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The role of different lifestyles on elderly's Health.  
Data from the MentDis\_ICF65+ Study

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**MentDis\_ICF65+**

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## **Title: The role of different lifestyles on elderly's Health. Data from the ICF\_65+ MentDis Study**

### **Abstract**

Due to demographic change mental health of the elderly increasingly becomes a focus of interest. Specifically aging can bear considerable consequences for physical and mental health, since it comprises numerous stress factors (e.g. social isolation, reduced functional capacity, somatic comorbidity). Sedentary habits, especially TV viewing, have been identified as potential risk factors for people's health.

The present research project is part of a broader international research project called MentDis\_ICF65+, funded by the European Community, on the prevalence and incidence of Mental Disorders in the elderly. The MentDis\_ICF65+ research group comprises 7 partners from 6 different European Countries and associated states (Italy – University of Ferrara, Germany – University of Hamburg and University of Dresden, UK - Royal College of Psychiatrists, London, Switzerland – University of Geneva, Spain- Complutense University, Madrid, Israel – Jerusalem University) and has collected data from around 3000 people in the general population between 65 and 84 years old.

From these data we analyzed the association between physical and mental health and sedentary habits, in particular TV viewing, in a subsample of 1383 elderly people. There are indeed associations between TV viewing and medical and mental health problems. Results support therefore the emerging indication that as well as promoting programs for increasing physical activity levels in the elderly, it would be also extremely important to raise awareness of the negative consequences of sedentary habits, TV viewing in particular, and design programs to help people reducing the time spent in such in-activity.

## **Abstract Italiano**

A causa delle variazioni demografiche la salute mentale degli anziani sta diventando sempre più un'area d'interesse. Nello specifico l'invecchiamento può avere conseguenze notevoli per la salute fisica e mentale, dato che comporta numerosi fattori di stress (es. isolamento sociale, capacità funzionali ridotte, comorbidità somatica). La sedentarietà, e in particolare il tempo trascorso a guardare la Televisione, sono stati identificati quali potenziali fattori di rischio per la salute delle persone.

La presente ricerca fa parte di un ampio progetto di ricerca internazionale chiamato MentDis\_ICF65+, finanziato dalla Comunità Europea, sulla prevalenza ed incidenza dei disturbi mentali negli anziani. Il gruppo di ricerca MentDis\_ICF65+ comprende 7 partner da 6 Paesi Europei (Italy – University of Ferrara, Germany – University of Hamburg and University of Dresden, UK - Royal College of Psychiatrists, London, Switzerland – University of Geneva, Spain- Complutense University, Madrid, Israel – Jerusalem University) e ha raccolto dati da 3000 persone nella popolazione generale tra i 65 e gli 84 anni.

Da questi dati abbiamo analizzato l'associazione tra salute fisica e mentale e le abitudini sedentarie, in particolare la visione della TV, in un sottocampione di 1.383 anziani. Associazioni tra la visione della TV e problemi di salute medica e mentale sono state identificate e riportate. I risultati supportano quindi l'indicazione emergente che oltre a promuovere programmi per aumentare i livelli di attività fisica negli anziani, sarebbe anche molto importante aumentare la consapevolezza delle conseguenze negative di abitudini sedentarie, visione della TV in particolare, e progettare programmi per aiutare le persone a ridurre il tempo trascorso in tale in-attività.

# **Title: The role of different lifestyles on elderly's Health. Data from the ICF\_65+ MentDis Study**

## **Summary**

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# 1. Introduction

## *1.1 Background: an older world*

The current trends in the world population indicate that there is a general tendency to live longer than the past.

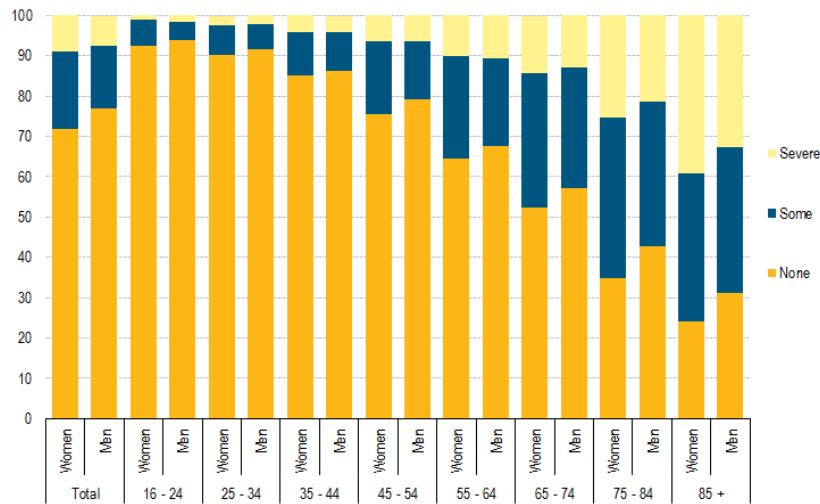
In the European Union in 2012 life expectancy at birth in was 80.3 years (83.1 years for women and 77.5 years for men). Between 2002 and 2012, there was an increase in life expectancy of 2.6 years, from 77.7 to 80.3 years (such increase was 2.2 years for women and 3.0 years for men) (European-Commission 2014).

This means that the number of people aged 65 and over is constantly increasing. According to the most recent Eurostat Survey, EUROPOP2013, between 2013 and 2080 there will be a decrease in the distribution of the working age population, while the elderly will likely increase in terms of share of the total population: by 2080 people of 65 years or over will be 28.7% of the EU-28's population, while in 2013 they were only 18.2 %. As a consequence, the forecast is for the EU-28's old-age dependency ratio<sup>1</sup> to almost double from 27.5 % in 2013 to 51.0 % by 2080 (European-Commission 2014).

Part of such increased longevity and shift in dependency ratio depends on the improvements in medical care, and it appears that having a disease results to be less disabling than in the past (Crimmins 2004). However living longer also means an increased risk of incurring into medical problems and activity limitations: in fact a strong association between activity limitation and age has recently been described (European-Commission 2013), see Figure 1.

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<sup>1</sup> In economics, geography and demography the dependency ratio is an age-population ratio of those typically not in the labor force (the dependent part) and those typically in the labor force (the productive part). It is used to measure the pressure on productive population.



**Figure 1** - Activity limitation by sex and age in 2011 EU-28, source European Commission (European-Commission 2013)

An interesting and more sensible concept therefore is the idea of “healthy life expectancy”, as an estimate of how many years people live in ‘good health and without disability’. According to Lunenfeld and Stratton the problem at the moment is that “healthy life expectancy has lagged behind the increase in life expectancy” ((Lunenfeld and Stratton 2013), p.1) creating a situation where ever increasing care burden is placed not only on National Health systems, but also on families and individuals (Martin, Schoeni et al. 2010).

