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El efecto del esquí alpino como deporte recreativo en el Bienestar personal de adultos de 60 años y más

Autora: Hadar Nezah

Directoras de la tesis:

Mª Luisa Zagalaz Sánchez

Fátima Chacón Borrego

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Mª Luisa Zagalaz Sánchez y Fátima Chacón Borrego, como directoras de la Tesis Doctoral de Hadar Nezah, titulada “El efecto del esquí alpino como deporte recreativo en el Bienestar personal de adultos de 60 años y más” que se ha realizado en la Universidad de Jaén, en el programa de Doctorado de Innovación Didáctica y Formación del profesorado.

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ZAGALAZ SANCHEZ MARIA LUISA - 75056079H
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Abstract

Alpine skiing is one of the physical activity branches available to older and third-age adults. The third-age adults who regularly engage in alpine skiing improve the plasticity of spinal reflexes, strength, and balance control, strengthen their body's physiological functioning and pulmonary system, boost aerobic ability, and may also improve their emotional state during and immediately following alpine skiing. Moreover, alpine skiing imparts enjoyment, flow, and positive body image, ultimately linked to satisfaction in life and social wellbeing.

This first innovative study was conducted among 60-year-old and above adults who regularly practice alpine skiing in Israel. The study explored alpine skiing's benefits for 60-year-olds and above and sought to characterize the skiers and understand how alpine skiing contributes to this age group's wellbeing. The study's objectives were to examine the ties between the variables of personal background, alpine skiing characteristics, the participants' frequency of engagement in physical activity, and the variables related to life quality, i.e., life satisfaction and health indicators among 60-year-old and above skiers. This qualitative study was conducted among 258 participants who engaged in alpine skiing. The research tool comprised four questionnaires covering the research subject: Q-LES-Q, IPAQ, SF-36, and Rosenberg Self-Esteem Scale (RSE).

The findings show that most alpine skiers aged 60 and above are men - approximately half are 60-64, and a third are 65-69, while women are a minority in this group. Most participants skied one to three times a year, and the majority had engaged in skiing before the age of 60 and, during the year, did some physical activity. The reasons for alpine skiing include preserving physical fitness, physical appearance, and competitiveness. The study demonstrated that most third-age skiers reported high-level self-evaluation, while the level is higher among the participants aged 65-69 and decreases with age. Based on the results, the study recommends encouraging physical activity among adults aged 60 and above; alpine skiing is one of the sports branches. Conversely, alpine skiing has no advantage over other sports in terms of older adults' wellbeing. Though alpine skiing is considered a unique, singular, and even prestigious sport in Israel, we may recommend other sports branches that benefit older adults' wellbeing if alpine skiing is inaccessible. However, it is advisable to make alpine skiing available to all citizens in the country, thus inspiring more third-age adults to engage in sports.

Keywords: Life quality, Wellbeing, Alpine skiing, Old people, Elderly people, Physical exercise.

Resumen

El esquí alpino es una de las ramas de actividad física al alcance de los adultos mayores y de la tercera edad. Los adultos de tercera edad que practican esquí alpino con regularidad mejoran la plasticidad de sus reflejos espinales, la fuerza y el control del equilibrio, fortalecen el funcionamiento fisiológico de su cuerpo y el sistema pulmonar, aumentan la capacidad aeróbica y también pueden mejorar su estado emocional durante la práctica e inmediatamente después. Además, el esquí alpino brinda placer, fluidez y una imagen corporal positiva, lo que en última instancia está relacionado con la satisfacción en la vida y el bienestar social.

Este primer estudio innovador se llevó a cabo entre adultos de 60 años o más que practican regularmente esquí alpino en Israel. El mismo exploró los beneficios del esquí alpino para personas de 60 años o más y buscó caracterizar a los esquiadores y comprender cómo contribuye al bienestar de este grupo etario. Los objetivos del estudio fueron examinar las relaciones entre las variables de antecedentes personales, las características del esquí alpino, la frecuencia de participación en esta actividad física y las variables relacionadas con la calidad de vida, es decir, la satisfacción con la vida y los indicadores de salud entre esquiadores de 60 años o más.

El presente estudio cualitativo fue realizado entre 258 participantes que practicaban esquí alpino. La herramienta de investigación constaba de cuatro cuestionarios que cubrían el tema de la investigación: Q-LES-Q, IPAQ, SF-36 y Escala de Autoestima de Rosenberg (RSE).

Los resultados muestran que la mayoría de los esquiadores alpinos de 60 años o más son hombres: aproximadamente la mitad tiene entre 60 y 64 años y un tercio entre 65 y 69 años, mientras que las mujeres son una minoría en este grupo. La mayoría de los participantes esquiaban de una a tres veces al año; la mayor parte de ellos había practicado esquí antes de los 60 años y, durante el año, realizaba alguna actividad física. Las razones para practicar esquí alpino incluyen la preservación del buen estado físico, la apariencia física y la competitividad.

El estudio demostró que la mayoría de los esquiadores de tercera edad informaron acerca de un alto nivel de autoevaluación; el nivel es mayor entre los participantes de 65 a 69 años y disminuye con la edad.

Sobre la base de los resultados, el estudio recomienda fomentar la actividad física entre los adultos de 60 años o más. El esquí alpino es una rama deportiva y no muestra ninguna ventaja sobre otros deportes, en términos del bienestar de las personas mayores. Si bien es considerado un deporte único, singular e incluso prestigioso en Israel, podemos recomendar otras ramas deportivas que contribuyen al bienestar de los adultos mayores en caso de que esta resulte inaccesible. No obstante, es aconsejable ponerlo al alcance de todos los ciudadanos del país, inspirando así a más adultos de la tercera edad a practicar deportes.

Palabras clave: Calidad de vida, Bienestar, Esquí, Personas mayores, Ancianos, Ejercicio físico.

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Introduction

In the past decades, significant improvements in medical sciences have led to a substantial and meaningful increase in life expectancy; on average, every person is anticipated to live longer. However, in the wake of this welcome increase in longevity, the effort to maintain and improve life quality is equally vital: independence, continuous functioning, and decreased frequency of injury, falls, and chronic and nonchronic diseases. In most cases, a sweeping recommendation to improve the situation is to engage in physical activity.

Multiple studies have already established the link between physical activity and its contribution to improving a long line of indicators: enhanced functioning ability, decreased risk of developing conditions leading to physical disability, prevention of cardiovascular diseases, management and prevention of different cancer types, metabolic disorders, and cognitive and mental health problems.

Regular physical activity is essential at any age but indispensable in the golden age. Seventy percent of third-age adults who do not engage in any regular physical activity are susceptible to various severe diseases and decline in physical functioning and life quality. In the third age, physical activity helps enhance physical fitness - with an emphasis on muscular, skeletal, cardiovascular, and respiratory systems, lowering the risk of developing high blood pressure, heart diseases, stroke, diabetes, different types of cancer, depression, and more., improving equilibrium and balance - thus reducing the risks of falling, strengthening the bones, reducing the risk of pelvic or vertebral fractures, maintaining proper body weight, improving flexibility and activity in the joints, elevating the functioning ability and independence in everyday life, improving the mood, and the older person's general wellbeing (Angulo et al., 2020).

In addition, persistent engagement in physical activity in the third age results in an improved state of mind and reduced intensity of anxiety and depression due to the elevated levels of endorphins in the blood, which directly contributes to decreased stress and

despondency levels. Therefore, many psychologists and psychiatrists recommend sports activity as an optimal concluding treatment. Outdoor sports activity has an additional health advantage, beneficial for the overall feeling and negative feeling regulation. Vitamin D, naturally produced by the body after prolonged sun exposure, positively affects many mental metrics. Due to many medications, older people have lower levels of this vitamin. In the social aspect, the older the person, the more difficulties they have in creating meaningful social relations. Physical activity in a homogeneous group allows older people to meet their peers and get out of their comfort zone. The conversations and the atmosphere generated during physical activity form a fertile ground for building new social connections and cultivating new friendships, even casual associations based on brief conversations.

Moreover, physical activity reinforces the sense of self-esteem, and sharing experiences perceived as positive contributes to relieving the sense of loneliness considered very common in this age. Also, making physical activity a part of older people's daily schedule allows them to boost their self-esteem and adopt a welcome physical activity routine. Successful performance of all the exercises adapted to the adult's difficulty level will give them a sense of success by the end of sports practice and improve their self-concept. The joy of being active and learning – the lot of all beginnings – enables older people to amplify their sense of competence, thus strengthening their self-value. Regular physical activity can improve older people's cognitive functions and help preserve proper brain functioning. Proper blood circulation can have a significant favorable effect on the proper functioning of the central nervous system. The hormone dopamine released due to physical activity effectively stimulates different areas in the brain. Also, given the reduced movement confidence felt by many third-age adults stemming from multiple illnesses, deficient neurological functioning, and reduced body mass, it is advisable to train with little weight lifting and enroll in dance and movement classes contributing to improved steadiness and flexibility even in older people who have Parkinson's disease.

Finally, endurance training and moderate heart rate elevation are essential to proper blood circulation and coping with cardiovascular diseases. The activity contributes to weight loss and lower cholesterol levels and is considered mandatory in maintaining the proper functioning of the heart. Hence, physical activity is crucial for maintaining good health at all ages, especially in the golden age. Choosing the right type of training and adapting it to each older adult's abilities and needs are the main factors in preserving physical and mental health (Ministry of Health, 2020). There are different types of physical activity suitable and optimal for the third age, such as jogging, jumping, walking, dancing, doing household chores, gardening, and more, which are considered physical activity. Any activity requiring older people to move and activate their bodies is a physical activity.

Alpine skiing is one of the sports available to adults and third-age adults. The sport demands more prolonged intensity and effort than any other sport and allows burning multiple calories each hour of skiing. The reason lies not only in the physical effort but also in the heavy weight of the equipment and the footgear and the body's coping with the cold. Furthermore, the activity occurs in high mountains, and the lack of oxygen may impair performance abilities even of well-fit people. Skiers may suffer dizziness and nausea until they adapt to the altitude (Bambach et al., 2008). Through regular engagement in alpine skiing, older people improve the plasticity of spinal reflexes, strength, and balance control (Lauber et al., 2011), strengthen their physiological functions and pulmonary system, elevate their aerobic ability, heart rate, and maximize lung oxygen saturation and ventilation (Niederseer et al., 2021).

Alpine skiing has potential in terms of mental health. As skiing occurs in attractive mountainous areas, the exposure to the natural environment during skiing may serve as an additional stimulus toward wellbeing and stress recovery. From the psychological viewpoint of physical activity, alpine skiing can become a positive interaction and improve skiers' emotional state during and immediately following skiing. The sport holds potential benefits for older skiers in terms of enjoyment, flow, and body image, ultimately linked to satisfaction in life and

social wellbeing. Alpine skiing - especially regular and consistent - may contribute to healthy aging because it is linked to a healthier lifestyle and includes a greater scope of physical activity. However, several other mechanisms can significantly contribute to the positive health impact of skiing, i.e., the challenges and specific adaptations of the muscular and skeletal control systems and exposure to cold temperatures and hypoxia alternately, and social and emotional advantages of spending time in nature (Burtscher et al., 2019). Thus, wellbeing in older adults could be supported and improved through physical activity, and one of the best sports is skiing. Older people found to have a high perceived level of wellbeing tend to take more interest in their friends and accept them in both their positive and negative traits, thus developing relationships based on trust that significantly improves their lives. Such people live according to defined goals and embrace new experiences with joy and pleasure; their endeavors are oriented toward realizing their abilities. They are surrounded by a community that enables them to build friendships, and they view their lives in positive aspects. All of the above allows them to develop interpersonal communication, which is most significant in the third age (Kovalenko, 2017). Wellbeing is independently linked to achieving and maintaining a higher level of physical activity. Alpine skiing is suitable for encouraging the older population to persist in sports activity and improve their health in winter. The skiing duration and intensity generate a positive psychological effect on this population (Tomas-Carus et al., 2007). Hence, in third-age people, regular skiing accomplishes and enhances wellbeing.

Israel has one site with limited opportunities for alpine skiing – the Mount Hermon site, which has a short ski season. Israeli winter does not provide optimal conditions for skiing; thus, this sport is underdeveloped in the country. Israelis travel abroad on ski vacations for a single week per year. Such vacations require proper preparation to ensure full enjoyment and prevent injury. These limitations are valid for the whole range of skiers in Israel and even more so for people aged 60 and above. They would prefer a group seven-to-10-day ski vacation in Europe, combining it with recreational activities, trips, and shopping around the ski resorts. These third-

age Israelis will also find good restaurants, a heated swimming pool, a hot Jacuzzi or a steaming sauna at the resort spa complex, and ski lessons on site if needed. They will request that the medical team be available should they need it (Oz, 2015).

The present study will attempt to show that skiing effectively improves and empowers wellbeing in older people aged 60 and above in Israel. The study will examine this matter through the eyes of adults who regularly engage in skiing.

It is the first and distinctive study conducted in Israel among people aged 60 plus who regularly engage in alpine skiing over the years.

The study's aimed to explore the relations between the variables of the participants' background, characteristics of engaging in alpine skiing, and physical activity frequency, and the variables associated with life quality, such as life satisfaction and health indicators in 60-and-above skiers. We sought to confirm the hypothesis that alpine skiing significantly enhances the wellbeing of 60-year-olds and above who persist in skiing annually.

This quantitative study starts with a theoretical review of older population's life and wellbeing. It proceeds with sports activity emphasizing skiing and its ability to improve older people's lives and concludes with the methods of engaging people aged 60 and above in alpine skiing. The methodology will be based on the adult population of skiers. The research instrument comprises four questionnaires covering the research subject: Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q), International Physical Activity Questionnaire (IPAQ), SF-36 Questionnaire, Rosenberg Self-Esteem Scale (RSE), Quality of Life Questionnaire, Health Survey, and an additional participant demographics questionnaire. The data analysis of the distribution of the demographics and skiing variables is based on Spearman's Rank correlation coefficient and Mann–Whitney U Test. The discussion will connect the study's results with the literature review. The significance of the present study lies in examining a sport uncommon in Israel – alpine skiing - among the population aged 60 and above. With increasing age, this sports branch can improve the wellbeing of this population that

might suffer from physical and mental illnesses. Physical activity and low physical and mental morbidity mediate the relationship between wellbeing and longevity. Hence, the higher the individual's wellbeing metrics, the more likely they are to preserve their physical health and thus increase their chances to live longer. Furthermore, wellbeing significantly reduces the risk of unnatural death resulting from suicide - mainly in older people (Conwell et al., 2011).

Several sports are available to the third-age population; however, the list is limited. Thus, adding a new exhilarating sport to that list may inspire part of the population to engage in it and develop it in the country. Alpine skiing can challenge older people to study a new and distinct realm and consequently create an optimal psychological environment against mental distress, which is most prevalent in older people with natural aging.

CHAPTER 1: LITERATURE REVIEW

1.1. Personal Wellbeing: Definitions

The sense of wellbeing reflects people's evaluation of their lives. This evaluation can be done cognitively when an individual consciously judges their level of life satisfaction in general. Individuals' responses to positive or negative emotional experiences can impact their life evaluation (Oerlemans & Bakker, 2013).

As early as 1961, Neurgarten et al. pointed out five variables defining life satisfaction that results in personal wellbeing: zest versus apathy, resolution and fortitude, congruence between life goals, self-concept, and mood tone (Neugarten et al., 1961).

In 1967, Wilson indicated the link between personal and demographic factors and the sense of individual wellbeing. He defined it as follows: The happy person is "a young, healthy, well-educated, well-paid, extroverted, optimistic, worry-free, religious, married person, with high self-esteem, high job morale, modest aspirations, of either sex and a wide range of intelligence" (Wilson, 1967, as cited in Diener, 1984, p. 542).

Bosley and Wolf (as cited in Deiner, 1984) defined wellbeing as a need or desire fulfillment. Shin & Johnson (as cited in Diener, 1984) defined happiness as a global evaluation of the quality of life according to individual criteria. Shikulla (as cited in Diener, 1984) defined happiness as satisfaction from the harmony between the person's desires and aspirations and their goals and objectives. Campbel et al. (1976) defined wellbeing as the individual's evaluation of their general status in life resulting from comparing aspirations with actual achievements. Positive results are anticipated as this is a long-term cognitive appraisal toward fulfilling the individual's desired goals (Baur & Okun, 1983).

There is also an assumption that satisfaction conducive to personal wellbeing is affected by external, objective, and quantitative factors related to living conditions (Felce & Perry, 1996).

Some researchers referred to the sense of personal wellbeing as a measuring tool in healthcare and asserted that a subjective wellbeing is a measuring tool in the individual's health, i.e., it has broad potential in examining the extent to which the treatment process impacts patients' positive life experiences. Such interpretation of the sense of wellbeing is viewed via three categories: evaluations, happiness experiences, and happiness conductors, which are supposed to form the basis for the individual's mental wellbeing and satisfaction (Lee et al., 2013).

Aristotle claimed that the desire to be happy and healthy is acquired via traditional life conduits; the desired state is, therefore, judged within a particular value. In his studies, Diener (1984) classified definitions of the sense of individual wellbeing or happiness into three categories. He believed the first category defined the sense of wellbeing through external criteria. Hence, happiness is not a subjective state but rather a desirable evaluation of a state. Namely, happiness is a state the individual desires. The second category of the definitions of the sense of wellbeing indicates social researchers' approach, focusing on the circumstances causing people to appraise their lives positively. This definition of individual wellbeing emphasized life satisfaction, expressed in the good-life standards. The third category defines happiness in everyday conversation, i.e., happiness indicates the primacy of positive emotions over negative. That means a person can experience positive emotions at present or is predisposed to such positive emotions despite not experiencing them. Thus, the definition of the sense of personal wellbeing includes positive measures, the absence of negative factors, and an overall evaluation of the individual's life aspects (Diener, 1984).

According to Oerlemans and Bakker (2013), the sense of wellbeing includes satisfaction with life and experiencing positive emotions, such as joy and happiness, and negative emotions, such as anger and sadness. Per Luhmann et al. (2012), the sense of personal wellbeing comprises two aspects: (a) emotional wellbeing, which highlights the presence of positive emotions and absence of negative emotions; (b) cognitive wellbeing, which highlights cognitive

life evaluation — the difference between the two lies in their stability and variance relative to different variables.

An additional definition specifies six dimensions of the sense of wellbeing: good relations with others, environmental mastery, self-acceptance, personal growth, autonomy, and purpose in life. The six dimensions can determine the sense of psychological wellbeing theoretically and operationally. They identify what facilitates effective control of daily events, emotions, and physical health (Kjell et al., 2013).

1.1.1. The Development of the Concept

Aristotle classified the components of personal wellbeing into three categories: (a) satisfaction theories stemming from needs and purposes in life; thus, reducing life tensions and pressures and enhancing the satisfaction of biological and psychological needs can cause people to be happier; (b) theories of processes and actions: individuals' more active engagement in programs, projects and social activities that interest them will generate their happiness and enjoyment, and positive experiences of the sense of wellbeing; (c) genetic theories and individual tendencies: it implies that the genetic component impacts people's emotions and personality in their responses to different life circumstances (Diener et al., 2002).

Since the 1960s, different attempts have been made to define and measure the sense of personal wellbeing. The central aspect of the concept is the individual's feeling (SWB – Subjective Wellbeing), happiness, and satisfaction with the quality of life. In 1960, Bradburn (as cited in Diener, 1984) published an article stating that happiness consists of two separate components: negative and positive emotions. To obtain a complete picture of the individual's sense of wellbeing, we must investigate and analyze actions that cause people happiness and activities that do not, each group separately. Differently put, if we ignore negative situations in life, a positive state will not necessarily "sprout"; distancing oneself from the pain will not inevitably lead to happiness and joy (Diener et al., 2002).

In 1967, Warner Wilson wrote a survey that explored the concept of subjective wellbeing in the context of happiness. He presented two perspectives that explained the differences in people's sense of wellbeing. The first perspective posits that adequate satisfaction of needs generates happiness, whereas their nonfulfillment leads to sadness and displeasure. The second perspective asserts that the degree of needs fulfillment that leads to satisfaction is subject to the individual's levels of adaptation and ambition, influenced, in turn, by prior experiences. Hence, Wilson assumed the existence of universal human needs that, if fulfilled, will generate people's happiness in life. (Diener et al., 1999).

Scheidt (1986) offered an integrative bidirectional model to explain the essence of the sense of wellbeing. In his opinion, the individual's subjective feeling regarding the quality of their life is both the cause and the effect of the capacity to cope with daily challenges and life experiences.

The bottom-up model views personal wellbeing as a result of all individual and environmental variables and the main predictor of general happiness (Stones & Kozma, 1980). Counter to this model, the top-down model posits that subjective interpretation of experiences impacts, above everything else, the individual's mental wellbeing, i.e., a sense of wellbeing is the basis for a subjective interpretation of the variables (Fiest et al., 1995).

Andrews & Robinson's study (1991) found that demographic variables such as gender, age, race, education, income, and marital status predict only a low percentage (up to 10%) of the variance in wellbeing. In contrast, Diener (1984), who also investigated the impact of demographic variables on personal wellbeing, stated that demographic variables predict and affect perceived wellbeing. In his extensive study on subjective wellbeing, Diener divided the concept of perceived wellbeing into three categories: (a) personal happiness as a concept founded on an external criterion – objective characteristics that influence the individual, e.g., economic status; (b) definitions that represent a cognitive component and refer to intellectual aspects, such as life satisfaction; this component is commonly considered as a stable and

consistent component in life; (c) definitions based on the emotional premise; they include positive and negative experiences (Diener, 1984).

The positive affect refers to the metrics of happiness and high morale, whereas the negative affect refers to the metrics of worry, anxiety, and depression. The two metrics are not interdependent, and in contrast to the cognitive component, the emotional component is a response characteristic that changes in the wake of different life events (Campbell, 1990).

Schimmack et al. (2002) asserted that culture impacts perceived personal wellbeing in two ways. First, culture directly impacts the individual's wellbeing, i.e., people living in distinct individualistic, democratic societies have greater perceived wellbeing than those who live in collectivistic, poor, and totalitarian societies. Secondly, culture maintains homeostasis between hedonic balance and life satisfaction.

A study conducted in Israel 1997 attempted to find a link between activism and personal wellbeing while integrating the subject of perceived loneliness in advanced age. Using structural equation models, the researchers analyzed survey data collected among people aged 60 and above. The results demonstrated that engagement in activities, especially the nonformal type, indirectly impacts perceived wellbeing in older age. Its contribution manifests in a reduced sense of loneliness; the less lonely older people feel, the more their perceived wellbeing improves (Shiovitza-Ezra, 2008). The study is based on the activity theory, a central gerontological theory that posits that disengagement from social activities is detrimental for older people.

In 1998, a new therapeutic approach, *positive psychology*, was developed. Seligman, the founder of positive psychology, published an article asserting that previously, psychologists focused on how to help people who feel badly recover their basic level of feelings. Seligman suggested exploring methods aimed at helping people feel better than in the past, i.e., be happier in their daily lives. In positive psychology, the main focus seeks to identify human talents and main strengths inherent in the individual from birth and find ways to nurture these talents and

strengths. The approach emphasizes that the individual has a choice and the responsibility to choose and actively search for meaning, creativity, and values. Positive psychology focuses on the personality's healthy and positive aspects; it seeks to enhance their strengths and generate happiness and wellbeing.

Positive psychology focuses on building positive qualities in the individual rather than on pathology as is customary in classic psychology; it looks toward the future, anticipating the individual's growth and development, and does not focus on curing illness and recovery. To promote happiness, one must choose only appropriate and comfortable strategies for the individual to practice over time. For the least experience of subjective wellbeing, the ratio must be three to one, of positive emotions to negative. (Seligman & Steen, 2005).

According to Oerlemans and Bakker (2013), significant components in high subjective wellbeing are life satisfaction, positive emotions, e.g., joy and happiness; negative emotions, e.g., anger and sadness. Studies on the impact of life events on perceived wellbeing demonstrated that the influence lasts for several years; the initial reaction varies across different life events. Thus, reactions to positive life events, such as weddings, are positive and show fast adaptability, unlike reactions to adverse life events, such as disability and widowhood (Luhmann et al., 2012).

1.1.2. Subjective Personal Wellbeing

The concept refers to the individual's subjective evaluation of the quality of their life as a sum of emotional and cognitive components (Mitchell et al., 2011). It contains a wide range of elements relating to effective reactions to experiences, events, and occurrences in the individual's life. Subjective personal wellbeing is perceived as a stable feature in the individual's emotional life and correlates highly with other personality traits, such as extroversion, self-abuse, and optimism (Eid et al., 2003).

Even if dramatic events change the individual's subjective wellbeing at specific points in their lifetime, the change is temporary - it will return to its typical level in a relatively short

time (Page, 2005). The impact of dramatic events also wears out, and the individual adapts to them, for better or for worse, relatively fast (Suh et al., 1996).

The emotional component of subjective wellbeing includes a combination of positive and negative emotions the individual experiences in reaction to internal and external stimuli. Positive affect is described as positive emotions, e.g., joy, satisfaction, affection, love, happiness, and pride. Negative affect is emotions such as sadness, despair, tension, anxiety, failure, guilt, and frustration. The ratio between positive and negative affect occurrences represents the individual's subjective wellbeing. A high level of positive affect and a low level of negative affect mean high personal wellbeing. In contrast, a high level of negative affect and a low level of positive affect mean low subjective wellbeing. The cognitive component is the individual's acknowledgment of reality - the way they judge, evaluate, and determine the degree of their progress toward the realization of their aspirations and main goals in life; the way they measure their achievements, according to the scale they see as appropriate for their life circumstances. The individual has many life interests, and the more positive their feelings are in more dimensions of their life, the higher their subjective wellbeing (Erhard, 2014).

At the same time, we can state that positive and negative emotions are two ends of the same continuum; the negative correlation between the two decreases as the incidence of emotional events in general rises, and these are two separate structures (Diener et al., 1985). Hence, we can view subjective wellbeing as a standard measure of long-term personal wellbeing and refer to the two types of emotions separately and alongside each other (Anand, 2016).

Subjective wellbeing at any given point in the individual's life is a combination of personality traits stable over time (e.g., self-esteem, coherence, mastery of life, social abilities, personal skills) and changing elements (e.g., crisis and environmental disaster situations, personal circumstances such as illness, dismissal from work, family crisis). At the same time, the level of wellbeing is linked to objective variables (e.g., health, education, income, events in

the local and global environment) and subjective variables (mental health, self-realization) (Cummins & Nistico, 2002). In other words, the combination of life missions – in all five realms that compose the whole self - with the context in which the individual exists provides a holistic picture of the level of the individual's subjective wellbeing. Given the reciprocal relations between the objective and subjective, situational and personality components, a change in one component will have either direct or indirect positive or negative impact on other components (Myers et al., 2000).

1.1.3. Personal Wellbeing in Older People

Older people's psychological wellbeing is not decidedly related to characteristics of everyday activities. Older adults with a developed high wellbeing are socially engaged, have abundant opportunities to communicate with friends and do not suffer from loneliness. In contrast, older people with low wellbeing are lonely, socially uninvolved, with few opportunities for social interactions. Various factors were found to affect older people's wellbeing:

a. The existence of meaning in life and the person's perception and evaluation of it, life goals with a perspective on the relationship between the present, the past, and the future. These factors are manifest in the ways the person advances their life goals, interests, and meaning in life;
b. The individual's external and internal conditions may lead to dissatisfaction with life caused by emerging anxiety about deteriorating health and physical fitness due to scarce material resources, lack of physical and moral support, and actual isolation. Thus, the benefit of good health does not always result in the older person's satisfaction with life (Yermolayeva, 2002). Wellbeing means emotional health and general functioning, i.e., a combination of good feeling and proper functioning. In the third age, the level of personal wellbeing gradually decreases and even drops below the age average (Kovalenko, 2017), and cognitive functioning declines with age as well. Older people

do not comprehend this development, and thus, they grow dissatisfied with their life and personality and struggle to accept themselves.

Assertiveness is the key regulator of psychological wellbeing for women and men aged 66-69, while their self-esteem and the lack of internal conflict are also important (Partyko, 2016). Psychological wellbeing and health have a strong relation in older age. Moreover, due to chronic diseases, this relation becomes more robust in older age (Steptoe et al., 2015).

American and European women were found to be more sensitive to the negative processes associated with physical aging (Sabik & Cole, 2017).

In older people, high wellbeing is manifest in numerous trusting relationships with friends, taking interest in them, and accepting their negative and positive personality traits. Advancing life goals allows for control in life, openness to new and unpredictable experiences, and aspirations to fulfill individual abilities. Such people are sociable, frequently communicate with others, see life in a positive light, and value it more. Moreover, they broaden their communication skills - so beneficial for them to cope with life's demands (Kovalenko, 2017).

High personal wellbeing is reflected in the fact that older people live with their families as opposed to older adults who live alone. Factors determining a higher sense of wellbeing include higher abilities to compromise and express sympathy and compassion toward friends and strangers alike, a sense of personal growth, an awareness of different life stages, and a positive attitude toward various aspects of the personality. In contrast, a low level of wellbeing linked to personality and age stems from difficulties in expressing positive feelings, a preoccupation with others' flaws, a decline in internal locus of control, decreasing self-esteem, and a lack of suitable ways to compensate for these mentioned failings; decreasing self-confidence and an increasing sense of an inability to perform; self-doubts regarding one's abilities to change anything and lack of opportunities to exhibit abilities; loss of interest in life and dissatisfaction with life; focusing on a limited social space; a desire to change life, accompanied by a reluctance to act; a negative attitude toward to internal changes, and more.

Additional factors decreasing older adult's wellbeing stem from social changes, such as retirement, loss of employment, isolation from friends and relatives, and social environment. Older people's health condition, timeframe, others' preferences, and objective circumstances (i.e., distance) do not allow them to communicate and feel at ease with others. Most older adults' income levels prevent them from being satisfied and fulfilled in life. Also, they are genuinely concerned with the political situation in both their home country and the entire world (Kovalenko & Spivak, 2018).

