



Published in final edited form as:

J Phys Act Health. ; 17(10): 977–986. doi:10.1123/jpah.2019-0295.

How Do Positive Psychological Constructs Affect Physical Activity Engagement Among Individuals at High Risk for Chronic Health Conditions? A Qualitative Study

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Abstract

Background: Positive psychological constructs (eg, optimism, positive affect) may help people engage in physical activity, though the details of these relationships and their directionality have not been studied in depth in people with cardiovascular risk factors. The objectives of this study were to use qualitative research to explore the relationships of positive psychological constructs with physical activity among people with metabolic syndrome.

Methods: Participants with metabolic syndrome and low physical activity from an academic medical center completed semistructured phone interviews about associations between physical activity and positive psychological constructs, and perceptions about benefits, motivation, and barriers to physical activity.

Results: The participants ($n = 21$) were predominantly older (mean age = 63 y) white (95.2%) women (61.9%). Engaging in physical activity was commonly associated with enjoyment, energy, relaxation, accomplishment, and determination. Experiencing positive psychological constructs like enjoyment, energy, connectedness, optimism, and determination also helped them engage in physical activity. Perceived benefits, facilitators, and barriers of physical activity engagement were noted.

Conclusions: The participants at high risk for chronic diseases described many specific positive psychological constructs that both promote and result from physical activity. Testing ways to increase positive psychological constructs may be a novel way to help people at high risk of chronic diseases become more active.

Keywords

metabolic syndrome; health behaviors; positive emotions; positive psychology; exercise

People with metabolic syndrome (MetS) are at high risk of progressing to chronic diseases, like type 2 diabetes (T2D) and cardiovascular disease (CVD).^{1,2} MetS affects 34% of US adults and is increasing due to the rise in obesity.^{1,3-5} MetS is composed of dyslipidemia, central obesity, impaired glucose metabolism, and elevated blood pressure.^{1,3} Lifestyle behaviors, including physical activity, are critical for preventing progression to T2D and CVD.⁶ However, despite the clear importance of physical activity, most people have difficulty achieving the recommended amounts of activity.⁷ Though lifestyle interventions exist, the effects tend to be difficult to maintain, and effective physical activity interventions are greatly needed.⁸

Psychological factors play an important role in completing health behaviors, such as physical activity.⁹⁻¹¹ People with MetS tend to experience poorer self-rated health and perceived life satisfaction.¹² Depression, anxiety, pessimism, and hostility have been associated with worse dietary habits,¹³ lower physical activity,¹⁴ increased risk of developing MetS, and poorer prognosis.^{15,16} In contrast, positive psychological constructs, such as optimism (positive expectations of the future), self-esteem (confidence about one's own worth), life satisfaction, and positive affect (experiencing positive emotions), have been associated with lower risk of developing MetS.^{17,18} The role of positive psychological constructs in changing health behaviors or the prognosis in people with elevated cardiometabolic risk is unknown. There are no studies that specifically explore the role of different types of positive states in health behaviors among this population.

Positive psychological factors may reduce cardiometabolic risk by mediating self-regulation of healthy behaviors, a primary mechanism for reduced MetS risk.¹⁹⁻²² For example, enjoyment of physical activity predicts physical activity intentions and behavior in healthy populations.²³ Beyond enjoyment, positive psychological states, such as optimism and positive affect, play a role in adherence to physical activity and related health behaviors.^{10,11,22,24} However, the role of specific positive constructs in relation to physical activity is less commonly studied and largely unknown, particularly in this high-risk population.

Several theories exist that can help explain the role of positive emotions in increasing health behaviors. The theory that drives the questions of interest in the present study hypothesizes that increased optimism and positive expectancy, social support or connectedness, positive affect, and well-being can increase motivation, confidence, and self-efficacy, which can contribute to increased physical activity.²⁵ Additional theories that have explored these connections include the *broaden-and-build* theory^{20,26} and the related upward spiral theory of lifestyle change,²² which suggest that increasing positive emotions can increase resources, coping, and problem solving and may promote healthy changes. In the present study, people were asked to identify their perceptions of the role of positive psychological constructs on their health and behaviors. Positive psychological constructs include positive emotions (eg, affect, joy) and positive cognitions (eg, determination). While theories tend to emphasize positive emotions as a global construct, we sought to broaden understanding of the specific constructs to include additional and less commonly studied positive cognitions. Some research has examined interventions that target increasing positive psychological constructs, such as optimism, gratitude, determination, and positive affect to improve health

behaviors and outcomes for patients with heart disease and T2D.²⁵ However, there is a research gap for interventions that cultivate positive psychological constructs in the predisease state, like MetS, that could help prevent the onset of chronic diseases.

