Physical Activity

The Science of Resilience

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Definition

According to Shepard (2003), "physical activity comprises all types of muscular activity that increases energy expenditure substantially" (p. 197). This broad definition includes household chores and other routine activities which may be a significant source of energy expenditure but are often overlooked. Exercise is also included as a subset of physical activity but is defined as a regular and structured activity preformed deliberately and with a purpose, such as health improvement (Shepard, 2003). The distinction is sometimes made between leisure-time physical activity (exercise) and non-leisure time physical activity (e.g., chores, workplace activity, transportation). While many studies look at both types of physical activity (c.f. Clarke et al., 2005; Heberg & Tone, 2014), Pickett et al. (2012) found that in their study of middle-aged adults from the U.K., only leisure-time physical activity, or exercise, was associated with decreased depression symptoms.

There is some agreement on the recommended amount of exercise. The World Health Organization (WHO) recommends "adults aged 18-64 should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week" and that "aerobic activity should be performed in bouts of at least 10 minutes duration" (WHO, 2020). In line with this, Clarke et al., (2019) define healthy exercise for older adults as 150 or more minutes of exercise a week. Gerber et al. (2012) and Moljord et al. (2014) use the recommendation of 30 minutes or more of moderate physical activity for 5 or more days a week, or 20 or more minutes of vigorous activity for 3 or more days a week, from the Behaviour Risk Factor Surveillance System report from the Centers for Disease Control and Prevention (2002). The United States Department of Agriculture (2015) Dietary Guidelines agrees that adults and older adults should ideally engage in 150 minutes a week of moderate-intensity physical activity or 75 minutes of vigorous activity. They also suggest children and youth aged 6 to 17 years old engage in 60 minutes or more of moderate to vigorous physical activity a day and should include vigorous activity at least 3 days a week.

Relationship to Resilience

Beyond the obvious health benefits, physical activity has been shown to improve mental well-being and contribute to resilience in the face of adversities such as, youth disfranchisement, mental health disorders, cancer, and the health challenges associated with aging. The association between resilience and physical activity has been found from adolescence to the elderly, and in various countries.

The association between physical activity and resilience and mental health has gained attention in recent years. In a longitudinal study in the U.K., Kandola et al. (2020) measured adolescents' physical activity and sedentary behaviours at age 12, 14, 16, and 18 using

accelerometers for an objective measure of physical activity. They found that sedentary behaviours increase throughout adolescence, displacing light activity, the decrease of which is associated with depressive symptoms at 18 years of age (Kandola et al., 2020). In 1,100 adolescents (mean age = 15.64, SD = 1.74) from urban areas in Norway, Moljord et al. (2014) found a strong association between physical activity and resilience that differed slightly by gender. Physical activity was significantly and positively associated with the social competence and structured style subscales of the resilience measure. Girls showed a significant, positive correlation between physical activity and person competence and a significant, negative correlation between physical activity and depression. Boys showed a significant, positive correlation between physical activity and social resources. There was no significant association between physical activity and depressive symptoms for boys; however, there was an interaction effect between physical activity and the structured style resilience subcategory for boys, dependent on the level of physical activity. Moljord et al. (2014) suggest that the combination of being well-organized and physically active is associated with fewer depressive symptoms in boys.

In a similar study in Switzerland, Gerber et al (2012) looked at the association between physical activity and "mental toughness," defined as, "an individual's natural or developed capacity to be consistently successful in coping with the stress and anxiety associated with competitive and stressful situations" (p. 35). Mental toughness is primarily a sports-specific construct; although different from resilience, Gerber et al. (2012) describe mental toughness as a potential resilience resource. Gerber et al. (2012) found that self-reported vigorous and moderate physical activity was positively related to mental toughness in 283 high school students (mean age of boys in sample = 19.05, SD = 5.0; mean age of girls = 17.83, SD = 3.57), and that those who reached the recommended levels of physical activity had relatively high mental toughness. This relationship has also been found in Chinese adolescents; Ho et al. (2015) found that physical activity was significantly correlated with resilience, self-efficacy, and mental well-being in 775 grade 7 and 8 students (mean age = 12.28, SD =0.77) from 12 schools in difference socioeconomic areas of Hong Kong. Resilience was the only significant mediator between physical activity and mental well-being, accounting for 60% of the relationship; Ho et al. (2015) suggest that remaining 40% may be due to biological mechanisms. This study also found slight gender differences, where the direct association between physical activity and mental well-being was stronger in girls than boys; additionally, girls reported lower physical activity levels (Ho et al., 2015). These gender differences are important as many studies have found that girls are less physically active than boys (Kandola et al., 2020; McKenzie et al., 1996; Moljord et al., 2014) and that they tend to score higher on measures of depression (Moljord et al., 2014); thus, physical activity could be an important support for adolescent girls.

The relationship between physical activity and resilience continues into adulthood. In a sample of 135 students, aged 18 to 49 (mean age = 21.71, SD = 4.94; 71.1% women) from an Australian university, Lines et al. (2018) found that "higher levels of resilience resources were associated with higher levels of physical activity " (p. 13). Specifically, hope and general self-

efficacy had moderate, positive associations with vigorous physical activity; and one's ability to "bounce back" from adversity, as measured by the Brief Resilience Scale, had a significant, positive association with walking activities. Lines et al. (2018) also found a small association between physical activity and perceived and objectively measured stress, suggesting that greater amounts of physical activity can help reduce stress.