1.1.4. Wellbeing in Israel

Israel is an advanced country in terms of developing national wellbeing, sustainability and resilience indicators. Since 2012, when the government resolved to develop a system of wellbeing indicators, an in-depth consultation process occurred between governmental ministries, diverse public sectors, and other relevant agencies regarding these indicators. At the same time, a broad public discussion was held on the significance of different issues and the development of proposals for additional existing variables. The Ministry of Economics, in collaboration with the Prime Minister's Office, led the process. They set the core questions, e.g., "Does this look right to you?" and "What would you add?". An online questionnaire accessible to all supplemented the study that followed the public discussion. The questionnaire questions referred to each proposed field and its sub-themes. For instance, the health section comprised questions on the significance of a healthy lifestyle, health, and physical illnesses. In the 56 days from March to May 2014, 2,136 people filled out the questionnaire. The collection of completed questionnaires took about two and a half years. In the analysis of findings, nine fields emerged; each contained eight indicators: (a) the material level of life; (b) engagement and civil government; (c) employment quality; (d) education and skills; (e) environment; (f) health; (g) personal and social wellbeing; (h) personal security, and (i) infrastructure and housing. Following public discussion and the government's recommendations, the second version was

published. It had two more fields added to the initial nine: leisure, culture and community, and information technologies.

The development of wellbeing indicators is an excellent example of collaboration between the government and the external offices. Upon obtaining the findings, the Central Bureau of Statistics (CBS) in Israel issued several recommendations to other countries which planned to develop wellbeing indicators. The process yielded a wellbeing measurement that will help significantly enhance wellbeing in Israel (Graham et al., 2018). Despite the obtained low scores on wellbeing, Israel ranked high in general satisfaction with life (7.1 on the 0-10 scale), especially when compared to the OECD countries' ranking – with high wellbeing scores (6.6. on the 0-10 scale).

To examine why engaging in "serious leisure" activities serves as a strategy for coping with the pressures of everyday life in Israel, the researchers conducted in-depth interviews with 63 people practicing yoga, blacksmithing, pottery, and yachting. According to the findings, the participants reported that those activities would allow them to cope with stress factors associated with national security and help them overcome social distress linked to academic achievements or the effect of motivation in leisure hours: personal, social, and moral components (Hayosh, 2017).

The head of the OECD's Statistics Division spoke of the importance of emotions and stated that we should not ignore them. She also explained why Israelis have solid and authentic reasons to be happy. "The OECD likes to argue that "without facts, all we have is opinions." This is a well-worded sentence that exhausts the organization's work, but one must admit that today's world speaks of other things such as "alternative facts" and "feelings" (OECD, 2017). Israelis appear to be among the happiest in OECD countries. However, seeing how Israel performs in the other indices is important. The country excels in health and employment, specifically in the low unemployment rate. The head of the OECD's Statistics Division stated she did not think that "Israelis have cognitive dissonance, and it is not simple to convince an unhappy person to feel

happiness" (OECD, 2017). This measure depends on culture as it is a critical part of how people live their lives and express themselves, and it can thus authentically influence emotions. Culture should not be viewed as a statistical bias or denial but as an authentic source of emotions.

Another interesting statistic is that Israelis are placed low in the index that measures emotional wellbeing, where the respondents answered whether they have been experiencing more positive or negative emotions lately. Paradoxically, Israel is at the bottom of the table, so it is clear that Israelis are generally satisfied with their lives, per the so-called happiness index. However, they do not feel happy every day. People can live complicated lives and still feel happy because they do things they believe in and live how they see fit (OECD, 2017).

1.1.5. Personal Wellbeing Measurement

For most of these subjective wellbeing indicators, international comparison is of the highest priority. Regarding these indicators, the most considerable evidence exists of validity and relevance, optimally understood outcomes, and the most developed policy uses. Demographic variables cover the essential data that serve to describe the population being assessed and enable researchers to analyze how the results vary per population subgroups. They include various demographic indices attempting to measure subjective wellbeing under the following indicators:

- *Age* – The respondent's age, in years of being single, if possible. Age range, though it allows for certain cross-classification, is less desired as it limits the flexibility regarding the examined groups and does not make it easy to analyze age as a continuous variable.
- *Sex or gender* – The respondent's sex or gender.
- *Marital status* – The respondent's legal marital status, also when they are widowed, divorced, or separated, and the respondent's social marital status, including whether the respondent lives as a married person despite not being legally married.
- *Family type* refers to the classification of the respondent's family unit, including being single or living with a partner and whether there are children.

- *Children* – The number and ages of the children in the respondent's family unit and their relationship to the respondent.
- *Household size* – The number of people living in the respondent's household. The household size may differ from the family size because more than one family unit can live in the same home. The household size is essential in understanding the impact of household income on subjective wellbeing.
- *Geographic data* – While privacy concerns might prevent releasing the respondent's detailed geographical data, it is possible to break down estimates per broad geographic areas, such as urban and rural, capital city, country/region, and others. Geocoding allows merging with other area databases containing geocodes, e.g., environmental data. In addition to the abovementioned demographic metrics that could be considered necessary, it is probably desirable to include several additional demographic variables. Their precise relevance might vary according to national circumstances and the research priorities being examined.
- *Immigration status/Country of birth/Year of immigration* – Immigration status may imply permanent residence, citizenship, or the respondent's country of birth.
- *Ethnical identification* – Ethnic identity or the respondent's identity can be highly significant for policies in ethnically diverse societies.
- *Language* – the respondent's primary language. In specific circumstances, it might also be desirable to collect information on the respondents' other spoken languages. The proficiency in the formal language of the country (the survey language) might be significant for specific purposes.
- *Type of residence area* – A classification of the respondent's place of residence according to the degree of urbanization.
- *Essential conditions:* income, wealth, consumption, and additional aspects of the respondent's material life circumstances. The interest in subjective wellbeing indicators focuses mainly on

the relationship between the respondent's material conditions and their subjective wellbeing. Traditionally, income has been a central focus.

- *Income level* – The household income is more significant than the individual income because the former drives the standard of living and the possibilities of consumption.
- *Consumption expenditure* – income flow is a relatively limited indicator of the actual consumption level the household can maintain. People might withdraw assets accrued in the past or accumulate debt to smooth consumption over time. Therefore, it is advisable to have expenditure indicators and access to specific goods or services to explore the relationship between consumption and subjective wellbeing.
- *Deprivation* - Collecting high-quality information on expenditures often involves difficulty and is costly; thus, surveys are often pressed for space available for additional questions. Indicators of material deprivation provide an alternative to detailed expenditure data in assessing the adequacy of consumption.
- *Housing quality* - Housing quality is an essential aspect of material conditions of living; there is evidence that housing conditions affect subjective wellbeing.
- *Life quality* is a broad term referring to components of overall wellbeing besides material conditions. A whole range of factors influences what we value in life, reaching beyond its material aspect. Data regarding these factors is crucial in measuring subjective wellbeing because they strongly correlate with subjective wellbeing, even after controlling for income and demographic factors.
- *Employment status* – Employment status was found to impact subjective wellbeing considerably. In particular, unemployment has a strong negative effect on life satisfaction and affect measures.
- *Health status* – Both physical and mental health correlate with subjective wellbeing indicators. The evidence shows that variations in disability status cause variations in satisfaction with life.

- *Work/life balance* – There is significant evidence suggesting that aspects of work/life balance impact subjective wellbeing, particularly the time spent commuting and caring for others.
- *Education and skills* – Education and skills are of apparent interest as variables in cross-classification. Moreover, there is valid evidence that education is associated with subjective wellbeing at a bivariate level.
- *Social connections* – Social contact is one of the most meaningful motivators of subjective wellbeing because it significantly affects life evaluation and affect.
- *Civic engagement and governance* – General trust in others and more domain-specific indicators of neighborhood and workplace trust are crucial factors in accounting for fluctuations in subjective wellbeing. Hence, it is essential to collect data on these indicators.
- *Environmental quality* – As environmental quality is inherently a geographic phenomenon, merging datasets on environmental quality with household-level data on satisfaction with life entails high costs.
- *Personal security* – A sense of security is vital for subjective wellbeing. That is reflected in correlations between victimization experiences and subjective wellbeing at the individual level, and subjective perceptions of safety, e.g., living in an unsafe or deprived area is associated with lower life satisfaction, after controlling for a person's income.

Coding data on subjective personal wellbeing consists of coding numerical scales as numbers, even if the scale bounds have labels. Subjective wellbeing data coding is primarily quantitative and includes manipulating the data, assuming that they are cardinal. For fully labeled response scales (such as scales with "Yes"/"No" answers referring to most questions), it is customary to code the data numerically and also in a labeled format, thus simplifying the use of microdata to generate summary indicators of affect balance or similar indicators. In addition, the "do not know" and "decline to answer" responses should be coded separately because the differences between them require a methodological approach (OECD, 2013).

1.2. Physical Activity

Physical activity (PA) is any activity performed through the contraction of different muscles that requires a more significant amount of energy (calories) than is necessary for a resting person. Physical activity is any activity that involves the use of muscles. We can, therefore, name a wide array of physical activity types: walking, running, mountain climbing, bicycle riding, skiing, ball games, such as football, basketball, tennis, and more common and less sportive activities, e.g., prolonged standing, doing various household chores, such as washing dishes, cleaning, doing laundry, washing the floors, grass mowing, or raking leaves. As physical activity requires a more considerable energy expenditure than that needed for the body at rest, we can distinguish between different activities based on the fitness components they develop, improve, or maintain and the amount of energy they require an individual to expend to perform them. For example, running or mountain climbing will require a significantly greater effort than a walk in the shopping mall or on the street. The same is true about various household chores. Thus, dishwashing, for instance, might be considerably easier than grass mowing or raking leaves. It is customary to classify various intensity or effort degrees of different activities by different measurement indices. For instance, oxygen consumption - VO2, pulse - HR, or MET (Metabolic Equivalent of Task) are among the most common indices. The higher the measurement values, the more intensive the activity. For example, a light walk around the house is measured as MET3, whereas running is considered MET6 and higher (Ze'evi, 2018).

1.2.1. The Importance of Physical Activity

The 21st century saw social and economic changes that led to a decrease in physical activity, weight gain, and increased rates of chronic diseases in the population of Western countries. The ensuing motorized transportation to work, the expansion of sedentary employment, and the increase in recreational activities of a sedentary nature - all contribute to a decline in the scope of physical activity. Performing physical activity prevents and reduces

the rate of mortality and morbidity, slows down the advancement of illness, improves physical fitness, strengthens muscles, and improves the quality of life. The health benefits associated with physical activity include reduced risk of chronic disease development, e.g., heart disease, stroke, obesity, type-2 diabetes (the risk among physically active people is 30% lower as compared to inactive people), elevated blood pressure, bone and joint diseases (osteoporosis) and osteoarthritis; malignant diseases, such as colon cancer, breast cancer; 30-40% decrease in the risk of developing colon cancer in both sexes; 20-30% decrease in the risk of developing breast cancer in women; falls among the older people which could result in a fractured hip joint. Also, physical activity can help normalize cholesterol levels in the blood. In addition, physical activity improves the psychological sense of well-being by alleviating depression symptoms, anxiety, and stress and impacting other factors, e.g., improved sense of self-image in women and improved self-esteem in children and adults. (Lev, 2017).

Studies show that a brisk one-hour walk per day contributes to a 34% reduction in the risk of developing diabetes and 24% - of obesity. However, an additional two hours of sedentary activity per week (e.g., watching TV) elevates the risk of developing diabetes by 14% and obesity – by 23% (Bucksch, 2005; WHO, 2014). Apart from the initial disease prevention (prophylactics), physical activity also effectively prevents secondary diseases. Physically active ill people have a lower risk of mortality from heart disease and diabetes, and they have a better-balanced blood glucose level. Also, consistent physical activity effectively preserves bone density in people suffering from bone thinning.

Physical activity is also associated with other positive health behaviors, such as sensible diet and nonsmoking; it might produce other positive behavioral changes (Lev, 2017). Given that a sedentary way of life increases the risk of coronary heart disease, brain stroke, type-2 diabetes, colon cancer, breast cancer, and more, the US Ministry of Health recommended, as early as 2008, to perform accumulated 150 minutes of physical activity of moderate intensity per week, or 75 minutes of high-intensity exercise, or a combination of both, with each activity

lasting at least 10 minutes (Physical Activity Guidelines Advisory Committee Report, 2008). In Israel, the 2020 goals in the sphere of physical activity include raising by 30% the percentage of people who successfully meet said recommendations: by 30% in the Jewish population and by 50% in the Arab population (Ministry of Education and Culture, 2015).

Apart from the personal benefits inherent in physical activity, it has social benefits, e.g., building sociocommunal and environmental relations (Cavil et al., 2006). In addition to the physiological impact of physical activity on the individual's health, there is also a positive impact on the individual's cognitive system. Studies indicate that physical activity strengthens the brain's abilities related to memory, attention, concentration functions, judgment, cognitive flexibility, and the ability to perform tasks that require focus, organization, and planning (Shachaf & Katz, 2014). A study conducted among children and youth found a positive link between the level of physical fitness and attention, working memory, speed of response, and speed of cognitive processes. The study that monitored 12 to 17-year-old elite athletes found that even though they devoted long hours to practice and studied total hours of the school curriculum, they successfully coped with the pressure and the workload and were characterized by high academic achievements and fewer problems at school. In addition, a study comparing athletes and nonathletes revealed that the athletes' group achieved better grades among graduates. This link between physical activity and cognitive functioning is elucidated using various mechanisms. The enhanced delivery of oxygen to the brain, creation of new cells in the hippocampus - the area of the brain that has an essential function in the acquisition of new memories of facts and events' structural changes in the brain, and the improvement of the brain's flexibility that occur in the wake of the physical activity, comprise part of these mechanisms (Sarussi, 2015).

1.2.2. Types and Categories of Physical Activity

We can view physical activity as a bodily movement driven by the skeletal muscles while expending energy, performed at different intensity levels while working, doing household

chores, moving from place to place, during leisure time, or upon engaging in activities of exercise or sports. At the bottom end of intensity range, sedentary behavior is defined as any waking behavior with a sitting, reclining or lying posture when energy expenditure is low (Tremblay et al., 2017).

The main principles are to employ a broad definition of physical activity, taking approach that is oriented toward population health, and work with programs that are based on indicated needs of the population. These principles should engage multiple sectors and operate at multiple levels, spanning from local to international, improve the environment for physical activity, work for equality of opportunities to be physically active and rely on best evidence of efficacy available. Technical definition of physical activity states that it is any force exerted by skeletal muscles that results in energy expenditure above resting level. This deliberately broad definition means that virtually all types of physical activity are of interest, including transport by walking or cycling, dancing, traditional games and pastimes, gardening and housework, and any sports or deliberate exercise. Thus, sports and exercise are perceived as particular types of physical activity: sports usually involve some form of competition, whereas exercise is usually done in order to improve health and fitness. Physical activity can have a wide variety of intensity: the amount of effort an individual exerts. Intensity varies according an individual's capacity and type of activity. For example, running being usually of higher intensity than strolling, and a person who is young and fit is likely to walk at a given pace more efficiently than someone who is older and less fit person (Cavil et al., 2017).

According to opinion of international experts, the type and amount of physical activity that is recommended for improvement and maintenance of health refer to accumulation of minimally half an hour of moderate-intensity physical activity on most week days. According to WHO Global Strategy on Diet, Physical Activity and Health, it is recommended for individuals to engage in adequate levels of physical activity in course of their lives. Different health outcomes call for different types and amounts of physical activity: minimally 30 minutes

of regular, moderate-intensity physical activity on most week days reduces cardiovascular disease and diabetes, colon and breast cancer risks. Strengthening of muscle sand balance training can reduce instances of falls in older adults and improve their functional status. Weight control can require more activity (WHO, 2009).

Table 1. How People of All Ages Could Reach the Recommended Levels of Physical Activity

Person	Activities
Young child	daily walk to and from school daily school activities (breaks and clubs) 3-4 afternoon or evening play opportunities weekend: longer walks, visits to the park or swimming pool, bicycle rides
Adolescent	daily walk (or cycling) to and from school 3-4 organized or informal midweek sports or activities Weekend: walks, cycling, swimming, sports activities
Student	daily walk (or cycling) to and from college taking any small opportunity to be active: using stairs, doing manual tasks 2-3 midweek sports or exercise classes, gym practice or swimming weekend: longer walks, cycling, swimming, sports activities
Adults with paid jobs	daily walk (or cycling) to and from work taking any small opportunity to be active: using stairs, doing manual tasks 2-3 midweek sport, gym or swimming sessions weekend: longer walks, cycling, swimming, sports activities, home repairs, gardening
Adult working from home	daily walks, home repairs, gardening taking any small opportunity to be active: using stairs, doing manual tasks occasional midweek sports, gym or swimming sessions weekend: longer walks, cycling, sports activities
Unemployed adult	daily walks, home repairs, gardening taking any small opportunity to be active: using stairs, doing manual tasks weekend: longer walks, cycling, sports activities occasional sport, gym or swimming sessions
Retired	daily walks, home repairs, gardening taking any small opportunity to be active: using stairs, doing manual tasks weekend: longer walks, cycling, swimming

Note. Adapted from WHO, 2006.

The table is a guide to several physical activity types according to the individual's needs and circumstances. It lists examples of health-enhancing physical activity for people of all ages.

However, the table does not reflect the values and cultures of different countries (WHO, 2006).

1.2.3. Factors that Influence Engagement in the Physical Activity

A complex range of factors – in the individual and the micro- and macro-environments– influence an individual, group, or community's likelihood of being physically active. The macro-environmental factors include general socioeconomic, cultural, and environmental conditions. The micro-environmental influences include the conduciveness of living and working environments to physical activity and the supportiveness of social norms and local communities. Such individual factors as attitudes toward physical activity, belief in one's ability to be active, or awareness of daily life opportunities can influence the likelihood of someone trying a new activity.

Macro-environment, as socioeconomic status and conditions, can affect physical activity in many ways. Participation in leisure-time physical activity tends to be directly related to socioeconomic status. Poorer people have less free time and less access to leisure facilities or living environments that do not support physical activity (Gordon-Larsen et al., 2016). Fear of traffic can be a powerful deterrent to parents allowing their children to walk, cycle to school, or play outdoors, especially in deprived areas (Institute of Public Policy Research at WHO, 2016). One of the most significant economic and cultural influences has been the growing demand for mobility in the past 30 years. The increased use of private cars has largely satisfied this demand, leading car transport to grow by almost 150% since 1970 (WHO, 2016). However, the distances walked and cycled have mainly remained stable during this time. The ability to travel long distances has, in turn, played an essential role in promoting urban sprawl. It increases the dependence on motorized transport to reach jobs, shopping centers, and other amenities and thus reduces opportunities for walking and cycling.

Another factor talks about the microenvironment problems of urbanization. The immediate environment in which people live and work strongly influences the ability to be physically active. The European Region is becoming increasingly urbanized: by 2004, 80% of the population in high-income countries and 64% in medium- and low-income countries lived in

urban areas (WHO, 2016). Levels of physical activity are usually higher in urban environments, where mixed use of land and high density of services, residences, and workplaces allow people to walk and cycle as part of everyday life because distances between destinations are short (Humpel et al., 2016). In many cities worldwide, living, working, shopping, and leisure activities increasingly occur in different countries and areas. The greater demand for motorized mobility reduces opportunities for activity in the neighborhood. As urban densities increase and open spaces give way to construction, little space may remain available for recreational and leisure activities (Urban Audit, 2016). Individual factors show that although the environment is a crucial influence on levels of physical activity, some psychosocial factors influence people's decisions about their lifestyles and their choices of healthy or unhealthy behavior.

1.2.4. Positive Factors

Personal factors that are positively associated with physical activity include self-efficacy (belief in one's ability to be active), intention to exercise, enjoyment of exercise, the level of perceived health or fitness, self-motivation, social support, expectation of benefits from exercise and perceived benefits (Trost et al. 2016). Barriers cause people to be active if they recognize many of these barriers. The key barriers to physical activity include the perception of lack of time, the perception that one is not "the sporty type" (particularly for women), concerns about personal safety, feeling too tired or preferring to rest and relax in spare time, and self-perceptions, for example, assuming that one is already active enough. There are few differences in the time available to active and inactive people; this is likely to have more to do with the priority people give to physical activity (Foster et al., 2016).

1.2.5. The Effect of Physical Activity on Different Age Groups

Physical activity strengthens the body's organ systems, such as the cardiovascular and respiratory systems, muscles, ligaments, and joints. Also, it assists in weight loss and treatment of diseases such as diabetes, hypertension, excess cholesterol, heart disease, and osteoporosis. Additionally, the hormones released during physical activity and the respite from everyday

problems that physical activity creates also improve the mental health of those who engage in sports. Sports activity cessation might lead to a recurrence of medical conditions that sport helps alleviate and improve, thus damaging health. Engagement in physical activity prevents and reduces the rate of mortality and morbidity from a range of chronic diseases, improves physical fitness, strengthens muscles, and improves the quality of life in general. However, the absence of physical activity takes a heavy health-related and social toll on the individual and society. Among other things, the absence of physical activity leads to an overburden of health system services, reduced work output, absenteeism in the workplace, a rise in demand for home care, and more.

According to the WHO report and based on the studies conducted in England and Switzerland, the absence of physical activity might cost the country between €150 to 300 per person annually (Lev, 2017).

The WHO developed guidelines for physical activity for children and adolescents (aged five to 17), adults (aged 18 to 64), and senior adults (aged 65 and up); they include specific recommendations for physical activity for secondary populations, such as pregnant women and people suffering from chronic conditions or disabilities. The guidelines do not define sleep as an activity or a behavior. According to international recommendations, adults should practice 150 minutes of moderate-intensity physical activity per week, 75 minutes of high-intensity exercise during a week, or a combination of both. It is advisable to perform the activity for a minimum of 10 minutes. Recommended activity for children should last 60 minutes daily (Lev, 2017). The American College, in partnership with the American Coronary Organization, determined that the population of the age stratum of 18 to 65 years should perform moderate physical activity of a minimum of 30 minutes each day, five days a week, or exercise rigorously at least 20 minutes per day three days a week. Combining moderate and vigorous physical activity and engaging in accumulated activity of 10 minutes or longer makes it possible to meet the requirements, thus reaching the minimum required threshold. In addition, a 2007 position

paper recommended that every adult perform strength workouts at least twice a week to build and maintain muscular strength and endurance. The position paper emphasizes that those seeking to enhance their dose-response can engage in physical activity above the required minimum. Similar recommendations were published in 2008 by the Federal Government Committee with an addition of several clarifications that specified the ACSM recommendations (regarding quantity, they were expanded in terms of age cross-section and referred to adults above 65 and young people below 18, clarified various conditions, e.g., pregnancy) and underlined that it is possible to benefit more from moderate physical activity of over 300 minutes a week and vigorous physical activity of over 150 minutes a week. Also, every adult should engage in muscle-strengthening physical activity of moderate and even high intensity for at least two days or more during the week (Magal, 2017).

Physical activity has been found to increase with age. The more advanced the age is, the higher the frequency of people's engagement in physical activity. The link between the recommended physical activity and age may relate to the time devoted to walking, as older people tend toward walking more so than young people (Carlson et al., 2010).

Based on the PA recommendation, almost 60% of European adults are considered sufficiently active. Considering that more than 40% did not practice enough physical activity to attain the recommended levels, there is much work to do to improve physical activity levels among European adults. Moreover, this study's findings support the importance of targeting specific demographic groups to promote physical activity education and introduce interventions to improve their physical activity levels, such as improving health literacy, because education influences knowledge-based decisions on health (Carlson et al., 2010).

Consistent with the WHO recommendations of 2020, physical activity should be classified by age group. The impact of physical activity also varies with age.

a) Children and adolescents (aged five-17)

More significant amounts and higher intensities of physical activity are associated with multiple beneficial health outcomes. Physical activity improves cardiorespiratory fitness and musculoskeletal fitness. Regular physical activity, primarily aerobic, has positively association with beneficial cardiometabolic health outcomes, including lipid profile, improved blood pressure, glucose control, and insulin resistance. Physical activity has positive correlation with accrual of bone mass and bone structure. Children and adolescents who are more physically active than their peers have greater bone mass, their bone mineral content or density are higher, and they have greater bone strength. It positively affects cognitive function and academic outcomes as well (e.g., memory, school performance and executive function). It reduces the risk to experience depression and depressive symptoms in children and adolescents with and without major depression.

b) Adults (aged 18–64)

The association between physical activity, all-cause mortality, and cardiovascular disease mortality in adults is already well-established. Higher levels of physical activity were found to be associated with reduced cardiovascular disease and hypertension incidence, reduced blood pressure among adults with prehypertension and normal blood pressure and lower risk of mortality, as well as inverse curvilinear relationship between higher volumes of physical activity and incidence of type-2 diabetes with a decreasing slope at higher levels of physical activity and additionally a reduced risk of developing type-2 diabetes. Higher levels of physical activity reduce the risks of colon and breast cancer. In relation to the brain, physical activity might reduce cognitive decline and risk of depression; those adults who engage in higher level of physical activity, as compared to lower levels, are at reduced risk of developing anxiety and depression. More significant amounts of physical activity of moderate to vigorous intensity are associated with improved cognition, brain function and structure, and as well a reduced risk of developing cognitive impairment, including Alzheimer's disease. Both periods of intense

exercise and regular physical activity improve sleep and outcomes of health-related quality of life in adults (Scarabottolo et al., 2022).

c) Elderly adults (65 years and older)

Elderly adults can undertake physical activity as part of recreation and leisure (play, sports, games, or planned exercise), transportation (wheeling, walking, and cycling), work, or household chores in frame of daily occupational, educational, home, or community settings. Physical activity confers benefits for the following health outcomes: improved all-cause mortality, cardiovascular disease mortality, incident site-specific cancers, incident hypertension, incident type 2 diabetes, mental health (reduced symptoms of anxiety and depression), cognitive health, and sleep; adiposity of various extents might improve as well. In elderly adults, physical activity helps in prevention of falls and fall-related injuries as well as declines in bone health and functional capability (WHO, 2020).

An Israeli study conducted in Jerusalem that followed about 2000 70-year-old participants for over 15 years discovered that the participants who consistently practiced physical activity reduced the risk of death by 30-60% compared to those who were not active. It is essential to note that an improvement in life expectancy was observed also among people aged 78 to 85 who had just begun exercising.

1.2.6. Physical Activity in Different Countries

People engage in physical activity worldwide; it varies between countries, yet essential physical activity is similar everywhere.

In recent years, several countries have begun monitoring the physical activity of children and youth from different aspects. This global initiative is called Report Card on Physical Activity.

In The United States (US), it was found that only a quarter of children and youths meet the recommendation of a minimum of 60 minutes of vigorous physical activity five times a week. About 24% of the girls and 30% of the boys aged 11 reported meeting the

recommendations. At the age of 12-14 only, 19% of the girls reported meeting the recommendations, compared to 34% of the boys. At the age of 15, 17% of the girls and 33% of the boys met the recommendations. On average, the boys practiced for 63.8 minutes, and the girls for 44.4 minutes daily. These studies demonstrated a decline in physical activity with age: children of six to 11 practiced rigorous activity for 88 minutes a day; at the age of 12 to 15 – only for 33.3 minutes per day; at the age of 16 to 19 – only 25.5 minutes per day. Regarding sedentary activities, about half of the children meet the goal of screen time of up to two hours per day at six to eight - 59%, and at the age of nine to 11 – about 48%. Ethnic distinctions were established between children in The US: Hispanic children spend the lowest amount of screen time, followed by White youths, whereas Afro-American children have the highest number of screen hours.

The total time of sedentary activities at the age of six to 11 is 5.9 hours; at the age of 12 to 15 – 7.7 hours; at the age of 16 to 19 – 8.3 hours. There are no significant differences between boys and girls. More than half of The US children practice sports in school teams or associations. The primary sports for school girls are athletics and field races, basketball, volleyball, football, softball, tennis, swimming and diving. Only about half of high school children in The US participate in physical education (P.E.) classes. This discipline has become increasingly downsized over the years, while the highest participation is observed in the ninth grade, and the lowest is among 10th to 11th-grade students. The girls participate less than the boys. Not all elementary and junior high school physical education teachers are qualified P.E. teachers. Sometimes, the lessons are conducted by teachers qualified in other disciplines who do not know how to encourage and increase physical activity (Katzmarzyk et al., 2014).

Nationally, in 2010–2015, 22.9% of The US adults aged 18 to 64 met the guidelines for both aerobic and muscle-strengthening activities. Fourteen states and the District of Columbia had significantly higher percentages of adults meeting the guidelines than the national average. In comparison, 13 states had percentages significantly below the national average. The

percentage of men who met the guidelines through participation varied from 17.7% in South Dakota to 40.3% in the District of Columbia, with the national average being 27.2%. Among women, percentages varied from 9.7% in Mississippi to 31.5% in Colorado, with the national average for women being 18.7%. Percentages meeting the guidelines among men were less regionally concentrated than among women, especially concerning exceeding the guidelines (Blackwell & Clarke, 2018).

Percentage of adults aged 65 and older in fair or better health who reported doing no physical activity or exercise other than their regular job in the past 30 days are: the healthiest State is Colorado: 21.7% and the Least-healthy State is Mississippi: 46%. A recent study found that around 10% of deaths among adults aged 40 to 69 and 7.8% of deaths among adults aged 70 and older were attributed to physical inactivity (America's Health Rankings, 2021).

In Australia, most children and adolescents aged five to 11 and 12 to 17 do not meet the physical activity and sedentary behavior guidelines. Twelve percent of children aged five to 12 and only 2% of young people aged 13 to 17 met the physical activity and sedentary screen-based behavior guidelines; 26% of children aged five to 12 and around 8% of adolescents aged 13 to 17 met the physical activity guideline. Thirty-five % of children aged five to 12 and 20% of 13 to 17-olds met the sedentary screen-based behavior guideline. Just over one in two adults (55%) did not participate in sufficient physical activity in 2017–2018. Women were more likely than men to be insufficiently active (59% compared to 50%). In 2017–2018, 23% of adults aged 18 and above did muscle-strengthening activities two or more days a week (22% of women and 25% of men). Only 15% of adults met the physical activity and muscle strengthening guidelines - 17% of men and 14% of women (AIHW, 2018).

In Canada, 39% of five to 17-year-olds meet the physical activity recommendation of the Canadian 24-Hour Movement Guidelines for Children and Youth - 52% of boys and 26% of girls. Twenty-five percent of 10 to 17-year-olds meet the physical activity recommendation of the Canadian 24-Hour Movement Guidelines for Children and Youth, and 41% of five to 19-

year-olds take at least 12,000 steps daily on average, which approximates the physical activity recommendation within the Canadian 24-Hour Movement Guidelines for Children and Youth (ParticipACTION, 2020). According to Statistics Canada, only 16% of Canadian adults are getting the recommended amount of physical activity (150 minutes of moderate-to-vigorous physical activity per week). That means 84% of the adult population is not active enough. Alternatively, to put it differently, eight in 10 Canadian adults are not active enough to reap the health benefits of a physically active lifestyle (ParticipACTION, 2018).