To begin to address this gap, we conducted semistructured individual interviews with adults with cardiometabolic risk factors who fulfilled the criteria for MetS.⁴ The interviews inquired about perceptions of health behaviors, positive psychological constructs, and the relationship between positive psychological constructs and health behaviors, with a focus on physical activity. The goals of the present study were to elicit and identify perceptions of specific positive psychological constructs and the directionality of positive psychological constructs and physical activity, as well as motivation, facilitators, and barriers to physical activity among people who are at high risk for developing T2D and CVD. Directionality of positive emotions and physical activity (eg, do positive emotions lead to more physical activity or vice versa) was a focus of the interviews, due to the lack of nuanced understanding of these relationships and to inform future intervention development. It was anticipated that participants would provide information about their positive emotional states; derive associations between positive psychological constructs and physical activity; and identify additional facilitators, motivation, and barriers for physical activity.

Methods

Study Criteria and Recruitment

This qualitative study was the first phase of a multiphase intervention development trial. Purposive sampling was used to identify patients who were potentially medically eligible, who could provide in-depth information about the experience of living with chronic conditions, and who were willing and able to provide their opinions.²⁷ Gender was the stratified sampling variable (50% men and 50% women) to represent the distribution of MetS prevalence. Recruitment took place from May to November of 2017. The eligible participants were English-speaking adults with at least 3 risk factors for MetS, as listed in their electronic medical record, based on the 2009 guidelines⁴: elevated abdominal obesity (waist circumference >102 cm in men or >88 cm in women, or if waist circumference was not available in the medical record, body mass index ≥ 29.1 kg/m² for men and 27.2 kg/m² for women²⁸), elevated blood pressure (systolic ≥ 130 and/or diastolic ≥ 85 mm Hg or on blood pressure medication), serum triglyceride level ≥ 150 mg/dL, high-density lipoprotein cholesterol level <40 mg/dL in men and <50 mg/dL in women, and fasting plasma glucose level of ≥ 100 mg/dL.⁴ People with cognitive deficits and illness likely to lead to death within the next 6 months were excluded. The participants were patients at an academic medical center's primary care clinic enrolled in the health care system's program that identifies patients who are willing to be contacted directly about research studies. To identify potential participants, a list of people who met the medical inclusion criteria within the past year was generated based on medical records. Next, this list was screened based on electronic medical record reviews to confirm and look for detailed medical inclusion and exclusion criteria. From the list of medically eligible patients (n = 83), we sent opt-out letters to 73, based on having complete contact information. As these interviews were conducted by phone, the remainder of the recruitment was also done by telephone. Of those who were sent letters, we

were able to reach and screen 32 on the phone. The participants had to be suboptimally adherent to physical activity recommendations (150 min of moderate-vigorous physical activity in the last or typical week²⁹) as measured by the International Physical Activity Questionnaire-Short Form,³⁰ administered as a phone screen. Of those screened, 27 were eligible, and 23 were interested in proceeding. We scheduled 23 interviews and had 2 dropouts, leaving 21 completed interviews. We completed interviews until reaching thematic saturation within each gender stratum. All participants read and signed an informed consent form. The study procedures were approved by the Partners Healthcare System's institutional review board. The study was registered at clinicaltrials.gov (NCT#03160755) on May 19, 2017.

Data Collection

Participant Characteristics and Baseline Assessments.—The demographic and medical data were obtained at enrollment via self-report and electronic medical record review. Prior to the qualitative interview, the participants completed self-report assessments and sent them back by mail. The responses were not seen by the interviewer prior to the interviews. We obtained self-report data to augment the interview content. The self-report questionnaires measured the following psychological constructs: dispositional optimism using the 6-item Life Orientation Test-Revised,³¹ in which higher scores indicate higher levels of dispositional optimism; positive affect using the 10 positive items (eg, energized, interested) of the Positive and Negative Affect Schedule³²; and health-related quality of life using the 12-item Medical Outcomes Study Short Form-12.³³ A depression and anxiety measures, the Hospital Anxiety and Depression Scale,³⁴ were completed with the principal investigator (RM) on the phone at the time of the interview in order to discuss elevated scores with patients and determine if additional follow-up or a referral might be needed. All of these self-report measures have been previously administered in phone-based studies.^{35,36}