Beyond general stress, physical activity has shown great promise for increasing one's resilience against depression and anxiety symptoms. In a large review of systematic reviews, Ströhle (2009) found that cross-sectional studies have consistently shown associations between physical activity and better mental health or lowered depression and anxiety in adolescents, undergraduates, elderly adults, and the general population in American, Canadian, and European samples. These associations are further supported by a handful of longitudinal studies (Ströhle, 2009). From an intervention standpoint, studies have shown that exercise training is as beneficial as cognitive therapy or antidepressant medication for depressed patients and has strong effect sizes when compared to no-treatment control conditions (Ströhle, 2009). The most common exercise training programs involve aerobic exercise such as walking or jogging programs, or nonaerobic exercise including resistance training, weightlifting, coordination, and flexibility training. Ströhle (2009) suggests that knowing the mechanisms by which physical activity effects depression symptoms could improve physical activity interventions further. Pickett et al. (2012) found that exercise was significantly associated with less depression and that an increase in pleasant affect and a decrease in negative affect partially mediated the relationship. Furthermore, physical activity self-efficacy mediated the relationship between exercise and depression through increases in positive affect; thus, Pickett et al. (2012) recommend that exercise intervention focus on activities participants will enjoy and that could increase their self-efficacy through feelings of mastery.

Ströhle (2009) reports finding less studies on the effect of physical activity on anxiety disorders, possibly due to the large clinic diversity of anxiety disorders. While some studies caution that exercise could induce panic attacks or increase subjective anxiety in patients with panic disorder, in a review of randomized control studies, the effect size of an exercise training program compared to waitlist control was large (0.94-0.99; Ströhle, 2009). LeBouthillier and Asmundson (2017) implemented an aerobic exercise program and resistance training program intervention for 48 adults diagnosed with an anxiety-related disorder, including panic disorder, social anxiety disorder, generalized anxiety disorder, and PTSD. They found that, "aerobic exercise improved general psychological distress, anxiety, and stress; while resistance training improved disorder-specific symptoms, general psychological distress, anxiety sensitivity, distress tolerance, and intolerance of uncertainty" (LeBouthillier & Asmundson, 2017, p. 50). Further studies find that in those with trait anxiety, exercise can reduce anxiety symptoms (Ströhle, 2009) and improve one's self-perceived resilience (Hegberg & Tone, 2014).

Physical activity has also been shown to provide resilience in cancer patients. Matska et al (2016) note that, "for adult cancer patients, resilience is described as a dynamic process of

facing adversity related to a cancer experience" (p. 2) and that higher resilience can influence how patients appraise their symptoms and thus ease their "symptom burden." In a sample of 343 adults (mean age = 58, SD = 14.4) diagnosed with cancer and undergoing chemotherapy, radiotherapy, or chemo-radiation at the Vienna General Hospital in Austria, Matska et al. (2016) found that a higher activity level correlated with higher resilience.

Physical activity can also increase older adult's resilience. Clark et al. (2019) define resilience as "the capacity to overcome an adverse event and return to a previous level of function" (p. 863); older adults may face adverse events such as illness, hospitalization, or other health setbacks that impact their desired health behaviours. Clarke et al. (2019) propose the idea of a "resilience repertoire," a supply of skills and resources that older adults can draw on to reduce the negative consequences of adversity. The repertoire consists of two broad categories of skills: the first being health-related, including health status, nutrition, medication compliance, and physical activity, and the second being social and economic resources (Clarke et al., 2019). Physical activity was associated with resilience, in Clarke et al.'s (2005) sample of 1,274 older adults (mean age = 75.4, SD = 6.6). Hogan (2005) similarly notes the importance of resilience in the elderly population and found in his review that physical activity levels are associated with cognitive resilience and the maintenance and resilience of the central nervous system, cardiovascular system, and musculoskeletal functioning in older adults. Hogan (2005) further finds that physical activity can reduce depression and anxiety, and that aerobic walking programs have shown improvements in subjective well-being in elderly samples.

Physical activity can offer further protection from adverse mental health in later life. Hall et al. (2016) looked at older, U.S. veterans with posttraumatic stress disorder (PTSD). There is a strong association between PTSD and negative health behaviours which contributes to a higher likelihood of being overweight or obese and poor chronic disease management. Hall et al. (2016) identify physical activity as a resource that could address both the somatic and psychiatric comorbidities and symptoms of PTSD. In a sample of 302 U.S. veterans, aged 60 to 89 (mean age = 67) in the obese range, including a subsample of 67 participants with PTSD, Hall et al. (2016) implemented a 12-month physical activity intervention. They found that, for those in the intervention group, self-reports of health-related quality of life improved significantly overtime, including measures of emotional health, vitality, and mental health compared to the care-as-usual control group (Hall et al., 2016). The subsample of participants with PTSD responded to the intervention the same as participants without PTSD, showing larger gains in physical functioning and vitality (Hall et al., 2016). Thus, physical activity is protective to the usual challenges of aging, and for those with additional mental health adversity.

Interventions

Interventions for Adolescents

Engagement in sports and other physical activities are thought to help tackle youth disaffection and disengagement from education. In recent years, it has become a common idea that sports encourage moral and social responsibility, pro-social behaviours, and respect for others. Sport has been proposed as a form of positive youth development for these reasons (Armour et al., 2013).

Increasing young people's physical activity can be targeted through two main pathways: after-school programs or school-based PE enhancements.

After-School Programs

After school programs are a promising way to increase physical activity in young people by giving them additional time and opportunities to be active, as well as fostering cooperation and socialization (Armour et al., 2013; Pate & O'Neil, 2008). Armour et al. (2013) evaluated two corporate-sponsored initiatives in the U.K. that aimed to use physical activity to re-engage youth in education and promote positive youth development.

