

**Fitness for Health:
The ALPHA-FIT Test Battery
for Adults Aged 18-69**

Tester's Manual

Fitness for Health: The ALPHA-FIT Test Battery for Adults Aged 18–69

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FOREWORD

ALPHA-FIT Test Battery for Adults Aged 18-69 reflects the continuum of co-operation between scientists in the European countries promoting physical activity and fitness for health in population level. Several fitness tests that were introduced in the “Eurofit for Adults” published in 1995, are still included in the ALPHA-FIT Test Battery. This test manual emphasizes the growing scientific evidence of the importance of physical fitness as a key indicator of person’s health.

The scientific work behind ALPHA-FIT was conducted as part of the project ALPHA (Assessing levels of physical activity and fitness), led by Karolinska Institute, Sweden, and funded by European Union, DG SANCO. ALPHA project aims at providing a set of evidence-based instruments for assessing levels of physical activity and its underlying factors (e.g. build environment, transport, and workplace), as well as fitness in a comparable way within the European Union.

The final aim of the ALPHA-FIT working group was to give evidence-based recommendation for population-based health-related fitness assessment in the countries of European Union, accompanied with standard operating procedures of health-related fitness testing for professionals working in the field of physical activity promotion.

The test manual of ALPHA-FIT Test Battery for Adults can also be used as a tool for individual physical activity counselling. Physical Activity Pie, containing the current recommendations for health-enhancing physical activity for adults is introduced as an additional tool for counselling. Following changes in fitness can be used to motivate people to lead a physically active life.

The ALPHA-FIT working group consisted of scientists from the UKK Institute for Health Promotion Research, Tampere Finland (Jaana Suni, leader of the ALPHA-FIT working group, Pauliina Husu, Marjo Rinne and Annika Taulaniemi), and the University of Granada Spain (Manuel Castillo, Jonatan Ruiz, Francisco B. Ortega Porcel, and Vanessa Romero-España).

The following international group of experts guided and commented the scientific work process: prof. Steven Blair, USA, prof. Kari Bø, Norway, prof. Hans Kemper and prof. Willem van Mechelen, Netherlands, and adjunct prof. Pekka Oja, Finland.

Tampere, 18 December 2009
Jaana Suni, adjunct professor
UKK Institute, Finland

1 WHAT IS HEALTH-RELATED FITNESS?

Both physical activity (PA) and fitness are currently considered as key factors in public health promotion. Assessment and monitoring of PA and fitness need to be part of a public health strategy to deliver interventions to communities likely to increase population PA and fitness levels. At best assessments of health-related fitness (HRF) can be used to monitor level of fitness in different populations, and to identify those with increased health risks due to inadequate levels of fitness.

The components of HRF are muscular/musculoskeletal fitness, motor fitness, cardiorespiratory fitness, body composition and metabolism. HRF can be defined as a distinct type of physical fitness with special relevance to the health potential of PA. It is considered both as an outcome of PA, and as an independent risk factor (or a moderator of effect of PA) for health. HRF has been defined as a state characterised by (a) an ability to perform daily activities with vigour and (b) demonstration of traits and capacities that are associated with a low risk of premature development of diseases and conditions related to physical inactivity.

Theoretical model on assessing the health effects of physical activity and fitness

The concept of health-related physical fitness was first introduced by what is known as the Toronto model on physical activity, fitness, and health (Figure 1). According to this model, habitual PA can influence the physical fitness level, which can, in turn, modify the level of PA. The model also specifies that fitness is related to health in a reciprocal manner.

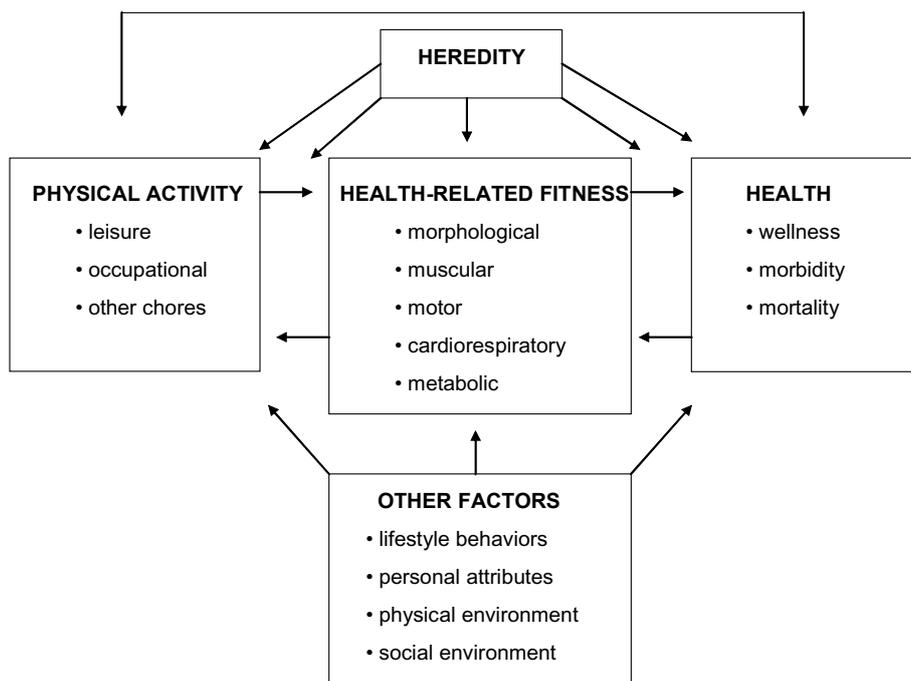


Figure 1. Toronto model on physical activity, fitness and health (Bouchard and Shephard 1994).

Good HRF is comprised of aerobic endurance, bodily control, muscular strength, joint mobility, and suitable weight. A person who is sufficiently healthy can cope with everyday activities without overtiring. HRF broadens the traditional concept of fitness as the capacity to perform sports and physical activities to include the functional capacity needed for everyday life and health.