Qualitative Interviews.—A clinical psychologist (RM) completed all interviews by phone from June to November, 2017. Telephone-based interviewing is considered to be a valuable method of conducting qualitative research.³⁷ A semistructured interview guide was developed based on the study aims, prior qualitative research investigating psychological constructs in the context of chronic illness,³⁶ and input from local qualitative research experts. The interviewer asked about various experiences with their symptoms and addressed the following 6 separate domains: (1) MetS health concerns, (2) emotions related to health conditions, (3) emotions related to physical activity and diet behaviors, (4) barriers and facilitators to physical activity and healthy eating, (5) social and environmental supports for health behaviors, and (6) lifestyle intervention program preferences. See Appendix for sample questions. The participants were asked for additional information (probes) about their specific positive emotions or moods when necessary. The participants completed hour-long interviews, which were audiotaped, transcribed, and reviewed by the principal investigator for completeness. The interviews continued until thematic saturation was reached (the point at which no new data emerged), which determined the sample size.³⁸ The participants were paid \$100 to complete the interview and surveys.

Analysis

Qualitative Analysis.—Transcribed interviews were uploaded into NVivo 11 (QSR International Pty Ltd, Melbourne, Australia) for content analysis. A coding framework was developed prior to analysis, with input from a qualitative research expert (EP), generated based on the participants' answers using directed content analysis following the Consolidated Criteria for Reporting Qualitative Research framework.³⁹ Directed content analysis is commonly used for examining patient experiences. It allows for themes that emerge in the data within a framework derived from preexisting literature and theory.^{40,41} Coding was completed using a hybrid of inductive and deductive methods: the codes were originally developed based on existing literature, and additional emergent themes were drawn from the raw data. Each interview was coded by 2 different raters using the codebook. The interviews were coded independently by the principal investigator and trained bachelor's-level research assistants, with oversight by the principal investigator between March 2018 and February 2019. Weekly rater and principal investigator meetings were held to discuss emerging themes and adjudicate discrepancies. Discrepancies were resolved using transcript review and discussion to come to a consensus, with adjudication by the principal investigator or a qualitative research expert (EP) as needed. This analysis draws themes from 2 of the interview's distinct domains, as the other domains are beyond the scope of this paper. It focuses on the following 2 broad categories: (1) positive psychological constructs associated with physical activity and their bidirectional relationships and (2) perceptions of the benefits, barriers, and facilitators of physical activity. Within these domains, there were 5 primary themes in the codebook, each with between 5 and 8 subthemes. A kappa was calculated based on the coding agreement for the interview sections used in this paper ($k = .87$).

Descriptive Statistics Analysis.—Descriptive statistics (mean, SD, frequencies, and ranges) were calculated to describe the population's demographics, medical conditions, physical activity, and psychosocial scales. The participants' reported priority health behavior (diet or physical activity) was tabulated.

Results

Participant Characteristics

There were 21 complete phone interviews. Most participants were white (95.2%) and female (61.9%), with a mean age of 63.1 years (SD = 9.7) (Table 1). All participants were overweight or obese (body mass index range: 28.6–39.5), with a mean body mass index of 33.5 (SD = 2.8). Of the remaining MetS components, 90.4% of the participants had hypertension, 90.4% had hyperlipidemia, and 66.7% had insulin resistance. On average, the participants reported engaging in 116.2 minutes of moderate-vigorous physical activity per week. When asked to choose a priority health behavior between physical activity and diet, 14 participants (66.7%) chose physical activity and 7 chose diet (33.3%). A minority of the participants had depression (14.3%) or anxiety disorders (19.0%) documented in their electronic medical record. The participants scored moderately high on optimism, with a mean Life Orientation Test-Revised optimism score of 11.4 (SD: 2.4) and positive affect with a mean Positive and Negative Affect Schedule positive score of 35.0 (SD: 3.8). Both

scores were higher than the general population norms (8.5 for Life Orientation Test-Revised⁴² and 31.3 for Positive and Negative Affect Schedule⁴³) (Table 2), indicating that this sample had higher than average optimism and positive affect. Table 2 describes the positive psychological constructs and measures used.

