Chapter II

REVIEW OF RELATED LITERATURE

Research has proved to be an essential and powerful tool in leading men towards progress. So there would have been very little progress without systematic research. One of the steps in systematic research is the review of related literature.

Hence, sincere efforts have been made by research scholar to locate literature related to each aspect of the relevant studies collected from the libraries, like National Medical Library, New Delhi, Library of SAARC Heart and Research Foundation, New Delhi, New Papers, Journals and Periodicals and Internet, are cited below.

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Taylor\textsuperscript{1} examined whether they could modify the risks of coronary heart disease using exercise among coronary heart disease

\textsuperscript{1}Taylor AH; Doust J; Webborn N J, "Randomised controlled trial to examine the effects of a GP exercise referral programme in Hailsham, East Sussex, on modifiable coronary heart disease risk factors. Epidemiol Community Health, 52:595-601, 1998 Sep.
patients. Under a GP exercise referral programme, 345 selected patients were all either smoker, had high blood pressure or were overweight. Those in the exercise group were offered 20 half-price sessions over 10 weeks at a leisure centre in which they engaged in moderate and vigorous aerobic type activity on various machines.

The results showed that 87% of those referred used the prescription and 28% (high users) (45% of obese patients) did at least 15 sessions. Those who were in the exercise group reduced their skinfolds by 9.2%. High users of the exercise programme reduced their systolic blood pressure by 7.2% compared with those who only exercised occasionally. The reduction in skinfolds lasted up to 26 weeks and a reduction in systolic blood pressure was evident up to 37 weeks among both groups of high users of the exercise programme.

In comparison to low users of the exercise routine, those carrying out the routines benefited significantly from regular exercise in reducing skinfolds and lowering blood pressure. This suggests that the more the patients complied with their GP’s prescription to carry out the exercise
programme, the more positive benefits they received in terms of reducing the risk of coronary disease.

**Thompson**² purposed a study to describe heart rate (HR), mean arterial blood pressure (MAP), and perceived exertion (RPE) responses to submaximal isokinetic concentric (CON) and eccentric (ECC) exercise at the same absolute torque output in older adults. Peak torques for ECC and CON knee extension were determined in healthy older males (n = 13) and females (n = 7). Subjects then performed separate, randomly ordered, 2-min bouts of CON and ECC exercise. Heart rate and MAP increased (p < .001) from resting values throughout both exercise bouts. CON exercise elicited a significantly greater cardiovascular response than ECC exercise after 60 s. Peak HR, MAP, and RPE after CON exercise were greater than after ECC exercise (p < .01). At the same absolute torque output, isokinetic CON knee extension

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exercise resulted in a significantly greater level of cardiovascular stress than ECC exercise. These results are relevant to resistance testing and exercise in older people.

The Study, monitored trends in coronary heart disease across 38 populations in 21 countries over 10 years. Data from this study indicate that secondary prevention and changes in coronary care are strongly linked with declining coronary end-points.³

Tanasescu⁴ suggested that turning exercise up a notch in intensity can lower the risk of heart disease in men even further. And running, weight training, rowing and brisk walking seem particularly helpful for heart health. To investigate, they followed a group of 44,452 men aged 40 to 75 from 1986 to 1998. Every 2 years all of the men were surveyed

http://www.heartcenteronline.com/myheartdr/home/research-detail.cfm?reutersid=3072&nl=4
about exercise habits and heart health. At the end of the study period 1,700 new cases of heart disease were documented.

Men who reported running for an hour or more per week were found to have a 42% lower risk of heart disease compared with men who did not run. And men who pumped iron for at least 30 minutes each week had a 23% reduced risk of heart disease compared with those who did not partake in weight training. Those who spent an hour or more each week rowing had an 18% reduced risk of heart disease. Men who exercised at a moderate or high level had a 6% and 17% lower heart disease risk, respectively, compared with men who engaged in low intensity exercise. Even a half-hour each day of "brisk walking" was associated with an 18% decrease in coronary heart disease risk, the study results indicate.