Lunenfeld and Stratton suggest that more research efforts should be placed in order to define better preventive measures to increase such proportion of healthy life expectancy. It is important therefore to understand which are the main issues in the ageing population and the possible factors influencing people’s physical as well as mental health. Starting from that possible suggestions on how to promote people’s health could be derived.

## ***1.2 Main issues in the ageing population: physical and mental health***

### **1.2.1 Physical health**

The ageing process entails many possible changes at physical and physiological level. They can start and evolve with great individual differences, nevertheless they tend to be common in people of 65+ years of age. We briefly summarize some of them here.

#### Bone and joint

Bones at old age can become thinner and tend to shrink. As a consequence there can be a loss of height, a hunched posture in some people, and a greater vulnerability to bone and joint problems such as osteoarthritis and osteoporosis. The gender difference in bone loss is important: this process is twice as faster in women than in men. Such changes increase the risk of fractures and related complications (Cavanaugh and Blanchard-Fields 2011).

#### Falls

Old age implies risk for injury from falls that might not cause damage to a younger person. Every year, about 33% of those 65+ years old and 50% of those 80 years old fall. Given the above-mentioned bones' frailty and the consequent increased difficulty in recovery from bone fractures, as well as the complications arising from prolonged inactivity following from such fractures, falls are the leading cause of injury and death for old people (Pasquetti, Apicella et al. 2014).

#### Heart

Many important physiologic changes occur in the aging heart and help clarify common age-associated cardiac disorders. The main physiologic change is the delay in left ventricular filling, which is reduced by 50% between 20 and 80 years of age. Cardiac filling becomes more dependent on active filling late in diastole during atrial contraction. This phenomenon commonly is related to thickening and stiffening of the left ventricular wall (Goldman and Schafer 2011).

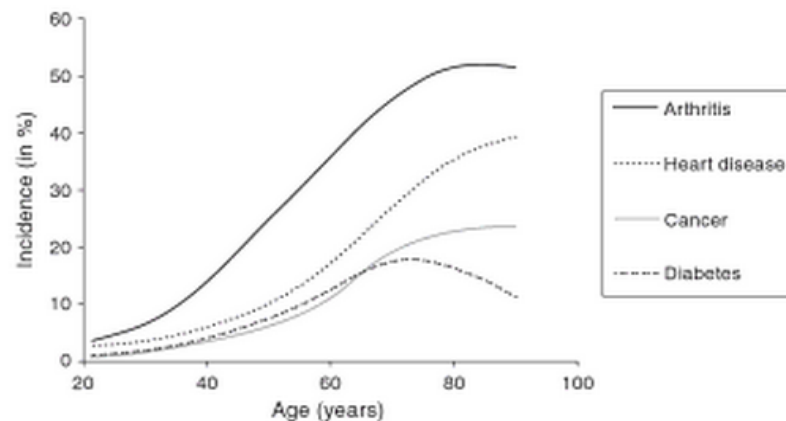
#### Nervous System

Brain size diminishes with age; after the age of 60 years, its size declines by 5 to 10%. The reduction in size is caused mainly by the progressive shrinking of the cerebral cortex. Novel adjustments to cell loss include the creation of new

connections between remaining neurons. Aging is associated with a progressive decline in the synthesis of neurotransmitters and a decline in their corresponding receptors. A major functional change is slower reaction times, which may be the result of a slower nerve conduction or trans-synaptic speed (Goldman and Schafer 2011).

### Chronic diseases

The previously cited health problems often translate into actual chronic diseases. WHO defines chronic diseases as “diseases of long duration and generally slow progression” (WHO 2010). The majority of people of 65+ years of age have at least one chronic disease and many have multiple conditions. In 2007-2009, the most frequently occurring conditions among older persons in the United States were uncontrolled hypertension (34%), diagnosed arthritis (50%), and heart disease (32%) (Martin, Schoeni et al. 2010; Aging-(AoA) 2011). As shown in Figure 2, such prevalence can be shown as an almost linear function of age.



**Figure 2** - Prevalence of selected chronic conditions as a function of age. Values are expressed in percentage for the US population (2002-03 data set). From Stuart-Hamilton (Stuart-Hamilton 2011) p. 23.

Other chronic diseases frequently affecting the old age population are:

- cancer
- diabetes
- respiratory diseases (diseases of throat and lungs): chronic obstructive pulmonary disease (COPD), asthma, allergic rhinitis

- neurodegenerative disorders (diseases characterized by progressive nervous system dysfunction): dementia, Parkinson's disease and multiple sclerosis
- mental disorders: depression

The inclusion among the list of chronic diseases of many types of cancer, HIV/AIDS, mental disorders (such as schizophrenia, depression, and dementia) and conditions affecting the level of functioning, such as sight impairment and arthrosis, depends on the important improvement in survival rates (WHO 2010).

### **1.2.2 Mild Cognitive Impairment and Dementia**

The term "Dementia" comprises a variety of brain disorders which gradually lead to brain damage, and cause a progressive decline of the individual's functional ability and social relations. Among the elderly it is one of the major sources of disability, causing a heavy burden not only on sufferers, but also on caregivers. Alzheimer's disease is the most frequent form of dementia, with a prevalence of about 60% to 80% of cases (Goldman and Schafer 2011). Consecutive strokes that produce multi-infarct dementia are another frequent cause. At present, there is no treatment that can stop dementia, however some pharmaceutical drugs and other interventions can slow the development of the disease. In 2012, a projected 8.4 million people aged 60 years and over were suffering from dementia in EU member states, a total of 7% of the population in that age group, according to estimates of Alzheimer Europe. Italy, Spain and France held the highest prevalence rates, with more than 7.5% of the population aged 60 years or older (OECD 2014).

Mild Cognitive Impairment (MCI) is generally considered as the precursor state from regular cognition to dementia. Patients with MCI are impaired in a specific aspect of cognition so that it is clearly different from normal performance but does not interfere greatly with daily functioning. Prevalence and incidence of MCI are more or less the same as those of dementia. Both increase with the advancement of age. MCI is generally considered a risk condition for the subsequent development of dementia, the rate of evolution from mild cognitive impairment to dementia being 15% per year (Goldman and Schafer 2011).