Qualitative Outcomes

Positive Psychological Constructs Associated With Physical Activity.—The participants shared their perceptions of the relationships between positive psychological constructs and physical activity. Overall, the participants frequently stated their perception that physical activity led to many positive psychological constructs in a temporal or direct fashion (eg, exercise makes one feel better). Both spontaneously and with additional probing, some, but not all, participants also thought that positive psychological constructs led to physical activity.

Directionality: Physical activity leads to positive psychological constructs. There was a clear preference for directionality: the participants readily named the positive psychological constructs that they felt after or because of engaging in physical activity. Among the most commonly stated positive psychological constructs were perceptions of positive affect (feeling good/better), enjoyment, feeling energized, relaxed, accomplished/proud, and determined. For the theme of positive affect (feeling good or better after physical activity), one example quote is “I’m definitely in a better mood when I’m engaged in a physical activity and then for a short period of time thereafter. [. . .] I’m more positive. I’m a clearer thinker” (54-y-old male). The theme of feelings of enjoyment after exercise is represented by a quote by a 67-year-old female: “Yeah, if I would, let’s say, start walking, then I would look forward to doing it and enjoy it.” Energized was another common theme, for example, “I feel better. I have more energy. Able to do more things. Keep up with my young grandchildren.” (72-y-old female). The participants also noted feeling relaxed after physical activity, for example, “Perhaps, what I like about the way I feel is, after I do a good bit of exercise, I’m very relaxed” (59-y-old female). For the theme of accomplishment or pride, a 76-year-old female stated, “Because when you do the physical activities, afterwards, you have a sense of satisfaction. I did it. Good. I can check that box off.” Finally, determination was a commonly stated theme, as summarized by a 61-year-old male: “When they ask you, ‘What are your goals?’ This is basically my answer, to get back to the point where I’m able to run, dribble, and everything. [. . .] Everybody thought, ‘You’re going to do what?’ [. . .] because I hadn’t skated in about 10 years”. Examples of additional illustrative participant quotes for each theme are presented in Table 3. Our findings confirmed prior research that has shown a clear direction of physical activity leading to positive emotions.⁴⁴

Directionality: Positive psychological constructs lead to physical activity. When asked specifically about directionality (do positive constructs lead to physical activity), the participants less frequently drew the link in this direction, but when they did, they noted the role of positive psychological constructs in initiating or maintaining physical activity. Many of the perceived positive psychological constructs that helped with initiation or maintenance of physical activity were the same as those that were perceived to result from physical activity, including positive affect/mood, energy, and determination or optimism.

Positive affect or broadly feeling good was frequently noted to lead to more activity; for example, a 47-year-old male stated, “I’d say when my moods are positive, there’s more physical activity going on. [...] So yeah, I think more physical activity is warranted or happens when we’re in good moods.” The role of *connectedness* leading to more activity was also a clear theme, for example, “But just talking to humans, being in a human environment might be nice. And I think that exercising can do that too if people do it as a group” (72-y-old female). Some participants perceived that having *energy* helped with exercising: “When you’re positive, you’re more active to go into exercise in full-force” (72-y-old female). *Determination and optimism* were often mentioned together as positive emotions that preceded physical activity, particularly as related to meeting goals. A 64-year-old male summarized this theme with the quote, “Well, I think optimism is when you go and you’re going to say you’re going to beat this thing and you’re going to do something about it [physical activity]. [...] You get motivated by knowing you have this, which kind of gives you determination. And you’ve got optimism that you’re going to beat it.” The participants noted the reinforcing nature of the positive psychological constructs leading to continued physical activity. Positive reinforcement was associated with physical activity, with a clear preference for this direction: “I mean, anytime we’re doing a lot of something that’s positive and healthy, then it does have an effect of reinforcing that and doing more of it” (59-y-old male). Though it was expected that more themes would emerge in this direction, the findings suggested that this direction was more difficult for people to describe, and there was a clear ease of describing the direction of physical activity leading to positive psychological constructs. Examples of additional illustrative participant quotes for each theme are presented in Table 4.