The most recent country-level data on physical activity in Asia show that about 27.5% of the adult population's physical activity levels are insufficient. Physical inactivity varies widely across Asia: Countries with the largest inactive populations are the Philippines, Malaysia, Singapore, Japan, the Republic of Korea (ROK), India, and Pakistan, as well as several Pacific nations: American Samoa, Marshall Islands, Nauru, Palau, Kiribati, and Micronesia. Countries with the lowest levels of inactivity in Asia include Cambodia, Myanmar, Nepal, the People's Republic of China (PRC), and many Pacific nations: Niue, Vanuatu, Tokelau, Samoa, and Papua New Guinea.

Rates in Asia and the Pacific (participation rate measures the share of the total population participating in one or more of the three physical activity categories regularly, at least monthly) appear in Table 2.

Table 2: Recreational Physical Activity Participation Rates in Asia and the Pacific, 2018.

	Participation Rate, %	Rank		Participation Rate, %	Rank
Austria	84.1	1	Viet Nam	35.7	14
Taipei, China	84.0	2	Indonesia	34.2	15
New Zealand	83.8	3	Philippines	32.7	16
Mongolia	75.0	4	Thailand	27.8	17
Republic of Korea	73.7	5	Timor-Leste	26.3	18
Japan	69.6	6	Bangladesh	25.2	19
Singapore	64.9	7	Cambodia	21.4	20
Hong Cong, China	58.2	8	Myanmar	21.3	21
Macau	51.1	9	Nepal	20.0	22
People's Republic of China	48.6	10	Sri Lanka	19.2	23

Papua New Guinea	46.4	11	India	15.0	24
Malaysia	41.1	12	Pakistan	13.2	25
Lao People's Democratic Republic	39.8	13			

Note. Adapted from Global Wellness Institute (2018).

The frequency of physical activity in Europe among adults was similar to that in the US - 62%, Australia - 60% and Canada - 65%. When compared to the findings from developing countries, the frequency of active adults is lower because it depended on the migration of the rural population to the city in most European countries in the past century and on the fact that the majority of the urban population engaged in work that involved sitting; thus, physical activity takes place mainly during leisure hours (Hallal et al., 2012).

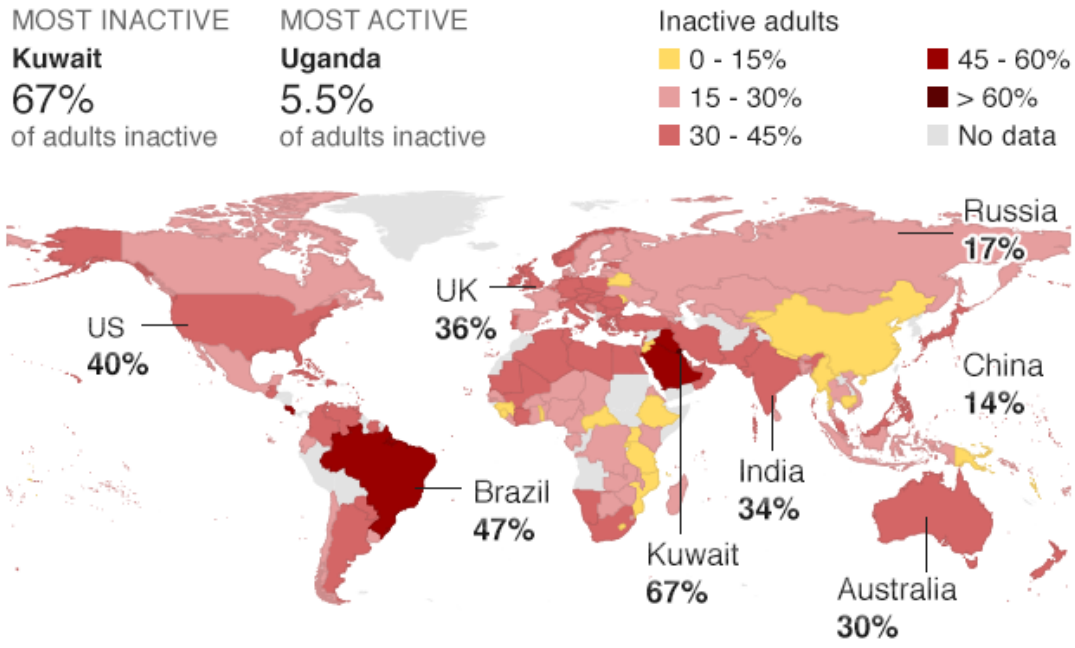
A significant variance was found in the levels of physical activity between the EU countries, measured as the frequency of moderate or rigorous weekly activity, based on the WHO recommendations, or as MET minutes per week.

About one-fourth of the adult population below 65 was classified as inactive. Northern and Western Europeans report higher rates of physical activity than Southern Europeans; several sociodemographic factors, i.e., gender, age, and ability to pay bills and for education, were linked to rates of reported physical activity. The significant differences between European countries in physical activity levels are not surprising, given that the EU is a diverse entity with cultural, environmental, and social differences between its member countries. For example, higher temperatures have been associated with less physical activity and higher Gross Domestic Product per capita - with more physical activity. It might partly explain why research respondents in Northern and Western Europe reported higher activity levels than people in Southern Europe. Even beyond the physical conditions, though, not all European countries promote physical activity with the same rigor, as evidenced by the massive variation in the annual instruction time of physical education in primary and secondary schools throughout the EU. The study respondents with no difficulty paying bills and those with more years of full-time education were more likely to be adequately and highly active than those with some or

frequent difficulties paying bills and lower educational levels, respectively. Previous studies have shown similar differences in leisure time activity, while occupational activity was higher among adults of low socioeconomic levels (Gerovasili et al., 2015).

Africa is a region in transition. The demographic profile of the continent is changing: reductions in infant and child mortality have contributed to rapid population growth and a concomitant rise in life expectancy. Africa is also the fastest urbanizing continent, with the number of people living in urban areas projected to triple in the next 50 years. Globalization, technological advances, and economic development have all contributed to a trend toward sedentary lifestyles and the uptake of unhealthy behaviors on the continent. A complex interaction of biological, social, and environmental factors influences physical activity. A self-reported physical activity data meta-analysis from 22 African countries found that 16% of men and 24% of women were physically inactive. The prevalence of physical inactivity varied between countries, ranging from 46.2% of men and 60.3% of women in Mali to 3.8% of men and 4.2% of women in Mozambique (Barr et al., 2018).

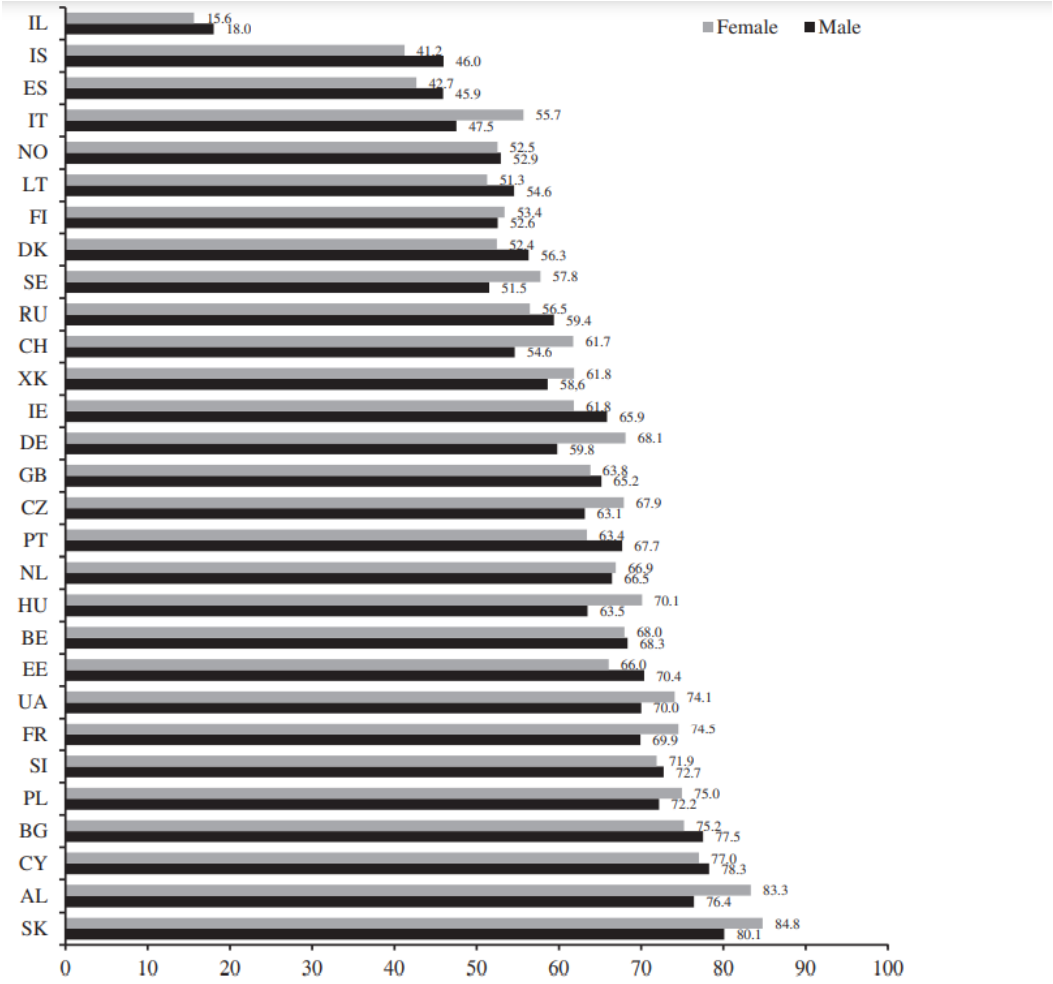
Tracking the level of physical activity around the world is shown in Figure 1.



Source: Therrien, BBC (2018). https://www.bbc.com/news/health-45408017

Figure 1. Global Inactivity in 2018 around the World.

Figure 1 shows that only 5.5% of Ugandans had insufficient physical activity. Mozambique, Tanzania, Lesotho, and Togo are also doing quite well. In comparison, people in Kuwait, American Samoa, Saudi Arabia, and Iraq appear to live highly sedentary lives, possibly because most of the population in these countries are farmers and spend eight hours a day on their feet, six days a week. However, about a quarter of the world's population does not get adequate exercise. Generally, people in low-income countries integrate sufficient physical activity into their lifestyles, unlike those in wealthier countries. The poorer people are, the more likely they are to use modes of transport or be in an occupation that involves physical work (Therrien**,** 2018).



Source: Marques et al. (2015). https://doi.org/10.1016/j.ypmed.2015.09.018

Figure 2: Prevalence of Attained Physical Activity, according to WHO, by European Countries in 2012.

The chart compares between European countries, including Israel. The numbers show the percentage of adults who engage in physical activity. As the chart demonstrates, there is enhanced physical activity engagement in Slovakia, Albania, and Cyprus, with more than three-quarters of the population actively practicing. In contrast, physical activity engagement is very low in Israel, Iceland, and Spain - lower than half of the population.

In comparison, by gender, in some countries, men are more physically active than women, and vice versa: in other countries, women engage more in physical activity than men. However, the differences between sexes are insignificant and fluctuate at around 8% variance. Adults who do not engage in sports activities, about 40% of the population in the country, justify it by the fact that they do not need sports because they do not know how to measure the rate of their daily physical activity or have no understanding or knowledge of the benefits of physical activity for their health (Marques et al., 2015).

1.2.7. Physical Activity in Israel

About 56% of Israeli citizens aged 21 and above engage in physical activity in their leisure time. Regarding population groups, about 59% of the men, 54% of the women, 59% of the Jews, and 43% of the Arabs practice physical activity. The most common physical activity is walking – among 28% of the Israelis aged 21 and above, followed, with a big gap, by running, swimming, and muscle-building exercises – each commonly practiced by 5% of the population. About 32% of the Israelis aged 21 and above meet the WHO and the Ministry of Sport's guidelines. Significant differences in the rate of those successfully meeting these guidelines were found between Jews and Arabs, 35% and 22%, respectively. The rate of physical activity engagement is higher among men than women - 36.3% and 28.8%, respectively. It increases in older age groups: 30% at the age of 21 to 34, 31% at the age of 35 to 49, 35% at the age of 50 to 64, and 36% at the age of 65 and above.

The lowest PA rate is reported among Arab women – about 18%, and it decreases in this group with age: 23% at the age of 21 to 34, 18% at the age of 35 to 49, and 13% at the age

of 50 to 64 (Ministry of Education and Sport, 2015). In light of these and additional findings, the Israeli government keeps pace; it understands the significance of physical activity and maintaining an active and healthy lifestyle. As part of a complex initiative, the Ministry of Health established a national master program, “For a Healthy Future 2020”. The program had clear objectives and goals to be achieved by 2020. Its goal was to promote physical activity, improve health, and prevent morbidity in Israel. The master program includes a range of solutions and tools, starting with encouragement and education of the population, from how and which physical activities to perform and up to a complete array of guidelines for local authorities, as to how, for instance, to encourage the use of municipal facilities for the benefit of the citizens, granting tax cuts to employers who would integrate physical activity into their workplace and other creative solutions, e.g., signage near the stairs, aimed at encouraging people to engage in physical activity and to maintain a healthy way of life (Ze’evi, 2018).

The program set the following goals in numbers:

For children and youth - to raise the percentage of youths engaged in daily physical activity of moderate intensity (the effort leading to a moderate rise in heartbeat and respiratory rate, such as brisk walking or domestic cleaning chore) or vigorous intensity (the effort leading to high elevation of heartbeat and respiratory rate, such as running or carrying heavy loads) for a minimum of 60 minutes; 10% reduction of the rate of adolescents aged 11 to 15 watching TV for two and more hours per day on average.

For adults (aged 21 and above) - to increase the rate of moderate physical activity engagement for a minimum of 150 minutes a week, vigorous exercise for at least 75 minutes per week, or a combination of both.

The Ministry of Health guidelines suggest that in order to meet the set goals, people should perform different types of physical activity, such as aerobic activity: walking, running, swimming; muscle-and-bone-strengthening activity, such as push-ups, crunches, weight-lifting

or resistance band stretching; activities aimed at improving the equilibrium and flexibility exercises.

Recommendations for children: It is vital to perform moderate-level aerobic activity for an hour daily. That means brisk walking, low-speed bicycle riding, or dancing. Engaging in vigorous activity, such as basketball, rope skipping, martial arts, or football, is recommended for at least three days. In addition, the activity focused on bone and muscle strengthening is suggested three days a week.

Recommendations for adults: As stated in the previous paragraph, it is essential to perform moderate-level physical activity for at least two and a half accumulated hours per week, for at least 10 minutes at a time. Alternately, each minute of vigorous activity equals two minutes of moderate-level activity. Hence, performing an hour and a quarter of weekly vigorous activity is sufficient. It is also possible to combine between the two levels of intensity. After the muscles work and warm up, it is advisable to perform stretching exercises: stretch for 10-30 seconds twice or four times for two or three days a week. Taking a break of at least two days between training sessions is suggested. Also, the recommendation is to train the large muscle groups through resistance exercises: for youth, performing a set of eight to 12 repetitions - two to four sets is optimal. For adults above 45, performing a set of 10-15 repetitions - two to four sets is advisable.

Recommendations for ages 65 plus are identical to those for younger adults. However, it is advisable to begin with graded physical activity. Also, it is critical to maintain and strengthen the equilibrium. For 20-30 minutes a day, two or three days a week, they should engage in yoga, tai chi, and other similar practices that work and strengthen the muscular and nervous systems responsible for equilibrium (Ministry of Education, 2020).

1.3. Alpine Skiing as a Physical Activity

To lead a healthy physical and social life, the person should engage in physical activity. Such sports activities can take place on sports tracks, in fitness centers, sports complexes, and on winter ski sites. Alpine skiing is one of the winter physical activities.

1.3.1. Alpine Skiing: Origin and History

The origins of today's skiing trace back to Norway; Norway had the most prominent role in developing skiing sports. Also, the term "ski" is Norwegian and means something like "log, split wood" (SnowTrex, 2021).

The beginnings of skiing and the pioneers among skiers are immersed in numerous stories. The sport of skiing began evolving more than 7,000 years ago. The testimony to the fact was discovered in the cave paintings on the Scandinavian peninsula. Driven by the need to gather food and hunt in the polar and sub-polar regions of the Nordic countries, the cave dwellers of that time invented this sport. The oldest skis were found submerged in the swamp in Sweden, their carbon footprint dating back 4,500 years (Dawson, 1997, as cited in Martinescu-Bădălăn & Stănciulescu, 2019). A cave drawing in Norway, dating back approximately 4,500 years, supposedly represents the image of a skier.

It is impossible to say precisely where and when the man first stood on skis. What is certain, however, is that thousands of years ago, people in snowy regions came up with the idea of attaching longboards under their feet so as not to sink into deep snow (SnowTrex, 2021).

Cave drawings in Salavrug near Lake Oneško and the bay of North Norway, Rodo, attest to the antiquity of skis. The drawings of skiers are 4,000-5,000 years old. Near *Musom*, in the marsh areas of south Norway, skis around 2,500 years old were found (Lund, 1996 in Milasinovic & Bjelica, 2017).

The Greek historian and military leader Xenophon wrote about skiing in 500 BC. In 1206, during the Norwegian Civil War, military skiers saved Norway's monarchy when they escorted King Haakonsson, a minor at the time, to a safe hiding area above the mountains. A

decade later, the skis helped the Norwegians to oust the Swedish army from the country. Thence, the Norwegian culture adopted the skis. Norway adopted skiing both as a sport and as an efficient way to move over the snow.

700 years later, the Austrian Hannes Schneider won his first ski competition in Grindelwald. During that time, the inhabitants of the Scandinavian countries began skiing for fun. They have developed innovative essential equipment for skiing. In 1557 AD, in his book "Historia de Gentibus Septentrionalibus", the historian Olaus Magnus described the Scandinavian skiers' climbing techniques on the slopes:

> "When they climbed in a place, they did not slip behind because they used animal skins on the bottom of the skis whose hair raised like the spears, or brushes and the admirable force of nature did not let them slide back" (Dawson, 1997, pp. 1-3, as cited in Martinescu-Bădălăn & Stănciulescu, 2019).

In the mid-19th century, a young Norwegian farmer and ski jumper, Sondre Norheim (1825-1897), needed a better solution for his ski jumping equipment. He bound a piece of birch root around the two toes and the heel of the boot and built shorter skis with several side-cut openings. Until then, openings had been made of simple pieces of material bound around the edge of the boot. Norheim also invented the Telemark ski style, which was named after Norheim's hometown, Telemark. He and his colleagues in the skiing profession innovated the technique of downhill skiing by finding a spot on the track where the skis were parallel on the turn, transferring the weight from one leg to the other, which was performed through genuflexion. This style is called Christiania. Both Telemark and Christiania styles were prevalent during that time and accepted in alpine skiing (Dawson, 1997 as cited in Martinescu-Bădălăn & Stănciulescu, 2019).

Around 1850, the first ski races took place in Christiania (today's Oslo), and instructions for skiing appeared around 1870, also in Norway. The first ski competition occurred in 1770 in Christiania. In 1875, the first ski club was established. In 1883, the first competition was held

in Holmenkolen near Oslo, the most famous ski center in the world today. Skiing explicitly developed in the district of Telemark, where in the middle of the 19th century, brothers Hamestvajt and Sondre Nordhajm gave the skis the shape and tie and thus contributed significantly to the development of skiing (Taylor, 2015). At the turn of the century, a genuine ski boom in Central Europe stemmed from the increasing popularity of skiing in Norway and the polar explorer Fritjof Nansens' crossing of Greenland in 1888 (SnowTrex, 2021). Another great skiing pioneer was Mathias Zdarsky, who, in 1896, in the Austrian Alps, developed a technique different from Norheim's, which allowed for a descent on steeper slopes. This technique consists of skidding on skis, increasing movement speed exponentially (Schi-şi-snowboard, 2014).

In 1910, the first International Ski Committee was founded in the Norwegian town of Kristijanija (today's Oslo). The committee framed the first regulations for international ski competitions (Taylor, 2015). In 1924, skiing appeared in the first Winter Olympic Games in Chamonix, France, where the first World Ski Championship was held in 1937 (Lutz, 2015).

The beginning of ski touring was with an expedition in the Swiss Alps in 1890, organized by the Swiss Christoph Iselin and the German Wilhelm Paulcke (Schi-şi-snowboard, 2014). In 1900, Hannes Schneider, an Austrian skier, who employed the ski discoveries developed by Zdarsky, created a technique by name of Alberg, which improved turns and stops. It was Hannes Schneider who founded the skiing methodology. He exhibited his passion for skiing as early as in adolescence: he became a ski instructor in a school in St. Anton. Viktor Sohm, creator of the ski wax idea, was Schneider's mentor in childhood. Schneider developed a comprehensive new idea for learning and practicing skiing by combined the then-existing methods and techniques. The Telemark remained the didactic practice. Schneider defined Christiania as a bypass to the valley that requires keeping the skis parallel. He defined the levels to be accomplished in skiing and developed a pedagogical system, organized into beginners' and advanced groups (Schi-şi-snowboard, 2014). While Norheim redefined the ski technique in

Northern countries, in North America, in the Sierra Nevada Mountains, Norwegian immigrants in field of mining developed a different ski technique (there is a long tradition of Scandinavian influence on North America regarding skiing, beginning with Leif Ericson, the Viking king who colonized North America in the 1000th A.D). Those miners used ski for transport, and they began a series of dangerous straight-line descents, reaching up to 80 miles per hour using 3.65-meter skis called "longboards." The golden age of mountaineering began in Europe with the first ascent of the Wetterhorn in 1854, and eleven years later, the Matterhorn was conquered by Edward Whymper (Dawson, 1997, as cited in Martinescu-Bădălăn & Stănciulescu, 2019).

1.3.2. The Prevalence of Alpine Skiing in the World

Over the years, skiing became a leisure sport for the masses with an increasing advance. In the 1950s especially, numerous lifts were built, and slopes were developed. As the lifts could transport more skiers, ski regions have become more and more attractive to tourists. In addition to the more modern ski lifts and cable cars, tourist infrastructure was created around ski areas. Mountain huts have opened, and numerous accommodations were set up, that were mainly used by tourists in the winter. Over the years the number of skiers has largely increased. While in 1950, only about five million people worldwide practiced in winter sports, by 1975, the figure reached 35 million. For most winter sports enthusiasts, the focus has been and still is enjoying nature with friends and family and less on performance. Skiers began trying various ways in addition to the classic downhill run. Skiers raved in deep snow on moguls, jumps, and kickers. Thus, at the end of the 20th century, disciplines such as "mogul piste," "freestyle," and "freeride" emerged. Some of these disciplines are also Olympic (SnowTrex, 2021).

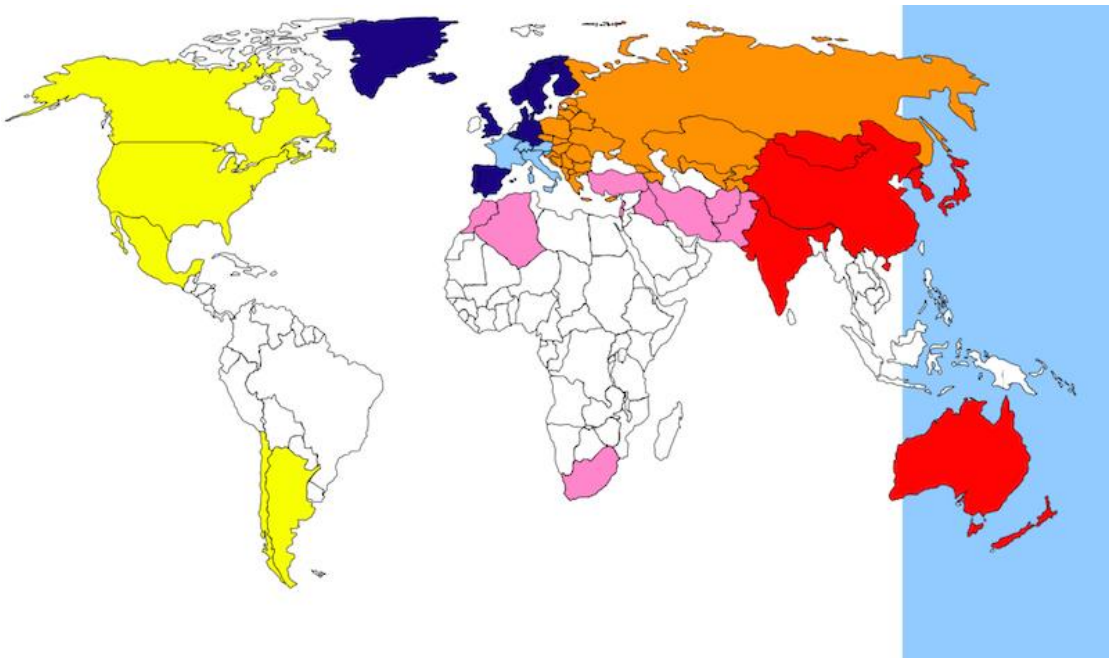
For a long time, people moved on two boards through or over the snow, but skiing has long ceased to be a means to an end. The competitions in the different disciplines are followed worldwide with enthusiasm; also, as a leisure sport, skiing is more popular than ever. Winter tourism is booming and is of great economic importance in some areas, such as Switzerland and Austria. In France, numerous villages have even emerged for winter tourism. However,

winter sports enthusiasts can find multi-faceted ski regions not only in the Alps. Today, there are countless ski resorts all over the world: in Australia, New Zealand, the USA, Canada, Japan, Sicily, as well as in the South American Andean countries, Chile and Argentina, snow lovers have the opportunity to ski down white slopes (SnowTrex, 2021).

Although the ski industry has faced adverse conditions related to climate change in the past decades, increasing competition, and demographics, it still has the potential to feature globally for three consecutive seasons with growth. In today's depressed environment, in the wake of the abrupt closure of the 2019-2020 season due to the COVID-19 pandemic in most of the northern hemisphere's ski areas, the strength of the ski industry shows that the 2020-2021 season will bring back a high level of attendance at ski resorts all over the world. For example, United States ski areas recovered from excellent snow conditions and performed above average. Visitation level was the fourth best in the past 41 years. Given the spread of the mega-passes, it may also have received a boost from the enhanced competition created by the industry's consolidation and intensive promotion. This trend, together with dynamic pricing, has also now reached Europe. China has built a robust ski-breading infrastructure by developing ski training centers, including ski simulators, dry slopes, and a growing number of indoor ski halls. However, the industry there still needs to mature. It has yet to find the golden way to introduce early beginners to skiing with a high customer satisfaction rate that generates a high level of returning guests. Unfortunately, western ski areas have nothing better to offer in support, as this has been, for two decades, an unsolved pain point in European and North American ski destinations. Despite this weakness, the Chinese ski industry managed to sustain its growth and reached over the 20 million skier visits mark in the 2018-19 season. Asia, Japan and South Korea are still in situation that expresses worry. While South Korea has showed continuously deteriorating visitation numbers, which stabilized in 2018-2019 after six years of decline, Japan has again seen lower attendance. After stabilizing over two former seasons at a level which is at about half of that of 20 years ago, Japanese skier visits figures have once again dropped in

2018-2019. Iceland and Scotland have as well experienced poor seasons due to lack of snow and bad weather conditions.

Currently there are 68 countries in the world that offer equipped outdoor ski areas which are covered with snow. They appear color-coded on the map of figure 3 below, numbering indoor facilities (about 90 indoor snow centers that operate in 20 countries worldwide) and mountaineering-only areas and as well other types of facilities such as dry slopes, the figure can reach 100 (according to a detailed breakdown that was prepared by famous ski journalist Patrick Thorne). Even should snowfields be much more numerous (the estimate is 5,000 to 6,000 designated skiing areas), about 2,000 ski resorts have been identified worldwide. Besides the major ski destinations in terms of skier visits, several other, smaller destinations exist where skiing has been either an industry for a long time or is currently developing (Vanat, 2020).



Source: https://www.boardsportsource.com/wp-content/uploads/2017/04/Screen-Shot-2017-04-16-at-15.55.23-copy.png

Figure 3. Demonstration of the 68 Participating Countries with Alpine Ski around the World.

Figure 3 above shows that Eastern Europe and China are the most apparent emerging destinations. However, several other small players are spread across the globe: Cyprus, Greece, Iran, Israel, Lebanon, India, Lesotho, New Zealand, Pakistan, South Africa, Turkey, Morocco,

and many more. There are 68 countries that offer outdoor, covered with snow, equipped, ski areas. Four countries that no longer have organized operational ski areas still offer skiing: Algeria, Afghanistan, Bolivia, and Colombia. Another thirteen countries offer permanent or temporary snow coverage in some mountains, which makes it technically possible to ski: Bhutan, that has snow-covered mountains in winter; Democratic Republic of Congo, that has a glacier with occasional snowfalls on the highest peaks; Ecuador, that has glaciers and occasional snowfalls on the highest peaks; Ethiopia, that has occasional snowfalls on the highest peaks; Indonesia, that has small glaciers that are quickly-melting; Kenya, that has occasional snowfalls on the highest peaks; Myanmar, that has high mountains covered with snow at the Himalayan border, and a projected ski resort as well; Nicaragua, that has the highest volcano tahth gains snow every few years; Peru, that has tropical glaciers and mountains with snowfalls in winter, and even some temporary lifts; Syria, that has snow in the mountains in winter (they had a ski resort in planning before the civil war); Tanzania, that has a glacier and occasional snowfalls on the highest peaks; Uganda, that has a glacier and occasional snowfalls on the highest peaks; Venezuela, that has a snowfield at the top of the Merida lift, which is not usually used for skiing. Thus, the total number of countries is 85 in which outdoor skiing is possible on snow. Another fifteen countries offer outdoor dry slopes or indoor ski centers, which brings the total number to 100 (Vanat, 2020).

In the Middle East, most of the region's 17 nations offer alpine skiing, and some have been doing so for over a century. In 1913, following his return to Lebanon from studies in Switzerland, a young engineer Ramez Ghazzoui introduced his friends to skiing on the slopes near Aley. By the 1930s, a national ski club had been formed. The year 1953 saw lifts installed at the Cedars - one of half a dozen centers that now exist in the country. In Iran, German railway engineers introduced skiing around 1930; it grew popular, especially among young men returning from studies in France and Switzerland. One such student even manufactured skis in Tehran, beginning in 1938. The first ski lifts were installed in 1951. With mountains rising over

14,000 feet, Iran has probably the most extensive lift-served skiing in the region. Iraq's Korek ski center owes its existence to the country's ethnic battles. As they gained autonomy, the Kurds sought to broaden their economic base beyond oil drilling. The Korek gondola may not draw international tourism yet. Where there's no natural snow or mountains, indoor skiing is booming. Egypt, Qatar, Dubai, Saudi Arabia, Oman, and Kuwait have created snowdomes, so one can find lifts turning in ten Middle Eastern nations (Thorne, 2020).