Holland 5 examined the influences of physiological aging processes on connective tissue, joint integrity, flexibility (range of

motion [ROM]), and physical functions of older adults. Studies that attempted to improve older adults ROM are also critiqued. Multiple mechanisms of musculoskeletal and soft-tissue degeneration, as well as disease processes (osteoporosis, arthritis, atherosclerosis), contribute to significant decreases in neuromuscular function and ROM in older adults, all of which can be exacerbated by disuse influences. No delineation of disuse effects on the rate of aging-related decrements in ROM can be provided, however, because long-term investigations (with physical activity controls) have not been conducted. Research efforts have documented both upper and lower extremity decrements in ROM with development of physical impairments, reductions in basic and instrumental activities of daily living, and progression of disability. There is limited research evidence that either specialized stretch-training or general-exercise intervention protocols moderately improve ROM in older adults and the frail elderly.
Guyton-Krishnan\textsuperscript{6} evaluated the effectiveness of cardiac patient education and rehabilitation on self-efficacy and activity of coronary artery disease patients with respect to walking, climbing, and lifting, when compared to a control group. CAD patients (N=50) attending cardiac rehabilitation were recruited (participant group). A group of randomly selected CAD patients (N=50) who had been prescribed participation in cardiac patient education and rehabilitation, but who opted not to do so, was selected as the control group. This study revealed that the participant group showed a significant increase in walking, climbing, and lifting self-efficacy and activity (p < .05) during the program relative to the control group. However, there was no significant difference in self-efficacy for the same behaviour when the participant and control groups were compared at post-testing. Interestingly, the participant group performed more walking and climbing activities at post-testing when compared to the control group. These results indicate that cardiac patient education and rehabilitation as effective in enhancing

patients' performance of activities at post-testing, despite its ineffectiveness in impacting patients' self-efficacy at that time.

Linfante\(^7\) studied to assess the prevalence of 2 social support variables, assess if depressive symptoms, anger, or social support predict lifestyle goal adherence, and evaluate the prevalence and impact of comorbidities on lifestyle goal adherence among women with CHD. Baseline, 6-week, and 6-month data on 304 women (mean age 62 years, 52% minorities) with CHD who participated in a randomized multicenter clinical trial testing a system approach to secondary prevention were selected for post hoc analysis. Demographic and behavioral risk factors were evaluated by interviewer-assisted standardized questionnaires. Carbon monoxide levels validated smoking status. Trained health educators measures psychological data systematically. Lifestyle goal adherence was defined as: (1) nonsmoking, (2) body mass index between 18.5-24.9 kg / m\(^2\) and waist circumference <35 inches, and (3) exercise

\(^7\) Linfante, Allison Hope, "Can Psychological factors Predict Adherence to Secondary Prevention Lifestyle Goals Among Women With Coronary Heart Disease?" Dissertation Abstract International vol. 65 no. 6 December 2004 pp. 2105
≥3 days / week, 30 minutes / day. Among the sample, 23% rated satisfaction with support network as poor / moderate and 34% reported having <3 good friends. Treatment group assignment was not associated with these factors. Prevalence of psychological factors remained consistent over 6 months, with modest increase in all at 6 weeks. Assignment to usual care was associated with increased depressive symptoms at 6 weeks (OR = 6.00, p = 0.001) and decreased social support at 6 months (OR = 0.29, p = 0.018). Depressive symptoms, anger, social isolation and number of good friends were not significant predictors of lifestyle goal adherence. Satisfaction with support network was a predictor of smoking adherence, with subjects less satisfied more likely to be smoking at 6 months (OR = 2.865, p = 0.019). Overall, 80% of the sample had ≥1 comorbidity and comorbidity was a significant predictor of non-adherence to the exercise (OR = 0.348, p = 0.004) and weight management goal (or = 0.283, P = 0.006). These data document sub-optimal lifestyle risk factor adherence and high prevalence of psychological factors among women with CHD. Subjects with poor social support and numerous comorbidities may be at heightened risk of
non-adherence suggesting the need for interventions targeted to these sub-populations.