The HSBC/OB project ran for 5 years from 2003 to 2008 and was a partnership between HSBC in the Community, the Outward Bound Trust, and five schools in London. Teachers recommended pupils to the programme who they deemed to be disaffected, disadvantaged, or disengaged. In each of the 5 years, a cohort of 30 young people from each school (aged 13-14) were selected to take part in the year-long program (a total of 150 pupils each year). The activities were designed to provide individual and group challenges and to develop skills such as team building, communication, and responsibility. The sessions were intended to scale progressively to provide increased opportunities for youth to take responsibility for themselves and others. Participants engaged in fully funded, partially residential outdoor/ adventurous activities such as rock climbing, gorge walking, high ropes courses, caving, sailing, hiking, and rafting. There was also a mentorship component where HSBC staff where trained and acted as mentors to the youth throughout the programme and sometimes continuing after the programme had ended.

The Sky Sports Living for Sport (SSLfS) programme is an ongoing national initiative that began in 2003 and encourages schools to design and run school-led projects with a broad framework developed by the program sponsors, Sky Sport, and organizers, the Youth Sport Trust. Teachers work with their students to select the activities and set individual and group goals. The core aim is to identify pupils who are having problems with one or more aspect of their school life and to facilitate re-engagement in education through physical activity. The activity options are extensive, including traditional sports (e.g. football, basketball, badminton, swimming, and hockey) as well as recreation activities (e.g. yoga, ultimate frisbee, street dance, free running, and skateboarding) and outdoor/ adventurous activities (e.g. rock-climbing, orienteering, canoeing, sailing, and rope courses). SSLfS programmes can last from one term to

one academic year and group sizes vary by school, although groups of 8 to 16 pupils are most common.

The majority of SSLfS and HSBC/OB project participants maintained positive improvements for up to 36 months after programme involvement, based on teacher appraisals. Armour et al. (2013) identified 6 components that led to successful after-school physical activity programmes:

- The selection of pupils that had similar issues and interests so that they could work together. This was done by matching pupils needs with programme objectives, based on teacher experience and expertise.
- The off-site nature of the activities was identified as a significant engaging and motivating feature, the authors suggest this was especially true with the pupil's disadvantaged background which meant they had rarely, if ever, been away from home.
- Giving the young people a sense of belonging and ownership in the programmes by involving them in key decisions
- Establishing positive relationships with programme leaders, teachers, mentors, and other pupils – an important point of this was that after the programme ended, the adults maintained contact with the youth, giving them sustained support
- Teamwork and meeting kids from other schools, cultures, and backgrounds, working with and for other young people
- Need for sustained involvement after the programme had ended. Those who progressed to later stages of the HSBC/OB project or who went on to engage with alternative programmes, initiatives, or activities sustained their positive development

Pate and O'Neil (2008) conducted a review on the effectiveness of after-school physical activity interventions at improving youth's physical activity. The results were mixed, with most random control trials showing some benefit. In general, after-school programmes were well received by children and parents and had high attendance rates. Some barriers Pate and O'Neil (2008) identified were the cost of traditional fee-based activities for low-income families and the cost/ availability of transportation. Another issue that was not investigated in any of the studies was whether the interventions were successful in creating long-term physical activity behaviours or whether the increases in physical activity stopped once the young people stopped attending the after-school programmes.

One intervention that reappeared in many of the studies Pate and O'Neil reviewed was the Girls health Enrichment Multi-site Studies (GEMS), which specifically targeted African American girls aged 8 to 10 years old, based on the increasing rates of obesity in African American populations.

The Stanford GEMS pilot study (Robinson et al., 2003) involved a 12-week dance after-school programme for 5 days a week. It included 135-minute sessions, where 30-45 minutes were dedicated to dance, the remaining time including an education component, a home TV

reduction component, a healthy snack, and homework time. Twenty-eight girls participated in the intervention. Compared to the control group (n = 33, received educational materials on diet and physical activity), girls in the intervention showed increased trends towards after-school physical activity and reduced TV watching, reporting 12% more time spend in moderate to vigorous physical activity (MVPA) than controls. The Stanford GEMS Phase 2 Obesity Prevention Trial (Robinson et al., 2008) was a two-year culturally tailored dance program involving 261 African American girls, aged 8 to 10 years old. It was offered 5 days of the week for 2.5 hours, consisting of 45-60 minutes of dance lessons, homework time, and a snack. Transportation from the school to the community centre where the intervention took place was provided. The Minnesota GEMS pilot study (Story et al., 2003) was a 12-week after-school dance programme involving 26 African American girls, aged 8 to 10 years old. It occurred 2 days a week for 1-hour sessions, provided physical activity opportunities and taught healthy eating habits. The control group (n = 28) received three monthly meetings that were not related to physical activity or nutrition. Girls in the intervention condition increased their physical activity levels compared to girls in the control group, although the difference was not significantly significant. Girls in the intervention condition also showed increased interest in various physical activities. These targeted physical interventions are important considering the evidence that girls participate in less physical activity than boys.

The CATCH Physical Education (PE) Program

Originally called the Child and Adolescent Trial for Cardiovascular Health (CATCH) and implemented in 56 schools in four cities throughout the U.S., San Diego, California; New Orleans, Louisiana; Minneapolis, Minnesota; and Austin, Texas, in 1996, this intervention is now called the Coordinated Approach to Child Health (CATCH) and has been implemented in 83 schools in the U.S./Mexico border region, and throughout Latin America (Heath & Coleman, 2002; McKenzie et al., 1996; Ribeiro et al., 2010). The intervention includes a cafeteria intervention, a physical education program (CATCH PE), classroom curricula promoting cardiovascular health, a tobacco curriculum and school policy, and a home/family component.