Motivation, Facilitators, and Barriers for Physical Activity

Motivation and Facilitators

The participants were readily able to identify motivation and facilitators for physical activity. The main themes identified for motivators or facilitators of physical activity largely echoed earlier themes of positive psychological constructs, for example, health or longevity, physical independence, and positive emotions. For quotes supporting each theme, see Supplementary Table 1 (available online). Many participants noted that the overall health benefits, including physical independence in the context of aging, were primary motivators. The emotional benefit of feeling relaxed was also noted as a motivator, as it was also found to be a positive result of physical activity. Social support, as related to motivation and accountability, and being part of a group, was a key facilitator in this population. Several male participants noted that spousal/partner support was critical to their physical activity. Additional social and physical resources, including personal trainers, physical activity locations (eg, a gym), and neighborhood built environment (eg, sidewalks, aesthetics) were also noted as facilitators. These motivators were all noted as being very important to the participants, even when the same participants were not able to meet their activity goals.

Barriers

The participants noted many barriers to completing their desired or recommended physical activity. While practical barriers, such as lack of time and resources, were frequently

mentioned, they are well-known in the literature.^{45,46} Therefore, these findings focus on specific emotion-based barriers, which are less well-studied. See Supplemental Table 2 (available online) for quotes supporting the identified barriers. Within emotion-based barriers, the participants cited a perceived lack of what they referred to as “willpower” as their primary challenge. In this category, there was frequent use of negative language. Finding the motivation to begin or maintain an exercise program was also a common concern, a theme that was also frequently paired with the perception of low self-efficacy. Lack of social support also came up as a barrier, as a negative correlate to the social support facilitator above. Overall negative emotions, including stress, emerged as additional barriers. Between perceived lack of willpower and stress related to competing time demands, these emotion-based barriers elicited additional negative emotions like guilt associated with not completing physical activity.

Discussion

In this qualitative study, we explored perceptions of the roles of positive psychological constructs in physical activity, along with motivators, facilitators, and emotion-based barriers of activity in people at high risk for cardiometabolic disease. The participants were eager to describe their goals and challenges related to taking care of their health, specifically their physical activity. We found that, in this overweight, older, low-active sample, most participants chose physical activity as their priority health behavior and noted many benefits of activity related to their emotional and physical health. The participants named specific, nuanced positive psychological constructs derived from physical activity, such as enjoyment, increased energy, relaxation, determination, and pride. Some participants were also able to find that increased positive psychological constructs helped them begin or reinforce existing physical activity, though perceived associations in this direction were less readily accessible. Motivators and facilitators focused on several similar positive psychological constructs around health and mental health benefits and social support. Barriers to activity were also prevalent and salient, including negative emotional factors, such as low self-efficacy, difficulty initiating motivation, and stress.

Research clearly shows that physical activity reduces depression and anxiety symptoms.²¹ However, it is less well known how emotions and cognitions, particularly different types of positive psychological constructs, might contribute to health behaviors such as physical activity. Studies that have looked at the role of positive emotions in physical activity have shown several related findings: positive affect and enjoyment predict physical activity more than cognitive or attitudinal intentions to exercise.^{11,23} Positive emotions experienced during physical activity predict future activity (but positive affect after activity does not),⁴⁷ and positive affect and physical activity are positively correlated (meta-analysis $r = .42$).²⁴ The *upward spiral theory of lifestyle change* and the *broaden-and-build theory* suggest that positive emotions experienced during physical activity can increase people’s repertoire of resources, coping, and problem-solving strategies. From a health behavior perspective, increasing the frequency of experienced positive emotions during a health behavior may promote healthy changes and reinforce conscious and nonconscious motivation to sustain behaviors such as physical activity.²² Furthermore, increased salience of the positive emotions gained from a health behavior can lead to increased motivation and behavior.²⁰

The findings presented here, combined with these theories, suggest that positive psychological constructs, like optimism, motivation, reinforcement, and enjoyment, can create a cycle that promotes health behaviors, like physical activity. These mechanisms and bidirectional relationships will form the basis of hypotheses that will be tested in future studies.

The positive psychological constructs found in this study largely concur with prior research on the well-being outcomes of physical activity, positive affect, and aging.^{48,49} However, while most research has investigated well-being or psychological health as a broad construct, there has been less of a focus specifically on different types of positive psychological constructs, which can each influence behavior and health outcomes.^{36,50} While this nascent body of literature points to relationships, even temporal relationships, between positive affective states and physical activity, less is known about whether interventions to increase specific types of positive constructs, particularly those found in the present study, might, in turn, increase physical activity.