Adams\(^8\) suggested in his study that following a sedentary lifestyle is more dangerous for health than smoking. Researchers looked at the level of physical activity in people who died and were able to correlate their level of physical activity with their risk of dying. The results indicated 20% of all deaths of people 35 and older were attributed to a lack of physical activity. That's more deaths than can be attributed to smoking. Looking at specific diseases, the risk of dying from cancer increased 45% for men and 28% for women due to lack of physical activity. The risk of dying from respiratory ailments was 92% higher for men and 75% higher for women. The risk of dying from heart disease was 52% higher for men and 28% higher for women, all due to a lack of physical activity.

Kraus\textsuperscript{9} have demonstrated that exercise—without accompanying weight loss—has a positive impact on improving cholesterol levels. The result shows that exercise has a positive effect on the number and size of the particles that carry cholesterol through the bloodstream. It appears from the study that cholesterol carried by smaller, denser protein particles appears to cause cardiovascular disease more efficiently than cholesterol carried by large, fluffy particles. Increasing amounts of exercise increased the size of the particles carrying both the good and the bad cholesterol. By using new methods of measuring the particles carrying cholesterol, it was found that some exercise is better than no exercise, and conversely, those patients in the control group who did not exercise actually showed worsening cholesterol levels. Researchers put 84 inactive and overweight men and women with high lipid levels in one of three groups: high, intense activity equivalent to jogging 20 miles a week; low but intense activity equivalent to jogging 12 miles a week; and low, moderate activity equivalent to walking briskly for 12 miles a week. A control group did not exercise at all. The study groups included significant numbers of African American participants. In order to

determine the role of exercise alone, participants were not allowed to change their diet during the course of the study. Each participant followed a 2- to 3-month "ramp-up" exercise period, followed by 6 months of exercise, which was carried out on exercise bikes, treadmills, or elliptical trainers in a supervised setting. Throughout the course of the study, researchers took blood samples from participants, and then used 2 new and different methods to determine the subtle and specific changes in cholesterol particle size and number.

**Blumenthal**\(^10\) recruited 133 sedentary and overweight men and women with mild hypertension to be randomly allocated to one of three groups. The first was a Control group, who had no intervention; the second was an Exercise Only group, who exercised three or four times a week for 45 minutes (jogging and bicycling); and the third was a Combined Treatment group, who in addition to the exercise, took part in weekly group sessions for instruction on weight loss. Each treatment

lasted for six months. Blood pressure was measured both in the clinic and by 24-hour ambulatory monitoring at the beginning and end of the study. The average blood pressure for the whole group of patients at the start of the study was 141/93 mmHg, and the average body weight 202 pounds (a body mass index of 32.5).

The participants in the Combined Treatment group lost 7.8 kilograms (17 pounds), compared to 1.8 (4 pounds) in the Exercise Only group, and 0.7 (1.5 pounds) in the Control group. Clinic blood pressure fell by 7.4/5.6 mmHg (systolic/diastolic) in the Combined Treatment group, by 4.4/4.3 mmHg in the Exercise Only group, and 0.9/1.4 mmHg in the Control group. Similar changes were seen in the ambulatory blood pressure measurements. Blood glucose levels were also reduced in the Combined Treatment group. The results of this study confirm that the combination of an exercise program with a weight loss program is more effective than exercise alone for lowering blood pressure. Thus exercise on its own lowered the blood pressure by about 4 mmHg and the combination with weight loss by 7 mmHg. While these changes may not seem very big, for people with borderline hypertension they may be all that is needed to avoid needing blood pressure medications. There is also
evidence that exercise and weight loss both help to prevent diabetes, which overweight people are particularly prone to and which can have devastating effects in combination with hypertension.

11 Morris found out in their study of 17,944 middle-aged male office workers, that over an 8 1/2 year period those who engaged in vigorous physical activity and kept fit had an incidence of coronary heart disease (CHD) that was less than half that of their colleagues who recorded no vigorous exercise. The CHD rate of the vigorously active men was especially lower in fatal clinical manifestation throughout the age range studied. This was also the case with men with family history of CHD, the obese, cigarette smokers, as well as men with severe hypertension and subclinical angina.