The major components of CATCH PE include: 1) CATCH PE curriculum and materials, 2) teachers training, and 3) on-site consultation to teachers. This intervention package was standardized across implementation sites (McKenzie et al., 1996)

1. PE curriculum materials include the CATCH PE Guidebook, the Activity Box, and supplementary materials
    a. The Guidebook describes the philosophy and goals of the program, makes recommendations for class structure and management and provides sample lesson and unit plans
    b. The Activity Box contains diverse and developmentally appropriate activities, organized into instructional units, such as aerobic games, aerobic sports, jump rope, and rhythmic activities – teachers were encouraged to add their own

activities. Three videotapes, made to support the aerobic dance and aerobic bench units were also provided to the schools

2. Third-grade teachers responsible for PE received a full day of training that included instruction and modelling in both PE curriculum content and pedagogical skills; in subsequent years, fourth- and fifth-grade PE teachers received a full day of training at the start of the school year and a half-day booster at midyear.
3. Following initial training, CATCH PE consultants provided on-site follow-ups approximately every 2 weeks. Consultants gave feedback to teachers, modelled new lesson segments, did team teaching, and provided motivation and technical support.

In the original study, there were 56 intervention schools and 40 control schools monitored for 3 years. McKenzie et al. (1996) reviewed the effects of the CATCH PE program and found that:

- After teacher training, children in intervention schools engaged in more moderate to vigorous physical activity (MVPA) during lessons than those in control schools (39% increase from baseline)
    - Intervention schools met the CATCH goal of more than 50% of PE class time spent in MVPA
- Compared to controls, children in intervention schools had a higher energy expenditure rate per lesson
- Children from intervention schools reported engaging in significantly more vigorous physical activity minutes and MET-weighted vigorous minutes per day than controls
- Boys were more physically active than girls and performed better on the nine-minute run, which is consistent with the literature
    - The authors suggest PE programs could play an important role in reducing gender differences in physical activity; the CATCH program was designed to promote equitable opportunities, but it is not clear if this in-class goal was reached
- "Systematic observations revealed lessons in intervention schools were not only more physically activity but differed from those in control schools on a number of important features. Nearly half of the lessons in this study were taught by classroom teachers, so the intervention was effective for the regular classroom teacher as well as the PE specialist" (McKenzie et al., 1996, p. 430)

From 1997 to 2001, the CATCH program was implemented in 83 schools in the El Paso/ Ciúdad Juárez border region (Heath & Coleman, 2002). The rate of child obesity in this region is twice as high in Hispanic children as it is in Caucasian children; the prevalence of Type 2 diabetes is also especially high in this region, even in children (Heath & Coleman, 2002). In Heath and Coleman's (2002) study, they included 24 elementary schools from West Texas and Eastern New Mexico where the schools had children of predominantly Mexican heritage (75-

98% Hispanic); 4 schools served as control and the other 20 were enrolled in the CATCH program. Heath and Coleman (2002) found that:

- There was a significant increase in PE class time spent in moderate to vigorous physical activity (MVPA) and vigorous physical activity. Most schools met the CATCH goals of 50% or more of class time spent in MVPA; however, they did not reach the goal of 20% or more spent in vigorous physical activity (VPA).
- Some of the challenges to the success of this intervention were a lack of support felt from parents and classroom teachers and prioritization of other school subjects. Classroom teachers felt a lack of support from parents and the administration, a lack of time to include the materials, lack of Spanish translation of the materials, and a pressure to prioritize other subjects.
- The authors stress that when implementing CATCH, the curriculum and materials must be adapted for the specific cultures they will be serving.
    - "For instance, in El Paso, the CATCH curriculum was not implemented and CATCH Home Team materials were not sent home by many teachers because Spanish materials were not available. The EAT SMART manual needed to be translated as well with culturally appropriate food items prepared with low-fat and low-sodium techniques for the Spanish-speaking cafeteria staff in many El Paso elementary schools" (Heath & Coleman, 2002, p. 455).

In Riberio et al's (2010) review of school-based physical activity interventions in Latin America, they found that they CATCH program had been adapted and implemented in low socioeconomic areas of the US/ Mexico border region in 4 schools to 473 students. (Coleman, 2005) and in Sao Paulo Brazil, in 8 public elementary schools to 179 children (Da Cunha, 2002). They found that these studies reported increased levels of physical activity during PE classes, which aligns with the findings of McKenzie et al. (1996) and Heath and Coleman (2002).

Interventions for Mental Health

Knubbed et al. (2007) implemented a 10-day treadmill walking intervention at a university hospital in German. Twenty-eight patients admitted for treatment of a major depressive episode were randomly sorted into either an endurance exercise condition (n = 20; mean age = 49, SD = 13; 9 men and 11 women) or a placebo activity control group (n = 18; mean age = 50, SD = 13; 8 mean and 10 women). The Intervention included:

- Walking on a treadmill daily for 10 days. Participants would walk uphill for 3 minutes in 5 increments, between which they walked at half speed for 3 minutes, for total of 30 minutes daily.
- Using the Borg Rating of Perceived Exertion Scale, the training intensity was rating at somewhat strenuous. Heart rate was monitored during training and as heart rate during exercise decreased due to training adaption, the treadmill elevation was increased to maintain training intensity.

- During training, participants were supervised by instructed study personnel. Interaction was limited to general comments about walking technique and training-related bodily sensations, such as amount of exertion or muscle complaints.

The placebo group did 30 minutes of light stretching and relaxation exercises for 10 days. Each muscle group was stretched for 20 seconds, with resting intervals of 40 seconds between stretching series so that the total activity time was less than 10 minutes daily.

At admission to the hospital, there were no differences between groups on clinical ratings of depression or subjective ratings of depression. The prescribed medication was not significantly different between groups. After 10 days, the exercise group had a substantially greater reduction in depression scores (36%) than the control group (18%; p = 0.01). A clinical improvement response was observed in 13 patients in the exercise group and 4 in the placebo group. Following the intervention, subjective evaluations of depression were more reduced in the exercise group (41%) than in the placebo group (21%; *p* = 0.01). Knubben et al. (2007) suggest that brief, in-hospital, exercise intervention may be effective at quickly reducing depression symptoms in those suffering clinical depression. The short-time frame is important considering that most antidepressants have a latency of several weeks. The authors suggest exercise as a useful intervention to provide support before the full benefits of antidepressant medication is felt.