However, it has to be also stressed that while all people with Dementia have gone through an initial period of MCI, not all people with MCI will necessarily develop a Dementia: some (17.3%) can actually revert to a normal condition (Maioli, Coveri et al. 2007). Gender seems also to influence the path of the disease. In a prospective community-based study of subjects aged 65 years and over in France by Artero, Ancelin et al. (Artero, Ancelin et al. 2008), of the 6892 interviewed subjects, 2882 (42%) were classified as having MCI at base-line. Thirty six percent of MCI subjects were over 75 years of age and 65% were women. Of these 189 (6.6%) were diagnosed with dementia in the following four years, 1626 (56.5%) continued being MCI and 1067 (37%) returned to normal levels of functioning. Significant ( $p < 0.02$ ) outcome differences were observed for men and women: women were less likely to return to normal cognitive functioning (36% compared to 39% for men) and to have continuing cognitive disorder (58 %, compared to 53% for men). Eight percent of men with MCI developed dementia compared to 6% for women (Artero, Ancelin et al. 2008).

Therefore, even though patients with MCI are at greater risk for developing dementia compared with the normal population, there is currently significant variation in risk calculation (from <5% to 20% annual conversion rates), depending also on the population studied (Langa and Levine 2014).

### **1.2.3 Mental health**

Mental health refers to a broad range of activities directly or indirectly connected to the mental well-being element included in the WHO's definition of health: "A state of complete physical, mental and social well-being, and not merely the absence of disease" (WHO 2015). There are many different mental disorders, with different impacts on people's lives and behaviours. They are generally characterized by a combination of unusual thoughts, perceptions, emotions, behaviour and relationships with others. Mental disorders in general comprise: depression (mood disorders), anxiety disorders, bipolar affective disorder, schizophrenia and other psychoses, cognitive disabilities and substance use disorders.

The main disorders classification according to the DSM IV TR (American Psychiatric Association. 2000), is summarised in Table 1.

**Table 1 - Main DSM IV Disorders**

<p><b>Anxiety Disorders</b></p>	<ul style="list-style-type: none"> <li>• Panic Disorder Without Agoraphobia</li> <li>• Panic Disorder With Agoraphobia</li> <li>• Agoraphobia Without History of Panic Disorder</li> <li>• Specific Phobia</li> <li>• Social Phobia</li> <li>• Obsessive-Compulsive Disorder,</li> <li>• Posttraumatic Stress Disorder, Acute Stress Disorder</li> <li>• Generalized Anxiety Disorder</li> <li>• Anxiety Disorder Due to a General Medical Condition</li> <li>• Substance-Induced Anxiety Disorder</li> <li>• Anxiety Disorder Not Otherwise Specified.</li> </ul>
<p><b>Mood Disorders</b></p>	<ul style="list-style-type: none"> <li>• Depressive Disorders ("unipolar depression"), (i .e., Major Depressive Disorder, Dysthymic Disorder, and Depressive Disorder Not Otherwise Specified)</li> <li>• Bipolar Disorders (i.e., Bipolar I Disorder, Bipolar n Disorder, Cyclothymic Disorder, and Bipolar Disorder Not Otherwise Specified) involve the presence (or history) of Manic Episodes, Mixed Episodes, or Hypomanic Episodes, usually accompanied by the presence (or history) of Major Depressive Episodes.</li> <li>• Mood Disorder Due to a General Medical Condition and Substance-Induced Mood Disorder (two disorders based on aetiology)</li> </ul>
<p><b>Schizophrenia and Other Psychotic Disorders</b></p>	<ul style="list-style-type: none"> <li>• Schizophrenia, Schizophreniform Disorder</li> <li>• Schizoaffective Disorder</li> <li>• Delusional Disorder</li> <li>• Brief Psychotic Disorder</li> <li>• Shared Psychotic Disorder</li> <li>• Psychotic Disorder Due to a General Medical Condition</li> <li>• Substance-Induced Psychotic Disorder</li> <li>• Psychotic Disorder not Otherwise Specified</li> </ul>
<p><b>Substance-related Disorders</b></p>	<ul style="list-style-type: none"> <li>• Substance Use Disorders (Substance Dependence and Substance Abuse)</li> <li>• Substance-Induced Disorders (Substance Intoxication, Substance Withdrawal, Substance-Induced Delirium, Substance-induced Persisting Dementia, Substance-Induced Persisting Amnesic Disorder, Substance-Induced Psychotic Disorder, Substance-Induced Mood Disorder, Substance-Induced Anxiety Disorder, Substance-Induced Sexual Dysfunction, and Substance-Induced Sleep Disorder).</li> </ul>

**From DSM-IV TR (American Psychiatric Association. 2000)**

**Anxiety Disorders**

A *Panic Attack* is a discrete period in which there is the sudden onset of intense apprehension, fearfulness, or terror, often associated with feelings of impending doom. During these attacks, symptoms such as shortness of breath, palpitations, chest pain or discomfort, choking or smothering sensations, and fear of "going crazy" or losing control are present.

*Agoraphobia* is anxiety about, or avoidance of, places or situations from which escape might be difficult (or embarrassing) or in which help may not be available in the event of having a Panic Attack or panic-like symptoms.

*Panic Disorder Without Agoraphobia* is characterized by recurrent unexpected Panic Attacks about which there is persistent concern.

*Panic Disorder With Agoraphobia* is characterized by both recurrent unexpected Panic Attacks and Agoraphobia.

*Agoraphobia Without History of Panic Disorder* is characterized by the presence of Agoraphobia and panic-like symptoms without a history of unexpected Panic Attacks.

*Specific Phobia* is characterized by clinically significant anxiety provoked by exposure to a specific feared object or situation, often leading to avoidance behaviour.

*Social Phobia* is characterized by clinically significant anxiety provoked by exposure to certain types of social or performance situations, often leading to avoidance behaviour.

*Obsessive-Compulsive Disorder* is characterized by obsessions (which cause marked anxiety or distress) and / or by compulsions (which serve to neutralize anxiety).

**Post-traumatic Stress Disorder** is characterized by the re-experiencing of an extremely traumatic event accompanied by symptoms of increased arousal and by avoidance of stimuli associated with the trauma.

*Acute Stress Disorder* is characterized by symptoms similar to those of Posttraumatic Stress Disorder that occur immediately in the aftermath of an extremely traumatic event.

*Generalized Anxiety Disorder* is characterized by at least 6 months of persistent and excessive anxiety and worry.

*Anxiety Disorder due to a General Medical Condition* is characterized by prominent symptoms of anxiety that are judged to be a direct physiological consequence of a general medical condition.

*Substance-Induced Anxiety Disorder* is characterized by prominent symptoms of anxiety that are judged to be a direct physiological consequence of a drug of abuse, a medication, or toxin exposure.

*Anxiety Disorder Not Otherwise Specified* is included for coding disorders with prominent



anxiety or phobic avoidance that do not meet criteria for any of the specific Anxiety Disorders defined in this section (or anxiety symptoms about which there is inadequate or contradictory information).