Havlik 12 established that stiff blood vessels contribute to systolic hypertension and increased cardiovascular disease with aging; risk

factors for vascular stiffness are still being defined. The Health, Aging, and Body Composition study is a longitudinal investigation of the determinants of physical-functional decline in a well-functioning biracial cohort of 3,075 men and women, age 70–79, in Pittsburgh, PA, and Memphis, TN. Aortic pulse-wave velocity (APWV), an index of vascular stiffness, was measured in 2,488 participants. Self-reported physical activity and exercise habits and fitness/walking endurance were also assessed. Moderate or greater physical activity, exercise, and fitness variables were independently associated with less vascular stiffness, even after inclusion of heart rate, visceral fat, and other correlates of APWV. Physical activity's association with APWV was particularly strong when levels of physical activity were quite low, suggesting that a minimal amount of physical activity might be sufficient to reduce arterial stiffness in older adults.
Stahle\textsuperscript{13} examined how exercise could increase physical capacity and heart rate in elderly patients recovering from an acute coronary event. ECG recordings were taken from 65 patients over 3 months. At the 3 month follow-up, exercise tolerance and exercise capability was found to have increased substantially in the training group than in those not practising the exercises. The day and night-time heart rates were also found to have increased significantly in the training group.

The result of this study confirm that carrying out a regular aerobic training programme can alter and significantly improve exercise capacity, modify heart rate variability leading to a more favourable prognosis in patients recovering from an acute coronary event.

\textsuperscript{13} Stahle A; Nordlander R; Bergfeldt L, “Aerobic group training improves exercise capacity and heart rate variability in elderly patients with a recent coronary event. A randomized controlled study European Heart Journal, 20:1638-46, 1999 Nov.  
Manson\textsuperscript{14} examined the association between physical activity, walking, and vigorous exercise and the incidence of coronary heart disease among 72,488 female nurses who were 40 to 65 years old in 1986. All those who took part were free of any diagnosed cardiovascular disease or cancer and completed a detailed questionnaire about the physical activities they carried out. The study was followed up over eight years and found 645 coronary events (nonfatal myocardial infarction or death from coronary disease).

The results of the study reveal a strong association between day-to-day physical activity and the risk of coronary heart disease. The analysis showed that women who walked three hours per week at a brisk pace were 30-40\% less likely to be associated with the risk of coronary events, this was similar to those doing vigorous exercise. Women who became active later in life also had a lower risk of coronary events than those who remained sedentary. Brisk walking or vigorous exercise produced the most significant reduction in the incidence of heart disease.

problems especially in women and the benefits are increased at any stage in life they were begun.

Stein\textsuperscript{15} studied two groups, each consisting of 7 men and 9 women of average age 66. One of the groups carried out 12 months of supervised exercise, consisting of 3 months of stretching and 9 months of 5 hours/week aerobic exercise at approximately 70\% of maximal oxygen uptake, whilst the other group carried out no specific exercise training.

The study revealed that of those in the exercise group compared with those not practising the training, oxygen consumption increased from 126 beats/min to 142 beats/min. The most observed change occurred in the average night time heart rate which decreased from 67 beats/min to 63 beats/min. Whilst those who practised the exercises benefited from an increased level of health, the study concluded that exercise training was most noted for increasing total heart rate variability

\textsuperscript{15} Stein PK; Ehsani AA; Domitrovich PP; Kleiger RE; Rottman JN, "Effect Of Exercise Training On Heart Rate Variability In Healthy Older Adults", \textit{American Heart Journal}, 138:567-76, 1999 Sep.
in normal older adults, with the most marked alterations in the heart rate at night.

Willenheimer 16 summarised that men with heart failure have been shown to benefit from exercise training, however, researchers aimed to find out if this also applied equally to women.

Forty-nine patients who were less than 75 years old with stable, mild-to-moderate heart failure were selected of which 29% were women. The Department of Cardiology in Sweden created an exercise programme which consisted of bicycle training for over a period of 4 months. All the men in the study with a diminished supply of blood to some part significantly got better, however, none of the women with the same aetiology improved.