LeBouthillier and Asmundson implemented two 4-week long exercise interventions, one focusing on aerobic exercise and the other on resistance training, to reduce anxiety. In a sample of 48 individuals in Saskatchewan, Canada, the most prevalent anxiety disorders were panic disorder, social anxiety disorder, generalized anxiety disorder, and PTSD; some had secondary disorders of agoraphobia, specific phobia, or OCD.

- Aerobic exercise condition: n = 23; mean age = 33.0, SD = 8.83; 7 men, 16 women; mean BMI = 27.57, SD = 4.48
- Resistance training condition: n = 18; mean age = 31.39, SD = 9.22; 3 men, 15 women; mean BMI = 28.98, SD = 6.85
- Waitlist: n = 15; mean age = 33.4, SD = 10.36; 3 men, 12 women; mean MBI = 28.03, SD = 8.21

For the intervention groups, exercise was done 3 times a week, for 4 weeks, under the guidance of a personal trainer. Exercise sessions began and ended with 5 minutes of stretching.

- Aerobic exercise condition: participants completed 40 min of aerobic exercise on a spin cycle at 60-80% age-adjusted maximum heart rate reserve
- Resistance training condition: participants completed 2-3 sets of 10-12 repetitions of machine leg press, machine chest press, machine hamstring curl, dumbbell single arm row, machine shoulder press, machine triceps extension, and machine bicep curl

One individual (9%) in the waitlist, 56% of individuals in the aerobic condition, and 100% of those in the resistance training group showed improvements in disorders status. Compared to the waitlist, changes in the aerobic and resistance group were significant. Those with lower fitness levels at baseline saw the greatest reduction in symptoms. Those of average fitness in the aerobic group saw a significant reduction of symptoms over time, but there was no significant reduction in the resistance training group for those of average fitness. “Aerobic exercise improved general psychological distress, anxiety, and stress; while resistance training improved disorder-specific symptoms, general psychological distress, anxiety sensitivity, distress tolerance, and intolerance of uncertainty” (LeBouthillier & Asmundson, 2017, p. 50). The authors interpret their findings to show that aerobic and resistance training are both effective interventions for anxiety disorders, but they are not equivalent and target different anxiety-related symptoms and constructs.

In an extensive review, Ströhle (2009) found that moderate intensity activities such as walking appear to be more successful than vigorous physical activity programs for reducing mental health disorders. He found that most studies have an overall program duration of 8-14 weeks, with 3-4 training sessions per week and a duration of at least 20-30 minutes of physical activity. Ströhle (2009) suggests that an activity diary is included in the intervention and should involve measures of depression and anxiety so that there is direct feedback on the association between exercise and well-being that may enhance adherence to the exercise program. The review found that exercise prescription or reminders in printed form or by computer may be more effective than face-to-face counselling alone. Finally, interventions that target specific groups or are tailored to the individual are more effective than more generic interventions; and disorder-specific information on exercise should be given.

Interventions for Older Adults

The Study of Exercise and Nutrition in Older Rhode Islanders (SENIOR) aimed to encourage older adults to eat a diet higher in fruits and vegetables and to exercise more (Clark et al., 2005). Using the Transtheoretical Model (TTM), the intervention attended to how older adults move through a series of stages in their attempt to change a behaviour, from precontemplation, contemplation, preparation, action, to maintenance of the behaviour. TTM includes an awareness of how decisional balance and self-efficacy are unique between individuals and make each stage different. The intervention was implemented with 1,274 older adults (mean age = 75.4, SD = 6.6; 69.6% women; 76.4% Caucasian; 93% non-smokers).

The intervention was 12-months long to provide a sustained, intensive dose. It was a 2x2 experimental design: 1) exercise intervention only, 2) nutrition intervention focusing on fruits and vegetables only, 3) combined exercise and nutrition intervention, and 4) a control group receiving fall prevention material. Each experimental condition included:

- Manuals: one for each target behaviour, they were organized by stage and strategy within each stage, contained a list of community resources and programs supportive of health behavioural change – distributed at the beginning of the intervention phase
- Newsletters: 82 separate newsletters were developed for exercise and diet containing stage-appropriate information about strategies, suggestions, activities, and resources. Were mailed on a monthly basis, except for the 3 months in which an expert system report was provided
- Expert system assessments and reports: participants were assessed approx. every 4 months by telephone interview to gather data on relevant TTM variables, the expert system report provided normative (compared to persons in the same stage who progressed the most, based on previous pilot research) and ipsative (compared to an individual's previous scores) feedback to encourage continued positive change
- Coaching calls: personal telephone calls to participants by trained behavioural change counsellor to integrate, enhance, and personalize the expert system reports – delivered three times during the 12-month period

The intervention was effective at increasing exercise in those participants in the pre-action stages of change (Clark et al., 2019).

Hall et al. (2016) implemented a physical activity intervention with 302 elderly U.S. veterans in the obese range (aged 60-89, mean = 67; 70% Caucasian), a subsample of them had PTSD (n = 67; aged 60-79, mean aged = 63). The PTSD subsample scored lower on physical health and mental health than the general population, and had poor aerobic capacity for their age; compared to the non-PTSD group, this sample was significantly younger, less likely to be White, and had significantly higher rates of depression. There were four groups: PTSD intervention, no PTSD intervention, PTSD case as usual, and no PTSD care as usual. The intervention was a 12-month, telephone-based counselling trial, designed to help participants reach a long-term goal of engaging in 30 or more minutes of aerobic exercise 5 or more days a week and 15 minutes of lower body strengthening exercises on 3 non-consecutive days each week.