2 EVIDENCE FOR FITNESS FOR HEALTH: THE ALPHA-FIT TEST BATTERY FOR ADULTS AGED 18-69

2.1 Development of the test battery

Fitness for Health: The ALPHA-FIT Test Battery for Adults Aged 18-69 was developed as a part of the project ALPHA (Instruments for Assessing Levels of Physical Activity and Fitness), funded by the European Commission, DG SANCO (www.thealphaproject.eu). ALPHA aims at providing a set of evidence-based instruments for assessing levels of PA, its underlying factors (e.g. build environment, transport, and workplace), and fitness in a comparable way within the European Union (EU). The aim of the ALPHA-FIT Test Battery for Adults was to present a reliable, valid, and easily applicable set of tests for public health monitoring of HRF among adults aged 18 to 69 years.

To achieve this aim two systematic literature reviews were produced with emphasis on former reports with high scientific quality. First, the evidence on physical fitness as a predictor for future health status was gathered. Based on recent knowledge on major public health problems cardiovascular diseases and related risk factors, mortality, low back pain, back-related disability and mobility difficulties were used as indicators of health status. The second systematic literature review concerned retest repeatability and criterion-validity of field based tests of HRF. In addition to these reviews, a field study on test-retest reliability on selected motor and musculoskeletal fitness tests was conducted. The international expert group (prof. Steven Blair, prof. Kari Bø, prof. Hans Kemper, prof. Willem van Mechelen, and adjunct prof. Pekka Oja) guided and commented the work process. Based on the findings of the reports produced and the comments of the expert group the Fitness for Health – The ALPHA-FIT Test Battery for Adults Aged 18-69 was developed.

2.2 Description of the test battery

The ALPHA-FIT Test Battery for Adults consists of seven field-based test items representing the most important fitness factors for health and physical functioning (figure 2): 2-km walk test indicating cardiorespiratory fitness, hand grip indicating muscular strength, jump-and-reach indicating lower extremity power and strength, modified push-up indicating upper-body and trunk muscular endurance, one-leg stand indicating balance, and body mass index and waist circumference indicating obesity.

Three secondary tests are recommended to be used as alternative or additional tests: dynamic sit-up indicating trunk muscular endurance, shoulder-neck mobility indicating flexibility and figure-of-eight run indicating dynamic balance and agility. Dynamic sit-up could be used among individuals with low fitness level and/or health-limitations to brisk muscular work required in modified push-up test. Shoulder-neck mobility test is a quick screening type tool to indicate altered posture and restricted mobility of shoulder-neck area. The use of the test is relevant while neck-shoulder pain due to continuous sitting is an increasing public health problem. Figure of eight run test of dynamic balance and agility could be used when one-leg stand test is not challenging enough for the population group being tested (i.e. young. or highly active part of adult population).

Fitness for Health: The ALPHA-FIT Test Battery for Adults Aged 18-69

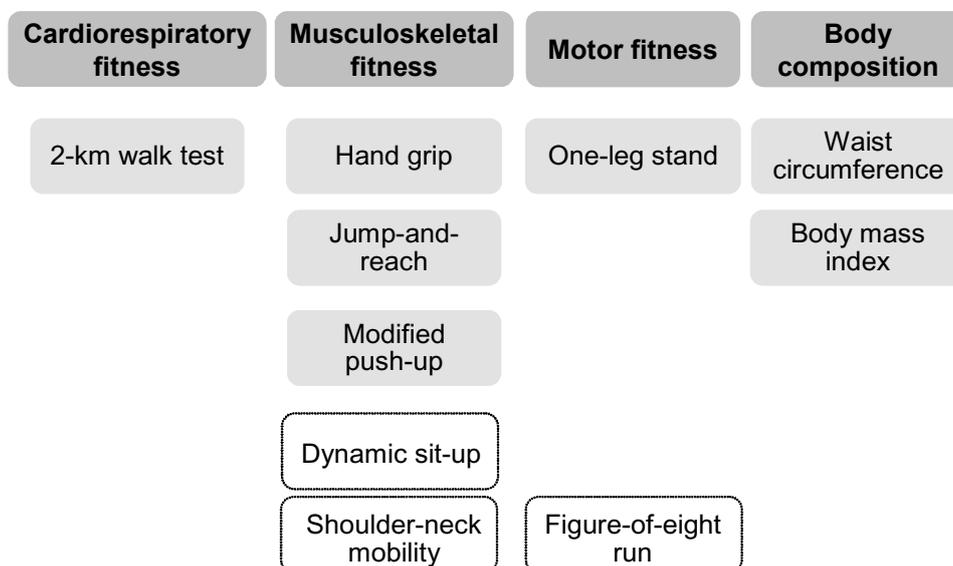


Figure 2. Fitness for Health: The ALPHA-FIT Test Battery for Adults Aged 18–69. Secondary tests are presented on white ground.

3 HOW TO CONDUCT THE TESTS?

3.1 Standardization and sequence of tests

Before testing the tester should prepare the testing environment, collect the equipment needed, and measure the courses needed for run and walk tests. The client should be provided with short instructions on proper clothing i.e. sport shoes and clothes suitable for exercise preferable with short trouser legs.

The ALPHA-FIT Test Battery should be conducted in standardized order. No warm-up or stretching exercises are allowed before testing. To make testing as objective as possible each client must be given specific instructions for each test performance, and be praised in a consistent manner as described in this test manual. The client is not allowed to perform preliminary trials unless explicitly instructed to do so. This is especially important in balance testing, where the effects of learning should be strictly controlled.

Measurements of body composition indicating obesity (BMI and waist circumference) are conducted as part of the pre-test health screening. After that motor fitness is tested first, followed by flexibility, muscular power and strength, muscular endurance, and finally cardiorespiratory fitness.

Table 1. The sequence of test items of the Fitness for Health: the ALPHA-FIT Test Battery for Adults Aged 18–69.