The study concludes that exercise training is a safe and beneficial method of treatment in heart failure patients, especially men with a

16 Willenheimer R; Erhardt L; Cline C; Rydberg E; Israelsson B, “Exercise Training In Heart Failure Improves Quality Of Life And Exercise Capacity. European Heart Journal, 19:774-81, 1998 May.
diminished blood supply. The results though not reflected by the women may benefit from further examination.

Stewart 17 has done a study, which was called the Senior Hypertension and Physical Exercise (SHAPE) study, in just over 100 patients aged 55 to 75 with mild high blood pressure. People with cardiovascular disease or serious medical illnesses, smokers, people with diabetes, and those who already exercised regularly were excluded. If they were taking blood pressure medication, they stopped this for 2 weeks to see if they met the study requirements. Selected at random, half the participants received 'usual care' (advice on exercise and diet) and acted as controls, while the rest underwent a 6-month supervised program of combined aerobic and resistance training. At baseline, their systolic blood pressure was between 130 and 159 mm Hg, or their diastolic pressure was between 85 and 99 mm Hg.1. Blood pressure (BP) was measured at screening, baseline, and twice monthly for 6 months - at least one day after an exercise day. If subjects' blood pressure fell outside

the accepted range on 2 consecutive occasions, they were withdrawn from the study. Effectiveness of aerobic and strength fitness was measured by peak oxygen uptake using a treadmill program, body weight, height, body mass index (BMI), fat mass, and percentage body fat. Aortic stiffness was measured by femoral pulse-wave velocity.

The exercising participants attended 3 sessions a week for 6 months; each session consisted of a warm-up period, 45 minutes of aerobics, and 2 sets of 10-15 repetitions of resistance training exercises. The average age at baseline was 63 years. The average systolic BP was 140 mm Hg, and the average diastolic BP was 76 mm Hg. Those in the exercise group improved their aerobic and anaerobic fitness, increased their lean muscle mass, and reduced their general and abdominal obesity; their BMI decreased, on average, 0.7 units more than those in the usual care group. Men had a greater increase in upper and lower body and total muscle strength than women; and a greater reduction in abdominal fat than women. After 6 months, both the exercisers and the 'usual care' controls reduced their systolic and diastolic BPs significantly, compared to baseline: systolic BP by 5.3 (exercisers) vs. 4.5 (controls) mm Hg, and diastolic BP by 3.7 (exercisers) vs. 1.5 (controls) mm Hg. The average
diastolic BP reduction was greater in the exercisers than in the controls, but the reductions were about the same for systolic BP. The degree of diastolic BP reduction was linked to changes in peak oxygen uptake, total muscle strength, body weight, percentage body fat, lean body mass, and abdominal fat. Systolic BP reduction, on the other hand, was only linked with decreased abdominal fat. There was no improvement in aortic stiffness in the exercisers or the 'usual care' controls.

Obituaries sometimes mention that a person died during some form of exercise. These deaths have usually been attributed to abnormal heart rhythms. In a small Swedish study that examined the frequency of abnormal heart rhythms among exercising elderly, 11 older men with lifelong histories of strenuous exercise were compared to a control group of 12 sedentary men. Both groups underwent 48-hour electrocardiogram monitoring. Abnormal and potentially dangerous heart rhythms were found in 9 of the 11 athletes, versus 5 of the 12 controls. Seven of the athletes also had episodes of significant slowing of the heart rate, although none of the controls had these. Though exercise has largely
positive effects on heart function, some researchers caution that it can increase the risk of potentially lethal abnormal rhythms. The long-term benefits of regular, moderate exercise typically outweigh the small risk of abnormal heart rhythms. A great many doctors recommend formal exercise stress testing for older adults starting new exercise programs, though few studies have demonstrated large benefits to such stress testing.  

In a recent study carried out by Confederation of Indian Industries in association with McKinsey and Co., India is going the way of developed countries, and by 2012 infectious diseases will take a backseat and seven lifestyle ailments – cancer, heart ailments, circulatory and nervous disorders, musculoskeletal diseases, ailments of sense organs and asthma will be the major killer in India.

