiarity with meditation techniques. Participants recommended a range of mindfulness meditations to strengthen pain awareness and tolerance. Additional benefits of mindfulness included improved sleep quality, decreased stress, and enhanced concentration. Several participants believed that cultivating positivity, self-compassion, and gratitude could help them cope with walking goal setbacks. Participants noted that it would be important to include educational information on CP and CD. They were receptive to the potential benefits of activity pacing to provide a structured routine noncontingent on pain and increase activity while preventing overexertion.

Theme 6: Potential barriers and facilitators to program participation

Participants did not explicitly identify CP or CD as a potential barrier to engagement with the programs. Instead, participants discussed the burden of recurrent in-person appointments such as challenges with transportation, parking issues, and an overall lack of energy or motivation. Limited time was also identified as a barrier for completing homework, as well as low motivation and a lack of perceived benefits. For these reasons, participants voiced skepticism about the ability to increase walking independently and provided suggestions to enhance participation.

Participants discussed how the group format and instructor could provide further accountability and facilitate peer mentorship. Many participants expressed interest in involving a loved one (e.g., establishing shared walking goals). Anticipated challenges to including a partner included lack of availability, desire for independence, and time limitations. Additional facilitators included schedule flexibility and compensation for parking or travel.

Quantitative Findings

Normative comparisons

Descriptive statistics for quantitative measures are reported in Supplementary Table 1. Participants reported moderate levels of pain (Boonstra et al., 2016) with activity (*M* = 6.2, *SD* = 2.2) and rest (*M* = 5.2, *SD* = 2.6), which was consistent with population estimates of patients with CP (Nicholas et al., 2008). Although pain self-efficacy scores (*M* = 38.7, *SD* = 14.3) were higher when compared to patients with CP in pain clinics (Nicholas et al., 2008, 2019), there was large variability in responses (range = 12–60). Importantly, physical function scores on the PROMIS Physical Function (*M* = 42.5, *SD* = 8.3), WHODAS (*M* = 51.4, *SD* = 17.1), and PASIPD (*M* = 13.7, *SD* = 8.6) were lower than norms for persons with physical disabilities (Rose et al., 2018; Stone et al., 2016; Üstün et al., 2010; Washburn et al., 2002). Sixty-one percent of participants had clinically significant impairment on the MoCA (<26, *M* = 24.2, *SD* = 3.5). Participants noted that their daily functioning was affected by CD, with ECog-12 scores (*M* = 2.0, *SD* = 0.7) comparable to mild cognitive impairment samples (Farias et al., 2011). Average scores on the PROMIS Anxiety, Depression, and Emotional Support were within norms (*T*-scores within 0.5 *SD* of the mean).

Associations with CP and CD

A correlation matrix of the quantitative measures is presented in Supplementary Table 2. Physical, emotional, and cognitive functioning were all interrelated. Higher pain intensity was significantly and moderately associated with a higher disability on the WHODAS and depression on the PROMIS. Higher CD severity on the ECog-12 was significantly and moderate to strongly associated with an increased disability on the WHODAS, decreased physical function on the PROMIS, and greater anxiety on the PROMIS.

Correlational analyses provided preliminary support for treatment targets. Higher pain self-efficacy on the PSEQ was significantly and moderate to strongly associated with increased physical function on the PROMIS, as well as a decreased disability on the WHODAS, depression and anxiety on the PROMIS, improved cognitions on the ECog-12, and loneliness on the UCLA-8. Higher emotional support on the PROMIS was significantly and moderately correlated with lower loneliness on the UCLA-8, disability on the WHODAS, and depression on the PROMIS.

Active Brains and *Active Brains–Fitbit* programs

We used the qualitative and quantitative information to refine the proposed *Active Brains* and *Active Brains–Fitbit* manuals and procedures. Supplementary Table 3 presents an outline of the session topics and skills for *Active Brains–Fitbit*. Both programs are 8-week in-person groups (90 min sessions) with assigned home practice. The programs teach (a) *walking skills* to gradually average increase step count through SMART goal-setting, individualized nonpain contingent quota-based pacing (e.g., walk for 30 min in *Active Brains* or meet a step goal of 3,000 steps in *Active Brains–Fitbit*), and engagement in meaningful activities; (b) *mind–body skills* to reduce reactivity and catastrophizing to pain or fear of CD through diaphragmatic breathing, body scanning, and mindfulness exercises; (c) *pain–cognition awareness skills* to correct misconceptions about CP and CD that may impede participation and understand the disability spiral (e.g., how sedentariness perpetuates CP and CD); (d) *cognitive functioning skills* to develop cognitive compensatory strategies and increase intellectual stimulation; and (e) *social and emotional functioning skills* to manage negative reactions from others and cope with stress or walking setbacks (positivity, self-compassion, and gratitude). Education on CD, CP, and healthy lifestyle with aging is included in each session. Planned trials will evaluate the feasibility and efficacy of *Active Brains* with or without Fitbit (Fitbit Alta HR, 2018) where participants set step count goals reinforced by the device.