Fitness component	Fitness factor	Fitness test item
Body composition	<i>Fat distribution</i>	• Waist circumference*
	<i>Obesity</i>	• Body mass index*
Motor	<i>Balance</i>	• One-leg stand
	<i>Agility</i>	• Figure-of-eight run (secondary)
Musculoskeletal	<i>Flexibility</i>	
	Upper body	• Shoulder-neck mobility (secondary)
	<i>Muscular strength</i>	
	Upper body	• Hand grip
	Lower body	• Jump-and-reach
Cardiorespiratory	<i>Muscular endurance</i>	
	Trunk	• Modified push-up • Dynamic sit-up (secondary)
	<i>Submaximal aerobic capacity</i>	• 2-km walk test, predicted VO_{2max}
	<i>Mobility (brisk walking)</i>	• 2-km walk test, time

*these measures are included in pre-test health screening

3.2 Instructions to the client

Couple of day before the fitness assessment, tester should inform the client about recommended nutrition, stimulants and PA as well as proper clothing. The following instructions increase the reliability of the test results and enhance safety of testing:

- avoid severe physical exertion for 48 hours before the testing
- avoid physical exertion on the day of testing
- do not consume alcoholic beverages for 24 hours before the testing
- a good night sleep before testing is recommended
- avoid heavy meal at least for 3-5 hours before the testing
- do not smoke, drink coffee, tea or stimulating soft drinks (for example coca-cola) at least for 1 hour before the testing

Bring with you the following clothing:

- sport shoes or other comfortable low heel shoes
- shorts or other sports clothing with short pant legs
- t-shirt or loose-fitting shirt

4 SAFETY OF TESTING

The purpose of ALPHA-FIT Test Battery is to promote health and well-being of adult populations. Safety is a major concern in testing while assessment of HRF is provided also for unfit and physically inactive individuals. The health risks of heavy physical exertion are increased among this group. On the other hand, most of the health benefits of PA and exercise accrue at moderate levels of intensity, at which the risks are low. The potential health risks include cardiovascular and musculoskeletal complications.

To enhance safe testing a standard pre-test health screening is recommended. In addition, appropriate preparations for how to act on emergency cases including first aid need to be considered.

The context of the health screening procedure should meet the local norms or quality requirements in different EU countries.

4.1 Pre-test health screening

Pre-test health screening consists of the following parts:

- questionnaire on physical activity, fitness and health (Appendix 1)
- measurements of blood pressure, BMI and waist circumference

The results of health screening can lead one of the following three alternatives: The client

- qualifies to all fitness tests
 - is referred to a health examination by a physician acquainted with the testing procedures
- or
- is excluded from selected tests due to potential health risk
 - is excluded from all tests

The cardiovascular exertion level and the musculoskeletal load on different body structures vary depending on the test item. In general, client is excluded only from those tests that would cause health hazards, but he/she can participate in all other tests. Assessment of current level of PA of the clients with minor health limitations helps the tester to make proper decisions about exclusion.

Medication

If the client is on regular medication, the tester needs to clear the reasons for that. Again, the suitability of the ALPHA-FIT tests need to be considered as previously described. Typically, the use of regular medication increases among individuals aged over 50.

Acute and transient diseases and symptoms

If the client has recently suffered from fever or other communicable disease, delaying the test is warranted, until the client has been symptomless for at least a week. Physical effort during an infection, such as the flu, can be associated with, for example, arrhythmia and myocardial inflammation. In addition, during recovery from such illnesses, the test can also give misleadingly poor results.

If the client has imbibed considerable amount of alcohol during the last 24 hours, the testing should be delayed. The ALPHA-FIT tests should not be done for inebriated persons or those suffering from a hangover.

4.2. Inclusion and exclusion criteria for ALPHA-FIT Test Battery

The client qualifies to all tests

The ALPHA-FIT tests can be performed safely if the client does not report any cardiorespiratory diseases or symptoms, chest pain or breathing problems either at rest or exertion, elevated blood pressure, light headedness and/or dizziness, inflammatory joint diseases, back problems or other long-term and/or repetitive musculoskeletal problems, uses no medication and

- systolic blood pressure is less than 165 mmHg and
- diastolic blood pressure is less than 100 mmHg and
- BMI is less than 30 kg/m².

The given blood pressures and BMI are not "normal" values or goals with respect to health. They are, instead, discretionary values selected on the basis of research results on the limit values for

"minor health risk" with respect to PA.

The client needs health examination by a physician

Health examination is necessary before any ALPHA-FIT tests if the client has any of the illnesses or symptoms mentioned in Table 2 or the client is excluded from all ALPHA-FIT tests.

Table 2. Illnesses and symptoms for which the client should be referred to a health examination before the ALPHA-FIT Test Battery. In cases marked with an* testing should be postponed until symptoms have disappeared

-
- serious cardiovascular diseases and symptoms
 - * recent myocardial infarction or coronary bypass or angioplasty (within six months)
 - * coronary heart disease, with related chest pain
 - * heart valve disorder, cardiomyopathy or other illness causing cardiac insufficiency
 - * untreated and significantly high blood pressure (180/100 mmHg or higher)
 - * arrhythmias that increase, or whose related symptoms become worse, during physical effort
 - * severe anaemia (hemoglobin 100 g/l for women and 110 g/l for men)

 - severe symptoms during physical effort (dyspnea, dizziness, pain)
 - severe or unbalanced chronic illness such as diabetes or hyperthyroidism
 - influenza or other general infection
 - recent serious injury
 - recent surgery
 - last trimester of pregnancy, a risk pregnancy, recent birth
 - unusual tiredness or weakness
 - hangover or drug overdose
-

The client needs to be excluded from selected tests

The following instructions are meant to help the tester to make decisions on test-specific exclusions:

One-leg stand and figure-of-eight run

Severe low back pain or symptoms in lower extremities which could be aggravated by the test positions or movement.

Shoulder-neck mobility

Severe pain symptoms in shoulder or neck region, which could be aggravated by the test movement.

Hand grip

Severe pain symptoms in hand region, which could be aggravated by the test movement.

Jump-and-reach

Severe overweight and no participation in weight bearing physical activity.

Severe low-back pain or related symptoms in lower extremities, which could be aggravated by the test movement.

Modified push-up

Cardiovascular diseases and symptoms, severe pain or symptoms in low back or upper and lower extremities, which could be aggravated by the test movement.

Dynamic sit-up

Severe pain symptoms in low-back or hip region, which could be aggravated by the test movement.

2-km walk

Severe cardiovascular and metabolic diseases, severe obesity and illness or disability that limits brisk walking. Physically active individuals with mild symptoms or risk factors for cardiovascular diseases can perform the walk test, however they are encouraged to keep the level of exertion at comfortable level.