- First, individuals received an in-person consultation with a trained health counsellor during which a progressive 2-week PA prescription was established
- Individuals were given a packet of materials including handouts on health benefits of exercise, tips for exercising safely, a poster with specific exercises, elastic exercise bands of varying resistances, and a pedometer
- The baseline counselling was supplemented with regular telephone counselling every 2 weeks for 6 weeks, followed by monthly calls over a 1-year period

Physical activity significantly increased over time for the PTSD intervention group, from an average of 80 min/ week to 161 min/ week at the 12-month check-in. The PTSD intervention group also showed significant increases in function capacity on the six-minute walking distance

test, a clinically meaningful indicator of physical resilience. Finally, self-reports of health-related quality of life (emotional health, vitality, and mental health scales of the SF-36) and self-reports of physical functioning all improved.

Hogan (2005) proposes Tai Chi as a promising exercise option for older adults, as it combines physical, cognitive, and meditative components which are associated with enhanced system resilience. Tai Chi is classified as a mild to moderate exercise in terms of energy expenditure and cardiovascular gain. Although some Tai Chi forms include strenuous movements, such as long squats, rapid twisting and whipping movements, these are excluding in many of the simplified forms and are less suitable for older adults or those beginning the practice for the first time. In his review, Hogan (2005) found that recent, quasi-experimental studies have found that older adults who practice Tai Chi had better cardiovascular, respiratory, postural, and musculoskeletal function than healthy, non-practicing groups. Experimental studies show that older adults in the Tai Chi condition reported increased self-efficacy and physical functioning and reduced perceived stress, as well as improved resting blood pressure and stress level according to objective bodily measures. Finally, older adults participating in Tai Chi reported finding the practice highly rewarding, positive, and motivating, as well as having a noticeable effect on their life and a sense of having benefitted from it, which Hogan (2005) concludes it important when considering the enjoyment of physical activity. Some studies found that a long period of sustained practice (9 months) was needed to see large, bodily benefits, such as reduced resting blood-pressure (Hogan, 2005); these findings are in line with the previous interventions discussed, which were intensive and sustained over 12-months (Clark et al., 2005; Hall et al., 2016).

Assessment

International Physical Activity Questionnaire

- Developed in Geneva in 1998, pilot testing occurred from 1998-1999.
- There are a variety of versions available (see https://sites.google.com/site/theipaq/questionnaire_links)
    - The Long form (31 items) covers activity domains: occupational, transport, yard/garden, household, leisure, and sitting (Appendix A)
    - The Short form (9 items) has one domain for all activity and one for sitting, and provides information on the time spent walking, in vigorous- and moderate-intensity activity, and in sedentary activity (Appendix B)
    - Telephone and self-administered versions
    - Reference period of “the last 7 days” or “a usual week”
    - The IPAQ had been translated into multiple languages
    - There is an English version for elderly adults and an adolescent version
- The original questionnaires were designed to be used by adults aged 18-65 years old

- Both the Long and Short form questionnaires can be scored to estimate total weekly physical activity by weighing the reported minutes per week within each activity category by a MET energy expenditure estimate assigned to each category
- Reliability and validity studies were carried out in 14 centres in 12 countries (Craig et al., 2003).
    - Reliability was measured over a period of 8 to 10 days
    - Validation of reported activity levels used objective data from accelerometers over a 7-day period
    - Studies were conducted in Australia, Brazil, Canada, Finland, Guatemala, the Netherlands, Japan, Portugal, South African, Sweden, two U.S. sites (San Diego and South Carolina) and two U.K. sites (Bristol and Cambridge).
- The long form IPAQ questionnaire had Spearman correlation coefficients ranging from 0.96 (U.S.) to 0.46 (rural S.A.), but most were around 0.8, indicating very good reliability
- The short form IPAQ questionnaire has Spearman correlation coefficients ranging from 0.25 (rural Guatemala) to 0.88 (U.S. and urban Guatemala), with most about 0.7, indicating good reliability
- The observed concurrent validity coefficients between the short and long forms suggest that they show reasonable agreement. The correlation coefficients for the short and long form total MET-minutes per week was not influenced by reference period (“last 7 days” or “usual week”) and were reasonable for both modes of administration (telephone or self-administered).
- The criterion validity for both the long and short forms show fair to moderate agreement between the self-report questionnaires and accelerometers for both estimated physical activity and sedentary behaviour.
- The short form questionnaire was better received, and nine data collection sites reported a preference for using the “last 7 days” over the “usual week” reference period.
- There is an Adolescent version that has been validated in European countries.
    - In a sample of 2,018 adolescents from the Healthy Lifestyle in Europe by Nutrition in Adolescence (HELENA) study, Ottevaere et al. (2011) found that the IPAQ-A (International Physical Activity Questionnaire for Adolescents) moderately correlated with accelerometer data, and that the IPAQ-A was as able to detect adolescents with the highest cardio respiratory fitness (the most active), as accelerometer data.
- The IPAQ is one of the most widely used physical activity questionnaires. Kim et al. (2013) conducted a meta-analysis of 21 studies using the IPAQ and found it to have good convergent validity in each physical activity category.
- The short form IPAQ was used in Lines et al.’s (2018) study of Australian university students (aged 18-49, mean age = 21.71, SD = 4.94). and Picket et al.’s (2012) study of adults from the U.K. experiencing depression (aged 19-63, median age of 30).