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Peel\(^{20}\) had done the study aimed to evaluate the effects of an 8-week supervised exercise program on physiological measurements during treadmill walking, muscle strength, functional performance, and health status in older adults limited in physical function. Twenty-four participants were randomly assigned to an exercise group (EG, N = 13) or a control group (CG, N = 11), and were evaluated before and after the exercise program (EG) or 8-week period (CG). Evaluations included a progressive treadmill test, strength testing, the Physical Performance Test (PPT), and the SF-36 Health Survey. The exercise program consisted of 3 sessions per week of brisk walking and strengthening exercises. The EG demonstrated increases in cardio respiratory fitness and increases in treadmill walking time. The EG also demonstrated increases in force production in 3 of the 6 muscle groups that were tested. Both the EG and CG demonstrated improvements in PPT scores and in 2 health concepts on the SF-36 Health Survey.

Preliminary data from World Health Organisation study on risk factors suggests that sedentary lifestyle is a major cause of death, disease and disability. Physical inactivity increases all causes of mortality, doubles the risk of cardiovascular disease, Type-II diabetes and obesity. It also increases the risk of colon and breast cancer, high blood pressure, lipid disorders and anxiety.\(^{21}\)

A recent study has shown that people who have inactive lifestyles are about seven times more likely to suffer a stroke than those who are moderately or very active. To reduce the risk of suffering a stroke, a daily walk of at least one mile was found to be necessary.\(^{22}\)

Effect of exercise on blood pressure has been well documented in a research study conducted at the University of Hartford. Blood pressure reduction of 6-10 mm of mercury in hypertensive men were noticed

\(^{21}\) [http://www.healthykhana.com/bphdfacts.htm](http://www.healthykhana.com/bphdfacts.htm)  
\(^{22}\) [http://www.puneheartbrigade.org/exercise.html](http://www.puneheartbrigade.org/exercise.html)
immediately after they had bicycled at a moderate level for 30 minutes. The reduction lasted for up to thirteen hours.\textsuperscript{23}

\textbf{Stathi} \textsuperscript{24} Using a qualitative approach, the dimensions of subjective well-being of active older adults were outlined and ways identified through which they might be influenced by participation in physical activities. One-to-one and group interviews were used to collect the data. Using cross-case analysis, 17 main themes were identified. The following main dimensions emerged: developmental, material, physical, mental, and social well-being. The findings indicated that physical activity influences all dimensions of the subjective well-being of older adults, with the exception of material well-being. Physical activity appears to contribute to the mental health of older adults through maintenance of a busy and active life, mental alertness, positive attitude toward life and avoidance of stress, negative function, and isolation. The

\textsuperscript{23} \url{http://www.puneheartbrigade.org/exercise.html}

\textsuperscript{24} Aphrodite Stathi, Kenneth R. Fox, James McKenna, "Physical Activity and Dimensions of Subjective Well-Being in Older Adults", \textit{Journal of Aging and Physical Activity}, 10 (1) (2002).\url{http://www.humankinetics.com/products/journals/showarticle.cfm?articleid=16123&JournalID=JAPA}
complexity of subjective well-being and the multiple roles of physical activity stress the need to extend qualitative research to sedentary older adults and the institutionalized elderly to explore the relationship between well-being and physical activity in later life.

Cavani\textsuperscript{25} determined the effects of 6 weeks of stretching and moderate-intensity resistance training on older adult’s functional fitness. Twenty-two older adults (69 ± 1 year) participated in a resistance-training program, and 15 (70 ± 4 years) participated in a control group. Training involved 3 sessions per week, each consisting of 1 set of 12–15 repetitions of lower and upper body exercises on resistance machines. Before sessions, participants performed 20 min of stretching exercises. A recently developed test battery (Rikli and Jones, 1999) to assess the physical parameters associated with independent functioning in older adults was performed before and after training. The combined stretching and resistance exercise resulted in significant (p < 0.008) improvements on

all the functional tests except the 6-min walk. The results indicate that moderate-intensity resistance training in conjunction with stretching can improve functional fitness in older adults, enabling them to more easily perform activities of daily living.