Skiing has become an incredibly diversified sport: freeski, carving, freestyle, skicross, and others, with the list seeming endless. Should snow lovers want conquering a slope which is unreachable by lift, there is even a possibility of being dropped by means of a helicopter onto untouched mountain peaks. The pioneers of skiing, back in the 19th century would probably never have thought this possible. Presently, offers for ski lovers are incredibly varied, and there is always something for anyone. It is no wonder that skiing is one of the most popular sports, particularly in Europe. From Norway to the Alps, from Telemark to carving ski – skiing has evolved steadily overtime time.

1.4. Skiing in Israel

Over the years, skiing has increased, and the number of skiers has grown constantly. Each year, the number of Israelis going on ski vacations is growing, and this branch of sports that initially was a hobby solely for the rich only occupies an increasingly significant position among ordinary Israelis who, until a few years ago, were content to glide down the slopes of Mount Hermon on plastic bags. Today, most skiers travel abroad on ski vacations, and some visit the Mount Hermon Ski Resort as well. The possibilities at the skier's disposal have significantly improved along with the growing demand.

The ski resorts in Israel include the Hermon Resort and the Gilboa Resort. The Mount Hermon Resort is the highest ski site, the northernmost and the coldest in the country, covering the 5,000-dunam (about 45 km) terrain at the height of 1,600-2,040 meters above sea level. It is the only site in Israel offering alpine skiing in winter. The resort has five cable cars, four T-bars, and a

conveyor belt. The first cable car at the Mount Hermon Resort was built in 1971 and served visitors and skiers. In 2019, the outdated cable cars dispersed across the resort were replaced with modern, enclosed, and faster cable cars. The cable car in use since December 2019 is based on the system of the detachable grip. According to this method, the cable car moves fast and slows down, as the grip automatically releases when it arrives at a station when passengers leave the car or get on. The new cable car has a much larger capacity than the existing ones, thus helping prevent queue build-ups during the busy season. During a skiing season, 340,000 skiers visit the resort, while the resort can receive up to 12,000 visitors daily. The Hermon Resort includes 13 ski trails, open during the winter season when weather conditions allow for it. One can ski at the site independently with ski equipment and a snowboard on a green (school) trail, three blue trails, seven red trails, and two black trails. A skiing and snowboarding school at the site is active for about 30 years, providing lessons for all levels. The major ski trails at the site are: "Cat", named after a snowcat – a vehicle that clears and grooms ski trails, "Club", named after the Israeli Ski Club, and "Sion" –after Sion Creek. Additional trails include "Arar" and "Shaked". In addition, the site has two trails designated for snow sledding. In the past, the ski season lasted at least three months. Due to global warming, however, nowadays, the season length has been reduced to a single month. Moreover, in 1999, the site did not open because of the scarcity of snow (Hermon, 2021).

In the winter of 2018, Israel's Ski Hermon Center celebrated 50 years since opening its first ski lift on the land captured from Syria during the 1967 war. Indeed, that was a strange winter. The COVID-19 pandemic kept the resort closed for half the season. Then, Israel's successful vaccination campaign coincided with a meter-high new snowfall in mid-February, and the resort opened on February 21 (Thorne, 2020).

The Gilbo'a Resort is the artificial snow ski site situated on the northern slopes of the Gilboa. The resort offers ski practice without snow as well. One can practice and improve their performance regardless of weather or time.

1.4.1. Types of Skiing Common in Israel

There are many types of alpine skiing. The skiing types most common in Israel are:

Alpine ski – the most popular and known skiing type. The term "alpine ski" includes a range of ski styles, the common feature being skiing down snowy slopes on skis and snowboard. Most ski competitions are in Alpine skiing and are divided into the following trails:

Slalom is the slowest and most technical among Alpine ski styles. The skiing is done between gates (pairs of flags placed close to each other) placed relatively densely (a gate per 12 meters, approximately). Hence, this ski trail is characterized by sharp turns between the gates.

Giant slalom is a ski trail with a less dense gate placement (one per 25 meters, approximately). The trail is the fastest because the turns the skier is required to take less sharp, thus allowing them to gain faster skiing speed. Also, there is a faster trail called Super Giant Slalom; its principle is similar to the former styles.

Downhill skiing is the fastest alpine ski style because the flags are placed far apart from each other (wide gates), and the number of gates is low in this style. Therefore, the turns are not sharp, and the skier gains a high speed. The style is less technical and more physical. Due to the speed, it is considered the most dangerous in terms of risk of injuries.

In contrast to alpine skiing, *cross-country skiing* is more similar to walking in the snow than gliding on the snow. Cross-country skiing is done on flat terrain (not mountain slopes) on long and narrow skis designed for the purpose; the ski poles fulfill a vital role in the activity (compared to Alpine skiing, in which ski poles are insignificant). This type of skiing is also called "distance skiing" because the participants in this skiing style usually cover long distances, tens of kilometers. It is considered very difficult, as the skier needs to activate most of the body muscles for an extended period and with high intensity. This style is typical mainly in the northern countries (Scandinavia, Canada, and Russia). Cross-country skiing styles include:

In classic ski style, the skis are placed on tracks laid in the snow in advance, the leg movements are horizontal, and the skiers propel themselves by kicking forward and pushing with the ski poles. This relatively slow style is easy to learn. The bulk of the load is on the skier's upper body.

Freestyle skiing does not include tracks in the snow, and the advancement forward is achieved mainly via vertical leg movement (as in ice skating). The load is distributed between the legs and arms. The style is much faster than the classic ski but more challenging to learn (IASI, 2020).

1.4.2. The Standard Ski Techniques in Israel

The skiing technique is adapted to the skier's level, goal, and skiing type.

Snow plough/wedge is a basic ski technique every beginner skier should learn and master to advance in their skiing level. It is a simple method of alternate gliding and stopping. Consistent with the technique, the skier forms a V-shape with the skis (also called a wedge shape). The technique prevents the skier from moving fast downhill. Stopping is done when the skiers tilt their weight slightly forward and exert pressure on the front part of the skis. The turn is done by shifting the weight slightly to the leg opposite of the direction of the intended turn (the weight must be shifted to the left side to turn right).

Parallel skiing is a more advanced ski technique in which the skier glides on skis kept parallel while shifting the weight from one leg to the other, according to the movement's direction and the slope's angle. The skiing is done on one blade on either leg (i.e., the weight is put onto one side of the ski, not evenly on the whole ski), with one leg on the inside blade and the other - on the outside blade. Stopping in this technique is called "hockey stop" (TravelZone, 2012).

1.4.3. The Ski Teaching method used in Israel

The "Central Theme" is the prevalent ski teaching method in Israel by the Ski Instructors' Association, adopted also by the British Association of Ski Instructors (BASI).

According to this method, advanced skiing is learned intuitively and gradually, consolidating the knowledge acquired in earlier stages.

· *Beginner's skiing*

The ski styles learned in the beginner's stage include an initial body stance that enables one to control the body and begin skiing without falling. The initial stance comprises six elements. The "herringbone" climb is an uphill walk, one step at a time. The ski prints form a herringbone on the snow, hence the technique's name. The "star" turn is a 360-degree turn in the snow, one step at a time, with the help of the ski poles. The ski prints create a star shape in the snow. The "snowplough" stop is a basic stopping technique down the slope. The "snowplough" turn is an expansion of the "snowplough" stop that allows for downhill gliding with controlled speed. Straight glide is downhill skiing, keeping the two skis parallel and gaining low speed. "Traversing" is skiing down steep slopes by crossing them from side to side, back and forth. The body posture in traversing is more straightforward than in downhill skiing. "Side slipping" occurs when the skier is static and the skis, pointing in the direction of the slope, glide toward the fall line. Side slipping is learned as a beginner skier's exercise, descending a short segment of a steep slope. The "Schuss" technique is a straight glide down the slope with a collected and bent body posture while gaining speed. Schuss skiing aims to avoid walking on the flat terrain segment further down the rail.

· *Advanced Skiing*

The following styles and exercises are for skiers who have gained several weeks of experience:

Parallel turn is intended to stabilize the skier on the slope and to regulate their speed. In this style, the turn is made when the two skis are parallel to each other all the time, and only the direction of the blades reverses. Side slipping (skidding) occurs when the skier slides fast, entering the parallel turn, and slows down while turning, the result being the skidding of the skis on the snow that creates a snow trail. Carving is done with carving skis when blade

directions flip over prior to turning. Crossover is shifting the center of the body mass from one side of the skis to the other before a carving turn initiation. With the body tipping from side to side, the blades' direction also reverses. Short turns are parallel turns performed on the steep slope without pausing between turns and using the ski poles extensively.

1.5. Physical Requirements for Skiing

Alpine skiing is one of the most popular winter activities that millions of people enjoy at a recreational level. Alpine skiing has different techniques, including different body positions and movements, such as walking, straight skiing, snowplough, parallel, or carving skiing. It involves a complex integration of many physiological systems, none of which is more important than the other to the overall performance. Due to these specific movements or techniques, alpine skiing has high requirements for physical fitness, muscle strength, and balance abilities (Ferguson, 2010). However, coordination and sensorimotor performance are also significant, as well as endurance and strength components.

The modern skiing technique, carving, requires a high level of balance due to the shorter skis and the wide tilting angles of the body inward during the turn. (Bambach et al., 2008).

The state of equilibrium or maintaining equilibrium (equilibrium refers to the body's ability to hold its center of mass over the base of support with minimal oscillation or maximum stability) is classified into *static* and *dynamic* (dynamic balance is defined as the ability to maintain balance while performing purposeful movement, whereas static balance means holding the center of gravity in a specific position or situations of minimal movement), depending on the stationary or moving surface (Abbasi et al., 2012). Balance is also classified as anterior, posterior, and medial-lateral, indicating the change of position of the body's center of gravity (Şimşek & Arslan, 2019).

The sport of skiing requires fine postural control to maintain balance in challenging conditions. One of the prerequisites for an optimally performed turn in skiing is maintaining the central balance position on the skis at each phase during the turn. The secondary importance

is to place the skis on the edge and steer them in the desired direction. If this requirement is not met, the skis will probably slide sideways, and the skier will lose control over the speed of skiing and the position of the central balance (Cigrovski & Matković, 2015). Thus, it is necessary to continuously adjust to the A-P width and direction in response to changes in speed, ski turning radii, terrain, or snow conditions (Raschner et al., 2017).

A skier can complete his descent without falling as long as they can balance the sum of all forces acting on the center of gravity while sliding. Otherwise, it may cause the skier to lose equilibrium and lead to a situation where they risk a fall and subsequent injury (LeMaster, 2010).

Poor balance skills were found to be significantly related to an increased risk of injury (Hrysomallis, 2007). However, studies indicate that skiing is beneficial for postural stability, irrespective of skiers' technical skill levels (Staniszewski et al., 2016). Wojtyczek et al. (2014) found that seven-day recreational alpine skiing significantly benefited women and men alike. Also, Cigrovski et al. (2017) established that the balance skills of recreational skiers participating in at least ten-day skiing activities per year improved positively.

Conversely, Müller et al. (2011) found that 12-week alpine skiing with an average of 28.5 days did not influence older people's balance skills.

1.6. The Benefits of Skiing

Skiing is a form of interval training that has become one of the most popular trends in the fitness world. After exerting effort from 20 seconds to 15 minutes during a run, one gets a break as they ride back up the hill. A growing body of evidence suggests this on-off training style - working hard for a few minutes, then resting - can provide a range of benefits, from extending one's longevity to improving fitness levels. Skiing distinguishes itself from other fitness activities regarding activation and training of the lower-body muscles. "The mix of highly coordinated movements with different exercise modes" - carving, skidding, quick turns, jumping - "and the mix of eccentric, isometric and other types of physical activity" (Stoggl, as

cited in Heid, 2019). Research on trail hiking and running suggests that activating and training supporting muscles can improve balance and stability. It may reduce the risk of overuse or repetitive motion injuries. While the academic literature on downhill skiing is less rich, studies show that it improves balance and range of motion. The subtle (and not so subtle) knee and hip movements and exertions during downhill skiing challenge a much broader range of lower-body muscles than most other forms of exercise. From the large muscles in one's thighs to much smaller support muscles around the knees, skiing is a complete lower-body workout, a recent study shows (Heid, 2019).

The top health benefits of skiing:

a) Improves proprioception. *Proprioception* is defined as one's ability to feel the position of different body parts and the effort that goes into moving them. In other words, when one holds their hand in front of the face with their eyes closed, they would still know their hand is there, even though they cannot see it. Skiing involves a significant amount of balance and coordination, and the skier must be conscious of the many slight movements and positions of their body if they want to ski well and remain on their feet. Proprioception weakens with age, so the more the older people are involved in proprioceptive activities, the less it will diminish.

b) Strengthens bones and joints. The knees must endure the tension and weight of one's body as the person turns and moves quickly downhill; thus, the knees grow stronger during skiing. In addition to strengthening the knees, the bones become denser due to the weight-bearing impact on the legs. Thus, besides the enjoyment, skiing helps prevent knee damage and osteoporosis and increases proprioceptive strength.

c) Elevates one's mood**.** Skiing not only boosts overall happiness and wellbeing but also benefits physical and mental health, irrespective of the frequency or duration of the activity.

d) Increases cardiovascular endurance**.** As an aerobic endurance activity, skiing can help one burn calories and lose weight. Moreover, beginners can get excellent cardiovascular exercise, working on the heart and lungs by walking up the slope rather than using the ski lift.

e) Strengthens lower-body muscles. Because skiing requires a constant squatting position, it works on the inner and outer thighs, hamstrings, quads, and glutes. The skier will relish the surrounding beauty, focus on the slope, and not immediately notice the burning sensation in their legs. However, they will feel the results on the following day.

f) Improves balance and core strength. One's core is always engaged because the person constantly works to stay balanced while skiing. Furthermore, skiing challenges balance and agility, helping fend off slips and falls with increasing age.

g) Promotes sound sleep. A beginner will feel exhausted after trying a new sport, especially one that activates the entire body. After a day of skiing, the individual will enjoy a deep and restful sleep.

h) Improves flexibility. A flexible body is a tremendous benefit in skiing. By building flexibility, one can avoid muscle strains and sprains. A thorough, regular stretching routine focusing on the core muscle groups will strengthen the abdominals, obliques, and hips used in downhill skiing.

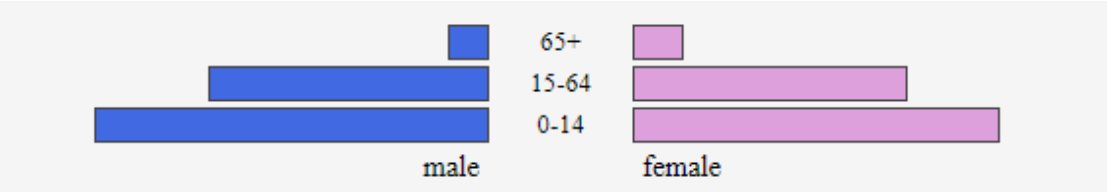
i) Promotes healthy eating habits. A person tends to adopt a wholesome diet. One will naturally be better conscious of consuming more protein, healthy fats, less sugar, and more fruits and vegetables.

Skiing can contribute to a more optimistic outlook. Spending the day on a snow-covered hill or mountain, surrounded by natural outdoor beauty, will make one forget about daily stresses. Also, skiers benefit from vitamin D exposure, which helps ward off seasonal affective disorder and boosts one's mood (Health Fitness Revolution, 2019).

1.7. Adult Population of 60-and-above in the World: Characteristics

As of the beginning of 2021, according to the statistics, the world had the following population age distribution:

- 26.6% is the population under 15: 2,084,569,466 young people under 15 years old (1,077,744,528 males /1,006,828,378 females).
- 64.7% is the population between 15 and 64 years old: 5,081,333,771 persons between 15 and 64 years old (2,569,398,787 males /2,511,954,917 females).
- 7.5% population 65+, 590,141,646 persons above 64 years old (261,787,349 males /328,342,163 females).

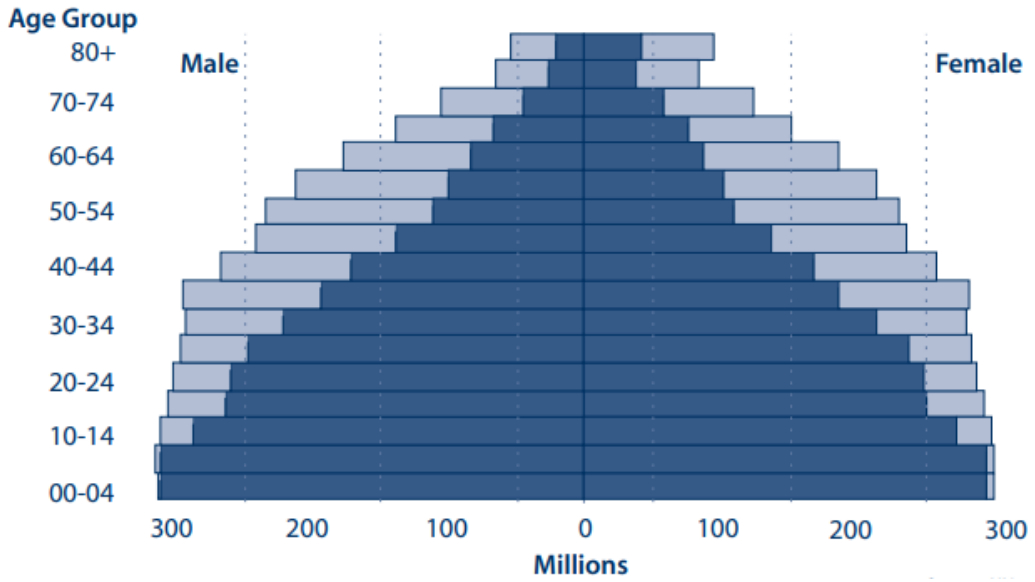


Source: Countrymeters (2021). https://countrymeters.info/en/World

Figure 4. A Model of the Population Distribution Pyramid

The world population pyramid has an expanding type. This pyramid type is typical for developing countries with declining fertility rates but still high birth and death rates (Countrymeters, 2021).

Worldwide, the proportion of people aged 60 and above is growing faster than any other age group. Between 1970 and 2025, growth in older populations of approximately 870 million or 380% is expected. In 2025, there will be a total of around 1.2 billion people over the age of 60.

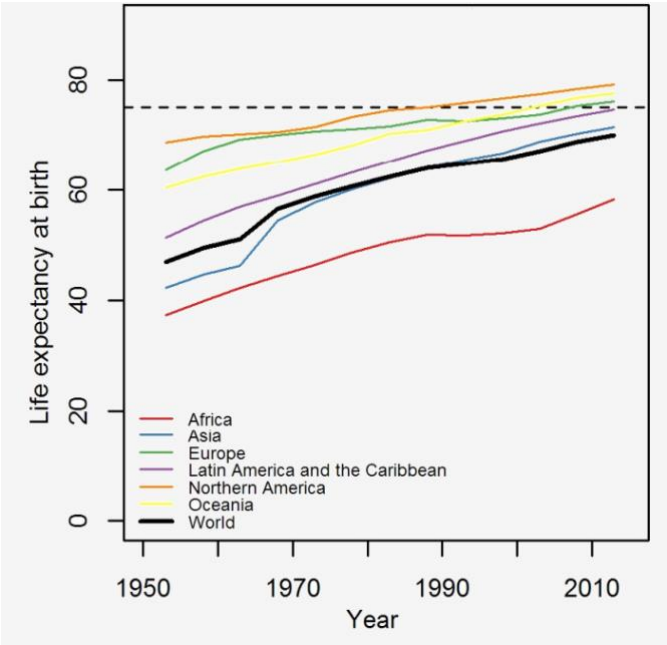


Source:
http://apps.who.int/iris/bitstream/handle/10665/66682/WHO_NMH_HPS_01.1.pdf;sequence=1

Figure 5. Population Pyramid in 1995 and 2025

The chart shows that as the proportion of children and young people declines and the proportion of people aged 60 and above increases, the triangular population pyramid of 1995 will be replaced with a more cylinder-like structure in 2025 (WHO, 2012).

According to the Population Division of the Department of Economic and Social Affairs of the United Nations, life expectancy (the number of years a newborn infant would live assuming that birth and death rates will remain at the same level during the whole lifetime) at birth for the world as a whole increased from 65 years in 1990-1995 to 70 years in 2010-2015. However, wide disparities persist, such that Africa's average length of life in 2010-2015, for example, is 12 years shorter than the global average and 21 years shorter than in Northern America (Countrymeters, 2021).



Source: https://countrymeters.info/images/data/life%20expectancy%20world.jpg

Figure 6. Life Expectancy at Birth by Major Areas

Asia and Europe are home to some of the world's oldest populations, those aged 65 and above. At the top is Japan at 28%, followed by Italy at 23%. Finland, Portugal, and Greece close the top five at just under 22%. Southern Europe, which includes Croatia, Greece, Italy, Malta, Portugal, Serbia, Slovenia, and Spain, is the oldest region in the world, with 21% of the population aged 65 and above. Twelve percent of China's population is aged 65 or above. That share is 16% in the United States, six percent in India, and three percent in Nigeria (PRB, 2021).

In many developed countries, age 65 is used as a reference point for older people as people often become eligible for old-age social security benefits at this age. Defining "old" is further challenged by the changing average lifespan of human beings. Around the 1900s, average life expectancy was 45 to 50 years in the developed countries. Nowadays, life expectancy in developed countries reaches 80 years. There are other definitions of "old" that go beyond chronological age. Old age as a social construct is often associated with a change of social roles and activities, for example, becoming a grandparent or a pensioner. Older persons often define old age as a phase in which functional, mental, and physical capacity is declining, and people grow more prone to disease or disabilities. Chronological definitions of old age were

not deemed as vital in signifying old age as changes in physical and mental capacity (UNFPA, 2012). The shift in age distribution is most often associated with the more developed regions of the world. The pace and significance of population aging is less appreciated in the less developed regions. Most older people already live in developing countries. These numbers will continue rising at a far more rapid rate than in the developed countries. According to estimates, by 2025, some 840 million people over 60 will live in developing countries. They will represent 70% of all older people worldwide. Between 1995 and 2020, in Europe and North America, the working age share of the population will have declined from 62% to 58%, and those aged 60 and above will make up about one-quarter of the population. Among individual countries, the most aged is Italy, with 24% of its population aged 60 or above in 2000 (see Table 3). Japan and many other European countries have comparable percentages.

Table 3. Percentage of Population Aged 60 Years and Over in Selected Countries, 2000 and 2050

Country	**2000, %**	**2050, %**
Italy	24	41
Germany	23	35
Japan	23	38
Spain	22	43
Czech Republic	18	41
USA	16	28
China	10	30
Thailand	9	30
Brazil	8	23
India	8	21
Indonesia	7	22
Mexico	7	24

Source: http://apps.who.int/iris/bitstream/handle/10665/66682/WHO_NMH_HPS_01.1.pdf;sequence=1

Rates of decreasing fertility and increasing longevity will ensure a continued world's population "greying" despite some setbacks in life expectancy in various African countries (due to AIDS) and in several newly independent states (due to increased death rates caused by cardiovascular disease and violence). Fertility rates with sharp decreases have been observed

throughout the world. According to WHO, the estimate was that by 2020, 121 countries would have reached total fertility rates below replacement level (which is average fertility rate of 2.1 children per woman), and it is a substantial increase compared to 1975, when only 22 countries had a total fertility rate below or at the replacement level. The 2021 figure was 68 countries. As percentage of children and young people declines and proportion of people with age of 60 and above increases, the triangular population pyramid of 1995 will be replaced with a more cylinder-like structure in 2025 (WHO, 2012).

1.7.1. Lifestyle

As the world population ages, older people become an increasingly significant group that merits special consideration on social and health-related issues. Lifestyle impacts health and survival at all ages; however, unhealthy lifestyle behaviors have different implications for older people than for younger people. The extent of the consequences may significantly vary depending on the earlier exposure in life to unhealthy habits (Rizzuto & Fratiglioni, 2014). In the past 50 years, improved living standards (income, nutrition, and education) and health services (curative and preventive medicine) significantly boosted the life expectancy of adults of all ages, including advanced ages. Several studies indicate that longevity stems from a combined effect of different fundamental factors, including genetic, environmental, and medical factors, and it also points to a stochastic component. Modifiable risk factors (e.g., lifestyle factors) are especially relevant because they are responsive to intervention (Christensen et al., 2009).

People in Sardinia (Italy), Okinawa (Japan), and Loma Linda (California, US) have a significantly longer life expectancy than other people across the developed world. Researchers found that these people share similar lifestyle characteristics, which might explain their increased life expectancy, such as avoiding smoking, regular moderate physical activity, social engagement, and nutrition rich in vegetables, fruit, and whole grains (Buettner, 2005).

According to the World Health Organization, lifestyle factors are at the root of noncommunicable diseases, such as cancer and cardiovascular diseases (WHO, 2011). Dementia is significantly related to lifestyle factors. In adults aged 75 and above, cancer shortens the lifespan by approximately 4.5 years, whereas cardiovascular diseases and dementia decrease life expectancy by 3.5 years. Furthermore, dementia is the most decisive determining factor in older people's functional dependency and institutionalization (Rizzuto et al., 2012).

Identifying possible factors in human life expectancy is an ongoing effort, and the underlying social and biological processes are yet to be elucidated. Although none of the factors identified thus far is essential or sufficient in determining the aging phenotype at the individual level, people can reach exceptional longevity through engagement in various combinations of protective behaviors (Rizzuto & Fratiglioni, 2014). The identified relationship between the most common modifiable lifespan factors, e.g., smoking, alcohol consumption, body weight, social network, physical activity, leisure, and a combination of healthy behaviors and survival in an advanced age, attests to the tremendous positive value of healthy lifestyle habits and sociability for older adults. Adopting a healthier lifestyle, even at a more advanced age, leads to more enhanced physical functioning, might reduce susceptibility to disease, and become a key to longevity (Rizzuto & Fratiglioni, 2014).

1.7.2. State of Health

Today, older people enjoy better general health, lower disability rates, and higher financial security than previous generations, among other things, owing to vital federal programs across the globe. However, older adults more often face challenges in their physical, mental, cognitive, and social health. Changes linked to chronological age can be classified into several categories: normal aging, characteristic diseases, functional, cognitive/psychiatric, and social changes. Normal aging implies sensory changes, such as age-related hearing loss (presbycusis) and increased tinnitus, which contribute to hearing difficulty. The prevalence of

hearing loss increases as a function of age and cumulative risk factors and is strongly linked to a decreased quality of life. As a rule, visual acuity declines with age (presbyopia). Older adults often experience problems with glare, and thus, night driving becomes more dangerous for them (Evans et al., 2002, as cited in Jaul & Barron, 2017). Vestibular function declines subtly with age. Thus, vestibular function impairment manifested in dizziness is a common multi-factored geriatric syndrome that causes falls in older people (Zalewski, 2015, as cited in Jaul & Barron, 2017).

Muscular strength and body fat percentage change with the decline in muscle mass and strength accompanied by chronic inflammation, a decrease in hormonal levels, and damage to the mitochondrial function of the muscle and the muscle stem cells.

Immunosenescence is age-related changes in the immune system: a decline in B-cell function, a decline in T-cell generation, altered T-cell activation, and dysfunction of innate immunity weaken the body's capacity to fight infection (Gould, 2015). Also, urologic changes occur, as the urinary bladder is often not sterile in older adults and causes infection.

1.7.3. Common Diseases

Cardiovascular disease remains the most common cause of death in older adults, although death rates have dropped in the last 20 years. This category includes chronic ischemic heart disease, congestive heart failure, and arrhythmia. Atherosclerosis causes inflammation and further vascular changes, increasing the risk for cardiac events, cerebrovascular events, peripheral vascular disease, cognitive impairment, and other organ damage (Alexander, 1995, as cited in Jaul & Barron, 2017).

Hypertension is the most common chronic disease among adults and a major contributor to atherosclerosis. Isolated systolic hypertension is most common in adults. It is also associated with mortality at an advanced age. (Federal Interagency Forum on Aging-related Statistics, 2016, as cited in Jaul & Barron, 2017).

Cancer is the second leading cause of death in older adults.

Osteoarthritis is the second most common chronic condition in old age. The incidence of osteoarthritis is higher among women than men. Obesity is a risk factor for osteoarthritis. As the population ages (especially the overweight older population group), the rate of severe hip and knee arthritis will increase.

Diabetes remains a strong risk factor for cardiovascular disease in old age. Peripheral arterial disease (PAD) refers to partial or complete occlusion of the peripheral vessels of the upper and lower limbs. It usually occurs as part of systemic atherosclerosis in the coronary and cerebral arteries. The prevalence of PAD is expected to continue to increase in the foreseeable future, owing to the rise in the occurrence of its major risk factors. Nonhealing ulcers, limb amputation, and physical disability are some of its major complications. Diabetes mellitus (DM) remains a significant risk for PAD, with DM patients having more than two-fold increased prevalence of PAD compared with the general population. The clinical presentation in people with DM differs slightly from that in the general population. In addition, PAD in DM may lead to diabetic foot ulcers (DFUs), which precipitate hyperglycemic emergencies and result in increased hospital admissions, reduced quality of life, and mortality. Despite the epidemiological and clinical importance of PAD, it remains largely underdiagnosed and hence undertreated, possibly because it is largely asymptomatic. Emphasis has been on neuropathy as a cause of DFUs. However, PAD is equally essential. (Soyoye et al., 2021).

Osteopenia is a typical loss of bone density associated with aging. Many older adults have osteoporosis, a more severe weakening of bone density. Osteoporosis is associated with an increased rate of bone fractures (Lin et al., 2016, as cited in Jaul & Barron, 2017).

1.7.4. Physical Functioning

Walking speed declines with normal aging but will decline additionally due to disease. Mobility disability is associated with social isolation, falls, and depression.

Disability in everyday activities like dressing and bathing and disability in instrumental activities of daily living such as cooking typically precedes difficulty with dressing or using the toilet. People with disabilities will often also struggle with chronic pain, depression, and complex medication regimens (Jagger et al., 2001, as cited in Jaul & Barron, 2017).

Falls are a primary cause of morbidity and disability among older adults (WHO, 2007, as cited in Jaul & Barron, 2017).

Frailty is defined as heightened vulnerability to stressors, evident in weakness, slowness, exhaustion, and weight loss (Puts et al., 2017, as cited in Jaul & Barron, 2017).