Discussion

We conducted a mixed-method study to understand the needs and preferences for a mind–body activity program for older adults with CP and CD and developed *Active Brains* and *Active Brains–Fitbit*, two identical programs aimed at improving physical, emotional, and cognitive functioning. Qualitative findings confirmed the association between CP and disability (Greenberg et al., 2019) and underscored how the CP–CD comorbidity can further degrade physical, emotional, and cognitive functioning (Gagliese et al., 2018). Participants noted that CD limited their physical functioning, increased their reliance on others, increased their emotional distress, and interfered with pain self-management. The qualitative results also highlight the need for education on the bidirectional relationship between pain and CD, assess patient-preferred language in the treatment manual, reduce social isolation through shared walking plans (i.e., “buddy system”), and teach communication skills to manage nonadaptive reactions to pain.

Despite the recognizable health benefits of walking, participants endorsed problems with adherence due to CP, CD, and aging. Walking was the preferred method of physical activity and participants referenced additional benefits of walking to emphasize in *Active Brains*, such as maintaining independence, socialization, and promoting valued activities. Patient-identified barriers highlight the need for additional support in this population, through quota-based pacing and mind–body skills, to establish a consistent walking regimen (Nielson et al., 2013). *Active Brains* could address ambivalence to getting active through motivational interviewing, which promotes exercise and lifestyle medications in populations with chronic conditions (Knight et al., 2006). Nevertheless, bona fide physical limitations and functional dependence heighten the importance of positive psychology skills, such as acceptance, gratitude, and self-compassion, to mitigate negative emotions (e.g., shame, embarrassment) that could further discourage walking. Setting lower walking goals, with gradual increases through quota-based pacing (Ambrose & Golightly, 2015;

Kent & Kjaer, 2012), may be more realistic for older adults and is consistent with public health guidelines that some exercise is better than none (Sattelmair et al., 2011).

Participants were supportive of technology to encourage walking and facilitate engagement in the programs, both in-person and home practice. Interest in using a Fitbit to establish step goals, monitor progress, and provide exercise cues aligns with the popularity of digital monitoring devices among older adults (Tedesco et al., 2017). Negative views toward technology underscore the need to preempt Fitbit nonadoption in *Active Brains–Fitbit* (Kononova et al., 2019) by enhancing familiarity with the device, discussing the benefits, and establishing reminders (e.g., to charge equipment). Participants were also receptive to text message reminders for homework and listening to audiotaped program skills, which could accommodate difficulties with short-term memory, comprehension, and organization. The delivery of the programs through live videoconferencing for older patients who lack the mobility, transportation options, and scheduling flexibility required to attend a 90-min, 8-week intervention would further increase the program's reach and uptake.

The interconnectedness of physical, cognitive, and emotional dysfunction on quantitative measures further supports the "disability spiral" conceptualization of CP and CD (Gagliese et al., 2018). Participants endorsed Pilkonis CD when performing everyday tasks and three quarters of them reported multiple CP conditions. Despite endorsing pain intensity levels comparable to the general CP population (Boonstra et al., 2016; Nicholas et al., 2008), physical function fell consistently below expectations across the PASIPD, WHODAS, and PROMIS (Rose et al., 2018; Stone et al., 2016; Üstün et al., 2010; Washburn et al., 2002). This finding is supported by previous evidence on the bidirectional relationship between physical functioning and CD in older age (Daly et al., 2014). Interpretations of MoCA data are limited by low reliability, perhaps due to the small sample size magnifying administration inconsistencies between study staff. Nevertheless, the results highlight additional outcomes significantly associated with CP and CD, including higher disability, depression, anxiety, and loneliness, that are unaddressed by current pharmacological treatments. In *Active Brains* and *Active Brains–Fitbit*, these psychosocial outcomes are targeted through the integration of mind–body skills, quota-based walking, and program-specific information on behavioral health (e.g., nutrition, sleep, hygiene). Participants' concerns about CD reinforced the incorporation of education on brain health, mindfulness of cognitive lapses, visual aids and manual simplifications to facilitate new learning, building cognitive reserves, and devising compensatory strategies. These adaptations aim to target CD without relying heavily on higher-order cognitions required by traditional cognitive-behavioral strategies (Beaudreau et al., 2019). The relationship between higher pain self-efficacy and lower negative outcomes (e.g., disability, loneliness) provides an empirical rationale for improving pain management in this population.

In conclusion, we developed the first group mind–body activity programs aimed at improving emotional, physical, and cognitive function in older adults with CP and CD. Using evidence-based guidelines (Czajkowski et al., 2015; NCCIH, 2015), we are now conducting a nonrandomized open pilot of the two programs with exit interviews to explore feasibility benchmarks and signal of improvement in cognitive, physical, and emotional outcomes. Subsequently, we will conduct an efficacy trial to understand whether the programs are superior to an education control and whether using a Fitbit is necessary in order to maximize physical, cognitive, and emotional function. The larger goal is the implementation of one or both programs within the care of older adults with CD and CP.

Supplementary Material

Supplementary data are available at *The Gerontologist* online.

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Conflict of Interest

None declared.

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