Goggin determined older adults' physical activity behaviours and stage of readiness for physical activity. Data were collected on 403 American adults over the age of 60. Of these participants, 206 were aged 61-70 and 197 were over the age of 70. Participants first provided information regarding their perceptions of the benefits of physical activity. Then questions were asked to determine their stage of readiness for physical activity (i.e., precontemplation, contemplation, etc.). Results indicated that older adults are aware of the health benefits of physical activity (89%), but 69% of them are not participating in sufficient physical activity to obtain such benefits. Physical activity involvement

decreases with increased age, and older men tend to be more physically active than older women. Increased knowledge about the benefits of physical activity and one's stage of readiness for it might help increase the number of older adults who engage in sufficient physical activity.

A German study of 73 men with chronic heart failure were assigned to either 20 minutes per day of regular exercise or to no exercise and followed for 6 months. At the end of that time, the exercise group experienced a number of improvements in their health. They had greater exercise capacity and exercise time. They had fewer heart failure symptoms. Sophisticated measurements of their heart function showed a 14 times greater increase in stroke volume (amount of blood pumped by the heart with each beat) than the non-exercisers. The exercisers also had less enlargement of their hearts by the end of six months than the non-exercisers.  

http://www.infoaging.org/1-exer-6-r-heart.html
Kathleen examined exercise-adherence rates and their predictors across 21 randomized controlled trials (RCTs) involving older adults (age 3 55 years). On average, participants completed 78% of their prescribed exercise bouts. Adherence tended to be greater in strength- and flexibility-exercise training programs (M = 87%) than in aerobic-exercise training programs (M = 75%). The best adherers were individuals who were fitter at baseline, had a history of a physically active lifestyle, were nonsmokers, and had higher exercise self-efficacy. Different variables predicted adherence (a) at different time points in a RCT, (b) to different types of exercise, and (c) to different aspects of the exercise prescription (i.e., frequency, intensity, and duration). The findings suggest that older adults might be more adherent to exercise prescriptions than younger adults are. There is also a need for more theory-based research to examine predictors of adherence to various aspects of the exercise prescription.

Wood\textsuperscript{29} suggested that physical and cognitive functions are associated with health-related quality of life (HRQL). Previous work examining the relationship between physical ability and HRQL is equivocal, and information about cognitive function in relation to HRQL is largely restricted to people with cognitive impairments. We investigated the relationships of physical ability and cognitive performance to HRQL in 44 older adults (72–93 years). The results suggest significant relationships between the endurance item of the AAHPERD test and the physical mobility and pain components of HRQL and between AAHPERD agility scores and the physical mobility component of HRQL. Visual simple-reaction time and the backward digit-span memory test were found to be related to physical mobility. The subject-performed-tasks memory test was related to the social component of HRQL. These data support the use of the AAHPERD test for characterizing physical ability of older adults as it relates to HRQL and identify specific cognitive support measures that reflect the relationship between cognition and HRQL in older adults.


Alderman\textsuperscript{30} studied to assess the time course of cardiovascular reactivity and recovery from mental arithmetic following acute aerobic exercise. A related purpose was to examine the role of the autonomic nervous system (ANS), using low and high frequency components of HR C variability, as a contributing mechanism underlying cardiovascular responses to stress following acute exercise. The effects of 30 min of high- and low-intensity (i.e., 75-80\% & 50-55\% VO\textsubscript{2} max, respectively) aerobic exercise were compared to the effects of a 30 min sedentary control condition. As predicted, both low- and high-intensity exercise resulted in significantly reduced stress reactivity and recovery following exercise. Furthermore, high-intensity exercise was more effective at reducing cardiovascular reactivity and recovery at 5, 30, and 60 min post-exercise. The results indicate that attenuated stress responses following acute exercise depend both on exercise intensity and time of exposure to psychological stress. The results also demonstrated greater cardiac vagal tone following exercise that persisted during exposure to

the laboratory stressor suggesting that ANS is a viable mechanism underlying exercise-induced reductions in cardiovascular responses to stress.