5 TESTS

5.1 Body composition

5.1.1 Waist circumference

Equipment: Tape measure
 Drawing pen

The objective is to estimate the amount of visceral adipose tissue, situated in the middle trunk. A marker is used to mark the following anatomic sites on the client's skin: lateral surface of lowest rib and iliac crest. The tape measure is placed around the body halfway between the marks horizontally, so that the tape is taut around the body but does not press into the skin. The client stands upright with feet 20-30 cm wide apart in front of the tester. The client is asked to breathe normally. Result is read during light exhalation and it is the mean of the 3 measurements rounded off to the nearest 0.5cm. If these 3 measurements differ more than 1 cm from each other, 2 additional measurements are performed.

Classification of waist circumference (cm) according to cardiovascular risk.

Men	Female	Risk	Fitness category
< 90	< 80	no risk	5
90 – 102	80 – 88	moderate risk	3
> 102	88	clearly elevated risk	1

Reference:

World Health Organization. Obesity. Preventing and managing the global epidemic. Technical Report Series No. 894. World Health Organization: Geneva 2000.



5.1.2 Body Mass Index (BMI)

Equipment: Tape measure
 Scale

The objective is to estimate relative body fat with a tape measure and weight scale. Height and weight are measured, and the scores are rounded to the nearest 0.5 cm and 0.5 kg.

The client is lightly dressed, without shoes. Height is measured with the client standing barefoot with heels together and back as straight as possible. Head is positioned at a level (Frankfort level) where the opening of the outer ear and lower level of the eye socket form an imaginary, horizontal line. The tester may support the head from both sides at the mastoid process to ensure the correct position. Weight is recorded, using a scale.

To calculate BMI, weight (kg) is divided by height squared (m²). $BMI = \text{kg} / \text{m}^2$
For example, a body weight of 65.5 kg and height 180 cm yields a relative body weight (BMI) of 20.

Classification of BMI.

BMI	Degree of under- or overweight	Fitness category
18.5	Underweight	1
18.5 – 24.9	Proper weight	5
25.0 – 29.9	Overweight	4
30 – 34.9	Moderate obesity	3
35.0 – 39.9	Significant obesity	2
> 40	Severe obesity	1

modified from WHO (1998)

Reference: International Obesity Task Force (IOTF). Obesity: Preventing and Managing the Global Epidemic. Geneva, Switzerland: World Health Organization; 1998. Publication WHO/NUT/NCB/98.1. National Institutes of Health and National Heart, Lung, and Blood Institute. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults. Evidence Report. *Obes Res* 1998;6(suppl. 2):51S-209S.



5.2. Motor fitness

5.2.1 One-leg stand

Purpose To measure postural control while the area of support is reduced.

Health relation

Falls, caused by poor postural control and leading to osteoporotic fractures, are a major health problem among older persons. The middle-aged clients with back pain often have impaired postural control.

Exclusion criteria

Contraindications include dizziness, severe spinal symptoms and problems of lower extremities that might be aggravated by the test position.

Equipment Stopwatch

Performance

The client can choose a preferred leg to stand on. The heel of the opposite foot is placed at knee against the inner side of the supporting leg (heel at the level of the knee joint) so that thigh is rotated outwards. Arms hang relaxed at the client's sides and eyes are open.

Instructions: "Stand on one leg as long as possible with the free leg against the inner side of the supporting leg, heel in the middle of the knee joint. Use your arms for balance only when necessary. Sixty seconds is the upper limit for the task."



Practice and number of test trials: The tester shows the right performance. For practise the client tries to stand on each leg and chooses the better one for test performance. Two trials are performed unless the result of the first trial is 60 seconds.

Measurement

The maximal duration of the test is 60 seconds. Tester starts timing when the client has reached the correct test position. Timing stops when the client loses the balance (ie. foot of the free leg loses contact from the supporting leg, supporting leg moves) or 60 seconds is reached.

Scoring

Test result is the longest time in seconds the client maintains the correct test position (0–60 s).

Reference values

Due to skewed distributions of the test results, the fitness categories are based on percentages of certain performance levels from two Finnish population studies conducted by the UKK Institute.

Fitness category		Percentage of population in each category				
		Age group				
			30–39	40–49	50–59	60–69
1	low-fit 0–29s	men	6 %	11 %	33 %	42 %
		women	7 %	17 %	23 %	45 %
2	mid-fit 30–59s	men	14 %	18 %	25 %	18 %
		women	10 %	14 %	23 %	32 %
3	high-fit 60s	men	80 %	71 %	42 %	40 %
		women	83 %	69 %	54 %	33 %
		men	n=111	n=163	n=156	n=117
		women	n=59	n=129	n=124	n=127

5.2.2 Figure-of-eight run (secondary test)

Purpose

To measure agility and muscular power of lower extremities.

Health relation

Falls, caused by poor postural control and leading to osteoporotic fractures, are a major health problem among older persons.

Exclusion criteria

Contraindications include dizziness, severe spinal symptoms and problems of lower extremities that might be aggravated by the test movement.

Equipments

Stopwatch
2 cones 10 m apart
Measurement wheel / tape measure

Performance

The client runs a course in a figure-of-eight, 20 meters long. The course is marked with 2 cones placed 10 meters apart with the start/finish line next to one of the cones. The stopwatch is started concurrently with a starting command “go”, and the client is asked to run to the second cone around it, and then return to the start/finish around the first cone.



Instructions: “Start running when you get the starting command. Run as fast as possible around the second cone and return to the starting line around the first cone. The stopwatch is stopped when you cross the start/finish line again.”

Practise and number of test trials: One practice trial and 2 test trials with maximal effort are performed with a short resting period between each trial.

Measurement

The stopwatch is started concurrently with the starting command “go” and stopped when the client crosses the start/finish line again.

Scoring

The fastest time of two trials in seconds.

Reference values

Fitness categories are based on fitness thirds from three intervention studies conducted by the UKK Institute.

Fitness category		Age group	
			35–50
1	poorest third	men	≥ 8.0
		women	≥ 9.0
2	middle third	men	7.0–7.9
		women	8.0–8.9
3	best third	men	≤ 6.9
		women	≤ 7.9

5.3 Musculoskeletal fitness

5.3.1 Shoulder-neck mobility (secondary test)

Purpose

A rough estimate of the posture and functional mobility of shoulder-neck region.