Incontinence problems, such as urinary incontinence, are commonly caused by overactive bladder, stress incontinence, and functional incontinence in older women (Sims et al., 2011, as cited in Jaul & Barron, 2017).

1.7.5. Psychological and Cognitive Functioning

Cognitive aging symptoms, e.g., mild short-term memory loss, word-finding difficulty, and slower processing speed, are standard parts of aging. Not all brain functions decline with age. Wisdom and knowledge increase with normal aging, contributing to the appropriate respect for community elders. Empathy and altruism also may increase with age (Rosen et al., 2016, as cited in Jaul & Barron, 2017).

Dementia increases with age.

Depression is not a normal consequence of aging (Jaul & Barron, 2017).

Although some variations in older people's health are genetic, much depends on their physical and social environments, including their homes, neighborhoods, communities, and personal characteristics, such as their sex, ethnicity, or socioeconomic status. These factors start to influence the aging process at an early stage. The environments that people live in as children or even as early as developing fetuses, combined with their characteristics, have long-term effects on how they age. Environments also have an essential influence on the development and maintenance of healthy behaviors. Maintaining healthy behaviors throughout life, mainly eating

a balanced diet, engaging in regular physical activity, and refraining from tobacco use, reduces the risk of noncommunicable diseases and improves physical and mental capacity. Behaviors also remain important in older age. Strength training, maintaining muscle mass, and good nutrition can help preserve cognitive function, delay care dependency, and reverse frailty. Supportive environments enable people to do what is important to them despite losses in capacity. The availability of safe and accessible public buildings and transport and environments that are easy to walk around are examples of supportive environments (WHO, 2018).

According to the World Health Organization (WHO, 2010, as cited in Hallal et al. 2012), the behavioral factors associated with an unhealthy lifestyle include a diet with inadequate fruit and vegetable amounts, tobacco smoking, physical inactivity, a sedentary lifestyle, and alcohol consumption. The literature indicates that people who exercise and eat healthy food have a higher chance of adopting a healthy lifestyle, and a lesser risk of developing chronic diseases, such as Type 2 diabetes, hypertension, and cardiovascular diseases (Hallal et al., 2012). Globally, the unhealthy lifestyle is becoming more prevalent, with physical inactivity ranging from 43% in the United States of America and the Middle East to 17% in Southeast Asia (Kahan, 2015). A national-level study from Saudi Arabia found that the prevalence of total physical inactivity in men versus women aged 15 to 64 years was 60% and 73%, respectively (Al-Hazzaa, 2018). Attractive advertisements and conveniently available fast and processed foods have reduced the consumption of a healthy and fresh diet, such as vegetables and fruits (Saghaiana & Mohammadib, 2018).

Moreover, the prevalence of smoking has increased, especially among young adults. In addition to cigarettes, the use of other dangerous forms of tobacco smoking, such as waterpipe, vaper, and e-cigarette smoking is also on the rise (WHO, 2018). An unhealthy lifestyle comprised of sedentary habits is associated with noncommunicable diseases, such as obesity, cardiovascular diseases, and musculoskeletal disorders. A lack of resources, increasing age,

female gender, family commitments, and adverse socioeconomic conditions are some factors associated with physical inactivity and lifestyle in the Arab world (Al-Zalabani et al., 2015).

In 2018, in the USA, 45% of noninstitutionalized people age 65 and above assessed their health to be excellent or very good as compared to 65% for persons between 18 and 64 years old. Leading chronic conditions among adults age 65 and above include heart disease (28% in 2016-2017), physician-diagnosed and undiagnosed diabetes (28% in 2013-2016), stroke (9% in 2016-2017), cancer (19% in 2016-2017), and arthritis (54% in 2018 among people age 75 and above). Between the years 2013-2016, 67% of men age 75 and above and 79% of women age 75 and above had hypertension or were prescribed antihypertensive medication. According to the US Census Bureau's American Community Survey, 34% of people age 65 and above reported to have some disability (i.e., difficulty in hearing, vision, ambulation, self-care, cognition, or independent living) in 2018. The percentages for individual disabilities ranged from 21% of having an ambulatory disability to 6% of having a vision difficulty. In 2018, 49% of people age 75 and above reported to have difficulty in physical functioning. This percentage being more than twice higher than that for the age group of 45 to 64 (19%). The percentage of people age 75 and above who reported on difficulties in physical functioning ranged from five percent of reporting a difficulty (or inability) to sit for two hours to 33% of reporting that it was hard (or they could not) stand for two hours (ACL, 2020).

1.7.6. Leisure Activity

Leisure activities are activities people engage in during their free time. Engagement in leisure activities is positively associated with cognitive function, physical function, and mental health in late adulthood and older age. The possible protective effects of leisure activity engagement against aging-related decline have thus been the object of investigation in the last two decades. Preserving cognitive function has received the most attention of these three outcomes, and its link with leisure activity engagement in older adults is well established (Sala et al., 2019).

Three possible explanations have been proposed for the observed relationship between cognitive function and leisure activity engagement. First, practicing mentally challenging activities (e.g., music, board games, video games, and brain training) may enhance overall cognitive function (Strobach & Karbach, 2016). Second, people exhibiting superior overall cognitive function may be more likely to engage in leisure activities that are cognitively demanding (Sala et al., 2019). Finally, engaging in intellectually demanding leisure activities may slow down cognitive decline. This idea relies on the so-called "use it or lose it" hypothesis, according to which engaging in intellectually demanding activities helps to preserve cognitive function in older people (Salthouse, 2006). Leisure activity engagement is related to mental health as well. Mental health aspects such as wellbeing and life satisfaction have been found to correlate positively with leisure activity engagement. Considering its positive effects on critical dimensions of functioning in older age, leisure activity engagement meaningfully impacts successful aging. The best characterization of successful aging is the concurrent presence of three dimensions: high cognitive and physical function, low probability of disease and disability, and active engagement in life. The latter captures the involvement in productive and social activities, giving those activities a similar importance as health and functioning for successful aging (Gould et al., 2015). Keeping the mind active and intellectually engaged helps reduce the development and progress of many memory-related conditions and may improve cognition. Furthermore, elders who stay physically active typically have ampler overall energy and strength, in addition to reduced risks for diabetes, heart disease, and other health-related conditions (NIA - National Institute on Aging, 2020)

Leisurely activities favored by active older adults can be:

- hobbies and recreational exercise for elders, such as arts and crafts, dancing, gardening, golfing, practicing yoga, cooking, bowling, swimming;
- checking off the traveling bucket list and travel abroad;

- relaxation and mental stimulation for older people, e.g., brain games and puzzles, spa experiences, senior dating, book club, and pet care (Hoyt, 2021).

1.7.7. Physical Activity

Aerobic and muscle-strengthening activities are crucial for elderly adults to improve overall health and reduce risk of multiple health problems. According to the US Department of Health and Human Services (HHS) Office of Disease Prevention and Health Promotion's Physical Activity Guidelines for Americans, the fundamental guidelines for older adults include 150 to 300 minutes of moderate-intensity or 75 to 150 minutes of vigorous-intensity aerobic physical activity a week, or an equivalent combination thereof. Adults should as well engage in moderate or greater-intensity muscle-strengthening activities involving all major muscle groups two or more days a week, providing additional health benefits. Above guidelines advise older adults to determine their level of effort for physical activity which is relative to their fitness level (ACL – Profile of Older Americans, 2019).

In 2017, approximately one-fifth of US men between 55 and 64 years of age (21%) and between 65 and 74 years of age (18%) have met aerobic activity and muscle-strengthening guidelines. More than double the percentage of men of all ages have met only the aerobic-activity guidelines as compared to the muscle-strengthening guidelines. Similar to older men, older women had a higher percentage of meeting aerobic activity guidelines at all ages than meeting only muscle-strengthening guidelines. More than twice the percentage of women between 55 and 64 years of age (17%) have met the aerobic activity and muscle-strengthening guidelines as compared to women age 75 and above (7%). However, these percentages still being low. More than half of all older women have not meet the aerobic-activity or muscle-strengthening guidelines, with 50% for women between 55-64, 53% for women between 65-74, and 69% for the age group of 75 and above (ACL, 2020).

An awareness of the importance of physical activity could be attributed to external and internal barriers. External barriers refer to factors beyond an individual's control, whereas

internal barriers are factors determined by an individual's personal decision. The external barriers are insufficient time, inadequate skills and resources, and lack of support from family or friends. 'Not having enough time' is the primary external barrier to physical activity and exercise participation. Older adults who were inactive were found to live a considerable distance from recreational centers, sidewalks, parks, or other fitness facilities that could motivate engagement in exercise, such as walking. Lack of facilities was also a significant barrier to physical activity and exercise participation. Another barrier, 'no one to exercise with', was one of the barriers to active participation in exercise and physical activity. Generally, older adults prefer to spend their time at home (playing with grandchildren) rather than participate in physical activity and exercise with friends of the same age. Middle-aged and older individuals, especially women, usually prefer to perform routine activities such as gardening and household chores. Adult populations have insufficient awareness of the beneficial effects of exercise in disease prevention due to a lack of knowledge, and low education levels are another barrier. The internal barriers are 'feeling tired' as a common barrier, leading to a higher risk of physical inactivity, self-motivation as the motivation to exercise may be altered over time, in association with the individual's commitment and self-efficacy, tiredness, and obesity (Justine et al., 2013).

Thus, recommendations for older adults' physical activity are:

- Numerous daily physical activities, such as walking to the shop, vacuuming, gardening, washing the car;
- Aerobic activities to increase the heart rate and breathing, such as brisk walking, ballroom dancing, cycling, *kapa haka*, lane swimming, playing with grandchildren, *kilikiti* game.

Resistance, flexibility, and balance activities include:

- Resistance (for muscle and bone strength): carrying shopping, standing up and sitting down repeatedly, weight training.

- Flexibility (for easy movement): modified tai chi, stretching, gardening, yoga, Pilates;
- Balance (to prevent falls): bowls, modified tai chi, Otago exercise program, standing on one leg, yoga (Ministry of Health, 2018).

1.7.8. Engagement in Leisure Activities

Meeting their family members and spending time at home are the most common leisure activities among older people in Israel because they are accessible, available, familiar, relatively cheap, and do not require physical effort. The importance of reciprocal relations with familiar people derives from the need to love, be loved, belong, and gain social recognition. The need for social communication does not fade over the years and even grows stronger in older age, as it is a significant source of support and meaning in life.

The factors affecting older people's leisure patterns in Israel reduce their engagement in leisure activities. Hence, older adults do not derive pleasure from leisure to the extent that would meaningfully benefit their wellbeing.

The centrality of family – the older people in Israel attribute vast importance to family, and many of their daily activities involve close family members. Israel's small geographical territory allows us to maintain relatively frequent family gatherings.

Strong work ethics and weak leisure ethics – the widespread concept in the Israeli culture is that work is positive, while leisure is negative.

Persistent *physical and financial insecurity* - this feeling holds a central place in the lives of most older Israelis and, thus, possibly reduces engagement in leisure (Cohen, 2018).

The main leisure spheres among the general population include watching TV, reading newspapers and periodicals, listening to music and radio, meeting with relatives, reading books, social gatherings, surfing the Internet, and passing time in shopping malls (Dahan & Nimrod, 2014).

As the physical age advances, the number of activities the older person engages in diminishes, and the tendency develops to shift from outdoor to indoor activities, as well as from activities requiring physical effort to less exertive activities. In light of this tendency, physical activity in old age, including very old, worn out, mentally worn out, and even disabled people, contributes to their psychological wellbeing and life satisfaction, life quality, and longevity (Netz, 2008).

Studies indicate that 39% of people aged 60 and above engage in physical activity to a large extent or higher. However, a similar percentage of people from this age group do not participate in any physical activity or participate to a small extent. Impediments such as medical conditions, accessibility, availability, and cost affect nonparticipation in physical activity (Klivansky, 2014).

1.8. Age 60 and above in Israel

In 2017, approximately 1,327,900 residents aged 60 and above lived in Israel, constituting 11.4% of the state population. Between 2000 and 2013, an eight percent growth in the rate of older people in Israel was recorded.

Distribution in the population appears in Table 4.

Table 4. Population Distribution of 60-Year-Old and Older Adults in Israel: Division by Age and Gender

age	total absolute number (thousands)	distribution in %	absolute number women (thousands)	absolute number men (thousands)	percentage of men in age group
60-69	704.7	53.07	372.5	332.2	47.14
70-79	379.7	28.59	208.8	170.9	45
80+	243.5	18.34	147.1	96.4	39
total	1327.9	100	728.4	599.4	

Source: Ostrovski-Berman (2020)

The percentage of older people in Israel varies within its different populations - the Arab and the *Haredi* (ultra-Orthodox Jewish) Sectors being the youngest in the country. While the

Arab population constitutes about 20.8% of the population in Israel, the percentage of older Arabs among the total older population in Israel is only 4.9%. Thus, the average life expectancy for an Israeli man was 80.1 years in 2015, whereas the average life expectancy for an Arab man was only 67.9.

Women's average life expectancy in the general population was 84.1, whereas the Arab woman's life expectancy was 81.1.

The Haredi elderly constitute 2.7% of the general elderly population, while the Haredi represent 11%. Today, the retirement age in Israel is 67 for men and 62 for women. In 2018, the poverty rate among older adults in Israel was 17.7% in the country's general elderly population (Nathanson et al., 2018).

The 60-year-old and above age group is the population at health risk. This section refers to the following diagnosed medical conditions:

1. Heart failure - myocardial infarction, coronary thrombosis, and any other heart disease, including congestive heart failure;
2. High blood pressure or hypertension;
3. High cholesterol level;
4. Stroke or cerebral vascular disease;
5. Diabetes or high sugar level in blood;
6. Chronic lung disease, e.g., chronic bronchitis or emphysema;
7. Cancer or malignant tumors, including leukemia and lymphoma, excluding nonmelanoma skin cancer.

The health situation of 60-year-olds and older is presented in Table 5.

Table 5. The Percentage of Older People Suffering from the Medical Conditions Listed above

Age/medical condition	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
60-69	9.2%	35.6%	26.6%	3.3%	18/8%	2.9%	4.6%
70-79	19.7%	48.1%	36.8%	4.5%	33.2%	6.7%	7.9%

80+	27.3%	53.1%	33.6%	11.8%	30%	5.1%	7%

Table 5 shows that the members of the younger age group, from 60 to 69 years, suffer from three medical conditions with high frequency: above 35% suffer from hypertension or high blood pressure, more than a quarter of 60-69-year olds suffer from high cholesterol levels, and almost a fifth of the group were diagnosed with diabetes or high blood sugar levels. The data show a significant deterioration in the health state of the 70-year-old and above among people aged 70-79; the occurrence of all the above-listed medical conditions is on the rise. In addition, more than 27% of the most senior group, the 80-year-olds and older, suffer or have suffered a heart attack, including myocardial infarction, coronary thrombosis, another heart disease, or congestive heart failure.

From the perspective of gender, the risk level among women of 60 to 69 is lower than among men of the same age: the rate of men who do not suffer from diseases is significantly lower compared to the percentage of healthy women. Respectively, the rate of men who have three or more medical conditions is almost double that of women of the same age group. There is also a gap in the risk level in favor of women in the 70-79 age group. However, from this age onward, the gap begins to decrease. From the perspective of age, the risk level grows with increasing age: from age 70, about a third of the population is diagnosed with three or more medical conditions. In terms of a subjective health state, there is a significant deterioration in health from the age of 70. About 30% of men and a similar number of women aged 80 and above have reported deteriorating health (Ostrovsky-Berman, 2020).

1.9. The Positive Effect of Physical Activity on Wellbeing

Physical activity significantly enhances mental wellbeing at any age (Physical Activity Guidelines Advisory Committee, 2008). Its effect, behavior, and cognition are subject to change across the lifespan, and these developmental changes may result in differences in physical activity, wellbeing, and the link between physical activity and wellbeing across life stages. *Wellbeing* is the preponderance of positivity of affect and high satisfaction with life.

Thus, people value their wellbeing and strive to be happy and satisfied with life (Diener, 2000). Physical activity may be a viable tool for enhancing wellbeing because it relates to more positive affect and higher satisfaction with life (Ekkekakis et al., 2011).

Age moderated the effect of physical activity on wellbeing in older adults, with more significant effects observed in people around the age of 65 as compared to people around the age of 74. This variable evidence must consider context, such as life stage, to translate into people's lives more quickly. In childhood (between 3-9 years of age), physical activity can be associated with good mental health in children, in aspects of high self-esteem, low symptoms of anxiety and depression, and low stress (Holder et al., 2010). Physical activity can acutely enhance mood in children. Physical activity and wellbeing appear to decline in adolescence (10–17 years). Physically inactive adolescents have lower life satisfaction levels than their more physically active peers (Schneider & Graham, 2009). In emerging adulthood (18–25 years), when they participated in more than typical physical activity, young adults' satisfaction with life was as well higher than usual. More physically active emerging adults tended to experience more pleasant activated feelings than those who were less active. Also, emerging adults who were more physically active than typical experienced more pleasant-activated feelings and physical activity to increase their positive affect (Maher et al., 2013). In adulthood (age of 26-65), physical activity and life satisfaction are mediated by physical self-worth and menopausal symptoms. Regarding physical activity and satisfaction with life the focus was in subpopulations such as cancer patients, survivors, and middle-aged women (Hyde et al., 2011). In older age (65 years and older), physical activity indirectly enhances satisfaction with life through its effect on affect, mental health, and self-efficacy. Physical activity that is more significant is associated with enhanced physical and mental health and greater self-efficacy. In turn, health status had positive relation to satisfaction with life. Self-efficacy and positive affect are significant mediators of the association between physical activity and wellbeing with a follow-up of 1 year, of physical activity intervention for older adults, and changes in positive

affect mediated this relation across an additional four-year follow-up (McAuley et al., 2006). Hence, perspective of a lifespan offers better understanding of correlation between physical activity and wellbeing (Hyde et al., 2013).

A lifespan perspective can help contextualize physical activity and wellbeing into the continually evolving physical, biological, psychological and environmental factors that manifest in life (Baltes, 1987). Highest levels of physical activity occur in childhood, followed by a steep drop in adolescence, a continued decline in emerging adulthood, stabilization in adulthood, and another drop in old age. In contrast, wellbeing begins high in childhood, drops throughout adolescence, emerging adulthood, and adulthood, then increases in old age, and gradually declines in the oldest age. Despite the fact that physical activity is connected to wellbeing at different ages, little is understood regarding how the link between wellbeing and physical activity changes across life stages (Ekkekakis et al., 2011). When taking a lifespan perspective it as well includes considering the extent to which physical activity and wellbeing vary at interpersonal and intrapersonal levels and in relation to various life stages, it includes considering how these differences can vary. Hence, the discussion is on how life events, individual differences, and daily changes may impact physical activity trajectories and wellbeing (Ram & Gerstorf, 2009).

1.9.1. Research per Age Groups

a) Children and teenagers

A study examined the relationship between physical activity and wellbeing in children and further explored how it may vary by gender and weight status. The sample was of 1,424 9 to 11-year-olds. They completed a self-report measure of physical activity, the Child Health and Illness Profile, KIDSCREEN, and a self-esteem scale. Results showed that children who met the recommended level of MVPA (level of 60 minutes of moderate-to vigorous-intensity physical activity daily) showed generally higher scores in wellbeing measures than children who did not achieve this activity level. Specifically, active children scored higher

on *satisfaction, comfort, resilience,* and *achievement* domains and reported higher global self-esteem, social acceptance, and more social support/better peer relations (Breslin et al., 2012).

Another study systematically reviewed associations between PA, SB, and psychosocial wellbeing during early childhood. Inclusion criteria were: (a). peer-reviewed publication since 1980 in English; (b). children aged birth to 5 years; (c). PA or SB measured during early childhood; (d). an indicator of child psychosocial wellbeing, and (e). association between PA/SB and psychosocial wellbeing reported. The results showed that 19 studies were identified: four examined PA, 13 examined SB, and two examined PA and SB. No interventions met the inclusion criteria; all included studies were observational. In total, 21 indicators of psychosocial wellbeing were examined, 13 only once, with the remaining eight reported in more than one study. Some dose–response evidence emerged, suggesting that PA is positively, and SB inversely, associated with psychosocial wellbeing (Hinkley et al., 2014).

b) Adulthood

A cross-sectional study examined the relationship between physical activity and mental wellbeing in undergraduate student nurses and found that participation in physical activity may benefit this population's mental wellbeing. Promoting physical activity in student nurses can increase self-esteem and life satisfaction and decrease the risk of anxiety and depression (Hawker, 2012). Another research investigated the association between physical activity and mental health in an undergraduate university population based in the United Kingdom. One hundred students completed questionnaires measuring their levels of anxiety and depression using the Hospital Anxiety and Depression Scale (HADS) and their physical activity regime using the Physical Activity Questionnaire (PAQ). Significant differences were observed between the low, medium, and high exercise groups on the mental health scales, indicating better mental health for those who exercise more. The conclusions were that engagement in physical activity can be an essential contributing factor in undergraduate students' mental health (Tyson et al., 2010).

A systematic review assessed the effectiveness of PA interventions for improving psychological wellbeing in working adults. It reviewed current evidence, assessed the quality of the research into this topic area, and identified issues and recommendations for future research. The review identified five office-based workplace PA interventions in promoting psychological wellbeing in 1,326 participants. The included studies varied substantially in sample size characteristics, methodological quality, duration of follow-up, types of interventions, and assessed outcomes. Three of the five included studies were of high quality. The types of PA intervention included yoga and exercise, and three studies focused on walking interventions. The findings evidenced that exercise, yoga, and walking interventions improve wellbeing as measured across workplace settings compared with no intervention. Some studies did not include a placebo control group; therefore, a form of PA intervention, regardless of the type, may be better than no intervention. Conclusion: This review found mixed evidence that PA interventions can effectively improve wellbeing across office settings. Although the findings are promising, there is no conclusive evidence because of methodological failings. Current evidence indicates that employees can improve their psychological wellbeing by participating in any form of PA intervention in an office setting (Abdin et al., 2018). Studies examined the potential impact of sport and physical activity on the subjective and psychological wellbeing of combat veterans in the aftermath of physical or psychological combat trauma. The question guiding this review was, "What is the impact of sport and physical activity on the wellbeing of combat veterans?" Results were that sport and physical activity enhances subjective wellbeing in veterans through active coping and doing things again, PTSD symptom reduction, positive affective experience, activity in nature/ecotherapy, and quality of life. Impact on psychological wellbeing includes determination and inner strength, focus on ability and broadening of horizons, identity and self-concept, activity in nature/ecotherapy, sense of achievement/accomplishment, and social wellbeing. Participating in sports or physical activity can also enhance motivation for living (Caddick & Smith, 2014).

c) Older people

Studies attempted to identify how intrapersonal, social, and environmental factors influence nutrition and physical activity behaviors among older adults living in urban and rural areas. This study is a cohort study of adults aged 55-65 across urban and rural Victoria, Australia. Results showed that obesity and its determinant behaviors, physical inactivity, and poor diet are major public health concerns and are significant determinants of the quality of life among the aging population. It provided evidence for developing effective policies and programs to promote and support increased physical activity and healthy eating behaviors among older adults (McNaughton et al., 2012).

Additional research tested whether higher baseline psychological wellbeing predicted higher physical activity levels over time. Prospective data were from the English Longitudinal Study of Ageing, a nationally representative sample of English adults over 50. The sample included 9,986 adults, assessed up to six times across an average of 11 years. Results showed that psychological wellbeing was independently associated with attaining and maintaining higher physical activity levels over 11 years, suggesting that it may be a valuable target for interventions aimed at helping older adults engage in more physical activity (Kim et al., 2017).

1.9.2. Self-efficacy among Older People

Self-efficacy refers to confidence in one's ability to perform a particular behavior successfully. A level of self-efficacy can have a substantial impact on behavior. The hypothesis that stronger self-efficacy beliefs are associated with better cognitive performance at older ages was examined in a sample of men and women aged 70-79. Multiple domains of efficacy beliefs and cognitive abilities were explored. The results showed that for men, instrumental efficacy beliefs were related to better performance on tests of memory and abstraction, independent of sociodemographic characteristics and physical and psychological health. For women, instrumental efficacy beliefs had no significant associations with cognitive ability tests (Seeman et al., 1993).

Physical activity is an efficient tool for increasing older people's independence level if its type and intensity are controlled by adapting physical exercises to each person's characteristics (Lesende et al., 2010). Evidence shows that more substantial functional independence results in participants' higher quality of life (Casals et al., 2015). There is a positive association between physical activity and positive self-esteem. The study concluded that regular physical activity should be encouraged to improve self-esteem and minimize the risk of dependence on older people (Moral-García et al., 2017). Those physical self-perceptions (activity, coordination, endurance, flexibility) are associated with self-reported planned and incidental physical activity. In contrast, sit-to-stand was the only objectively measured physical functioning variable associated with planned it. Similarly, more falls, global self-esteem, general physical and domain-specific physical self-perceptions (flexibility and strength), and knee strength were associated with fear of falling (Sala et al., 2017).

Female customers generally show markedly higher satisfaction than male customers, older customers are more satisfied than younger ones, and socioeconomic status is negatively related to satisfaction scores (Matzler et al., 2008). Another study showed no significant difference between older males and females regarding *self-esteem*, *happiness*, and *life satisfaction* and a significant difference in places of locality of older people regarding *self-esteem*, *happiness*, and *life satisfaction*. It found that a positive relationship between s*elf-esteem*, *happiness*, and *life satisfaction* is the primary predictor of happiness and life satisfaction (Vilkhu & Behera, 2019).

Alpine skiing could serve as suitable activity to encourage continued sports practice and to improve this population's health during winter. Conversely, sports practice not necessarily impacts all dimensions of HRQoL (health-related quality of life), with significant differences in physical function, general health, and vitality, as long as it is performed in high volume or vigorous intensities. Thus, PA would not benefit HRQoL below a certain threshold, which makes a difference in health between effectiveness of practicing different sports, which must

be considered upon prescribing PA for older adult population. Some evidence suggests that low-intensity sports have little or no impact on HRQoL (Tomas-Carus et al., 2007). Skiing constitutes a complete sport which is practiced over the entire day. It induces acute cardiac responses, alternating with necessary breaks for going up and take a lift; it benefits cardiovascular health. The entire locomotor musculature is as well subjected to intermittent efforts of medium and high intensities that favor the capacity to exert effort and perform daily tasks. It as well leads to reduced body fat, improved bone density, and insulin resistance – aspects that are linked to general health. It illustrates the differences thahta are found in the PF, PR, and GH dimensions of HRQoL. Higher levels in the VI and SF dimensions could be due to the fact that the activity of alpine skiing generates positive alterations in mental and social health and is associated with social wellbeing and life satisfaction (Conde-Pipó et al., 2022). A similar study examined how psychological states change across three measurements in a skiing session of 3.5 hours in older male and female recreational skiers and found that the duration and intensity of skiing were appropriate and yielded immediate positive psychological effects on the older participants. Furthermore, recreational alpine skiing positively affects MS ratings, reflecting wellbeing, while generating age-appropriate moderate RPE values in older alpine skiers (Krautgasser et al., 2012).

1.9.3. The Positive Effect of Alpine Skiing on Wellbeing

Skiing, as one of the popular physical sports, affects people's wellbeing. As millions of people practice downhill skiing during the winter season, skiing becomes part of regular physical activity. Alpine skiing is an outdoor sports activity that is typically undertaken in winter on snow-covered slopes of mountainous areas. Cold temperatures and moderate altitudes (1,500–2,500 m) constitute ambient conditions. Ski lifts and cable cars are used by skiers for ascending, which is followed by downhill turns counteracting gravity through muscle power (Burtscher & Ruedl, 2015). Related benefits include the following aspects: (a) higher levels of exercise during leisure time are known to be generally associated with a healthier lifestyle, and

(b) skiing may contribute to reaching well-accepted minimal recommendations for physical activity (which are 150 min of moderate or 75 min of vigorous activity per week). Regular physical activity is correlated with individual performance level, which is negatively correlated with mortality. Performance level was even a better predictor of mortality than cardiovascular risk factors, like well-established risk factors such as dyslipidemia, systemic hypertension, diabetes, or smoking (Kokkinos, 2008). Repeated exposures to environmental stresses such as hypoxia (high altitude) and cold might provoke adaptations and thus contribute to favorable effects. Beneficial health consequences may be partly mediated through improving individual cardiorespiratory fitness, motor abilities, and psychosocial wellbeing thus diminishing the high prevalence of major cardiovascular risk factors in the general population (Burtscher & Ruedl, 2015).

As skiing occurs mainly outdoors, it is interesting to consider additional potential psychological benefits of this activity driven by environmental factors. Significance of environmental effects on PA behavior, in general, has been recognized as affective responses. Consequently, adherence to PA is affected by surrounding environment. Moreover, PA in a natural environment has been shown to create more significant positive effects than indoor PA on affective responses (Sallis et al., 2016). Evidence exists of a dose-response relationship between duration of green exercise and impact on affective responses. Skiing is associated with pleasure, which increases satisfaction of participants (Lee et al., 2014). In more detail, following total effects were shown via structural equation modeling: pleasure from skiing leads to involvement and satisfaction, and skiing-experienced flow leads to satisfaction. Researchers concluded that those who participate in skiing activities and convening socially around a sporting activity are likely to have positive psychological outcomes, which can be associated with overall human wellbeing. Freeride skier participants stated in a study that they are motivated to engage in the sport by regularly experiencing pleasure, nature, freedom, balance, challenge, and social interactions (Frühauf et al., 2017). Another study revealed that

improvements in psychological wellbeing during and after skiing can be explained by (a) the mere fact of exposure to nature, (b) the effects of skiing itself, and (c) interaction of these variables (Berto, 2014).

Physical activity may have different positive mental health effects. A guided alpine skiing intervention has marginal positive effect and no negative effect on psychosocial variables in individuals age 60 and above (Finkenzeller et al., 2011b). Questionnaire data assessing physical self-concept in sportiness, strength, and endurance, were positively correlated with external performance criteria of endurance, muscle power, concentric muscle strength, and balance (Amesberger et al., 2011). A longitudinal study revealed that elderly individuals who were involved in a repeated measures study on physical fitness tended to relate their self-rated global fitness to an endurance parameter on a continued basis. Another study of same group reported on enhanced wellbeing and no significant impact on perceived pain, exertion, or knee function following a skiing intervention in elderly skilled skiers after total knee arthroplasty (TKA) (Würth et al., 2015). Despite these inspiring data, there is no evidence that suggested that skiing might result in enhanced psycho-physiological reactivity and recovery or better cognitive performance in individuals age 60 and above (Finkenzeller et al., 2011a). On matter of environmental conditions, alpine skiers can benefit from their sport by keeping their cognitive performance at the same level in cold temperatures (Racinais et al., 2017).