From the second qualitative aim of investigating perceptions of the motivators, facilitators, and barriers of physical activity, we found that people were readily able to identify each of these factors, and they provided a nuanced view of their interrelationships. The barriers found here are in line with other studies' findings about barriers to physical activity, among which, self-efficacy, motivation, time, and social support are common in older adults.⁵¹ Fortunately, most of the barriers cited may be overcome using targeted patient-centered intervention strategies ranging from increasing motivation to finding resources like social support.^{7,25,28,52,53} The facilitators were often correlates of the barriers, like social support for physical activity.⁵⁴ Among women, having an activity partner or group was a strong facilitator, and among men, their wives or partners were highly motivating. Social support appears to facilitate activity independently, as well as through increased self-efficacy and outcome expectations, both of which can help older adults adhere to physical activity recommendations.⁵⁵

Health behaviors like physical activity are essential for reducing cardiometabolic risk and the development of chronic diseases such as T2D and CVD.⁵³ The literature on the determinants of physical activity in this population is limited, but appears to be similar to those of the general population, for example, individual, social, environmental, and policy factors.⁴⁵ While strategies to increase physical activity among older adults and those at risk for chronic diseases exist,⁵⁶ the low prevalence of adequate physical activity and high prevalence of sedentary time within people at high risk⁵⁷ indicate that improved physical activity intervention studies are needed.⁵⁸

Limitations

This study's aims were to explore health behaviors in this population and to inform a future intervention. The interview questions focused on positive psychological constructs and health behaviors, which may lead to reflexivity, or the chance of finding the expected associations.⁵⁹ However, to offset this risk, a multidisciplinary team designed the interview, coding guide, and analysis. There were unexpected findings, including the participants' strong preference for physical activity improvement (eg, over diet), their relative ease of

discussing the emotional sequelae of physical activity, and their high levels of health literacy (all participants were aware of changes they could make to improve their health). This sample was higher than average on optimism and positive affect; however, it was still less common that participants mentioned the role of positive constructs promoting physical activity compared with the opposite direction. This speaks to a potentially more challenging experience eliciting positive emotions in the general population. These unexpected findings helped to reduce concerns of bias or reflexivity.

Future Directions

These exploratory findings suggest that there could be a benefit to developing an intervention to increase positive psychological constructs, such as the ones found in this study, to determine whether there is a relationship with increased physical activity. The next steps will be a proof-of-concept trial of a positive psychology and physical activity intervention adapted to the needs of individuals at high risk for chronic diseases.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

This work was supported by grant K23HL135277 to Dr. Millstein from the National Heart Lung and Blood Institute, National Institutes of Health. Time for scientific input and editing was provided to Dr. Huffman by grants 1-17-ICTS-099 from the American Diabetes Association and R21DK109313 from the National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health. Funding for study design, mentorship, and editing was provided to Dr. Park by grant NIH/NCI K24CA197382.

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Table 1

Baseline Characteristics and Psychological Assessments (n = 21)

Characteristics	N (%) or (mean [SD])
Demographic variables	
Age, y	63.1 (9.7)
Women	13 (61.9%)
Race: white	20 (95.2%)
Ethnicity: Hispanic or Latino	1 (4.7%)
Education: college or higher	16 (76.2%)
Marital status: married	15 (71.4%)
Priority health behavior: physical activity	14 (66.7%)
MVPA minutes/week	116.2 (55.1)
BMI (range: 28.6–39.5)	33.5 (2.8)
MetS components	
Hypertension	19 (90.4%)
Hyperlipidemia	19 (90.4%)
Insulin resistance	14 (66.7%)
Taking metformin	4 (22%)
Psychiatric conditions (by chart review)	
Depression	3 (14.3%)
Anxiety	4 (19.0%)
Psychosocial variables	
Optimism (LOT-R; range: 6–15)	11.4 (2.4)
Positive affect (PANAS; range: 26–41)	35.2 (3.8)
Mental health-related quality of life (SF-12 MCS; range: 0–100)	48.5 (8.9)
Physical health-related quality of life (SF-12 PCS; range: 0–100)	46.4 (9.7)

Abbreviations: BMI, body mass index; LOT-R, Life Orientation Test-Revised; MCS: Mental Health Composite Score; MetS, metabolic syndrome; MVPA, moderate-vigorous physical activity; PANAS, Positive and Negative Affect Schedule; PCS, Physical Health Composite Score; SF-12, Medical Outcomes Study Short Form-12.