Health relation

Restrictions in shoulder-neck mobility limit the ability to perform everyday tasks among older adults. Middle-aged persons with shoulder-neck pain often have restrictions in the sagittal mobility of the lower cervical and upper thoracic spine.

Exclusion criteria

Contraindications include severe symptoms of the neck or shoulders that might be aggravated by the test movements.

Performance

The client stands with his or her back against the wall; the feet should be placed at a distance of 1½ foot length from the wall. The buttocks, back and shoulder plates rest against the wall.

Instructions: “Raise your hands (thumbs ahead) above your head as far as you can while keeping your arms shoulder-wide. Turn your hands and try to place backs of your hands against the wall, keeping your elbows and wrists straight.”

Practise and number of test trials: The tester shows the correct performance. No practice is allowed. There is only one test trial.

Measurement

The tester estimates the restrictions of functional movement by observing the final position of the hands against the wall. Result is separately scored for the right and left sides.

Scoring

5 =	no restriction of range of motion	the whole dorsal side of hand is in contact with the wall
3 =	moderate restriction of range of motion	only fingers reach the wall
1 =	severe restriction of range of motion	no hand contact with the wall

The test score is the sum of the right and left side points.

Fitness category

2 points =	1
4 points =	2
6 points =	3
8 points =	4
10 points =	5



5.3.2 Hand grip

Purpose

To measure static grip strength.

Health relation

Sufficient grip strength is required for performing many everyday functions and tasks such as opening cans and bottles, pulling plugs from sockets and holding on to handrails. It also reflects more general muscle strength and predicts mobility difficulties.

Exclusion criteria

Contraindications include joint problems of the test arm and high blood pressure.

Equipments

A calibrated hand dynamometer with adjustable grip



Performance

Hand grip strength is measured with a hand dynamometer. The client stands in an upright position with the dynamometer in the preferred hand. The arm is straight and slightly away from the body the scale facing the tester. The grip of the dynamometer is adjusted to the size of the hand to bring the second joint of the fore-finger approximately to a right angle. This is usually consistent with subjective impression of the optimal grip size. The client squeezes the dynamometer firmly and gradually, building quickly up to maximal force. No extraneous movements such as jerking of the arm or body are allowed.

Instructions: “Squeeze the handle of the dynamometer as forcefully as possible. Keep arm straight and slightly away from the body, do not jerk arm or body.”

Practise and number of test trials: The tester shows the correct performance. Client does one pretrial in order to secure a comfortable grip on the dynamometer. There are 2 test trials, with an interval of about 10 seconds between them.

Measurement

The client squeezes when the tester gives the order “squeeze!”. The tester reads the result after each trial.

Scoring The better result of two attempts is the score in kilograms (to the nearest kg).

Reference values Fitness categories were derived from the test book of Eurofit for adults (1995). In relation to body weight (Newtons/kg*)

Fitness category			Age group				
			20–29	30–39	40–49	50–59	60–69
1	poorest quintile	men	≤ 5.8	≤ 5.5	≤ 5.6	≤ 4.9	≤ 4.9
		women	≤ 4.1	≤ 3.9	≤ 4.0	≤ 3.4	≤ 3.1
2	2nd quintile	men	5.9–6.6	5.6–6.4	5.7–6.1	5.0–5.8	5.0–5.4
		women	4.2–4.7	4.0–4.7	4.1–4.5	3.5–3.9	3.2–3.6
3	3rd quintile	men	6.1–7.2	6.5–7.0	6.2–6.6	5.9–6.4	5.5–6.0
		women	4.8–5.2	4.8–5.1	4.6–5.0	4.0–4.5	3.7–3.9
4	4th quintile	men	7.3–7.9	7.1–7.8	6.7–7.6	6.5–7.0	6.1–6.6
		women	5.3–5.9	5.2–5.7	5.1–5.6	4.6–5.1	4.0–4.6
5	best quintile	men	≥ 8.0	≥ 7.9	≥ 7.7	≥ 7.1	≥ 6.7
		women	≥ 6.0	≥ 5.8	≥ 5.7	≥ 5.2	≥ 4.7

* 1 kg is equivalent to approximately 10 Newtons

5.3.3 Jump-and-reach

Purpose

To measure leg extensor power.

Health relation

Leg muscle power and strength are important physiological factors for mobility function.

Exclusion criteria

Contraindications include severe obesity, severe dizziness or severe symptoms of the spine or the extremities that might be aggravated by the test movements.

Equipments

Measurement board to reach
Tape measure
Magnesium powder

Performance

The aim is to jump as high as possible. The client stands beside the jump-board facing forward. Dominant upper extremity is raised up straight against the jumping board. The "standing height" is marked with magnesium powdered middle finger. After that vertical jumps are performed.



Instructions: "Jump as high as possible, using your hands to enhance your performance. You may flex your knees to enhance the performance, but whole feet must stay on the floor. During the jump touch the board with your middle finger while at the highest position."

Practise and number of test trials: The tester shows the correct performance. One practise trial and 2 test trials with maximal effort are performed.

Measurement

The vertical difference between the "standing height" and the "jumping height" is measured in centimetres with a tape measure.

Score

The maximal jump height in centimetres.

Reference values

Fitness categories are from two Finnish population studies conducted by the UKK Institute.

Fitness category			Age group			
			30-39	40-49	50-59	60-69
1	poorest quartile	men	≤ 38	≤ 36	≤ 29	≤ 28
		women	≤ 24	≤ 21	≤ 16	≤ 16
2	2nd quartile	men	39-43	37-40	30-34	29-32
		women	25-27	22-24	17-19	16-20
3	3rd quartile	men	44	41-44	35-37	33-37
		women	28-30	25-28	20-23	21-22
4	best quartile	men	≥ 45	≥ 45	≥ 38	≥ 38
		women	≥ 31	≥ 29	≥ 24	≥ 23
		men	n=49	n=95	n=96	n=37
		women	n=53	n=102	n=89	n=24

5.3.4 Modified push-up

Purpose To measure short-term endurance capacity of the upper extremity extensor muscles and the ability to stabilize trunk.

Health relation

Sufficient upper body muscle strength is necessary for functional independence especially at older ages. The ability to stabilize the trunk is one factor related to motor control of the trunk muscles, which is often impaired in clients with back pain.