Overall, in factors closely related to mental health, skiing has some potential. Due to the fact that skiing mainly occurs in attractive mountain areas, exposure to natural surroundings at time of training may provide additional stimulus for stress recovery and wellbeing. From a psychological perspective, skiing may be a favorable intervention to enhance participants' acute affective states during and right after exercising. However, this requires validation in controlled crossover trials. Currently, available research results show the potential merits of skiing in terms of flow, body image, and pleasure, which eventually are associated with social wellbeing and life satisfaction. Downhill skiing, mainly when it is performed regularly, may contribute to

healthy aging by its association with a healthier lifestyle, including higher levels of physical activity. However, favorable health effects of downhill skiing can be significantly contributed by several other mechanisms, e.g., exposure to cold temperatures and intermittent hypoxia, specific challenges and adaptations of postural and musculoskeletal control systems, and emotional and social benefits from outdoor recreation (Burtscher et al., 2019).

1.9.4. Injuries in Skiing

Annually, millions of people engage in mountain sports activities worldwide. While these activities are associated with health benefits, they also involve a risk of injury and death (Ruedl et al., 2009). Snow-caused injuries have the potential to cause serious problems. There are several notable injuries one should be aware of:

a) Head Injuries While Skiing. Both experienced and inexperienced skiers may struggle to maintain adequate speed and balance simultaneously. A disastrous injury can occur after collision with bumping the head with a tree, a rock, or another person or after a fall. Head injuries can range from minor to significant trauma and requires immediate attention. In the worst case, head injuries can lead to excessive bleeding, which might require stitching. Other injuries may appear less severe however they can cause lack of coordination or light-headedness. Head injuries are severe and could exacerbate without proper treatment.

b) Medial Collateral Ligament Tear. The medial collateral ligaments (found on the knee's inside) connect the end of knee bones. Their ultimate function is preventing a knee from bending inwards fully, thus maintaining proper functionality. Cold weather alone can harm the knees. While skiing or snowboarding, the force of one leg falling on another can cause an MCL tear. Such injury might result in bruising, severe pain, and swelling. It is possible to stand with such injury, however it will be painful.

c) ACL Tear or Rupture. Being one of the commonest sports injuries, ACL is liable to be damaged in any sport that involves rapid maneuvering. Sudden turns that are involved

in Skiing and snowboarding can cause an ACL tear. Being located in center of a knee, ACL controls the distance to which a tibia can move in relation to the femur. When someone pivots while standing, hyperextends, or stops suddenly ACL injuries can occur. When suffering from an ACL injury one often notices a "pop" sound. One might as well experience other signs of injury, notably a significant swelling.

d) Wrist Fracture. Trying to restore one's balance during a fall by reaching out a hand, feeling for support is instinctual. Occasionally by catching the ground or a tree one might avoid injuries. In other cases, a ligament can be damaged by putting the pressure of one's entire body weight on a wrist. Pain in a hand can be particularly confining, especially from an orthopedic perspective. Among snow sports enthusiasts it is a frequent injury as the best way to prevent falls is stretching a hand out.

e) Shoulder Injuries. Depending on how one falls, shoulder injuries may also be expected. If one of the bones is dislocated or the bone fractures, it can be excruciating. Many a body structure may as well be affected as a shoulder connects arms to the torso. The fall may also affect the ligaments, muscles, and tendons. As a result, they become weakened (Kerker, 2020).

Skiing and snowboarding are popular winter sports worldwide but carry a substantial risk of sports injuries, with a reported incidence of 0.5–1.35 injuries per 1000 skier/snowboarder days among recreational skiers/ snowboarders 1–3 and 6.9 injuries per 1000 runs (or 26.8 injuries per 100 athletes per season) among professional alpine skiers in recent years. Female skiers are more susceptible to lower extremity injuries, especially knee injuries, with nearly 50% of injured female skiers suffering from knee injuries. The lower extremities were the most commonly injured limbs among female skiers. However, there was no significant difference in injured body parts between male and female skiers and snowboarders (Ruedl et al., 2009). Snowboarders accounted for nearly 40% of the injured population during the latest season. Men

experienced more severe injuries than women, which may be due to men's higher speed, body weight, and trail difficulties (Chen et al., 2020).

Many variables affect skier injury rates; the most common are age, gender, ability, physical conditioning, and snow conditions. Beginners have three times the injury rate of experts, however their injuries are less severe. Experts more severe however less frequent injuries, fractures, head injuries, and high-grade ligament sprains. Their higher speed on the ski slopes might account for that. Intermediate skiers are somewhere midscale. Age is another critical factor. Highest injury rate is among 11 to 13-year-olds. They have intermediate ability, however their judgment is lesser than that of adults. Injuries in teenagers (ages 13 to 20) are slightly less frequent however more severe. Many have adults' skill levels however their judgment is immature. Finally, injury rate of children under 12 is twice than that of adults however lower than that of adolescents. Females have twice the injury rate of males, which is attributed to conditioning. A study on female ski racers found that their anterior cruciate ligament (ACL) injury rate was six times that of their male counterparts. Injury rates might have significant impact on physical conditioning may – meaning, the better is a skier's shape, the less frequent the injuries are.

Injuries are most likely to occur on a first day of ski week, in early morning, before a skier has warmed up; in late morning and later during the day, when fatigue sets in; and at a week's end when cumulative effects of a vacation make a skier tired. Snow conditions affect injury patterns as well. Hard-packed snow will generally induce high-speed and impact injuries. Heavy snow of powder is associated with more torsional or twisting injuries. A fall that leads to injury might be caused by quick changes in snow conditions, such as hitting a line between groomed and ungroomed snow (American Orthopaedic Society for Sports Medicine, 2008). Studies indicate that the cause of injury is linked to injured body parts among skiers and snowboarders. Head injuries took up a significantly larger portion of accidents involving others. Sports-specific injuries, such as shoulder injury in snowboarding and knee injury in skiing, were

more frequent in accidents not involving others. These findings can be attributed to different injury mechanisms, with noncontact injury often causing ligament and tendon tears and contact injury causing bony injury and concussion (Davey et al., 2019).

Sudden cardiac death (SCD) is an unanticipated and dramatic event resulting from cardiac causes with infinitely great suffering for the immediate family and friends. Almost 50% of all SCDs recorded in the Austrian Alps occurred on the first day of hiking or skiing. They were most frequently observed in the late morning hours and accumulated with increasing time from the last food and fluid intake. These facts suggest that physiological stress factors like unpracticed physical activity, mental exposure, dehydration, and depletion of carbohydrate stores result in elevated sympatho-adrenergic activity, triggering unfavorable cardiovascular responses, e.g., tachycardia and elevated systemic blood pressure. The hemodynamic stress and catecholamine surge may boost myocardial oxygen demand, acute ischemia, disruption of vulnerable atherosclerotic plaques, and platelet activation, resulting in increased thrombogenicity and thus provoke MI.

Moreover, activation of the sympathetic nervous system might also raise the susceptibility to ventricular fibrillation. Also, extreme ambient temperatures and high altitudes may trigger SCD. Concerning altitude, pulmonary hypertension, when acutely exposed to high altitude (hypoxia), may contribute to left ventricular dysfunction in individuals suffering from heart disease. On the other hand, sleeping at a somewhat higher altitude before exercising on the first day in the mountains may represent some SCD protection, likely due to pre-conditioning or short-term acclimatization. The most important measures to prevent SCD during mountain sports activities for older people include sports medical examination, appropriate physical preparation, pharmacological therapy of cardiovascular risk factors, and promoting awareness of risk conditions and triggers during mountaineering activities (Burtscher & Niederseer, 2020).

Deaths during skiing can be of traumatic (e.g., collision with an object/person) or nontraumatic nature (e.g., cardiac death). The most common scenario of traumatic death in skiing is a collision with a solid object such as trees or rocks or a collision with another skier, and it can be largely avoided by choosing a skiing velocity appropriate for individual skiing skills. About 65.3% of all victims who died due to a traumatic event wore a ski helmet at the time of the accident. Bianchi and Brugger (2016) reported that falls during skiing are the primary cause of traumatic deaths on ski slopes. Another cause of traumatic death on ski slopes was a collision with other skiers or solid objects (50.2%). Males above 32 account for more than 80% of all traumatic deaths. The majority of males (72.5%) who died on ski slopes were older than 32 years (Bianchi et al., 2017).

1.9.5. The Influence of Alpine Skiing on the Wellbeing of Adults Aged 60 and Over

Snow sports provide numerous ascertained health and wellness benefits to participants. According to the World Health Organization, regular physical activity benefits the body and mind. The organization states that physical activity increases strength and fitness, reduces the risk of cardiovascular and other physical ailments, and improves mental health, specifically reducing the risk of depression in all ages (WHO, 2020).

A study assessed the influence of 12 weeks of alpine skiing on spinal reflex plasticity, strength, and postural control in senior citizens. Soleus H-reflexes and postural stability were measured during bipedal quiet and unstable stance in 22 older subjects aged 66.6 ± 1 years. The results showed an increased H-reflex excitability after the training, while no changes occurred in the background EMG. The postural sway decreased after training, and the maximal force increased. No adaptations in any parameter were observed in the control group. The present study demonstrated that skiing training effectively alters the spinal reflex activity in elderly individuals (Lauber et al., 2011).

Another study investigated whether regular alpine skiing could reverse sarcopenia and muscle weakness in older individuals. Twenty-two older men and women (67 ± 2 years)

underwent 12 weeks of recreational skiing, two to three times a week in approximately 3.5-hour ski sessions. An age-matched, inactive group (n=20, 67 ± 4 years) served as a control (CTRL). Before and after the training period, knee extensors muscle thickness (T(m)), pennation angle (θ), and fascicle length (L(f)) of the vastus lateralis muscle were measured by ultrasound. Maximum isokinetic knee extensor torque (MIT) at an angular velocity of 60°/s was measured by dynamometry. After the training, T(m) increased by 7.1%, L(f) by 5.4%, and θ by 3.4%. A significant gain matched the increase in T(m) in MIT. No significant changes, except for a decrease in θ, were found in the CTRL group. The gain in T(m) in the training group correlated significantly with an increase in the focal adhesion kinase content, pointing to a primary role of this mechano-sensitive protein in sarcomere remodeling with muscle hypertrophy. The results show that alpine skiing is an effective intervention for combating sarcopenia and weakness in old age (Narici et al., 2011). A study demonstrated that guided alpine skiing two to three times per week over 12 weeks in otherwise sedentary elderly participants induced significant changes in the cardio-pulmonary system but not in pulmonary function. Most importantly, changes in aerobic capacity, oxygen pulse, and maximal minute ventilation, resulting in better performance during exercise, were observed (Niederseer et al., 2021).

Physiological variables were measured in nine older recreational skiers (62.6 +/- 5.1 years) who completed a maximal cycle ergometry test and four different skiing modes via ski instructor-guided skiing at moderate altitude. During testing, the study measured heart rate (HR), oxygen uptake (VO(2)), blood lactate concentration (LA), blood pressure (BP), and ratings of perceived exertion (RPE). The mean values in the laboratory were: HR(max) 167 +/- 7.9 bpm, VO(2peak) of 35.7 +/- 5.1 ml kg(-1) min(-1), LA(max) 8.9 +/- 2.4 mmol l(-1) and BP of 228/91 mmHg. The average values of field compared to laboratory test ranged from 48 to 94% of HR(max), VO(2) of 22-66% of VO(2peak), LA of 0.7-6.0 mmol l(-1), RPE during on-snow was 6-17, while BP remained at submaximal level during field tests. The study found a weak correlation between laboratory and field tests. The results suggest that aerobic metabolism

predominates on flat and low-intensity steep slopes and transitions to anaerobic metabolism on steeper high-intensity runs (Scheiber et al., 2009).

A study tried to assess whether a guided alpine skiing intervention lasting 12 weeks impacts psychosocial dimensions, measured by subjective assessments, of individuals aged 60 and above. Several well-established questionnaires measured wellbeing, life satisfaction, self-concept, health status, depression, and self-efficacy. The physical self-concept in the domain "strength" increased significantly in the intervention group from pre- to post-test and remained stable through the retention test. In contrast, the control group exhibited almost no alteration. A similar effect arose in life satisfaction for the dimension "friends and relatives."

Conversely, the older people's psychosocial aspects were not negatively influenced. This study's findings recommend a guided alpine skiing intervention for individuals 60 years of age and older with high values in psychosocial variables (Finkenzeller et al., 2011a). Another study focused on the psychological and quality of life aspects of resuming alpine skiing practice after total knee arthroplasty (TKA) in elderly skilled skiers. The researchers used two data pools to analyze psychological states: (a) at the beginning, at the end, and eight weeks after a 12-week skiing intervention, and (b) concerning diurnal variations of states. In particular, the effects of skiing on physical activity level, perceived exertion, perceived pain and knee function, and subjective wellbeing were analyzed using a control group design. Results reveal that the skiing intervention substantially increases the amount of physical activity by the intervention group, compared with the control group. Additionally, the analyses of psychological states demonstrated that skiing correlates with enhanced wellbeing and has no significant impact on perceived pain, exertion, or knee function. In sum, alpine skiing can be recommended for older adults with TKA for wellbeing, perceived pain and knee function, and perceived exertion (Würth et al., 2015).

CHAPTER 2: THE EMPIRICAL FRAMEWORK

2.1 Research Objectives and Hypotheses

2.1.1. Research Objectives

The study's objectives were to explore the relations between the variables of the participants' background, characteristics of engaging in alpine skiing, and physical activity frequency, and the variables associated with life quality, such as life satisfaction and health indicators among skiers aged 60 and above.

The study will attempt to confirm the hypothesis that alpine skiing significantly enhances the wellbeing of 60-year-olds and above who persist in skiing annually.

2.1.2. Research Hypotheses

The study's hypotheses were:

1. The personal background affects alpine skiing among people ages 60 and above regarding gender, education, occupation, skiing frequency, and age of starting skiing.
2. Alpine skiing improves 60-plus-old people's wellbeing in the aspects of the individual's self-esteem and functioning.
3. People aged 60 plus who persist in skiing enhance their wellbeing.

This study aimed to examine the relationships between the variables of personal background, characteristics of engagement in skiing, and physical activity frequency and the variables related to life quality: satisfaction with life and health indicators among 60-plus skiers. The Results chapter presents descriptive statistics of the theoretical research variables, distribution ratios of the variables of personal background and engagement in skiing, gender differences across all the research variables, relationships between all the theoretical variables, and differences between parameters of reasons for skiing. In addition, the study explored the combined impact of the variables of personal background and physical activity frequency on the variables describing life quality: satisfaction with life and general health indicators.

2.2. Method

We employed a quantitative research method in the study. This approach fits the subject of the study because it allows the researcher to draw information from a broad group of participants regarding their personal experiences of skiing and life following the ski activity throughout the year.

2.2.1. Research Population

In Israel, the total population above 60 is 1,327,900, according to the 2022 data provided by the Israel CBS (CBS, 2022); eight percent among them are skiers, i.e., n=106,232: 80% are men, and 20% are women. All the participants live in the State of Israel, from the north to the south.

2.2.2. Sample

The estimated sample for a 95% confidence level, 5% margin of error, and 3% (d) was 238 respondents adjusted to 15% loss, and the gender proportion was 190.4 men and 47.6 women. The final sample size (n) was 258 participants: 199 men and 59 women. The researcher used a nonprobabilistic convenience sampling technique.

Two hundred fifty-eight respondents participated in the study. Table 7 presents background variables and distributions of personal background and demographics (in the Results).

The age range was as follows: 117 participants aged 60-64 (45.3%), 95 participants aged 67-69 (38.8%), 37 participants aged 70-74 (14.3%), and nine participants aged 75 plus.

Gender: Participants included 59 women (22.9%) and 199 men (77.1%).

Education: 118 participants (45.7%) had secondary school education, 136 (52.7%) had an academic education, and four participants (1.6%) had another education.

All the participants completed 12 years of schooling, at minimum. 50% are employed, and 50% are pensioners. Their income level is above €3000.

The average frequency of sports engagement is three times a week, an hour each time.

The frequency of engagement in alpine skiing over the past year has been one to three times, three to seven consecutive days each time. Skiing frequency in the past five years has been between one and ten times for three to seven days.

Their routine sports activities include speed-walking, jogging, swimming, or cycling. Skiing is not a regular sports activity among the participants.

2.2.3. Research Instruments

The research tool in this study was a close-ended questionnaire on the study's subject that contained four sections:

1. The demographics section comprised questions regarding the participants' relevant data: age, gender, education, and employment status.

2. General characteristics of practicing physical activity and skiing: engagement in physical activity in the past year, skiing frequency, practice reasons, and whether they had skied before the age of 60.

3. The Life Quality and Health Section is based on the four following questionnaires:

a) The Quality-of-Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q) was developed in 1993 in the US by Endicott et al. (2005). It assesses the degree of enjoyment and satisfaction experienced by respondents in various areas of daily functioning. The Q-LES-Q consists of 93 items, 91 of which can be grouped into eight summary scales that were rationally derived and reflect the organization of the questionnaire. Five of these summary scales are scored for all subjects: physical health (13 items, subjective feelings (14 items), leisure time activities (six items), social relationships (11 items), and general activities (14 items). Also, three are scored for those subjects for whom the activities are applicable: work (13 items), household duties (10 items), and school/coursework (10 items). Each of the 93 questions is scored on a five-point scale that indicates the degree of enjoyment or satisfaction achieved during the past week relative to the particular activity or feeling described in the item. The sample included US outpatients diagnosed with major depressive

disorder, aged 18-63 years. Scores were compared with scores from previously validated measures to confirm concurrent validity. Results also indicated internal consistency as well as test-retest reliability, which is 0.9-0.93. (Endicott et al., 2005). The sample questions from our study:

"Considering everything, during the past week, how satisfied have you been with your ability to get around physically without feeling dizzy, unsteady, or falling? During leisure time activities?"

b) The International Physical Activity Questionnaire (IPAQ) was developed in 1998 by Craig et al. (2003). The researcher sought to find out which kinds of physical activities people do as part of their everyday lives. The questions refer to the time one spent being physically active in the past seven days. The respondent must answer each question even if they do not consider themself an active person. They have to think about the activities they perform at work, as part of their household and yard work, to get from place to place, and in their spare time for recreation, exercise, or sport. The respondents should think about all the vigorous and moderate activities they performed in the past seven days. Vigorous physical activities refer to activities that require a more demanding physical effort and result in much heavier than normal breathing. Moderate activities refer to activities requiring moderate physical effort and causing somewhat heavier breathing than usual.

   This scale is a self-report comprised of four questionnaires. Long (five activity domains asked independently) and short (four generic items) versions for telephone or self-administered methods are available.

c) The questionnaires provide standard instruments that serve to obtain internationally comparable data on health-related physical activity. Test-retest reliability ranged between 0.96 and 0.46, with an average of about 0.8.

   Sample questions:

"On the days when you do moderate activity for at least 10 minutes, how long do you do those activities?"

"How many days per week do you do these vigorous activities for at least 10 minutes at a time?"

d) Health Survey, Quality of Life Questionnaire (SF-36). The original SF-36 stemmed from the Medical Outcome Study (MOS) conducted by the RAND Corporation. Since then, a group of researchers from the original study released a commercial version of SF-36, while the original SF-36 is available license-free in the public domain from RAND. The SF-36 consists of eight scaled scores - the weighted sums of the questions in their section. Each scale is directly transformed into a "0-100" scale, assuming each question carries equal weight. The lower the score, the more disability. The higher the score, the less disability, i.e., a score of zero is equivalent to a maximum disability, and a score of 100 is equivalent to no disability.

The eight parameters are: vitality, physical functioning, bodily pain, general health perceptions, physical role functioning, emotional functioning, social functioning, mental health or emotional wellbeing.

Instructions for converting the individual scores into z-scores and providing standardized combined scores (mean 50, standard deviation 10) for several populations are on the *Australian Longitudinal Study of Women's Health* website of the Australian Longitudinal Study of Women's Health. SAS code is provided as well (Ware & Sherbourne, 1992).

Sample questions:

"Did you feel full of life?"

"Have you felt downhearted and depressed?"

"During the past four weeks, how often have your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, and others)?"

e) Self-esteem. The Rosenberg Questionnaire was developed by Rosenberg (1965) and revised by Hobfoll and Wallfisch in 1984.

The questionnaire evaluates the individual's general self-esteem by self-acceptance/lack of self-acceptance. It is a self-report questionnaire that contains ten statements assessing the individual's level of self-esteem. The respondents mark their agreement with the statements on a scale from one ("strongly agree") to five ("strongly disagree"). The average of the questionnaire statements computes the total score of self-esteem. A high score indicates high self-esteem. Scoring: Items Two, Five, Six, Eight, and Nine are reverse scored. Give "Strongly Disagree" one point, "Disagree" two points, "Agree" three points, and "Strongly Agree" four points—sum scores for all ten items. Keep scores on a continuous scale. Higher scores indicate high self-esteem. *Cronbach's alpha* reliability level is 0.83 (Rosenberg, 1965).

Sample questions: *"Sometimes, I think I am not good at anything*."

"I feel I am equally valuable as others."

Table 6. Internal Consistency Data Obtained in This Doctoral Thesis

	Internal Consistency
Life quality	0.84
Physical activity	0.88
General health	0.84
Physical functioning	0.88
Task performance - physical	0.84
Task performance - emotional	0.73
Vitality	0.59
Wellbeing	0.85
Social functioning	0.83
Coping with pain	0.72
Current health	0.84
Self-esteem	0.84

2.2.4. Procedure

The questionnaire was uploaded to Google Forms.

The researcher located skiers for participation in the study via contacts with ski instructors at the Mount Hermon Ski Resort in Israel and during ski trips abroad through the researcher's work as a ski instructor.

The questionnaire was administered to skiers ages 60 and over in Israel. The researcher contacted the respondents via their email addresses provided to the researcher by skiers. In these communications, the researcher described the study's objective and explained how to access and fill out the questionnaire after obtaining the participants' consent.

The estimated time needed to complete the questionnaire was 25 minutes. The researchers collected the survey questionnaires between February through October 2022.

2.2.5. Data Processing and Analysis

Following the extraction of data from the forms survey program and the questionnaire coding, we performed a statistical analysis using SPSS statistics software (Version 27) that included reverse scoring items and discarding items with a weak correlation until optimal reliability of Cronbach Alpha coefficients for all the questionnaire scales were obtained, and theoretical variables and their subscales were constructed according to the index of the questionnaires (see Research Tools section).

Before conducting data analysis, we checked descriptive statistics and ran the *Shapiro-Wilk* test that determined that all the theoretical variables included in the study were non-normally distributed ($p<.05$); thus, all the analyses presented in the results chapter are of a non-parametric type.

Initially (see the chapter Results), we conducted the *Chi-square* tests of independence, checking the distribution differences between the values of the categorical variables of demographics and skiing characteristics. In the second stage, we examined descriptive statistics.

Also, we ran the *Mann-Whitney U* test for independent samples to examine the gender differences for all the questionnaire statements regarding reasons for skiing.

In addition, we tested the *Spearman* correlations between the items in this questionnaire and the central statistical research variables. After running an additional *Chi-test* of independence checking the distribution of levels of perceived *self-esteem*, we tested the theoretical variables in the study using descriptive statistics, the Spearman test assessing the relationships between them, and gender analysis (with the help of the *Mann-Whitney U* test). Subsequently, the *Kruskal–Wallis* tests for two factors were conducted, examining the shared effects of *gender*, *age strata*, and *self-esteem* levels (each analysis included a pair of independent variables) on *general health* and *satisfaction with life*. To assess the quality of interactions, we performed Simple Effects analysis using *Kruskal–Wallis* and *Mann–Whitney* tests. Finally, two multiple linear regression analyses were conducted (Method Enter) that helped examine the contribution of *personal background* characteristics and *physical activity* variables in predicting *satisfaction with life* and *general health*.

2.2.6. Ethics

The researchers had had no prior acquaintance with the participants. They explained the study's objectives and conditions to the participants, provided information on questionnaires, and the estimated time frame of the study. Also, the researcher provided information regarding their academic affiliation and the corresponding researcher's contact email address for any clarification before the study's commencement. The researcher made clear that the participants had the right to withdraw from the study and refrain from completing the survey despite their prior consent to participation.

The researcher committed to participants' complete confidentiality, pledged that all the collected data would remain anonymous, and did not collect any data allowing for participant identification.

In addition, we conducted the study according to universal ethical regulations and principles: respect for persons, beneficence, and justice.

CHAPTER 3: RESULTS

Table 7 below summarizes the distributions of *demographic* and *personal background* variables and the value of *the chi-square goodness of fit* test that examined the significance of these ratio distributions. We observed differences in the ratio distributions of the respondents' *age* [$\chi 2(3)=116.64$, $p<.001$], while the most common age range - almost half of the participants – was 60-64, followed by 65-69 – above a third of the sample. Men comprised almost 80% of the sample [$\chi 2(1)=75.79$, $p<.001$]. The distribution ratio between the *university* and *high school education* in the participants was comparable [$\chi 2(2)=119.16$, $p<.001$], and one-half of respondents reported being *married* or in a *civil partnership*.

In contrast, *divorced/separated* respondents constituted about a quarter of the sample [$\chi 2(3)=136.08$, $p<.001$].

In addition, a difference in the distribution rate emerged regarding *employment status* [$\chi 2(3)=70.58$, $p<.001$]; the majority reported being self-employed, and a third were salaried employees. Also, the distribution ratio was different in the levels of perceived *self-esteem* [$\chi 2(2)=279.92$, $p<.001$], so above 80% reported high-level self-esteem, and fewer than five percent – low self-esteem. Finally, almost all the respondents stated that the *frequency of* their *skiing* was one-three times a year [$\chi 2(1)=230.76$, $p<.001$]; nearly all of them engaged in *physical activity* in the past year [$\chi 2(1)=238.39$, $p<.001$], and skied at least once before 60 [$\chi 2(1)=226.99$, $p<.001$].

Table 7. Distribution of the Demographics and Skiing variables

	n	**%**	χ^2 **(df)**	***p***
Age range				
60-64	117	45.3		
65-69	95	36.8	$\chi^2_{(3)}=116.64$	<.001
70-74	37	14.3		
75 +	9	3.5		
Gender				
Women	59	22.9	$\chi^2_{(1)}=75.97$	<.001
Men	199	77.1		

Education				
High school	118	45.7		
University	136	52.7	$\chi^2_{(2)}$ =119.16	<.001
Other	4	1.6		
Marital status				
Single	18	7.0		
Married/civil Partnership	141	54.7	$\chi^2_{(3)}$ =136.08	<.001
Divorced or separated	62	24.0		
Widowed	37	14.3		
Employment status*				
Part-time	16	6.2		
Full-time	75	29.1		
Employee	86	33.3	$\chi^2_{(4)}$ =70.58	<.001
Self-employed	106	41.1		
Retired	53	20.5		
Skiing frequency				
1-3 times a year	250	96.9	$\chi^2_{(1)}$ =230.76	<.001
4-5 times a year	8	3.1		
Self-esteem				
Low	12	4.7		
Moderate	34	13.2	$\chi^2_{(2)}$ =279.72	<.001
High	212	82.2		
Engaged in physical activity in the past year	251	97.3	$\chi^2_{(1)}$ =238.39	<.001
Engaged in skiing before 60	253	98.1	$\chi^2_{(1)}$ =226.99	<.001

Note.* Distribution of the variable *employment status* is above 100% in sum because the participants could mark several answers in response.

Table 8 summarizes the questionnaire's statements on reasons for engaging in skiing. It is evident that per skiers, the most significant reason was *for pleasur*e (*M*=8.40), followed by *spending time with friends/others* (*M*=8.24) and *staying fit* (*M*=7.24). On the other hand, the three lowest-rated reasons were, respectively, *part of a sports career* (*M*=1.30), *competition* (*M*=2.25), and *"to unplug oneself"* (*M*=3.23).

To examine gender differences in the significance of reasons for skiing, the researcher conducted *the Mann-Whitney U* test. Table 8 presents the test results and indicates that a higher rate of men reported skiing *for pleasure* than women (*Z*=3.11, *p*=.002). In addition, gender

differences were found (marginal significance) regarding the reasons: *staying fit* (Z=1.86, p=.06), and *health* (Z=1.88, p=.06), i.e., men were more inclined to engage in skiing *to stay fit* and *health reasons* than women. Moreover, men exhibited a higher tendency to report skiing for *competition* (Z=2.02, p=.04).

Table 8. The Average, Standard Deviation, and T-test Values of the Questionnaire Statements on the Reasons for Skiing in the Entire Sample and by Gender (n=258).

	Sample (n=258)		**Women** (n=59)		**Men** (n=199)			
Reasons for skiing	*M*	*SD*	*M*	*SD*	*M*	*SD*	*Z*	*p*
Pleasure	8.40	1.39	7.76	2.10	8.59	1.03	3.114	.002
To spend time with friends/others	8.24	1.48	8.14	1.75	8.27	1.39	0.210	.833
To stay fit	7.24	1.97	6.73	2.34	7.40	1.83	1.864	.062
Health reasons	7.03	2.11	6.59	2.25	7.16	2.05	1.878	.060
To unplug oneself	3.23	2.89	3.58	2.98	3.13	2.85	0.948	.343
Competition	2.25	1.89	1.81	1.63	2.38	1.95	2.019	.044
To improve physical appearance	6.98	2.59	6.69	2.72	7.06	2.55	1.137	.256
As part of a sports career	1.30	1.24	1.51	1.64	1.24	1.09	1.238	.216
Other	2.20	2.67	2.36	2.75	2.16	2.66	0.552	.581

To examine the relationships between the questionnaire statements on *reasons for skiing* and *age* and other central variables, we conducted *the Spearman's correlation coefficient*. Table 9 below represents correlation values. In this segment, distinct correlations with a high indication of a relationship (relationships with at least moderate strength - $rs \geq .3$) emerged.

Vigorous physical activity had a distinct positive correlation with three metrics for reasons for skiing: *staying fit* (*rs*=.30, *p*<.001), *competition* (*rs*=.33, *p*<.001), and *improving physical appearance* (*rs*=.33, *p*<.001): the more frequent physical activity, the higher tendency to ski for reasons of staying fit, competition, and physical appearance improvement.