Chogahara\textsuperscript{31} stated that the purpose of this dissertation was to investigate positive and negative social influences on the physical activity of older adults. Three studies were conducted in the overall investigation. The findings indicated that although negative influences rarely occurred compared with positive ones the negative influences had an equal or even stronger impact on the current physical activity level. Moreover, when the negative social influences on physical activity exceeded the beneficial effects of positive influence these findings suggested that there is need for a redirection toward more balanced assessment and intervention strategies which take into account both the positive and negative properties of social influence for promoting physical activity in older adults.

\textsuperscript{31} Chogahara, Mokoto, "Positive and Negative Social Influences on Physical Activity in Older Adults", Dissertation Abstract International, 59:12, June 1999
Winmore\textsuperscript{32} have shown that improvements in VO2 max with training are similar for younger (21-25yr.) and older (60-71yr) men and women. This research indicates that endurance training products similar gains in aerobic capacity in healthy people throughout the range of 20-70 years, and initial fitness level. Strength training indicates that older men’s extension strength increased by 107\% and flexion strength increased by 227\%. This improvement was attributed to muscle to muscle hypertrophy, as determined from midthigh CT scans. Biopsies of the vastus lateralis muscle (in the quadriceps) revealed that the cross-sectional area of slow twitch fibre increased by 35.5 \% and that of fast twitch fibre increased by 27.6\%.

Marrow\textsuperscript{33} indicated that individuals can increase physical fitness and health benefits well into their 6th and 7th decades of life. Additionally, even moderate level of physical activity can result in increased health benefits for individuals of all ages. The purpose of this research was to

determine the physical activity behaviour of American adults age 61+. Results suggest that while older adults are aware of the importance of physical activity to achieve health benefits. Their physical activity involvement decreases with age and is a function of gender. Increased knowledge about the benefits of physical activity as one age and SRPA (Specific questions asked for the readiness for physical activity) men help increase the number of senior adults who engage in physical activity for health benefits. Intervention strategies directed at the specific needs, knowledge, and physical abilities of senior adults should be developed to help motivate them to become more physically active.

Blanco\textsuperscript{34} done the descriptive, correctional study focused on the relationship between health beliefs and physical activity among older adults. The health belief model (HBM) served as a framework for the study. Subjects consisted of a convenience sample of 125 non-institutionalised older adults, aged 50 and over, excluding individuals with physical disabilities, which impeded ambulation. The data

\textsuperscript{34} Blanco, Margarita, "The Relationship of Health Beliefs to Physical Activity Among Older Adults", Dissertation Abstract International 48:02, Aug. 1987, pp-330-A
collection instrument for the study was a four-part survey instrument (the physical activity-health belief questionnaire), based on instruments. Hypotheses dealt with the relationships between the H.B.M variables, knowledge, and physical activity at P<. 05. No significant association was found between knowledge and physical activity.

Standford\textsuperscript{35} in a gerontological exercise research has focused primarily on older men have longer life spans. The exercise literature implies a relationship between exercise participation and health. Yet, only 10-20\% of the population over the age of 65 regularly engage in deliberate physical activity. The pre-test research examines mall walking as a new sport from that has been adapted and perpetuated by the older adult. Using participant observation, informal and formal interview methods the author produced an ethnography describing and interpreting mall walking within its cultural context. Five themes emerged from the research: (1) the shopping malls are cathedral of consumerism, (2)

\textsuperscript{35} Standford, Christine Lee, "The walk of Life: An Examination of Mall-Walking and the Older Women", Dissertation Abstract International, 53:10, April 1993, pp-3474-A
Older women have stylised mall walking through the use of rituals, unique walking style and clothing, (3) primary and sedentary socialization into physical activity appears to be one of the influential factors for mall walking participation, (4) the use of social support networks which includes partners, children, doctors, nurses and other agencies is an important determinant of continued mall walking participation and (5) a positive correlation between exercise participation and health exists in the literature. The women in this study were knowledgeable about general as well as personal health practices. All of the women cited health as the primary reason for mall walking participation.