The Global Physical Activity Questionnaire Version 2 (GPAQ-2; WHO)

- The WHO-recommended tool for physical activity surveillance in developing countries (Armstrong & Bull, 2006).
- Described as a "compromise" between the long-from IPAQ (too long and complex) and the short form IPAQ (does not differentiate between activities), specifically for developing countries.
- The first version contained 19-items and was piloted in nine countries (Bangladesh, Brazil, china, Ethiopia, India, Indonesia, Japan, Portugal, and South Africa).
    - The concurrent validity between the GPAQ-1 and IPAQ produced a moderate-to-good correlation coefficient (r=0.54). The concurrent validity of the sedentary question was also good (r=0.65)
    - Pooled criterion validity from pedometer studies for total physical activity was fair (r=0.31) and provided a fair negative correlation for time spent in sedentary activities (r=0.26)
    - Test-retest reliability data produced good-to-excellent results, indicating a high level of repeatability (0.67-0.81)
- The second version (GPAQ-2) has the same structure and domain approach but with 16-items and improved wording (Appendix C)
    - The main outcome variables of the GPAQ-2 are:
        - a categorical variable of total physical activity (low, moderate, high)
        - continuous variable of total physical activity within each domain – work, transport, and leisure – reported as median MET min/week
    - The measure of total physical activity should be comparable with the outcome measure obtained from the IPAQ. Armstrong and Bull (2006) claim the measures are conceptually comparable but structurally different
    - In a further validation study by Cleland et al. (2014), they compared GPAQ-2 measures to accelerometer days for moderate to vigorous physical activity (MVPA), sedentary behaviour, and changes over time in MVPA, in 95 individuals (mean age = 44, SD = 14) from the U.K. They concluded that the GPAQ-2 was a valid measure of MVPA and change in MVPA but less valid for measures of current levels of and change in sedentary behaviour. They suggest the GPAQ-2 is an appropriate measure for assessing interventions aimed at promoting MVPA.
- Used by Hegberg and Tone (2014) in their study of undergraduate students from a university in the Southern U.S.

Other Notes

There is a lot of variation in how physical activity is defined and measured. While Pickett et al. (2012) found that only leisure time physical activity, what Shepard (2003) defines as "exercise", was significantly associated with lessened depression symptoms, there is still

discussion on the importance of including other forms of physical activity and looking at the amount of time spent in sedentary behaviour. Armstrong and Bull (2006) note that many people in developing countries do not have time to engage in leisure time physical activity, and that much of their work and daily activities include a lot of physical activity; while Shepard (2003) makes the point that physical activity in the workplace has drastically decreased in most developed countries. Both the IPAQ and GPAQ-2 include measures of sedentary behaviour, however, not many studies focus on this area when looking at physical activity. Kandola et al. (2020) found that sedentary behaviour increases throughout adolescence and that an extra hour of sedentary behaviour per day was associated with an 8-11% increase in depression score at the end of their 6-year longitudinal study. Thus, there are many ways to look at physical activity in studies that seek to promote wellbeing.

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Appendix A: International Physical Activity Questionnaire (2002) Long Form

Last 7 Days reference period, self-administered format

Retrieved from https://sites.google.com/site/theipaq/

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** and **moderate** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

PART 1: JOB-RELATED PHYSICAL ACTIVITY

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home. Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

1. Do you currently have a job or do any unpaid work outside your home?

☐ Yes

☐ No → ***Skip to PART 2: TRANSPORTATION***

The next questions are about all the physical activity you did in the **last 7 days** as part of your paid or unpaid work. This does not include traveling to and from work.

2. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, heavy construction, or climbing upstairs **as part of your work**? Think about only those physical activities that you did for at least 10 minutes at a time.

_____ **days per week**

☐ No vigorous job-related physical activity → ***Skip to question 4***

3. How much time did you usually spend on one of those days doing **vigorous** physical activities as part of your work?

_____ **hours per day**
_____ **minutes per day**

4. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads **as part of your work**? Please do not include walking.
_____ **days per week**

☐ No moderate job-related physical activity → ***Skip to question 6***

5. How much time did you usually spend on one of those days doing **moderate** physical activities as part of your work?
_____ **hours per day**
_____ **minutes per day**

6. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **as part of your work**? Please do not count any walking you did to travel to or from work.
_____ **days per week**

☐ No job-related walking → ***Skip to PART 2: TRANSPORTATION***

7. How much time did you usually spend on one of those days **walking** as part of your work?
_____ **hours per day**
_____ **minutes per day**

PART 2: TRANSPORTATION PHYSICAL ACTIVITY

These questions are about how you traveled from place to place, including to places like work, stores, movies, and so on.

8. During the **last 7 days**, on how many days did you **travel in a motor vehicle** like a train, bus, car, or tram?
_____ **days per week**

☐ No traveling in a motor vehicle → ***Skip to question 10***

9. How much time did you usually spend on one of those days **traveling** in a train, bus, car, tram, or other kind of motor vehicle?
_____ **hours per day**
_____ **minutes per day**

Now think only about the **bicycling** and **walking** you might have done to travel to and from work, to do errands, or to go from place to place.

10. During the **last 7 days**, on how many days did you **bicycle** for at least 10 minutes at a time to go **from place to place**?
_____ **days per week**

☐ No bicycling from place to place → ***Skip to question 12***

11. How much time did you usually spend on one of those days to **bicycle** from place to place?

_____ **hours per day**
_____ **minutes per day**

12. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time to go **from place to place**?

_____ **days per week**

☐ No walking from place to place → ***Skip to PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY***

13. How much time did you usually spend on one of those days **walking** from place to place?
_____ **hours per day**
_____ **minutes per day**

PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY

This section is about some of the physical activities you might have done in the **last 7 days** in and around your home, like housework, gardening, yard work, general maintenance work, and caring for your family.

14. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, chopping wood, shoveling snow, or digging **in the garden or yard**?
_____ **days per week**

☐ No vigorous activity in garden or yard → ***Skip to question 16***

15. How much time did you usually spend on one of those days doing **vigorous** physical activities in the garden or yard?
_____ **hours per day**
_____ **minutes per day**

16. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, sweeping, washing windows, and raking **in the garden or yard**?

_____ **days per week**

☐ No moderate activity in garden or yard → ***Skip to question 18***

17. How much time did you usually spend on one of those days doing **moderate** physical activities in the garden or yard?
_____ **hours per day**
_____ **minutes per day**

18. Once again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, washing windows, scrubbing floors and sweeping **inside your home**?
_____ **days per week**

☐ No moderate activity inside home → ***Skip to PART 4: RECREATION, SPORT AND LEISURE-TIME PHYSICAL ACTIVITY***

19. How much time did you usually spend on one of those days doing **moderate** physical activities inside your home?
_____ **hours per day**
_____ **minutes per day**

PART 4: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY

This section is about all the physical activities that you did in the **last 7 days** solely for recreation, sport, exercise or leisure. Please do not include any activities you have already mentioned.

20. Not counting any walking you have already mentioned, during the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **in your leisure time**?
_____ **days per week**

☐ No walking in leisure time → ***Skip to question 22***

21. How much time did you usually spend on one of those days **walking** in your leisure time?
_____ **hours per day**
_____ **minutes per day**

22. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like aerobics, running, fast bicycling, or fast swimming **in your leisure time**?
_____ **days per week**

☐

No vigorous activity in leisure time → ***Skip to question 24***

23. How much time did you usually spend on one of those days doing **vigorous** physical activities in your leisure time?
_____ **hours per day**
_____ **minutes per day**

24. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis **in your leisure time**?
_____ **days per week**

☐ No moderate activity in leisure time → ***Skip to PART 5: TIME SPENT SITTING***

25. How much time did you usually spend on one of those days doing **moderate** physical activities in your leisure time?
_____ **hours per day**
_____ **minutes per day**

PART 5: TIME SPENT SITTING

The last questions are about the time you spend sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television. Do not include any time spent sitting in a motor vehicle that you have already told me about.

26. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekday**?
_____ **hours per day**
_____ **minutes per day**

27. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekend day**?
_____ **hours per day**
_____ **minutes per day**

This is the end of the questionnaire, thank you for participating.

Appendix B: International Physical Activity Questionnaire (2002) Short Form

Last 7 Days reference period, self-administered format

Retrieved from https://sites.google.com/site/theipaq/

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?
   _____ **days per week**

   ☐ No vigorous physical activities → ***Skip to question 3***

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?
   _____ **hours per day**
   _____ **minutes per day**

   ☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.
   _____ **days per week**

   ☐ No moderate physical activities → ***Skip to question 5***

4. How much time did you usually spend doing **moderate** physical activities on one of those days?
   _____ **hours per day**
   _____ **minutes per day**

☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

☐ No walking → ***Skip to question 7***

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

This is the end of the questionnaire, thank you for participating.

Appendix C: Global Physical Activity Questionnaire version 2

Armstrong & Bull (2006)

Instructions: I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person. Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. [Insert other examples if needed]. In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.

1. Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like [carrying or lifting heavy loads, digging or construction work] for at least 10 minutes continuously?
   Insert examples and use showcard

   Yes____

   No____ [if no, go to #3)

2a. In a typical week, on how many days do you do vigorous-intensity activities as part of your work?

   Days a week: ____

2b. How much time do you spend doing vigorous-intensity activities at work on a typical day?

   In hours and minutes: ____hrs ____mins

3. Does your work involve moderate-intensity activity, that causes small increases in breathing or heart rate such as brisk walking [or carrying light loads] for at least 10 minutes continuously?
   Insert examples and use showcard

   Yes____

   No ____ [if no, go to #5]

4a. In a typical week, on how many days do you do moderate-intensity activities as part of your work?

   Days a week: ____

4b. How much time do you spend doing moderate-intensity activities at work on a typical day?

In hours and minutes: ____hrs ____mins

The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example, to work, for shopping, to market, to place of worship. [insert other examples if needed]

5. Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places?

Yes_____
No_____ [if no, go to #7]

6a. In a typical week, on how many days do you walk to bicycle for at least 10 minutes continuously to get to and from places?

Days a week: ____

6b. How much time do you spend walking or bicycling for travel on a typical day?

In hours and minutes: ____hrs ____mins

The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities (leisure). [insert relevant terms]

7. Do you do any vigorous-intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate like [running or football,] for at least 10 minutes continuously?
Insert examples and use showcard

Yes_____
No_____ [if no, go to #9]

8a. In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (leisure) activities?

Days a week: ____

8b. How much time do you spend doing vigorous-intensity sports, fitness or recreational (leisure) activities on a typical day?

In hours and minutes: ____hrs ____mins

9. Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that causes a small increase in breathing or heart rate such as brisk walking,[cycling, swimming, volleyball] for at least 10 minutes continuously?

Insert examples and use showcard

Yes ____

No ____ [if no, go to #11]

10a. In a typical week, on how many days do you do moderate-intensity sports, fitness, or recreational (leisure) activities?

Days a week: ____

10b. How much time do you spend dong moderate-intensity sports, fitness or recreational (leisure) activities on a typical day?

In hours and minutes: ____hrs ____mins

The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent [sitting at a desk, sitting with friends, travelling in car, bus, train, reading, playing cards or watching television], but do not include time spent sleeping. *Insert examples and use showcard*

11. How much time do you usually spend sitting or reclining on a typical day?

In hours and minutes: ____hrs ____mins

R2

For more information about R2 or to discover how you can bring the program to your organization, business or educational setting, please contact us.

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