Table 2

Measures and Definitions of the Positive and Negative Psychological Constructs Used

Positive and negative psychological constructs	Measure	Description of measure	Sample items
Optimism: positive expectation about the future	LOT-R ³³	The LOT-R is a well-validated 6-item instrument used to measure dispositional optimism (range: 0–24). Higher scores indicate higher levels of dispositional optimism.	“In uncertain times, I usually expect the best.” (1 = I disagree a lot; 2 = I disagree a little; 3 = neutral; 4 = I agree a little; 5 = I agree a lot)
Positive affect: experiencing positive emotions	PANAS ³⁴	The widely used PANAS asks about 10 positive characteristics to measure positive affect (range: 10–50). Higher scores indicate higher levels of positive affect.	“Indicate the extent you have felt this way over the past week: Active, Excited, etc.” (1 = very slightly; 2 = A little; 3 = moderately; 4 = quite a bit; 5 = extremely)
Health-related quality of life: an individual’s perceived mental and physical health	SF-12 ³⁵	The SF-12 is used to measure health-related quality of life with 2 subscales: the Mental Composite Score and Physical Composite Score (range: 0–100 each). Higher scores indicate a higher level of health-related quality of life.	“In general, would you say your health is excellent, very good, good, fair, or poor?” (1 = excellent; 2 = very good; 3 = good; 4 = fair; 5 = poor)
Anxiety and depression	HADS ³⁶	The Hospital Anxiety and Depression Scale is used to measure depression and anxiety in people with medical symptoms. Higher scores (range: 0–14 each) indicate greater levels of anxiety and depression.	“I feel tense or ‘wound up.’” “I still enjoy the things I used to enjoy.” (3 = most of the time; 2 = a lot of the time; 1 = time to time, occasionally; 0 = not at all)

Abbreviations: HADS, Hospital Anxiety and Depression Scale, LOT-R, Life Orientation Test-Revised; PANAS, Positive and Negative Affect Schedule, SF-12, Medical Outcomes Study Short Form-12.

Table 3

Additional Quotes of Themes Supporting the Direction of Physical Activity Leading to Positive Psychological Constructs

Themes: positive psychological constructs	Quote
Positive affect	“Well, if I exercise, I’m much more positive. If I don’t exercise and I’m lazy, it bothers me. You know, it does. Definitely.” (70-y-old male)
Enjoyment	“It might not be feeling good, or I’m just not motivated, but then when I get out there like 9 times out of 10, I just totally enjoy it. And I enjoy it so much that I’m not like one of these people who put headphones on because I think it’s distracting. I just like to enjoy the movement and the feelings that go along with the movement.” (62-y-old male)
Energized	“I did more physical activity just because the world was before me, and with enough energy and enough determination, you could really accomplish a lot.” (54-y-old male)
Relaxed	I feel so good when I walk [...]—especially when I walk on my lunch hour. I leave that stress behind, I walk, I come back in. It’s like a new day to take on the afternoon.” (66-y-old female)
Accomplished	“Physical activity makes you feel good afterwards because you’ve accomplished something. [...] No, probably afterwards or during.” (76-y-old female)
Determination	“So I love physical exercise. Is there anything I’ve learned? Well, a couple things I’ve learned is that I can do it because I did it. [...] It’s just you have to do it, and I guess that’s about it.” (70-y-old male)

Table 4

Additional Quotes of Themes Supporting the Direction of Positive Psychological Constructs Leading to Physical Activity

Themes: positive psychological constructs	Quote
Positive affect	“But then I walk. See, if I walk every day, I’m golden.” (76-y-old female)
Energized	“So sometimes, you try to reach more goals than you thought you were going to do. Once you get going. And then you feel, ‘All right. I did that much.’ That’s good.” (69-y-old female)
Connectedness	“But when it’s positive, my mood is great, running around with the kids. We’re obviously doing more physical things, running around, riding bikes, swimming in the pool.” (47-y-old male)
Determination and optimism	“[...] I did more physical activity just because the world was before me, and with enough energy and enough determination, you could really accomplish a lot.” (54-y-old male)
Positive reinforcement	“I feel like you always-- it’s a cliché, like you always feel better when you go to the gym [...]. And in particular, the things that I do like when I swim in the mornings, and then walk to work, I just feel stronger and my muscles feel less tense.” (39-y-old female)