Exclusion criteria

Contraindications include moderate to severe disease or symptoms of the circulatory system, and severe symptoms of the lumbar region or extremities that might be aggravated by the test movements.

Equipments

Gym mat
Stopwatch

Performance

The client lies prone on the mat, and begins the push-up cycle by clapping hands behind the back once; this is followed by a normal straight-leg push-up with elbows completely straight in the up-position, so that the client can touch his/her either hand with the other hand. The client ends the cycle in prone position. Position of the arms should be controlled.



Alternative performance

If the client has limited range of motion in shoulder joints and is unable to clap hands behind the back, he/she can begin the push-up cycle by clapping hands to lateral sides of the thighs.

Instructions: "Do as many correct push-ups as you can in 40 seconds. Start by clapping hands behind your back."

Practise and number of test trials: The tester shows the correct test performance. The different phases of the modified push-up are practised once before the test trial. There is 1 test trial.

Measurement

The number of correctly performed push-ups completed in 40 seconds is counted.

Score The test score is the total number of correctly performed push-ups.

Reference values

Fitness categories are from two Finnish population studies conducted by the UKK Institute.

Fitness category			Age group			
			30-39	40-49	50-59	60-69
1	poorest quartile	men	≤ 12	≤ 10	≤ 8	≤ 6
		women	≤ 8	≤ 8	≤ 7	≤ 4
2	2nd quartile	men	13-14	11-12	9-10	7-9
		women	9-10	9-10	8-9	5-6
3	3rd quartile	men	15-16	13-14	11-12	10-11
		women	11-13	11	10-11	7-8
4	best quartile	men	≥ 17	≥ 15	≥ 13	≥ 12
		women	≥ 14	≥ 12	≥ 12	≥ 9
		men	n=110	n=152	n=114	n=43
		women	n=56	n=123	n=89	n=38

5.3.5 Dynamic sit-up (secondary test)

Purpose To measure the dynamic strength of the abdominal and hip flexor muscles.

Health relation

Trunk muscle strength is one factor affecting the motor control of the trunk which is often impaired in clients with back pain.

Contraindications Contraindications include severe pain of spine or hips that might be aggravated by the test movements.

Equipment Gym mat

Performance

The client lays supine on the gym mat, knees flexed to 90 degrees (knees and ankles together). The tester supports ankles with his/her hands so that during the test performances feet of the client stay on the gym mat. Five repetitions of sit-ups are performed in three different test levels (hand positions) as follows:

The first five sit-ups: The aim is to reach midpatella with fingertips of both hands from a straight lying position while keeping the arms straight and palms resting on thighs.



The second five sit-ups: Arms are folded over chest. The aim is to reach thighs with both elbows.



The last five sit-ups: Touch back of earlobes with fingertips. The aim is to reach thighs with elbows.



Instructions: “The test is performed in three performance levels with increasing difficulty. Your aim is to perform 5 sit-ups in each level without a rest between the levels. The performance should be smooth and back of the head and elbows should touch the mat between each sit-up.”

Practise and number of test trials: The tester shows the correct test performances. No practise trials are allowed. There is 1 test trial in each performance level.

Scoring The test score is the number of correctly performed sit-ups (0-15).

Reference values

Due to skewed distributions of the test results, the fitness categories are based on percentages of certain performance levels from two Finnish population studies conducted by the UKK Institute.

Fitness category	Percentage of population in each category					
			Age group			
			30–39	40–49	50–59	60–69
1	low-fit 0–5 repetitions	men	2 %	8 %	18 %	27 %
		women	10 %	15 %	38 %	47 %
2	mid-fit 6–14 repetitions	men	5 %	11 %	14 %	15 %
		women	10 %	20 %	14 %	22 %
3	high-fit 15 repetitions	men	93 %	81 %	68 %	58 %
		women	80 %	65 %	38 %	31 %
		men	n=41	n=75	n=80	n=66
		women	n=39	n=78	n=79	n=62

5.4 Cardiorespiratory fitness

5.4.1 2-km Walk Test

Purpose

To predict maximal oxygen uptake (VO_{2max}) and to measure the ability of brisk walking.

Health relation

Aerobic fitness is a good indicator of health. Poor aerobic fitness increases the risk of cardiovascular and metabolic diseases. Slow walking time predicts mobility difficulties.

Contraindication

Contraindications include severe cardiovascular diseases, severe obesity and other illness or disability that limits brisk walking.

Equipments

Measurement wheel
Stopwatch
Heart rate monitor
Cones (if needed)

Performance

Client walks 2-km as fast as possible on a flat surface using a normal walking style. During the test the client is asked about the feeling of exertion. The test is aborted if the client is not feeling well and continuing the test might be a health hazard. The heart rate is measured instant the client has crossed the finish line.



Instruction: "Walk as fast as possible at a even pace, without risking your health."

Practise and number of test trials: The practice walk to try out fast walking pace is performed for approximately 200m. There is only 1 test trial.

Scoring

The time needed to finish the 2-km walk is recorded in minutes and seconds. Estimated VO_{2max} is calculated separately for men and women on the basis of walk time, heart rate, weight, height and age:

Men:

1. Multiply and add values:

$$[\text{walking time (min)} \times 11.6] + [\text{walking time (s)} \times 0.2] + [\text{heart rate (beats/min)} \times 0.56] + [\text{BMI (kg/m}^2) \times 2.6] = \text{sum}$$

2. Subtract from the sum:

$$\text{sum} - [\text{age (years)} \times 0.2] = \text{difference}$$

3. Subtract the calculated difference from:

$$420 - \text{difference} = \text{Fitness index}$$

Women:

1. Multiply and add the values:

$$[\text{walking time (min)} \times 8.5] + [\text{walking time (s)} \times 0.14] + [\text{heart rate (beats/min)} \times 0.32] + [\text{BMI (kg/m}^2) \times 1.1] = \text{sum}$$

2. Subtract from the sum:

$$\text{sum} - [\text{age (years)} \times 0.4] = \text{difference}$$

3. Subtract the calculated difference from:

$$304 - \text{difference} = \text{Fitness index}$$

For further information see the Tester's Guide, UKK Walk Test. UKK Institute for Health Promotion Research, Tampere 2006.