### **Mood Disorders**

*Major Depressive Disorder* is characterized by one or more Major Depressive Episodes (i.e., at least 2 weeks of depressed mood or loss of interest accompanied by at least four additional symptoms of depression).

*Dysthymic Disorder* is characterized by at least 2 years of depressed mood for more days than not, accompanied by additional depressive symptoms that do not meet criteria for a Major Depressive Episode.

*Depressive Disorder Not Otherwise Specified* is included for coding disorders with depressive features that do not meet criteria for Major Depressive Disorder, Dysthymic Disorder, Adjustment Disorder With Depressed Mood, or Adjustment Disorder With Mixed Anxiety and Depressed Mood (or depressive symptoms about which there is inadequate or contradictory information).

*Bipolar I Disorder* is characterized by one or more Manic or Mixed Episodes, usually accompanied by Major Depressive Episodes.

*Bipolar II Disorder* is characterized by one or more Major Depressive Episodes accompanied by at least one Hypomanic Episode.

*Cyclothymic Disorder* is characterized by at least 2 years of numerous periods of hypomanic symptoms that do not meet criteria for a Manic Episode and numerous periods of depressive symptoms that do not meet criteria for a Major Depressive Episode.

*Bipolar Disorder Not Otherwise Specified* is included for coding disorders with bipolar features that do not meet criteria for any of the specific Bipolar Disorders (or bipolar symptoms about which there is inadequate or contradictory information).

*Mood Disorder Due to a General Medical Condition* is characterized by a prominent and persistent disturbance in mood that is judged to be a direct physiological consequence of a general medical condition.

*Substance-Induced Mood Disorder* is characterized by a prominent and persistent disturbance in mood that is judged to be a direct physiological consequence of a drug of abuse, a medication, another somatic treatment for depression, or toxin exposure.

*Mood Disorder Not Otherwise Specified* is included for coding disorders with mood symptoms that do not meet the criteria for an)' specific Mood Disorder and in which it is difficult to choose between Depressive Disorder .o t Otherwise Specified and Bipolar Disorder Not Otherwise Specified (e.g., acute agitation).

### **Schizophrenia and Other Psychotic Disorders**

*Schizophrenia* is a disorder that lasts for at least 6 months and includes at least 1 month of active-phase symptoms (i.e., two [or more] of the following: delusions, hallucinations, disorganized speech, grossly disorganized or catatonic behavior, negative symptoms).

*Schizophreniform Disorder* is characterized by a symptomatic presentation that is equivalent to Schizophrenia except for its duration (i.e., the disturbance lasts from 1 to 6 months) and the absence of a requirement that there be a decline in functioning.

*Schizoaffective Disorder* is a disorder in which a mood episode and the active phase symptoms of Schizophrenia occur together and were preceded or are followed by at least 2 weeks of delusions or hallucinations without prominent mood symptoms.

*Delusional Disorder* is characterized by at least 1 month of non-bizarre delusions without other active-phase symptoms of Schizophrenia .

*Brief Psychotic Disorder* is a disorder that lasts more than 1 day and remits by 1 month.

*Shared Psychotic Disorder* is characterized by the presence of a delusion in an individual who is influenced by someone else who has a longer-standing delusion with similar content.

In *Psychotic Disorder Due to a General Medical Condition*, the psychotic symptoms are judged to be a direct physiological consequence of a general medical condition.

In *Substance-Induced Psychotic Disorder*, the psychotic symptoms are judged to be a direct physiological consequence of a drug of abuse, a medication, or toxin exposure.

*Psychotic Disorder Not Otherwise Specified* is included for classifying psychotic presentations that do not meet the criteria for any of the specific Psychotic Disorders defined in this section or psychotic symptomatology about which there is inadequate or contradictory information.

### **Substance Use Disorders (Substance Dependence and Substance Abuse)**

The essential feature of **Substance Dependence** is a cluster of cognitive, behavioral, and

physiological symptoms indicating that the individual continues use of the substance despite significant substance-related problems. There is a pattern of repeated self-administration that can result in tolerance, withdrawal, and compulsive drug taking behavior. A diagnosis of Substance Dependence can be applied to every class of substances except caffeine. The symptoms of Dependence are similar across the various categories of substances, but for certain classes some symptoms are less salient, and in a few instances not all symptoms apply (e.g., withdrawal symptoms are not specified for Hallucinogen Dependence). Although not specifically listed as a criterion item, "craving" (a strong subjective drive to use the substance) is likely to be experienced by most (if not all) individuals with Substance Dependence. Dependence is defined as a cluster of three or more of the symptoms listed below occurring at any time in the same 12-month period.

The essential feature of **Substance Abuse** is a maladaptive pattern of substance use manifested by recurrent and significant adverse consequences related to the repeated use of substances. In order for an Abuse criterion to be met, the substance-related problem must have occurred repeatedly during the same 12-month period or been persistent. There may be repeated failure to fulfill major role obligations, repeated use in situations in which it is physically hazardous, multiple legal problems, and recurrent social and interpersonal problems. Unlike the criteria for Substance Dependence, the criteria for Substance Abuse do not include tolerance, withdrawal, or a pattern of compulsive use and instead include only the harmful consequences of repeated use. A diagnosis of Substance Abuse is preempted by the diagnosis of Substance Dependence if the individual's pattern of substance use has ever met the criteria for Dependence for that class of substances.

Although a diagnosis of Substance Abuse is more likely in individuals who have only recently started taking the substance, some individuals continue to have substance-related adverse social consequences over a long period of time without developing evidence of Substance Dependence. The category of Substance Abuse does not apply to caffeine and nicotine. The term abuse should be applied only to a pattern of substance use that meets the criteria for this disorder; the term should not be used as a synonym for "use," "misuse," or "hazardous use."

### Demoralization Syndrome

Within the psycho-oncology field a specific syndrome called Demoralization has been identified (Kissane, Clarke et al. 2001; Clarke and Kissane 2002). The Demoralization Syndrome can be described as a clinical condition where people experience existential despair symptoms, such as loss of meaning, hopelessness impotence-helplessness, loss of purpose, pessimism, feeling of being trapped, social isolation, aloneness and lack of support (de Figueiredo 1993; Clarke and Kissane 2002).

It is distinct from depression as there is no Anhedonia and no reduction in magnitude of motivation (de Figueiredo and Frank 1982; Cockram, Doros et al. 2009). Demoralization could be risk factor for psychopathological conditions and/or physical illnesses (Tecuta, Tomba et al. 2014) and could also be considered as a possible element in the delicate relationship between mental and physical health. A prevalence of 20% of moderate to severe demoralization was referred in cancer patients in a recent work (Vehling and Mehnert 2014) where it was also pointed out that loss of dignity significantly mediated 81% of the effect of the number of physical problems on demoralization. Also a global sense of meaning was shown to be an important protecting factor regarding the development of demoralization among cancer patients (Vehling, Lehmann et al. 2011).