The respondents' *age* had a distinct negative correlation with skiing *to improve physical appearance* (*rs*=-.32, *p*<.001): the older the respondents, the lower the tendency toward skiing to improve one's physical appearance. Furthermore, we found a distinct positive correlation between the health metric – engaging in *tasks requiring physical activity* – and skiing for *physical appearance improvement* (*rs*=.34, *p*<.001). Skiers reported a high capacity to perform daily physical tasks and a lesser tendency to ski to improve their physical appearance.

Table 9. The Spearman's correlation coefficient between statements on reasons for skiing and physical activity metrics, general health, life quality, and perceived self-esteem (n=258)

		Physical activity				General health									
Reasons for skiing	**Age**	Physical activity (total)	Vigorous	Moderate	Walking	Physical funtioning	Physical tasks	Emotional tasks	Vitality	Wellbeing	Social funtioning	Coping with pain	Current health	Life quality	Self - steem
Pleasure	-.005	-.007	.036	-.103	.036	.231***	.056	-.009	.211**	-.184**	-.115	.055	-.238***	-.041	-.130*
To spend time with friends/others	.037	.073	.045	.031	.056	.196**	-.039	.016	.125*	-.076	-.063	.054	-.171**	.057	-.069
To stay fit	-.076	.206**	.302***	-.054	.015	.267***	.186**	.038	.284***	-.119	-.058	.095	.027	.164**	-.066
Health reasons	.217***	.124*	.070	.074	.084	.078	-.069	-.073	.080	-.079	-.069	-.008	-.171**	-.046	-.102
To unplug oneself	-.075	-.036	-.026	.034	-.077	-.013	.008	-.120	-.274***	-.032	-.110	-.108	.043	.023	-.043
Competition	-.269***	.142*	.327***	-.127*	-.095	.058	.130*	.018	.128*	.002	.070	.060	.262***	.249**	.097
To improve physical appearance	-.319***	.262***	.327***	-.049	.097	.265***	.344***	-.012	.226***	-.209**	-.104	.194**	.060	.113	-.128*
As part of a sports career	.010	-.132*	-.057	.006	-.215***	-.132*	-.064	-.091	-.089	.084	.032	-.104	.114	.149*	.030

Note. *p<05; **p<.01; ***p<.001.

Table 10 below summarizes the median central variables and subscales they contain. The table shows that of all the three physical activity forms, *vigorous activity* (*M*=3028.1) is the most frequent, followed by *walking* (*M*=2746.5), and, finally, *moderate activity* (*M*=2389.1). In the health metrics, the skiers reported the highest *health* level in *physical functioning* (*M*=90.10) and *social functioning* (*M*=84.16). Conversely, the lowest *health* level was in the *current health* situation (*M*=70.21) and vitality (*M*=72.34).

It is also worth mentioning that the three variables: *life quality and satisfaction* (*M*=77.34), and *perceived self-esteem* (*M*=33.53) demonstrated significantly higher average values than the median point on the grading scale.

To examine the *gender* differences in the central research variables, we conducted the *Mann-Whitney U* tests. The results presented in Table 10 show that generally, men reported a higher *frequency* engagement in *physical activity* (*Z*=1.95, *p*=.05), whereas women indicated higher levels in *general health* (*Z*=2.15, *p*=.03), and in four out of the eight health metrics: *wellbeing* (*Z*=4.58, *p*<.001), *social functioning* (*Z*=1.86, *p*=.06), *coping with pain* (*Z*=2.61, *p*=.009), and *current health status* (*Z*=3.61, *p*<.001). In addition, the test found gender differences in the metrics of *satisfaction with life* (*Z*=2.76, *p*=.006); thus, women reported a higher quality of life and satisfaction from life than men and had higher self-esteem compared to men (*Z*=1.97, *p*=.05).

Table 10. The average, Standard Deviations, and T-test values of the Research variables in the entire sample and by Gender (n=258)

			Women n=59		**Men** n=199			
Research variables	*M*	*SD*	*M*	*SD*	*M*	*SD*	*Z*	*p*
Physical activity (total)	8163.7	3069.8	7829.4	3688.7	8262.8	2864.1	1.947	.052
Vigorous	3028.1	2288.5	2619.7	2106.1	3149.1	2331.1	1.724	.085
moderate	2389.1	1468.8	2619.0	1654.1	2321.0	1406.5	1.112	.266

Walking	2746.5	1322.8	2590.8	1358.8	2792.7	1311.9	1.315	.189
General health	80.44	13.41	83.89	10.99	79.42	13.91	2.152	.031
Physical functioning	90.10	14.0	88.81	16.25	90.53	13.34	0.731	.465
Task performance - physical	83.43	30.47	85.59	29.44	82.79	30.81	0.451	.652
Task performance - emotional	82.56	30.73	89.83	19.82	80.40	33.01	1.469	.142
Vitality	72.34	11.19	72.03	9.24	72.44	11.73	0.693	.488
Wellbeing	78.42	12.68	84.47	9.66	76.62	12.93	4.583	<.001
Social functioning	84.16	18.09	88.35	15.02	82.91	18.77	1.859	.063
Coping with pain	82.28	14.27	85.85	15.03	81.22	13.90	2.613	.009
Current health	70.21	15.68	76.19	13.08	68.44	15.97	3.609	<.001
Life quality	77.34	12.38	80.80	11.68	76.31	12.43	2.756	.006
Self-esteem	33.53	4.02	34.53	3.46	33.24	4.14	1.975	.048

To explore all relationships between the central research variables, the researcher calculated *the Spearman's correlation coefficients.* Table 11 presents the strength and significance of the relationships and shows that the variable of *life quality and satisfaction* has distinct moderate correlations with *general health* (*rs*=.51, *p*<.001) and the entire subscale: *physical functioning* (*rs*=.37, *p*<.001), *performing physical tasks* (*rs*=.45, *p*<.001), *performing emotional tasks* (*rs*=.48, *p*<.001), *vitality* (*rs*=.45, *p*<.001), *wellbeing* (*s*=.48, *p*<.001), *social functioning* (*rs*=.52, *p*<.001), *coping with pain* (*rs*=.36, *p*<.001) and the *current health* subscale (*rs*=.65, *p*<.001).

The positive correlations indicate the pattern of high-level life quality and satisfaction manifestation of the abovementioned distinct health components. Similarly, the variable of *perceived self-esteem* had a distinct moderate positive correlation with the full scale of the *health* variable (*rs*=.59, *p*<.001) and its subscales: *physical functioning* (*rs*=.29, *p*<.001), performing *tasks requiring physical effort* (*rs*=.37, *p*<.001), performing e*motional tasks* (*rs*=.57, *p*<.001), *vitality* (*rs*=.53, *p*<.001), *wellbeing* (*rs*=.67, *p*<.001), *social functioning*

(*rs*=.68, *p*<.001), *coping with pain* (*rs*=.39, *p*<.001), and with the *current health* subscale (*rs*=.68, *p*<.001). Hence, high levels of *perceived self-esteem* will manifest in increased *health* metrics mentioned above.

Furthermore, Table 11 demonstrates a distinct moderate negative correlation between skiers' *age* and the health metric *of tasks requiring physical effort* (*s*=-.34, *p*<.001). Also, skiers' *age* had a low negative correlation to the health metrics: *vitality* (*rs*=-.22, *p*<.001), *coping with pain* (*rs*=-.26, *p*<.001), and the *current health* subscale (*rs*=-.26, *p*<.001). Consequently, the older the skiers, the lower their reported health in the aspects mentioned above will be. Other correlations between *age* and the general scale of *health* and its metrics (*physical functioning, performing emotional tasks, wellbeing,* and *social functioning*) were indistinct or insignificant (*rs*<.20).

Table 11 demonstrates a significant moderate positive correlation *between life quality and satisfaction* and *perceived self-esteem* (*rs*=.50, *p*<.001); reported high-level life quality and satisfaction will manifest in high self-esteem. *Life quality* had a weak negative correlation with the skiers' *age* (*rs*=-.21, *p*<.01), whereas *perceived self-esteem* did not have a distinct correlation with *age* (*p*>.05).

The variable of *general physical activity frequency* had distinct moderate correlations with the general *health* scale and its three metrics: physical functioning (*rs*=.38, *p*<.001), *performing tasks requiring physical effort* (*rs*=.29, *p*<.001), and *current health* (*rs*=.31, *p*<.001). In addition, distinct weak positive correlations emerged between the variable of *general physical activity* and health metrics: *vitality* (*rs*=.28, *p*<.001), *social functioning* (*rs*=.24, *p*<.001), and *coping with pain* (*rs*=.22, *p*<.001). In general, high-frequency physical activity will manifest in reported high levels of health metrics. We should also mention the negligible correlations between *general physical activity* and health metrics of *performing emotional tasks* and *wellbeing*. The study found distinct moderate correlations between the *vigorous physical activity* subscale and the *general health* scale (*rs*=.39, *p*<.001), and the health

metric of *performing tasks requiring physical effort* (*rs*=.31, *p*<.001), vitality (*rs*=.35, *p*<.001), and current health (*rs*=.39, *p*<.001). Furthermore, we found distinct weak positive correlations between the variable of *vigorous physical activity* and *health* metrics: *physical functioning* (*rs*=.27, *p*<.001) and *social functioning* (*rs*=.24, *p*<.001). A high frequency of vigorous physical activity manifests in reported high levels of the health metrics mentioned above. The remaining health metrics (*performing emotional tasks, wellbeing,* and *coping with pain*) had negligible or indistinct correlations with vigorous physical activity.

Table 11 indicates that the *frequency of moderate physical activity* and *walking* had indistinct (or negligible) with all health variables, except for a distinct weak positive correlation between the activity of *walking* and *physical functioning*.

The variable of skiers' *age* had distinct weak and moderate negative correlations with the variable of *general physical activity frequency* (*rs*=-.19, *p*<.01) and v*igorous activity frequency* (*rs*=-.33, *p*<.001), respectively. The older the respondents, the lower their reported frequency of engaging in general physical activity and even less - vigorous activity. In addition, the variable of *frequency of general physical activity* had distinct weak positive correlations with *perceived self-esteem* (*rs*=.26, *p*<.001) and *quality of life* (*rs*=.26, *p*<.001). Thus, the high frequency of general physical activity manifested in high perceived self-esteem and quality of life. Moreover, *vigorous physical act*ivity had a moderate positive correlation with *life quality and satisfaction* (*rs*=.32, *p*<.001); hence, a high frequency of vigorous activity will translate into high life quality and satisfaction levels. The remaining correlations between *physical activity* metrics and *perceived self-esteem* and *life quality* were negligible or indistinct.

Table 11. Spearman Correlation Coefficient between all the research variables (n=258)

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
1. Physical activity (total)	---	.693***	.546***	.515***	.393***	.381***	.295***	.179**	.282***	.164**	.237***	.216***	.312***	.262***	.214**	.256***	-.190**
2. Vigorous		---	-.060	-.055	.392***	.272***	.309***	.147*	.352***	.094	.240***	.182**	.394***	.317***	.253***	.179**	-.333***
3. Moderate			---	.261***	.072	.135*	.052	.082	-.072	.172**	.081	.085	.072	.175**	-.025	.178***	.122
4. Walking				---	.085	.265***	.093	.071	.125*	.026	.044	.091	-.037	-.136*	.088	.087	.001
5. General health					---	.681***	.761***	.823***	.602***	.698***	.681***	.580***	.524***	.515***	.034	.598***	-.153
6. Physical functioning						---	.473***	.333***	.389***	.194**	.299***	.373***	.340***	.370***	.294***	.291***	-.184**
7. Physical tasks							---	.421***	.461***	.253***	.373***	.449***	.464***	.452***	.168***	.369***	-.341***
8. Emotional tasks								---	.544***	.645***	.708***	.391***	.459***	.481***	-.014	.575***	-.079
10. Wellbeing									---	.517***	.557***	.522***	.488***	.446***	.265***	.535***	-.225***
11. Social functioning										---	.737***	.319***	.513***	.480***	-.194***	.670***	.066
12. Coping with pain											---	.336***	.558***	.519***	-.116	.681***	-.080
13. Current health												---	.433***	.357***	.123*	.390***	-.264***
14. Life quality													---	.654***	-.109	.679***	-.256***
15. Reasons for skiing														---	.081	.502***	-.214**
16. Self-esteem															---	-.142*	-.088
17. Age																---	-.059

Note. *p<05; **p<.01; ***p<.001.

To examine the relative contributions of *demographics* and *physical activity* metrics to predicting *life quality* and *satisfaction*, the researcher used *multiple linear regression* that was distinct [$F(6,247)=11.42$, $p<.001$], and the predictors explained 22% of the total variance in the response variable (Table 12). The *physical activity* metrics showed the highest contribution in predicting *life quality and satisfaction* (from the highest to low): *vigorous activity* ($\beta=.29$, $p<.001$), *moderate activity* ($\beta=.24$, $p<.001$), and *walking* ($\beta=-.16$, $p<.001$); vigorous and moderate physical activity predict high life quality and satisfaction, whereas the activity of walking predicts low-level life quality and satisfaction. The study demonstrated that also *gender* is a distinct predictor of *life quality and satisfaction* ($\beta=-.14$, $p=.02$); thus, women reported higher life quality and satisfaction levels than men. Also, skiers' *age* showed a distinct contribution ($\beta=-.12$, $p=.04$): older age predicted lower life quality and satisfaction levels. The *education* predictor did not contribute distinctively beyond the abovementioned predictors ($p>.05$).

Table 12. Regression Model for Prediction of Life Quality and Satisfaction with Life by Physical Activity Frequency and Demographics (n=258).

	B	*SE* β	β	*p*
Gender				
Women	-4.101	1.684	-.140	.016
Men				
Age	-1.890	0.923	-.125	.042
Education	2.037	1.409	.082	.150
High-school				
University				
Vigorous activity	0.002	0.000	.292	<.001
Moderate activity	0.002	0.000	.242	<.001
Walking	-0.002	0.001	-.162	<.001
R^2		.22		
F		11.422		<.001

To explore the contribution of *demographics* and *physical activity* metrics, we employed *multiple linear regression* and found it distinct [$F(6,247)=9.21$, $p<.001$], and the predictors

successfully explained 18% of the variance in *general health* (Table 13). In addition, the metric of *physical activity frequency* indicated a distinct contribution (β =.32, *p*<.001), as did the *frequency of walking* (β =.11, *p*=.06): a *high frequency of vigorous activity* and *walking* predicted high *health* levels. Also, *gender* distinctly contributed to predicting *general health* (β =-.16, *p*=.02); thus, women reported higher general health levels compared to men, while skiers' older age predicted lower general health levels (β =-.12, *p*=.06). The moderate *physical activity* and *education* predictors did not demonstrate additional distinct contribution to the abovementioned response variables (*p*>.05).

Table 13. Regression Model of Predicting General Health and Satisfaction by Physical Activity and Demographics (n=258).

	B	*SE* β	β	*p*
Gender				
Women	-4.936	1.852	-.157	.008
Men				
Age	-1.935	1.015	-.119	.058
Education	1.781	1.550	.067	.252
High-school				
University				
Vigorous activity	0.002	0.000	.319	<.001
Moderate activity	0.001	0.001	.085	.160
Walking	0.001	0.001	.115	.056
R^2		.18		
F		9.215		<.001

CHAPTER 4: DISCUSSION AND CONCLUSIONS

It is the first innovative study among people aged 60 and above who regularly practice alpine skiing in Israel. Skiing is not a common sport in this country because the winter in Israel is short, with one site with snow suitable for skiing for one to two months per year. Skiers are forced to fly to European countries or North America. Thus, skiing has become a costly and prestigious sports branch affordable to the country's upper class. Hence, this study examined the contribution of skiing to people aged 60 and above and sought to characterize the skiers and find ways to expand the number of skiers in this age group in Israel. Indeed, the study's findings indicated that skiing benefits wellbeing at the level of self-esteem and functioning among older people, although its effect diminishes with age. The study concluded that it was necessary to encourage people aged 60 and above to engage in skiing and turn this sport into popular, accessible, and affordable - like any other sport, such as swimming, walking, and cycling, to enable masses of older people to practice and enjoy it.

The present study explored the relationship between practicing alpine skiing and wellbeing among people aged 60 and above. The study's objectives were to examine the relationships between variables of the participants' background, characteristics of engagement in skiing, physical activity frequency, and the variables linked to life quality, such as satisfaction with life and health metrics among skiers aged 60 and above.

4.1. The Study's Hypotheses:

a) Personal background – that is, indicators of gender, education, occupation, frequency of engagement in alpine skiing, and the age of starting to ski - affects engagement in skiing among adults aged 60 and above.

b) Skiing improves wellbeing of people aged 60 and above regarding self-esteem and functioning levels.

c) People aged 60 and above who persist in regular skiing enhance their wellbeing.

The first component was the link between alpine skiing and the older participant's *background*.

The results demonstrated that most skiers were men – half were 60-63, and one-third were 65-69. Regarding gender, 80% of participants were male, and 20% were female. Regarding engagement in alpine skiing and its frequency, most skied one to three times annually. Moreover, most participants had skied before 60 and did some form of physical activity throughout the year. However, the skier's education level and marital status bore no significance. In terms of occupation, most ran independent businesses.

4.2. Engaging in Physical Activity and Skiing

We found that of all three forms of physical activity popular among skiers aged 60 and above, vigorous activity is the most common, followed by walking and moderate-strength activity. The reasons for engagement in skiing cited were staying fit, competitiveness, and improvement of physical appearance. The more frequent physical activity engagement correlated with a higher tendency to adopt skiing for maintaining fitness, competitiveness, and improving physical appearance.

The study's findings showed that the reasons for engagement in alpine skiing were on the following ranking scale: (a). pleasure, (b). spending time with peers, and (c). staying physically fit. The lowest ranking reasons included: (c) part of developing a sports career, (b). competitiveness, (a) to disconnect from the life flow.

Magal (2017) states that every adult must engage in moderate and high-intensity muscle-strengthening activity at least two days a week. Carlson et al. (2010) found that physical activity intensifies with age. That is, the number of people doing physical activity rises with age. The link between recommended physical activity and age may refer to the time spent walking, as older adults are more disposed to walking than younger people. Almost 60% of older adults in Europe are regarded as sufficiently active.

Given that over 40% of older people do not do enough physical activity to reach the recommended levels, the physical activity levels among European older adults will merit improvement. It is critical to focus specific demographic groups on education and intervention toward physical activity to elevate their physical activity levels, i.e., health literacy improvement, as education impacts decisions based on knowledge about health. According to the WHO recommendations (2020), adults after retirement can engage in physical activity as part of recreation and leisure (games, sports, or planned physical activity), transportation (wheels, walking, and cycling), work, or household chores - in the context of daily occupation, education, home maintenance, or community.

Physical activity offers the older population advantages in reducing mortality and morbidity caused by cardiovascular diseases, hypertension, cerebrovascular accidents, cancer, and Type 2 diabetes, and improving mental health (alleviating symptoms of anxiety and depression), cognitive health, and sleep – even fat indices might improve. Furthermore, physical activity helps prevent falls, injuries associated with falling, and decline in bone health and functioning ability. According to WHO (2006), daily walking, cycling, swimming, and long weekend walks are prevalent activities for adults following retirement. Also, simple home maintenance and gardening

provide various opportunities to be physically active: climbing stairs, doing manual chores, and others.

McNaughton et al.'s study (2012) sought to identify how intrapersonal, social, and environmental factors impact physical activity in adults above 55 living in urban and rural areas. The researchers found that lack of physical activity and deficient nutrition led to obesity, constituting significant factors in the aging population's quality of life. Similarly, Kim et al. (2017) found a positive correlation between high psychological wellbeing and higher physical activity levels over time. Also, in a recent study (Yangutova et al., 2023), researchers from Russia and China investigated the character of skiing among older people in the Baikal Lake area in Russia – a tremendously attractive site for ski tourism. They found that the skiers' chief interest in the area stems from competitiveness in skiing. Thus, the *Sobolinaya* Mountain ski resort offers excellent competitiveness among the researched ski resorts, with *Bychya* and *Eastland* having average competitiveness and *Davan* and *Mamai* having low competitiveness. As stated, skiers travel to the area chiefly to compete.

However, neither the WHO recommendations nor studies on the character of physical activity mention alpine skiing as part of physical activity among adults aged 60 and above. The probable reasons may be the required special ski gear, traveling to suitable sites often found far from the residence, and the physical fitness the sport requires; skiing on snow-covered slopes is dangerous at any age, especially for older people. Whether the skier is 25 or 75, there is a risk of falling, but falls and subsequent injury in older age may make it more challenging to bounce back to health. Hence, adults aged 65 and above tend to engage in other spheres of physical activity, while those who engage in alpine skiing arrive with years of experience before doing it.

Studies indicate that vigorous physical activity relates to the reasons for skiing: staying fit, competitiveness, and preserving physical appearance. Thus, the more frequent the physical activity, the higher the tendency to ski to stay fit, compete, and improve physical appearance. Skiing develops a high ability to perform daily physical chores. Skiers with a lesser tendency toward skiing do so to improve their physical appearance. The study's results showed that the respondents' age correlated negatively with skiing to improve physical appearance: the older the participants were, the lower the tendency to ski for better physical appearance.

Cash's (2017) study found that one of the most alarming signs that prompt thoughts about losing an active lifestyle, the emergence of neurodegenerative physical diseases, and sometimes death, is a decline in physical appearance. Most people fear old age, which arrives toward the age of 50 and constitutes a significant point of age. McGuinness and Taylor (2016) explain that the "maturity crisis" is the way time affects physical appearance and results in people's feelings of sadness and disappointment. Keyes and Westerhof (2012) further expand and state that in most modern societies, the social status of older people is low, and some face financial deprivation. Many older adults depend on state welfare support and retirement pensions to maintain essential living conditions. Thus, a person who feels they are getting old undergoes the process of self-identification, which includes an increasing acceptance of new traits and limitations. At times, these changes and adjustments come with symptoms of depression or anxiety.

Nonetheless, Walker (2022) says that 18% of all skiers (about one in five) are over 55, which means that skiing is more common in older adults than people think. Many people, after their retirement, want to travel and visit new places, such as ski resorts, to enjoy their time after retirement. Skiing is a pleasant, low-impact exercise for the body and does not put much pressure on the knees. Many people ski in their 70s as it is an excellent way to relax. Many senior skiers

suggest learning skiing activities, for skiing is always learnable. However, at 70, skiing can be dangerous. Older adults experience age-related changes, including decreased flexibility, issues with balance, reduced power, and loss of muscle mass. These changes can lead to an injury while skiing and, more importantly, make it difficult to heal. Some risks include getting out of the bathtub or sliding down a mountain. The old adult cannot eliminate these risks but can work on them to minimize them.

He should follow proper techniques and use suitable equipment to reduce the risk of falling or getting injured during skiing. People who follow the proper methods to ski in their old age can safely ski without worrying about engaging in an accident.

Regarding gender, higher rates of men reported skiing for pleasure than women. Also, men's reasons for skiing are to maintain fitness and health. Men were more likely to ski to stay fit and healthy than women. Moreover, men exhibited a higher tendency to report skiing for competition.

Sjögren and Stjernberg (2010) found in research in Sweden that the reason to be active outside among seniors is to be independent physically and healthy enough to manage one's hygiene, and having access to areas for country walks were the most critical factors associated with the probability of doing outdoor recreational physical activity, for both men and women. Although the level of performance is almost equal for both sexes, as two-thirds of both had performed outdoor recreational physical activity during the preceding year, more factors, i.e., living alone, struggling to cover unexpected costs, fear of violence, and fear of falling, were associated with the possibilities of engaging in outdoor recreational physical activities among women. Also, increasing age seems to affect activities negatively in women more than men. They conclude that men and women seem to have different opportunities and needs concerning

performing physical activity. These considerations do not seem to be sufficiently taken into account today, and improvements could be made concerning, e.g., health-promoting activities suggested to older people by healthcare personnel and spatial planning within society. Promoting outdoor recreational physical activity that has restorative effects on well-being needs to focus on attractive and affordable activities for most men and women. The research checked activities like jogging, long and high-intensity walking, heavy gardening, long bicycle tours, intense gymnastics, long-distance skating, skiing, swimming, and ball games. Another study by Lytle et al. (2018) found that older women suffer much more from poor health and well-being; they have higher levels of internalized ageism (more endorsement of negative aging stereotypes and less endorsement of positive aging stereotypes) and more aging anxiety than men, consistent with a small body of existing research. Stereotypes of aging and stereotypes about women compound, demonstrating that ageism appears to have a more substantial impact on women than men and change their attitude towards physical activity.

On the same issue, Glazner (2017) asserts that skiing is a physically demanding and dangerous sport. Hence, any skier - particularly an older skier - should avoid unnecessary risks on the ski site and familiarize themself with the difficulty rates of pistes and their signage on the site map: blue pistes are easy and designated for beginners; red is for more experienced skiers and black pistes present a high-level difficulty, designated for advanced skiers.

Nevertheless, many publications state the advantages of skiing in older age. Skiing is a fantastic way to stay active and enjoy the great outdoors. An experienced skier or beginner has many ways to make the most of their time on the slopes (SnowVision, 2023).

In conclusion, the results are comparable with other studies. As the subject matter is based on the skiers' background, the differences indicated in the professional literature stem from the fact

that other studies were conducted mainly among skiers in European countries and the USA - countries different from Israel in culture, geography, and the perception of the quality of life. Israel is profoundly invested in its national security, economy, and health and has a single minor ski site. Hence, Israelis must travel to other countries to ski at high costs. Also, skiing is less prevalent in Israel than in countries with snowy winters, ski resorts open most of the year, or short-trip accessible ski resorts in other countries. The above-stated factors impact the Israeli skiers' background and perception of skiing. Moreover, this is a ground-breaking study on alpine skiing among 65 and above Israeli adults. The obvious conclusions are that alpine skiing is affected by the respondents' background in gender, physical activity frequency, financial ability (independent), free time, the need for special alpine skiing gear, and health status.

Future follow-up studies should explore additional personal aspects among alpine skiers in Israel, such as the levels of disposable income and financial investment in alpine skiing, the reasons for the decreased practice of alpine skiing, the options available to alpine skiers during the year and their utilization for ski practice, the perception of skiing within the general of physical activity continuum, and the family's support for the occupation. All these aspects were not examined in the present study. We recommend conducting a qualitative study and using a semi-structured open-ended interview as a research tool to comprehend skiers' attitudes and the effect of their background on their attitudes.

Another possible follow-up study can add a 45-60-year-old skier participant group to investigate their background, similar to those of skiers aged 65 and above. Such study results will allow us to examine the impact of age on engagement in alpine skiing or identify additional aspects linked to skiers' background that influence it. Another possibility for further research is to study skiers aged 60 and above in countries other than Israel. Such a study will show whether Israeli

skiers' backgrounds differ from those in other countries. While theoretically, there is no difference, such a study could reveal the differences (e.g., available time, physical activity engagement, health status, and others).

The second component was the link between alpine skiing and wellbeing in people aged 60 and above regarding the individual's perceived self-esteem and functioning level.

4.3. Satisfaction with Life and Perceived Self-esteem

In terms of perceived self-esteem, the study indicated that 80% of participants reported high self-esteem, and only five percent reported having low self-esteem.

Lesende et al. (2010) also found that physical activity can be an efficient tool for boosting older people's independence level if its type and intensity are kept under control by adapting physical exercises to each person's characteristics. Casals et al. (2015) even found evidence that greater functional independence results in a higher quality of life for the subjects. Moral-García et al. (2017) found in their research a positive association between physical activity and positive self-esteem. They concluded that regular physical activity should be encouraged to improve self-esteem and minimize the risk of dependence on older people.

According to Deshayes et al.'s study (2021), physical self-perceptions, such as activity, endurance, coordination, and flexibility, were found to be linked to self-reported physical activity, occasional or planned. In contrast, sit-to-stand was the only objectively measured physical functioning variable associated with planned activity. Also, more falls, global self-esteem, general and specific physical self-perceptions regarding flexibility and strength, and knee strength were related to the fear of falling.

Male skiers reported the highest frequency of physical activity irrespective of the intensity level. Women reported the highest levels of general health in the four health metrics of wellbeing, social functioning, coping with pain, and current health status.

Sales et al. (2017) support these results and found that age and gender influence physiological functioning. In particular, physiological functioning declines with increasing age and is moderated by gender, with men declining twice as fast compared to women. Magee & Upenieks' study (2019) conducted in Canada and the USA found that self-esteem differs by gender due to a greater tendency for men to agree with positively worded self-statements and a greater tendency for women to agree with negatively worded self-statements. Also, in the study, women reported higher satisfaction with life and self-esteem than men.

Matud et al. (2020) examined the relevance of gender to the psychological wellbeing of older adults. They found that men scored higher than women in self-acceptance, autonomy, purpose in life, and environmental mastery. Although the most important predictors of psychological wellbeing in both women and men were self-esteem and social support, both masculine/instrumental and feminine/expressive traits were associated with higher psychological wellbeing. However, the effect size was higher for the masculine/instrumental trait. They concluded that gender plays an essential role in the psychological wellbeing of older adults.

The possible reason for the difference between this finding and our findings lies in the relative uncommonness of skiing among women. Thus, their successful performance in this sport led to higher satisfaction and self-esteem.

Furthermore, the study found, among male and female participants, high levels of satisfaction with life and perceived self-esteem manifest in increased bodily functioning, performance of physical and emotional tasks, vitality, wellbeing, social functioning, coping with

pain, and current health status. Chu & Koo (2023) examined the link between self-esteem and life satisfaction in reference to different health components among adults aged 65 and above engaged in volunteering. They found a positive association between life satisfaction and self-esteem in older adults engaging in formal volunteering. In addition, adhering to a vegetarian diet, volunteering for five or more days per week, and possessing eudaemonic motives were also significantly associated with higher levels of life satisfaction. The association between self-esteem and life satisfaction observed in participants could be explained by the Self-Evaluation Maintenance model. Volunteer work can be a source of positive experiences, such as feelings of accomplishment, social connection, and a sense of purpose. These positive experiences could contribute to higher levels of self-esteem, as individuals maintain positive self-evaluations based on their perceived competence within the volunteer community. In addition, individuals may compare themselves to others, perceived as less competent or less engaged in volunteer work, which will boost their self-evaluations.

Regarding gender, Vilkhu & Behera's study (2019) showed no significant difference between male and female older adults regarding self-esteem, happiness, and life satisfaction, and a significant difference among the place of the locality of older people with reference to self-esteem, happiness, and life satisfaction. They found a positive relationship between self-esteem, happiness, and life satisfaction to be the primary predictor of happiness and life satisfaction. Matzler et al. (2008) found that, in general, female customers show markedly higher satisfaction than male customers; older customers are more satisfied than younger ones, and socioeconomic status is negatively related to satisfaction scores.