Reference values

Fitness categories are from two Finnish population studies conducted by the UKK Institute. walk time (min:s)

Fitness category			Age group			
			30-39	40-49	50-59	60-69
1	poorest quartile	men	≥ 16:08	≥ 16:32	≥ 17:29	≥ 18:14
		women	≥ 17:43	≥ 18:08	≥ 18:26	≥ 20:05
2	2nd quartile	men	15:29–16:07	15:31–16:31	16:13–17:28	17:08–18:13
		women	16:53–17:42	16:47–18:07	17:05–18:25	18:59–20:04
3	3rd quartile	men	14:30–15:28	14:26–15:30	15:20–16:12	15:59–17:07
		women	15:58–16:52	16:01–16:46	15:55–17:04	17:56–18:58
4	best quartile	men	≤ 14:29	≤ 14:25	≤ 15:19	≤ 15:58
		women	≤ 15:57	≤ 16:00	≤ 15:54	≤ 15:55
		men	n=111	n=162	n=149	n=78
		women	n=57	n=126	n=123	n=86

6 INDIVIDUAL PHYSICAL ACTIVITY PLAN

In addition to be used in public health monitoring, the ALPHA-FIT Test Battery for Adults can be utilized in individual PA counselling. In addition to the test results from ALPHA-FIT pre-test health screening includes useful information for this purpose.

A successful PA plan is the result of the discussion between the tester and client about what is important in respect to the client's health and/or fitness and also what is feasible in respect to his/her life situation and motivation. It is important that the client him/herself actively participates in the planning of the PA program. That helps the client to commit him/herself to carrying out the plan. The most important information needed is health status of the client, the PA of his/her work, leisure-time sports and PA, and the opportunities, skill and motivation for activity.

The following outline is aimed at helping to accomplish an individual plan for him/her. The people participating in the tests can be divided into the following three groups with respect to their PA behaviour. The objective of PA counselling is different for each of these groups.

Those who are regularly physically active and who have desire to either estimate or follow changes in their fitness testing helps

- to specify their PA program
- to assess the suitability of PA alternatives.

Those who are seldom or occasionally physically active, but who are interested in increasing their physical activity testing serves

- as an instrument for individual counselling
- as a safe base for efficient PA program.

Those who are seldom or occasionally physically active and who are not interested in increasing their PA testing

- provides information on current fitness and the sufficiency of the current PA level with respect to health and fitness
- attempts to awaken an interest in a more active life-style

The following procedure will guide the counselling process towards realistic PA plan:

Define the target for PA

- health oriented
- fitness oriented
- other

Prepare a written "Individual Physical Activity Plan"

- define PA modes, frequency, duration and intensity
- make sure of your client is committed to the plan
- make sure that your client is able to carry through the plan

Plan the monitoring

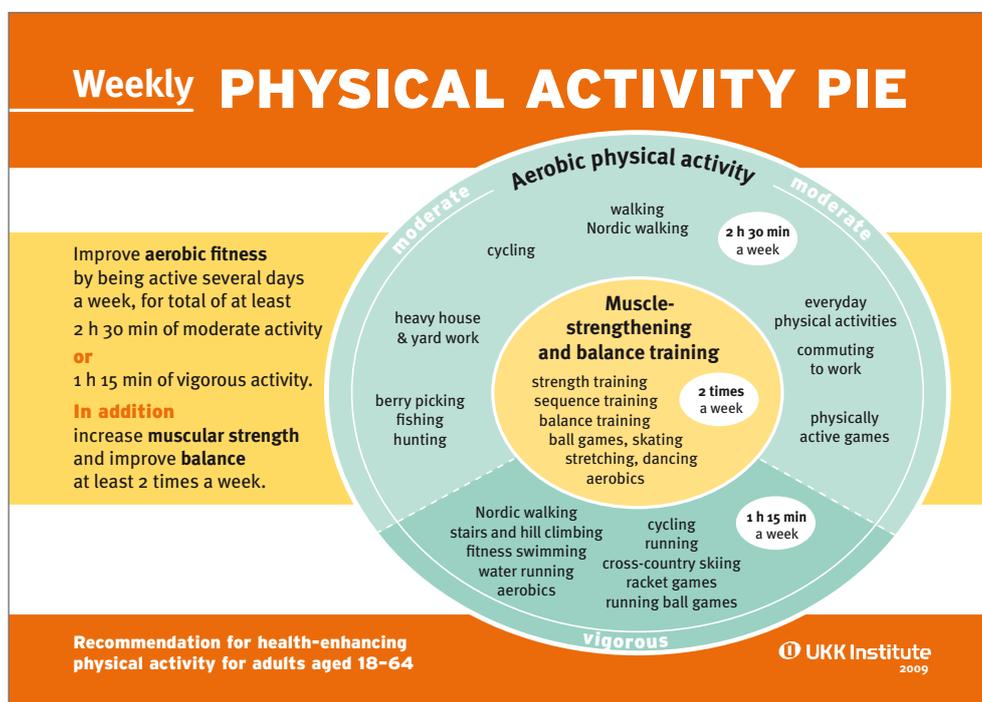
The contents of monitoring

- follow-up visits
- phone calls
- emails
- support group
- self-monitoring
- re-testing etc.

The time period of monitoring

- short-term (2 months)
- intermediate (6 months)
- long-term (12-24 months)

Individuals should be counselled according to current **recommendation for health-enhancing PA** [U.S. Department of Health and Human Services 2008 (www.health.gov/paguidelines)].
www.ukkinstituutti.fi



Recommendation for health-enhancing physical activity for adults aged 18-64

Health-enhancing physical activity promotes health and functional capacity while also improving a person's mood.

Adults should do aerobic physical activity for 2 hours and 30 minutes a week at a moderate intensity or 1 hour and 15 minutes a week at a vigorous intensity. An equivalent combination of both is also possible. Aerobic activity should be performed in episodes of at least 10 minutes, preferably spread throughout the week, at least 3 times a week.

In addition, everyone needs muscle-strengthening activities at least twice a week.

- Even a small amount of regular physical activity is better than none at all.
- Everyday activities lasting only a few minutes are not enough to be considered health-enhancing physical activity.
- The benefits to health increase when physical activity is performed longer or more vigorously than the minimum recommendation.