The demoralization syndrome features are frequently highlighted in people with a diagnosis of cancer or other severe physical illnesses (Clarke, Kissane et al. 2005; Mangelli, Fava et al. 2005), yet, given the major changes in people's life that ageing entails, it could be an important issue also in the elderly. However so far no specific research has been done on demoralization syndrome in the elderly general population.

#### **1.2.4 Mental Disorders Prevalence**

According to estimates by the World Health Organization, mental disorders concern about 15% of people aged 60+ (WHO 2013) furthermore 6.6% of all disability (disability adjusted life years-DALYs) in people over 60s is referable to neurological and mental disorders (Murray, Vos et al. 2012).

In a recent meta-analysis by Volkert et al. (Volkert, Schulz et al. 2013) the

following data were derived concerning prevalence of mental disorders in the elderly:

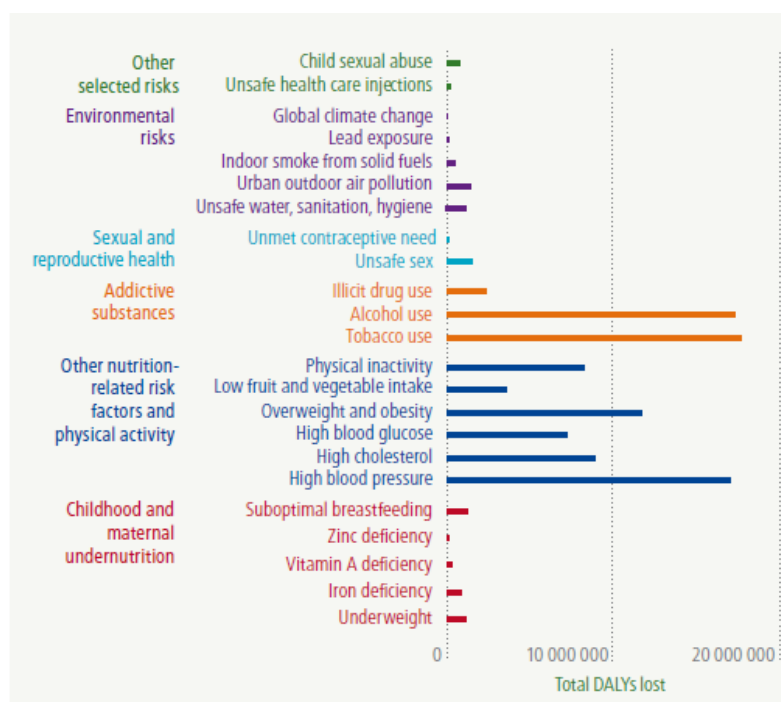
- Disorders with the highest prevalence estimates were dimensional depression (19.47%), lifetime major depression (16.52%), and lifetime alcohol use disorders (11.71%).
- Disorders with the lowest estimates were current and lifetime drug use disorders (0.34% and 0.19%, respectively), and current bipolar disorder and current agoraphobia (both 0.53%).
- The estimate of current psychosis was 1.7%, and the estimate of lifetime psychosis was 4.7%.
- Concerning Anxiety disorders, the highest prevalence was for lifetime specific Phobia (6.66%) followed by Lifetime Generalized Anxiety Disorder (6.36%) and Lifetime Social Phobia (5.07%). Current Agoraphobia resulted as the least prevalent (0.53%).

The mainstream results of the MentDis-ICF65+ study showed that the most prevalent mental disorders in the Elderly were anxiety disorders (17.2%), affective disorders (13.7%) and substance-related disorders (8.9%) (Andreas, Schulz et al. 2015 submitted).

It has finally to be noted that mental health has an influence on physical health and vice versa. For example, older adults with physical health conditions such as heart disease have higher levels of depression than those who are medically healthy. On the other hand, untreated depression in an older person with heart disease can adversely affect the consequence of the physical disease (Frasure-Smith and Lesperance 2006; Goldston and Baillie 2008).

## 1.2 Risk factors and Protective factors

Given the serious implications of having an increasingly older proportion of the population with the consequent health issues mentioned so far, an important area to consider is disease prevention and health promotion. It involves an analysis of the possible factors (health risks, socioeconomic situations, environmental and behavioural determinants) that influence the distribution of diseases (WHO 2013).



**Figure 3** - Attributed DALYs (Disability-adjusted life year) lost by risk factor in the European Region, 2004 (WHO 2013)

As shown in Figure 3 among the major causes of DALY lost, an important role is covered by what we could call “life styles”, such as alcohol use, tobacco use, physical inactivity and low fruit and vegetable intake, that are in turn linked to health issues such as high blood pressure, overweight and obesity, high cholesterol.

Given such strong relationships, many efforts have recently been employed in order to understand how to change people’s habits, in particular, for example, on how to increase people’s physical activity (WHO 2015). A recent development in this area has been concerning the influence of the introduction in people’s lives of ever increasing time spent watching Television (TV). TV viewing has actually been associated with many health problems, even in adults and elderly.

### *TV viewing and physical health*

Television (TV) viewing is a familiar, pervasive way of spending leisure time at all ages. Time spent watching TV by Europeans has lately been estimated to be 22.1 hours per week on average (Nationmaster 2009). In adults, TV viewing, frequently used as a measure of sedentary behaviour, has been correlated with a number of severe health risks, such as higher risk of obesity and type 2 diabetes mellitus in a longitudinal study (Smith and Hamer 2014) in women (Hu, Li et al. 2003), and in men (Hu, Leitzmann et al. 2001; Grontved and Hu 2011) in prospective cohort studies, higher risk of obesity and cardiovascular diseases in longitudinal and cross-sectional studies (Fung, Hu et al. 2000; Jakes, Day et al. 2003; Marshall, Biddle et al. 2004; Bowman 2006), metabolic syndrome in cross-sectional works (Dunstan, Salmon et al. 2005; Gao, Nelson et al. 2007; Wijndaele, Duvigneaud et al. 2009), atherosclerosis in a cross-sectional study (Kronenberg, Pereira et al. 2000), sleep problems (Basner and Dinges 2009).

Recent works have even highlighted the possible association between TV viewing and cancer risk (Behrend 2014; Ukawa, Tamakoshi et al. 2014) and colorectal adenoma in a cross-sectional research (Cao, Keum et al. 2015). Another longitudinal one in adults, found that Television viewing was directly associated with all-cause mortality (Basterra-Gortari, Bes-Rastrollo et al. 2014). Finally a recent meta-analysis showed that the risk of all-cause mortality appeared to increase with TV viewing of duration higher than 3 hours per day (Grontved and Hu 2011).