Regarding age, the more advanced in age older skiers are, the lower their reported health in tasks requiring physical effort and in health metrics of vitality coping with pain and current health status.

WHO (2022) clarified it at the biological level, so aging results from the impact of the accumulation of a wide variety of molecular and cellular damage over time. It leads to a gradual decrease in physical and mental capacity, a growing risk of disease, and ultimately death. These changes are neither linear nor consistent, and they are only loosely associated with a person's age in years. The diversity seen in older age is not random. Beyond biological changes, aging is often associated with other life transitions, such as retirement, relocation to more appropriate housing, and the death of friends and partners.

Other findings point to a weak relationship between skiers' age and general physical and vigorous activity frequency. Thus, the more advanced the skiers' age, the lower and the more inferior - compared to vigorous activity - the reported frequency of general physical activity. Another weak relationship was found between the frequency of general physical activity, perceived self-esteem, and life satisfaction. Also, a moderate positive relationship

Thus, the high frequency of general physical activity is manifest in high self-esteem and life satisfaction. In addition, a moderately positive relationship was found between vigorous physical activity and life satisfaction. Hence, a high frequency of vigorous activity will translate into high levels of life satisfaction.

Krautgasser et al.'s study (2011) found that alpine skiing requires both aerobic and anaerobic capacities. Also, in a 75-minute recreational skiing by older intermediate-level skiers, the oxygen demand ranged from 40 to 50% of VO2 maximum, while at the same time, HRs ranged from 70 to 80% of peak HR. When compared to typical aerobic activity of older adults, such as

walking or cycling, there seems to be a greater demand on HR versus VO2; yet, given that blood LA remained low during skiing, older skiers may govern their intensity via signals more closely in tune to VO2 and blood LA rather than HR or BP.

Vilkhu & Behera's study (2019) showed no significant difference between male and female older people regarding self-esteem, happiness, and life satisfaction but a significant difference among places of the locality of older adults concerning self-esteem, happiness, and life satisfaction. They found that a positive relationship between self-esteem and happiness, and life satisfaction and self-esteem is the primary predictor of happiness and life satisfaction.

Thus, skiing leads to a moderate level of life satisfaction and less to higher self-esteem. The reason may lie in the time that lapsed between the skiing and the study. Older skiers who have not practiced skiing for an extended period of approximately a year will not feel satisfaction with life and empowerment in their self-evaluation. It is necessary to conduct a similar study among older adults shortly after their return from ski vacation.

4.4. Frequency of General Physical Activity and the General Health Scale, including bodily functioning, performing tasks requiring physical effort, and current health.

The study found weak relationships between general physical activity frequency and the general health scale among participants aged 60 and above. Namely, a high frequency of physical activity lowers the general health scale. Also, the relationship between the variable of general physical activity and the health indicators of vitality, social functioning, and coping with pain was weak. In contrast, Elsden et al.'s study (2022) found that physical activity is associated with greater levels of physical functioning, general health, and vitality at higher frequencies. The researchers found that higher physical activity was strongly associated with general health and vitality, whereas cultural engagement was associated with better social functioning.

Academic literature does not support these findings and asserts that the frequency of general physical activity enhances the general health scale. The explanation for the discrepancy may be rooted in the lower awareness of their health situation among adults aged 60 and above or the older skiers' dissatisfaction with their health situation and consequent reporting of low health. At the time of the study, the participants could have taken a long break from skiing and, therefore, considered their health indicators to be low.

Additional findings exhibited negligible relationships between physical activity and health indicators of emotional task performance and wellbeing, between vigorous physical activity and health indicators of bodily functioning and social functioning, between general physical activity and health indicators of vitality, social functioning, and coping with pain, between general physical activity and health indicators of emotional task performance and wellbeing.

In addition, only moderate relationships emerged between vigorous physical activity, the general health scale, and health indicators of performing tasks requiring physical effort, vitality, and current health, between vigorous physical activity and health indicators of bodily functioning and social functioning. The explanation of the results mentioned above may apply to the participants' perceptions regarding the period they did not ski or went on a ski vacation. This explanation finds support in the study by Conde-Pipó et al. (2022), who state that skiing is a complete sport practiced over a whole day, in which acute cardiac responses that are beneficial for cardiovascular health alternate with the necessary breaks to go up again taking a lift. The entire locomotor musculature is also exposed to intermittent efforts of medium and high intensities that favor the capacity to exert effort and perform daily tasks. It also leads to an improvement in bone density, reduction in body fat, and insulin resistance—aspects related to general health. It goes to justify the differences found in the PF, PR, and GH dimensions of HRQoL. The higher VI and SF dimension levels could

be attributable to alpine skiing being an activity that produces positive alterations in mental and social health and is associated with life satisfaction and social wellbeing. In a similar study, Krautgasser et al. (2012) described how psychological states changed over three measurements in a skiing session of 3.5 hours in elderly male and female recreational skiers. They found that the duration and intensity of skiing were appropriate and yielded immediate positive psychological effects on older participants. Furthermore, recreational alpine skiing has a positive effect on MS ratings, reflecting wellbeing while generating age-appropriate moderate RPE values in elderly alpine skiers.

Hence, the proximity of an intensive skiing activity to the time of the study might alter the participants' answers over the year.

4.5. Age, General health, Satisfaction with Life

The findings show that "young" adults aged 60-69 have higher self-esteem than 70-year-olds and above and perceive their general health as higher. Moreover, the study's results indicate that "young" adult groups exhibit significantly higher satisfaction than adults aged 70 and above. Similarly, concerning the relationship between self-esteem and life satisfaction, the study found that skiers aged 70 and above with high self-esteem reported lower satisfaction with life than younger skiers with high self-esteem. A study conducted in China by Chen et al. (2022) showed that the attitude and self-efficacy of physical activity in older people can affect personal behavior, in addition to demographic factors, such as age and gender. A general misconception of modern culture accepts that the older age is a time for relaxation and that physical activity and exercise are unnecessary. This result showed that the ability to integrate and judge exercise information can strongly affect the level of exercise and physical activity. So, improving the ability to anticipate exercise is an essential method in cultivating good physical activity habits.

Lee et al. (2008) examined the ways of employing self-efficacy theory in intervention programs designed to overcome psychological barriers to increasing physical activity among older people. They found that older adults are likely to be hindered by several psychological factors in adopting and maintaining regular physical activity. Addressing attitudes and beliefs may maximize the effectiveness of a physical activity program. The application of self-efficacy theory is evident in several physical activity intervention programs where increasing confidence may facilitate adherence to a physical activity program. Shaabani et al. (2017) from Iran found that the self-efficacy of residential older adults and the quality of their lives in Iran is low. An increase in self-efficacy among the older residents of the nursing homes led to a rise in their quality of life. The research literature corroborates the study's findings.

Regarding the relationship between self-esteem and general health, the study indicated that both women and men with high self-esteem reported higher general health than women and men with medium-low self-esteem. However, men reported more significant gaps between age groups, whereas women with medium-low self-esteem reported higher general health than men with moderate-low self-esteem. Also, among respondents with high self-esteem, women's reported general health was higher than men's.

Regarding the link between satisfaction with life and gender group, the relationship between life satisfaction and self-esteem appears gender-based: women with high self-esteem reported higher satisfaction with life than women with medium-low self-esteem. On the other hand, among men, the result was similar, but the gap was more considerable.

Women with medium-low self-esteem reported higher satisfaction with life than men with the same life satisfaction level.

Moreover, among the participants with high self-esteem, women reported higher life satisfaction than men.

In conclusion, the study's findings are partially in line with the professional literature. The reason for the differences stems from this being the first study conducted in Israel among skiers aged 60 and above, compared to numerous studies on other countries on the concept of skiing in European countries, the USA, and Canada.

There have been no previous similar studies in Israel because skiing, in general, and for older adults, in particular, is not widespread in Israel due to the high costs of skiing and the gear involved, and given a single ski site in the country with snow for a month or two during a year and the annual recreation time for alpine skiers aged 60 and above included a vacation abroad that entails high expenses affordable only to wealthy people. In contrast, in various studies on the subject, the participant skiers reported skiing as part of their lives, whether they lived in a country with snow throughout the season or had easy and cheap access to a nearby country, ski resorts with snow most of the year. The inconsistency between the results of the present study and those of other studies lies mainly in the reasons stated above. Alpine skiers in Israel who can afford ski vacations, in Israel or abroad, comprise a population group with high socio-economic status. Among adults aged 60 and above, skiing involves substantial expenses, proper planning, booking accommodations, preparing appropriate gear, and other preparations before the vacation. Thus, every ski vacation becomes a project demanding a lot of consideration and planning, which elevates the skiers' self-esteem. Throughout the entire execution of the project, the skiers are physically active, training at the artificial snow site in Israel to go back to sports activities suitable for skiing, consulting, and readying.

All those activities before and following a ski vacation elevate the level of functioning and perceived self-esteem. Conversely, studies conducted in other countries examined skiers above 60 for whom skiing is part of life. Access to skiing is accessible, close by, available, and even cheap for most resorts. That is the central reason for the differences between our study's findings and others.

The obvious conclusion regarding the contribution of skiing to 60-year-olds and above is to make this sport accessible for that population in Israel by reducing its costs for older adults, thus enabling them to enjoy it, organize one-day trips to the only ski site in Israel because it is situated on the northern border of Israel, and assign them skiing times at the site.

Furthermore, given the significance of enhancing self-esteem and functioning among this age group, they should be encouraged to enter alpine skiing by opening ski-training courses in the areas of residence at affordable prices, which are very expensive today.

In other words, it is advisable to make alpine skiing affordable to adults aged 60 and above out of consideration of its cognitive benefits for this age group.

Another conclusion is the necessity of spreading the information regarding the significance of alpine skiing across the country - with an emphasis on its benefits for older adults, publicizing and expounding the experience of skiing, and offering ways of practicing skiing in Israel. It is essential to explain that this sport is uncomplicated to learn and practice and, above all, affordable to older people. We should turn skiing into a common sport across the country. Typically, sports therapists for the third age who advance physical activity recommend daily walks. When recommending an exercise routine in the gym, they should add the concept of ski training as part of possible gym practice. They should describe the benefits of alpine skiing to the older gym-goers and offer suitable exercises. Moreover, third-age sports centers should organize practice groups

who will go alpine skiing together, having completed a proper annual training program. Older adults must be encouraged to join such groups out of the understanding that this sports activity improves their abilities as they age.

Future research should examine a similar population against geographical and cultural characteristics, analyze their characteristics and background, and select research groups with apparent differences between them known beforehand. Clearly, it is essential to conduct a similar study in countries comparable to Israel regarding the scarcity or absence of ski sites and the necessity to travel vast distances by plane to ski. The research instruments in follow-up studies are supposed to combine questionnaires and open-ended semi-structured interviews in order to learn the participants' traits and attitudes toward alpine skiing in depth. It would be valuable to incorporate an additional study investigating alpine skiers' conduct from the time they began skiing until the study's commencement. The goal of such a study is to identify the participants' motives to engage in alpine skiing over the years and characterize the skier from their youth to older age. The third component was the relationship between persistence in alpine skiing and improved quality of life, as reflected in the participant skier's satisfaction. The study showed that skiers over 60 who succeed in persevering in skiing enhance the quality of their lives.

The results indicate that "younger" adults aged 60-65 expressed significantly higher satisfaction than those aged 70 and above.

Across genders, the study showed high levels of satisfaction with life manifest in high motivation toward performing physical activity and physical and emotional tasks and enhancing vitality, wellbeing, social functioning, coping with pain, and current health status. However, the study yielded several differences between women and men. Thus, female skiers' reported satisfaction with life was higher than among male skiers.

Matud et al.'s study (2020) examined the relevance of gender to older adults' psychological wellbeing. They found that men scored higher than women in self-acceptance, autonomy, purpose in life, and environmental mastery. Although the most important predictors of psychological wellbeing in both women and men were self-esteem and social support, both masculine/instrumental and feminine/expressive traits were associated with higher psychological wellbeing. However, the effect size was higher for the masculine/instrumental trait. They concluded that gender plays an essential role in the psychological wellbeing of older adults.

Concerning the relationship between age and satisfaction with life, the results indicate that among men and women, satisfaction decreases with age. Baird et al.'s comprehensive study (2010) stated a steep decline in life satisfaction among people older than 70. However, there is a relatively significant increase in satisfaction in the age group of 40 to early 70.

Regarding the relationship between age and satisfaction with life, the findings also demonstrate that among men and women alike, satisfaction with life diminished with age. Similarly, a comprehensive study by Baird et al. (2010) found a steep decline in life satisfaction among participants over 70 but a relatively significant increase in satisfaction in the 40-to-early 70s age group.

The reason for the differences in the findings stems from the present study's focus on a specific population: Israeli alpine skies with their specific characteristics. This finding befits skiers aged 70 and above who tend to ski less due to health issues, thus leading to a decrease in their satisfaction with life. Hence, skiers' age has an apparent impact: older age predicts lower levels of life satisfaction. Women with high self-esteem reported higher levels of life satisfaction than women with medium-low self-esteem. While men reported similar results, the gap among them

was more substantial. Hence, gender is a significant predictor of satisfaction with life. Also, women reported higher levels of satisfaction than men.

Women with medium-low self-esteem reported higher levels of life satisfaction than men with the same self-esteem level. In addition, among the participants with high self-esteem, women had a higher level of satisfaction with life compared to men.

Regarding the relationship between participant skiers' demographics and physical activity and life satisfaction, physical activity indicators showed the highest contribution in predicting satisfaction with life according to the following ranking: vigorous activity, moderate activity, and walking. Thus, vigorous and moderate physical activities predict high satisfaction with life, whereas walking predicts low-level life satisfaction. The frequency of physical activity contributes to life satisfaction – mainly, high frequency of physical activity and walking, which predict high levels of health.

According to the WHO (2020), regular physical activity benefits both the body and mind. The organization says that physical activity increases strength and fitness, reduces the risk of cardiovascular and other physical ailments, and improves mental health, specifically reducing the risk of depression in all ages, including the golden age.

Finkenzeller et al.'s study (2011a) assessed whether a 12-week guided alpine skiing intervention has an impact on psychosocial dimensions, measured by subjective assessments, of individuals who are 60+ years of age. The researchers employed a number of well-established questionnaires to measure well-being, life satisfaction, self-concept, health status, depression, and self-efficacy. The physical self-concept in the domain "strength" increased significantly in the intervention group from pre- to post-test and remained stable through the retention test. In contrast,

the control group demonstrated nearly no alteration. A similar effect was observed in life satisfaction for the dimension "friends and relatives."

On the contrary, the psychosocial aspects of older people were not negatively influenced. The subjects of this study had very high pre-test scores that might reflect a ceiling effect, which, in turn, can explain the marginal positive impact of the intervention. The findings of this study argue for recommending a guided alpine skiing intervention for individuals who are 60 years of age and older with high values in psychosocial variables.

In a similar study, Narici et al. (2011) investigated the impact of 12 weeks of alpine skiing on spinal reflex plasticity, strength, and postural control in senior citizens. The results show that alpine skiing is an effective intervention for combating sarcopenia and weakness in old age. Also, in a recent study, Niederseer et al. (2020) observed changes in aerobic capacity, oxygen pulse, and maximal minute ventilation, resulting in better performance during exercise. Würth et al. (2015) focused on the psychological and quality of life aspects of resuming alpine skiing practice after total knee arthroplasty (TKA) in elderly skilled skiers. They found that the skiing intervention substantially increases the amount of physical activity, and skiing goes along with enhanced well-being and no significant impact on perceived pain, exertion, or knee function. The sum that alpine skiing can be recommended for older persons with TKA with respect to well-being, perceived pain and knee function, and perceived exertion.

Holder et al. (2010) examined the effect of physical activity on wellbeing among people aged 65 and above and found it to be more significant among people around 65 than those aged 74. McAuley et al. (2006) found that in older age (65 and above), physical activity indirectly increases satisfaction with life through its effect on mental health and self-efficacy. Increased physical activity is linked to higher self-efficacy, which is, in turn, linked to more positive physical

and mental health. Consequently, health state correlated positively with life satisfaction. Self-efficacy and positive affect are significant mediators of the relationship between physical activity and mental wellbeing in a one-year observation of physical activity intervention in adults; changes in positive affect mediated this relationship over additional years of follow-up.

Burtscher and Ruedl (2015) explored engagement in alpine skiing among skiers in general. Their study indicates that skiing is one of the popular physical sports that impacts people's wellbeing. Millions of people practice skiing on the slopes in the winter season; thus, skiing becomes part of regular physical activity. Lee et al.'s study (2014) adds that skiing is linked to pleasure, leading, in turn, to a sense of satisfaction among skiers.

In conclusion, the study's findings are consistent with similar studies on improved mental wellbeing among alpine skiers aged 60 and above. Gender-wise, women reported a more significant effect of skiing than men at the age of 65 and above compared to the age of 74. That is, more advanced age predicts lower levels of life satisfaction. This phenomenon is consistent in all physical activities performed by people aged 65 and above. Therefore, at that age, sports activity is of primary importance - skiing being one of the sports branches - aimed at improving mental wellbeing. With increasing age, the more physical activity an older adult performs, the more enhanced their wellbeing. Thus, in older age, skiing becomes a sport like any other sport, and the essence is its benefit for older adults. The obvious conclusion is the necessity to encourage physical activity among 60-year-old and above adults, with alpine skiing being one of the accepted sports. On the other hand, alpine skiing has no advantages over other sports regarding older adults' mental wellbeing. While alpine skiing is considered a distinctive, exceptional, and prestigious sport in Israel, aging adults who cannot engage in skiing due to this sport's inaccessibility can be advised to engage in other sports, which would also contribute to their wellbeing. However, skiers aged 60

and above, per the study's results, exhibit enhanced perceived self-esteem and functioning levels. It merits analyzing whether these effects are achieved via "conventional" physical activities, i.e., walking or swimming, in order to conclude the existence of distinct effects of alpine skiing beyond regular physical activity and thus establish the significance of promoting alpine skiing specifically, more than walking or swimming or any other sport.

Future studies should examine the effect of alpine skiing compared to other popular sports, such as walking, swimming, cycling, and others, on the same population aged 60 and above. Also, the subject warrants a study on the effect of alpine skiing on the wellbeing of a similar population across different countries. However, researchers must isolate factors affecting wellbeing in those locations. Future research should perform a follow-up over the years on skiers in Israel from age 60 to 80 regarding their mental wellbeing.

Finally, it will be beneficial to use an open-ended semi-structured interview as an additional research tool to hear third-age adults' perspectives and perceptions of alpine skiing in their lives.

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APPENDIX
RESEARCH QUESTIONNAIRE

Wellbeing and Health of Israeli Older Adults Engaged in Alpine Skiing

Part 1

Informed Consent

We provide the information below to request your participation in a study exploring how people aged 60 or over who practice alpine skiing perceive their wellbeing and health.

The information collected in this questionnaire will remain confidential and anonymous. The questionnaire does not collect identifiable personal data and serves exclusively for research purposes. The data will not be transferred to third parties or institutions.

The questionnaire contains basic questions on sociodemographic data and physical activity, health, and quality of life.

There are no right or wrong answers. The estimated time needed to fill it out is 25 minutes.

Your participation is strictly voluntary. For more information, please, contact the primary researchers: *Hadar Nezah* by email: hadar.nezah.phd@gmail.com or *Fátima Chacón* (University of Seville) by email: fchacon@us.es

You can abandon or reject your participation simply by not completing the delivery of the questionnaire, regardless of whether you initially clicked on the acceptance tab for your participation.

* I consent to participate in the study (check the desired option).

Yes ○

No ○

Part 2

Sociodemographic and Physical Activity Data

* Age:

60-64 ○

65-69 ○

70-74 ○

75 and above ○

* Sex

Male ○

Female ○

* Level of Education

Secondary ○

University ○

Other ○

* Marital Status

Single ○

Married ○

Widowed ○

Separated ○

Other ○

* Current Employment (you can mark multiple options):

Part-time ☐

Full-time ☐

Self-employed ☐

Retired ☐

* During the past year, have you engaged in any type of sports activity? (including walking more than 10 minutes as a physical exercise):

Yes ○

No ○

* If yes, what kind of physical/sports activities?

your answer

* Had you engaged in alpine skiing before the age of 60?

Yes ○

No ○

* If yes, how many years?

your answer

* At present, how many times a year do you ski?

1-3 times ○

4-5 times ○

6-10 times ○

Other ○

* Rate the significance of each of the following reasons for you engagement in skiing

(1 - insignificant, 9 – most significant)

	1	2	3	4	5	6	7	8	9
Fun	○	○	○	○	○	○	○	○	○
Spend time with friends and other people	○	○	○	○	○	○	○	○	○
Stay fit	○	○	○	○	○	○	○	○	○
Health	○	○	○	○	○	○	○	○	○
Disconnect	○	○	○	○	○	○	○	○	○
Competition	○	○	○	○	○	○	○	○	○
Improve physical appearance	○	○	○	○	○	○	○	○	○

Sports career	○	○	○	○	○	○	○	○	○
Other									

* If you chose "other" in the previous question, please, state the other reason(s) for skiing

your answer

Part 3 **Life Quality Enjoyment**

* Considering everything, in the past week, how satisfied were you with your …….?

	Very dissatisfied	Dissatisfied	OK	Satisfied	Very satisfied	You take **no** medication (for the last but one statement only)
Physical health	○	○	○	○	○	
Mood	○	○	○	○	○	
Work	○	○	○	○	○	
Household activities	○	○	○	○	○	
Social ties	○	○	○	○	○	
Family relationships	○	○	○	○	○	
Leisure activities	○	○	○	○	○	
Ability of everyday functioning	○	○	○	○	○	
Sexual drive/interest or performance*	○	○	○	○	○	
Economic status	○	○	○	○	○	
Living/housing conditions	○	○	○	○	○	
Physical ability to move around without dizziness or falling	○	○	○	○	○	
Your perspective on all things work-related or hobbies*	○	○	○	○	○	
Medication (if you don't take	○	○	○	○	○	

any, mark the last option)						
Satisfaction and contentment during the past week	○	○	○	○	○	

* If your satisfaction level is very low or OK, please, underline the factor(s) related to lack of satisfaction.

Part 4

Physical Activity

We are interested in finding out in what types of physical activities people engage as part of their everyday lives. The questions below refer to your physical activity **in the past 7 days**. Please, answer each question even if you do not consider yourself an active person. Please, think about the activities you do at work, around your house and garden, to get from place to place, and in your spare time for recreation, exercise, or sports.

Think about all the **vigorous** activities you performed **in the past 7 days**. **Vigorous physical activity** refers to an activity requiring considerable physical effort that makes you breathe harder than normal. Think only about the 10-minute uninterrupted physical activities you performed.

1. In **the past 7 days**, on how many days did you engage in **vigorous** physical activities, e.g., heavy lifting, digging, aerobics, or fast cycling?

   [ ] * days per week

2. How much time did you typically spend engaged in **vigorous** physical activities on each of those days?

   [ ] * hours per day

   [ ] * minutes per day

   I don't know/Not sure ○

   Think about all the **moderate** activities that you did in **the past 7 days**. **Moderate physical activity** refers to activity that requires moderate physical effort and make you breathe somewhat harder than normal. Think only about the 10-minute uninterrupted physical activities that you performed.

3. In **the past 7 days**, on how many days did you engage in **moderate** physical activities, e.g., carrying light weight, regular-pace cycling, double tennis, excluding walking.

   ☐ * days per week

4. How much time did you typically spend doing moderate physical activities on each of those days?

   ☐ * hours per day

   ☐ * minutes per day

   I don't know/Not sure ○

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

5. In **the past 7 days**, on how many days did you **walk** for 10 minutes uninterrupted, at least?

   ☐ * days per week

6. How much time did you spend walking on each of those days?

   ☐ * hours per day

   ☐ * minutes per day

   I don't know/Not sure ○

   The last question refers to the time you spent **sitting** during **the past 7 days**, including time spent sitting at work, at home, while studying and during leisure time. This may include time spent sitting at a work desk, while visiting friends, reading, or sitting or lying down to watch television.

7. In **the past 7 days**, how much time did you spend sitting on a regular weekday?

   ☐ * hours per day

   ☐ * minutes per day

   I don't know/Not sure ○

Part 5 Health Survey (SF-36)

General Health

* In general, would you describe your health as:

   Excellent ○

Very good ○

Good ○

Fair ○

Poor ○

* Compared to the situation one year ago, how would you describe your general health at present?

Much better than a year ago ○

Somewhat better than a year ago ○

About the same ○

Somewhat worse than a year ago ○

Much worse than a year ago ○

Limitation in Activity Performance

The items below refer to activities you might typically perform during a day. Does your health situation limit your engagement in these activities today? If so, to what extent?

* Vigorous Activities, e.g., running, heavy lifting, engaging in strenuous sports

Yes, very limited ○

Yes, somewhat limited ○

No, not limited at all ○

* Moderate activities, e.g., moving a table, pushing a vacuum cleaner, bowling, or playing golf

Yes, very limited ○

Yes, somewhat limited ○

No, not limited at all ○

* Lifting or carrying groceries

Yes, very limited ○

Yes, somewhat limited ○

No, not limited at all ○

* Climbing several flights of stairs

Yes, very limited ○

Yes, somewhat limited ○

No, not limited at all ○

* Climbing a flight of stairs

Yes, very limited ○

Yes, somewhat limited ○

No, not limited at all ○

* Bending, kneeling, or stooping

Yes, very limited ○

Yes, somewhat limited ○

No, not limited at all ○

* Walking more than 1,5 km

Yes, very limited ○

Yes, somewhat limited ○

No, not limited at all ○

* Walking several blocks

Yes, very limited ○

Yes, somewhat limited ○

No, not limited at all ○

* Walking a block

Yes, very limited ○

Yes, somewhat limited ○

No, not limited at all ○

* Bathing or dressing yourself

Yes, very limited ○

Yes, somewhat limited ○

No, not limited at all ○

Physical Health Problems:

In the past 4 weeks, have you experienced any of the following problem with your work or other daily activities as a result of your physical health?

* Cut down the amount of time you spent on work or other activities

Yes ○

No ○

* Accomplished less than you would like

Yes ○

No ○

* Were limited in the kind of work or other activities

Yes ○

No ○

* Had difficulty performing the work or other activities (for example, it took extra effort)

Yes ○

No ○

Emotional Health Problems:

In the past 4 weeks, have you experienced the following problems with your work or other daily activities as a result of any emotional problems (e.g., feeling depressed/anxious?

* Cut down the amount of time you spent on work or other activities

Yes ○

No ○

* Accomplished less than you would like

Yes ○

No ○

* Didn't do work or other activities as carefully as usual

Yes ○

No ○

Social Activities:

* Emotional problems interfered with your normal social activities with family, friends, neighbors, or social groups?

Not at all ○
Very little ○
Moderately ○
Seriously ○
Severely ○

Pain:

* How much bodily pain have you experienced in the past 4 weeks?

None ○
Very mild ○
Mild ○
Moderate ○
Serious ○
Severe ○

* In the past 4 weeks, to what extent did pain interfere with your normal work (both work outside home and housework)?

Not at all ○
Slightly ○
Moderately ○
Considerably ○
Extremely ○

Vitality and Emotions

The questions below refer to your feelings and wellbeing in the past 4 weeks. For each question, please, mark the answer that most accurately describes your feelings:

* Have you felt full of energy?

Always ○
Almost always ○
A great deal ○
Sometimes ○
Rarely ○
Never ○

* Have you been tense and nervous?

Always ○
Almost always ○
A great deal ○
Sometimes ○
Rarely ○
Never ○

* Have you felt so miserable that nothing could cheer you up?

Always ○
Almost always ○
A great deal ○
Sometimes ○
Rarely ○
Never ○

* Have you felt calm and contented?

Always ○
Almost always ○
A great deal ○
Sometimes ○
Rarely ○
Never ○

* Have you felt you had a lot of energy?

Always ○
Almost always ○
A great deal ○
Sometimes ○
Rarely ○
Never ○

* Have you felt down or depressed?

Always ○
Almost always ○
A great deal ○
Sometimes ○
Rarely ○
Never ○

* Have you felt exhausted?

Always ○
Almost always ○
A great deal ○
Sometimes ○
Rarely ○
Never ○

* Have you been a happy person?

Always ○
Almost always ○
A great deal ○
Sometimes ○
Rarely ○
Never ○

* Have you felt tired?

Always ○
Almost always ○
A great deal ○
Sometimes ○
Rarely ○
Never ○

Social Activities:

* To what extent, in the past 4 weeks, did your physical health or emotional problems interfere with your social activities (visiting family, relatives, etc.)?

Always ○
Almost always ○
A great deal ○
Sometimes ○
Rarely ○
Never ○

General Health:

To what extent the following statements are true for you**?**

* I seem to get sick a little easier than others.

Absolutely true ○
Mostly true ○
Don't know ○
Mostly untrue ○
Absolutely untrue ○

* I am as healthy as anyone I know.

Absolutely true ○
Mostly true ○
Don't know ○
Mostly untrue○
Absolutely true ○

* I expect my health to get worse.

Absolutely true ○

Mostly true ○

Don’t know ○

Mostly untrue○

Absolutely true ○

* I am in excellent health.

Absolutely true ○

Mostly true ○

Don’t know ○

Mostly untrue○

Absolutely true ○

Part 6: **Rosenberg Scale**

Finally, below is a list of statements referring to your general feelings about yourself. Please, indicate how strongly you agree or disagree with each statement.

* 1. In general, I am satisfied with myself.

Strongly agree ○

Agree ○

Disagree ○

Strongly disagree ○

* 2. Sometimes, I think I'm mot good at anything.

Strongly agree ○

Agree ○

Disagree ○

Strongly disagree ○

* 3. I feel I have several good qualities.

Strongly agree ○

Agree ○

Disagree ○

Strongly disagree ○

* 4. I am capable of functioning equally well as other people.

Strongly agree ○

Agree ○

Disagree ○

Strongly disagree ○

* 5. I feel I don't have much to be proud of.

Strongly agree ○

Agree ○

Disagree ○

Strongly disagree ○

* 6. I definitely feel useless sometimes.

Strongly agree ○

Agree ○

Disagree ○

Strongly disagree ○

* 7. I feel I am valuable, at least equally as valuable as others.

Strongly agree ○

Agree ○

Disagree ○

Strongly disagree ○

* 8. I wish I could respect myself more.

Strongly agree ○

Agree ○

Disagree ○

Strongly disagree ○

* 9. All in all, I am inclined to feel that I am a failure.

Strongly agree ○

Agree ○

Disagree ○

Strongly disagree ○

* 10. I have a positive attitude toward myself.

Strongly agree ○

Agree ○

Disagree ○

Strongly disagree ○