Aerobic training

- moderate-intensity physical activity that causes some shortness of breath
- or**
- vigorous-intensity physical activity that causes significant shortness of breath.
- Improves your cardiorespiratory endurance.
- Promotes the health of your heart, circulation, and lungs.
- Improves your blood lipid and glucose balance.
- Helps also to control your body weight.

Training to strengthen muscles and improve balance

- 8-10 movements involving the large muscle groups
- 8-12 repetitions of each movement
- Improves muscular strength and endurance.
- Improves flexibility, balance, and agility.
- Increases bone strength.

Physical activity suits everyone. Select pieces of the pie and put them together to please your own taste!

Based on the guidelines of the U.S. Department of Health and Human Services 2008.
www.health.gov/paguidelines

www.ukkinstituutti.fi
 Finland

UKK Institute

A lack of time is one of the most limiting factors for regular PA. Few people have time to participate in a certain form of activity several times a week. Daily activity, commuting to and from work, running errands and other forms of necessary activities offer good opportunities to increase activity level. PA counselling should take into consideration possibilities of daily activity and short bouts of activeness provided by normal daily routine.



**Fitness for Health:
The ALPHA-FIT Test Battery
for Adults Aged 18-69**

Pre-test Health Screening

PHYSICAL ACTIVITY QUESTIONNAIRE

1. The physical load of my job is

- | | |
|-------------------|---|
| light | 1 |
| medium heavy | 2 |
| heavy | 3 |
| I am not employed | 4 |

2. To what leisure time physical activity group do you belong?

Please take into consideration all leisure time physical effort that lasted at least 20 minutes at a time within the last three months.

- 1 practically no physical activity weekly
- 2 light or relaxed physical activity one or more times a week
energetic and brisk physical activity.
- 3 about once a week
- 4 twice a week
- 5 three times a week
- 6 at least four times a week

Physical activity is energetic and brisk when it causes at least some sweating and intensified breathing.

3. What have been your most common modes of physical activity or sports recently?

- 1 most typical mode of sport or other physical activity

- 2 second most typical mode of sport or other physical activity

- 3 third most typical mode of sport or other physical activity

4. Has your leisure time physical activity changed during the last three months in comparison with earlier?

- 1 it has increased
- 2 there has been no notable change
- 3 it has decreased

5. How are your possibilities (time, money, facilities, instruction) and interest in being regularly physically active in your current life situation?

- | | |
|------------------------------|-----------------------------|
| 1 good possibilities | 1 very interested |
| 2 considerable possibilities | 2 somewhat interested |
| 3 poor possibilities | 3 not interested whatsoever |

HEALTH QUESTIONNAIRE

Circle the most suitable alternative in response to the following questions.

6. How do you estimate your own health status?

- 1 very poor
- 2 poor
- 3 average
- 4 good
- 5 very good

7. How do you estimate your physical fitness in comparison with that of other persons of the same age?

- 1 clearly poorer
- 2 somewhat poorer
- 3 just as good
- 4 somewhat better
- 5 considerably better

Read the following questions carefully and respond by circling either yes or no

8. Do you have a heart disease, circulation disorder or lung disease that has been diagnosed by a doctor? yes no

What? _____

9. Do you ever experience chest pain or breathlessness

- | | | |
|-----------------------------|-----|----|
| a) while resting? | yes | no |
| b) while physically active? | yes | no |

10. Has a doctor ever stated that your blood pressure is permanently increased (do you suffer from "hypertension")? yes no

11. Have you smoked regularly during the last six months? yes no

12. Do you often feel faint or have dizzy spells? yes no

13. Have you ever been diagnosed by a doctor as having an inflammatory disease of the joints? yes no

14. Do you have low back problems or any other chronic or recurring musculoskeletal disorder? yes no

What? _____

15. Do you have any other health-related reason (that is not mentioned above) that would limit your participation in physical activity, even though you want to participate? yes no

What? _____

16. Are you currently taking any medication? yes no

What? _____

17. Have you had the flu or a fever during the last two weeks? yes no

18. Have you imbibed a substantial amount of alcohol within the last 24 hours (more than 2 restaurant-size drinks)? yes no

HEALTH STATUS MEASUREMENTS (to be filled out by the tester)

Resting blood pressure:

Systolic _____ mmHg

Diastolic _____ mmHg

Weight _____ kg

Height _____ cm

Body mass index _____

Waist circumference _____ cm



***Fitness for Health:
The ALPHA-FIT Test Battery for Adults Aged 18-69***

TABLE OF MEASUREMENTS

Name of the testee _____ Man/Woman Age (years) _____

MOTOR FITNESS, Balance

One-leg stand

2 test trials unless 60 seconds

1st trial _____ (seconds)

is achieved in the first trial

2nd trial _____ (seconds)

Fitness category

Figure-of-eight run (secondary test)

1 practice trial

practice trial _____ (seconds)

2 test trials

1st trial _____ (seconds)

2nd trial _____ (seconds)

MUSCULOSKELETAL FITNESS, Flexibility

Shoulder-neck mobility (secondary test)

1 test trial

Right

5

no restriction

3

moderate restriction

1

severe restriction

Left

5

no restriction

3

some restriction

1

severe restriction

Right+Left _____ (points)

Fitness category

MUSCULOSKELETAL FITNESS, Muscular Strength

Hand grip

1 pre-trial, 2 test trials

1st trial _____ (kg)

2nd trial _____ (kg)

Better result _____ (kg)

Fitness category

MUSCULOSKELETAL FITNESS, Muscular Strength

Jump-and-reach

1 pre-trial, 2 test trials

1st trial _____(cm)

2nd trial _____(cm)

Fitness category

Better result is used for fitness category

MUSCULOSKELETAL FITNESS, Muscular Endurance

Modified push-up

1 trial

Number of correctly performed push-ups _____

Fitness category

Dynamic sit-up (secondary test)

1 trial

1st 5 sit-ups _____(number)

2nd 5 sit-ups _____(number)

3rd 5 sit-ups _____(number)

Number of correctly performed sit-ups _____

CARDIORESPIRATORY FITNESS, Submaximal aerobic capacity and mobility

2-km walk

walk time _____ (min)

walk time _____ (s)

heart rate _____ (beats/min)

Fitness category

Name of the tester _____ **Date** _____

Notes (reasons for test-specific exclusions, problems occurring during testing etc.)