### *TV viewing and mental health*

In the young/adult population, TV viewing has also been related with risk for mental health disorders. In a Spanish work, Sanchez and colleagues found an association between sedentary activities (watching TV and computer use) and the incidence of mental disorders (Sanchez-Villegas, Ara et al. 2008). In a Scottish survey, Hamer et al. concluded that TV and screen-based entertainment were associated with poorer mental health scores in a representative population sample of adults (Hamer, Stamatakis et al. 2010). De Wit and colleagues report that, independently of physical activity quantity, sedentary behaviors occur more frequently among persons with a mental disorder. In particular in this Dutch study, TV viewing was higher in people with dysthymia, panic disorder and agoraphobia

compared to controls (de Wit, van Straten et al. 2011). Atkin, Adams et al found a negative association between sedentary activities (including TV viewing) and mental health scores in women in the UK (Atkin, Adams et al. 2012). Dempsey et al. in an Australian extensive survey with almost 10.000 older people, found that TV viewing time is associated adversely with physical well-being, mental well-being and vitality (Dempsey, Howard et al. 2014). Finally, in an important longitudinal study, the English Longitudinal Study for Ageing, Hamer and associates found a cross-sectional and longitudinal association between TV viewing and depressive symptoms (Hamer, Poole et al. 2013; Hamer and Stamatakis 2013).

#### *TV viewing and cognitive functioning*

Furthermore, TV viewing has been linked to a possible increased risk of cognitive impairment. In the previously cited Longitudinal study, Hamer et al found an inverse association between TV viewing and cognitive function levels (Hamer and Stamatakis 2013). A 5-year longitudinal study in China found that watching television was associated with a higher risk of developing a cognitive impairment (Wang, Zhou et al. 2006). Finally, another 6-years longitudinal study done in France found a negative association between time spent watching TV and executive functioning<sup>2</sup> (Kesse-Guyot, Charreire et al. 2012).

A recent review on the prevalence of sitting behaviour in people of 60+ years indicated that over 55% referred watching more than 2 hours of TV daily. However, while the previously cited studies have mostly focussed on adults, little has been published on the effects of TV viewing on people over 65 years old (Lucas, Mekary et al. 2011; Kikuchi, Inoue et al. 2013). A recent review on the prevalence of sitting behaviour in of people of 60+ years indicated that over 55% referred watching more than 2 hours of TV daily (Harvey, Chastin et al. 2013).

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<sup>2</sup> **Executive functioning** (EF) is a multifaceted neuropsychological construct that can be defined as (1) forming, (2) maintaining, and (3) shifting mental sets, corresponding to the abilities to (1) reason and generate goals and plans, (2) maintain focus and motivation to follow through with goals and plans, and (3) flexibly alter goals and plans in response to changing contingencies (Suchy, Y. (2009). "Executive functioning: overview, assessment, and research issues for non-neuropsychologists." *Ann Behav Med* **37**(2): 106-116.



### ***1.3 Protective factors: New developments from the Neurosciences***

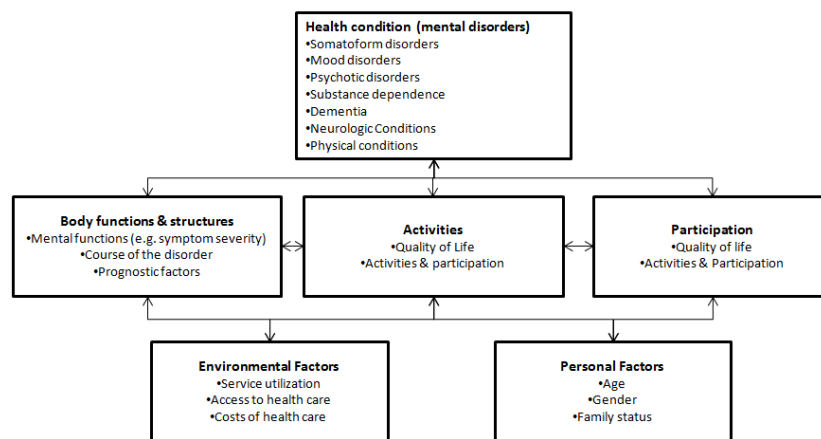
As mentioned above, the positive effect of an active lifestyle, especially the healthy consequences of physical activity for the entire body, and the complementary detrimental effects of a sedentary lifestyle, is a longstanding common knowledge (de Rezende, Rey-Lopez et al. 2014). It is only in the recent years that new evidence is building on the definition of possible similarly protective factors for the brain. The most recent research in the Neurosciences field in fact indicates that the cognitive decline related to ageing shouldn't be considered as inexorable. The key words are "neuroplasticity", "neurogenesis" and "enriched environment". *Neuroplasticity* refers to the possibility of the brain structures to change with the experience, i.e. with the interaction between the person and the environment. *Neurogenesis* refers to the possibility of the brain to build new neurons, again, according to the individual experience. *Enriched environment (EE)* consists of the "exposure to sensory, cognitive, motor, and socially enriched conditions" (Sale, Berardi et al. 2014).

An important recent review (Sale, Berardi et al. 2014) on the most advanced research on brain plasticity and neurogenesis conclude that an Enriched Environment, a completely non-invasive setting, has strong influences on brain plasticity, "evident in developing, adult and even aging brain, under both physiological and pathological conditions" (op.cit. p. 220). This idea leads also to the conclusion that people's lifestyle has a profound impact on both physiological and pathological aging process.

*With the enduring and frustrating absence of efficacious pharmacological compounds capable to arrest the deterioration of cognitive abilities with aging or the progression of dementia in AD, an active life remains one of the very few accepted prescriptions of medicine for a substantial improvement of brain functions in the elderly (Sale, Berardi et al. 2014) p. 220 .*

## 1.5 The ICF – International Classification of Functioning Disability and Health

The International Classification of Functioning, Disability and Health (ICF) model (WHO 2002) affirms that while the diagnosis is very important, additional factors and components can affect the quality of a person’s life. The ICF is based on the *bio-psycho-social model* of health and disability and classifies functionality at different levels (op. Cit.). The first component refers to functioning and disability based on dimensions of “body functions and structures” and “activities and participation”. Two further components of the model are the dimensions of “environmental factors” and “personal factors” (Figure 4) (Andreas, Harter et al. 2013).



**Figure 4** - The Model of the International Classification of Functioning, Disability and Health applied to the study aims of the MentDis\_ICF65+ project (ICF) (WHO 2002)

Functioning and disability are viewed as a multilevel interface between the health condition of the individual and the related factors of the environment as well as personal ones. The classification describes these dimensions as interactive and dynamic rather than linear or static. It enables an assessment of the degree of disability, though it is not a measurement instrument. The language of the ICF is neutral regarding aetiology, focusing on function rather than condition or disease. It also is thoroughly designed to be relevant across cultures as well as age groups and genders, making it extremely appropriate for diverse populations (WHO 2002).

Knowing how a disease impacts one's functioning allows also improved services planning and management, treatment, and rehabilitation for people with long-term disabilities or chronic diseases. The implications of using the ICF include highlighting the resources of individuals, assisting individuals in participating more extensively in society by the use of interventions directed to improving their skills, and taking into consideration the environmental and personal factors that might hamper one's participation (Bornman 2004).

## **2. Materials and methods**

### ***2.1 The MentDis\_ICF65+ Study***

The present research is part of the broad MentDis\_ICF65+ (MentDis) Study, funded by the European Commission under the 7<sup>th</sup> Framework Programme<sup>3</sup>.

The MentDis\_ICF65+ project, as the name indicates, was designed to investigate the area of mental health in the elderly, taking into account the ICF classification, and to improve the quality and comparability of epidemiological data in Europe through the use of standardized methods (Andreas, Harter et al. 2013).

The main aims of the MentDis project were therefore to:

1) adapt a structured diagnostic interview for the assessment of mental disorders in older people according to ICD-10 and DSM-IV standards.

2) assess prevalence rates of mental disorders in the elderly in different European and European associated countries together with incidence rates and their association to symptom severity, levels of activity and participation and service utilization as indicated by the ICF dimensions.

The following research questions (RQ) were derived:

RQ 1: How feasible is an adapted version of a standardized/structured diagnostic interview for the needs of people age 65 and above in different European and European associated countries?

RQ 2: How reliable and valid are the adapted and translated standardized/structured diagnostic interview and the newly translated instruments?

RQ 3: What are the point, year and lifetime prevalence rates of mental and physical disorders among the elderly population of different European and European associated countries and what is the relationship of this prevalence to symptom severity, activities and participation and service utilization?

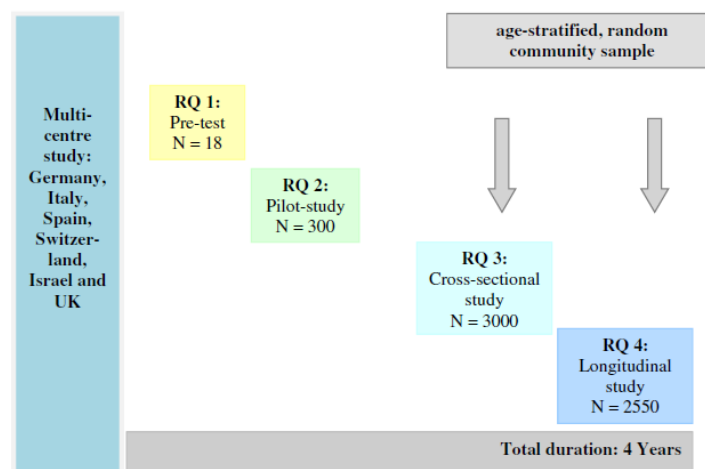
RQ 4: What is the one-year incidence rate of mental disorders among community respondents aged 65 and above and what is the 12-month course and outcome

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<sup>3</sup> [http://ec.europa.eu/research/health/public-health/health-systems/projects/mentdis-icf65\\_en.html](http://ec.europa.eu/research/health/public-health/health-systems/projects/mentdis-icf65_en.html)

(prognosis) of mental disorders in older people in different European and European associated countries? (Andreas, Harter et al. 2013)

The study design of the MentDis\_ICF65+ project is represented in Figure 5 (Andreas, Harter et al. 2013). To answer RQ 1, a pre-test phase was conducted. This stage was dedicated to the adaptation of age- and gender-specific assessment tools (e.g., Composite International Diagnostic Interview, CIDI) and to the translation and back translation of these instruments for the elderly. An in-depth review of the significant literature followed by a detailed multi-level analysis of the quality criteria for different assessment tools (e.g., practicability, reliability and validity), as well as language availability and prior application in an elderly sample were performed. Next, the instrument adaptation was performed. Various methods were employed to test the feasibility, acceptability and usability of the adapted instruments, including expert-panel review, respondent debriefing, simple testing (interviewer feed-back), and behaviour coding from a sample of 18 participants with and without mental disorders. This part was carried out at two centres in Hamburg (Germany) and London (UK) (see Figure 5).



**Figure 5** - Design of the MentDis\_ICF65+study (RQ= research question) (Andreas, Harter et al. 2013)

For RQ 2, a pilot-phase was carried out. A sample of 50 inpatients and outpatients in each of 6 countries (for a total of 300 patients) were selected. These patients with different mental and physical disorders were interviewed in Germany, Hamburg and Dresden, as well as in Italy Ferrara, Israel Jerusalem, Spain Madrid, Switzerland Geneva and in UK London. To evaluate instrument reliability, a subsample of 150 inpatients and outpatients (25 from each country) with different

mental and physical disorders were interviewed twice 3 to 7 days after the first meeting.

To assess RQ 3 and 4, a stepwise cross-sectional and prospective longitudinal design was performed. The multi-centre study in six European countries and associated states was based on an age-stratified, random sample of 3000 subjects living in selected catchment community areas of each participating country (500 subjects from each country). Additionally, all participants in the cross-sectional study were contacted for follow-up participation one year later.

Participant inclusion criteria were the ability to provide informed consent, living at home in the predefined catchment area at the beginning of the cross-sectional study, and ages between 65 and 84 years, respectively. The exclusion criteria for the participants were severe cognitive impairment as assessed with the MMSE (Mini-Mental State Examination, cut-off score > 18) in the screening part of the diagnostic instrument, making the administration of assessment instruments impossible, and insufficient understanding of the corresponding language. Qualified and trained interviewers screened patients for inclusion and exclusion criteria. These interviewers remained in close contact with the study's research staff.

Table 2 provides an overview of the study measures for the whole MentDis\_ICF65+ project covering all domains of the ICF (see also Figure 4). These instruments were used to answer RQ 3 and 4.

**Table 2 - MentDis\_ICF65+ assessment battery covering ICF domains**

<b>ICF domain: personal factors</b>	
<i>Instrument</i>	<i>Content</i>
Adapted version of the Composite International Diagnostic Interview for the elderly (CIDI65+) (Wittchen, Strehle et al. 2014)	Socio-demography
<b>ICF domain: health condition and body functions and structures</b>	
Adapted version of the Composite International Diagnostic Interview for the elderly (CIDI65+) (Wittchen, Strehle et al. 2014)	Screening for nicotine abuse Somatic, Somatoform disorders Anxiety disorders Depressive disorders Bipolar disorders Psychotic symptoms Screening for alcohol abuse

<b>ICF domain: personal factors</b>	
Health of the Nation Outcome Scales 65+, HoNOS-65+ (Burns, Beevor et al. 1999)	Obsessive compulsive disorder Screening for drugs and medication abuse Posttraumatic stress disorder, adjustment disorder
10-item version of the Big Five Inventory BFI-10	Cognitive impairment (MMSE)
Shalev's Coping Efficacy Scale (CES)	Current medical conditions  Symptom severity
<b>ICF domain: activities and participation</b>	Personality assessment
WHOQoL-BREF (The WHOQOL Group 1998)	Assessment of coping efficacy
WHODAS II (WHO 2001; Sousa, Dewey et al. 2010)	
<b>Additional Questionnaires</b> (used only in Hamburg, Ferrara and Geneva study centres)	
International Physical Activity Questionnaire (IPAQ) (Hallal and Victora 2004; IPAQ-Group 2005) + TV viewing and sedentary time item	Quality of life  Assessment of activities and participation, Level of Functioning
Demoralization Scale (Kissane, Wein et al. 2004)	Assessment of physical activity, TV viewing and sitting time  Demoralization syndrome

### *The Composite International Diagnostic Interview for the elderly (CIDI65+)*

The main instrument of the study was a standardised diagnostic interview used to gather data on the current and lifetime prevalence and incidence of mental disorders in the elderly (RQ 3 and 4). The study group adapted and translated the broadly used "Composite International Diagnostic Interview" (Wittchen, Strehle et al. 2014) to the needs of the elderly. The CIDI65+ is adapted to the specific social, cognitive and psychological abilities and needs of the elderly. Both the paper and the computerised version of this instrument were adapted and translated; the computerised one was employed as main tool while the paper one only as emergency tool. The interview evaluates, within the area of mental health: somatoform disorders, anxiety disorders (panic, panic disorder, GAD, agoraphobia, social and specific phobias), depressive disorders, bipolar disorders, psychotic symptoms, obsessive-compulsive disorders, substance abuse (screening sections for nicotine, alcohol, drugs/medication), adjustment disorders, acute stress- and post-traumatic stress disorders. It also investigates the presence of somatic morbidity, in particular chronic conditions such as cardiac and

circulatory system diseases. nervous system diseases, musculoskeletal and inflammatory diseases and so on.

#### *The Health of the Nation Outcome Scales65+ (HoNOS65+)*

The HoNOS65+ is an instrument for the severity level evaluation of 12 problem areas (e.g. item 7: depressive mood; item 2: self-harm). Numerous studies have assessed the mostly satisfactory psychometric properties of the HoNOS65+ (Pirkis, Burgess et al. 2005). Moreover, the HoNOS65+ is one of the six most widely used assessment scales in elderly psychiatry services (Reilly, Challis et al. 2004).

#### *The short version of the Big Five Inventory (BFI-10)*

In order to assess personality traits, another important component of the body function and structure domain based on the ICF, the short version of the Big Five Inventory (BFI-10) was used. This instrument was derived from the 44-item version of the BFI by Rammstedt and John (Rammstedt and John 2007). The BFI-10 covers five personality domains: extraversion, agreeableness, conscientiousness, neuroticism, and openness on a five-point Likert scale (1 = disagree strongly to 5 = agree strongly). This shortened version of the BFI provides satisfactory psychometric properties (op.cit).

#### *World Health Organization's QoL measure (WHOQoL-BREF)*

To determine the quality of life the WHO Quality of Life short version (WHOQoL-BREF) was used (The WHOQOL Group 1998). The WHOQoL-BREF was developed by the World Health Organization from the WHOQoL-100 item version as a 26-item questionnaire and applies a five-point Likert scale to measure the individual's view in the context of their culture and value systems, and their personal goals, standards and concerns. The questionnaire includes dimensions of physical and psychological well-being, environmental factors and social support. The psychometric properties were found to be satisfactory (op. cit).

#### *World Health Organization disability assessment schedule II (WHODAS II)*

The assessment of activities and participation (based on ICF categories) was completed using the World Health Organization Disability Assessment Schedule II (WHODAS II) (WHO 2001; Sousa, Dewey et al. 2010). The WHODAS II is a generic tool assessing the functional impairment of daily activities in six different



areas constituting six subscales: mobility, household, cognitive, social, self-care and society. It provides also a total functionality score, given by the simple sum score of the single items, as well as a disability degree based on score ranges (12= no disability, 13-16= mild disability, 17-21= moderate disability, >22 = severe disability).

#### *Shalev's coping efficacy questionnaire (CES)*

This short evaluation scale is made of four items addressing domains of coping efficacy: ability to pursue task performance, emotional control, ability to sustain rewarding interpersonal contacts and ability to maintain positive self-image.

#### *Mini Mental State Evaluation (MMSE)*

Cognitive functioning was measured through the Mini Mental State Evaluation (MMSE) (Tombaugh and McIntyre 1992). This is a short tool (30 items with an average delivery time of 10 minutes) normally used for cognitive impairment screening and severity evaluation (Folstein, Folstein et al. 1975). It requests to adjust the final scores based on age and education (O'Connor, Pollitt et al. 1989). Although it does not provide a definitive diagnosis for dementia, it has sufficient psychometric properties to be considered helpful to investigate cognitive functioning in general (Tombaugh and McIntyre 1992; Crum, Anthony et al. 1993).

As previously specified, in the present study people with severe cognitive impairment were excluded. People were considered as having a Mild Cognitive impairment with a 18-26 MMSE score, while with 27-30 score they were considered with no cognitive impairment.

## **Additional questionnaires**

The additional questionnaires that were employed in three centres (Hamburg, Geneva and Ferrara) were used to answer further more specific research questions regarding physical activity, TV viewing and Demoralization, as will be explored in more detail.

### *International Physical Activity Questionnaire (IPAQ)*

Physical activity levels were collected through the International Physical Activity Questionnaire (IPAQ), using the short last 7 days self-report telephone version, even though it was used during the face to face interview (Craig, Marshall et al. 2003; Hallal and Victora 2004). This version was chosen as it was shorter to complete compared to the general one. This plain questionnaire records information on the time people spent doing three different types of physical activities (vigorous, moderate and walking) during the previous week. The original version comprised a fourth area related to the sedentary behaviour that included time spent viewing television. For the objective of our study the question was to some extent modified to divide TV viewing time from the time spent in other sedentary activities (having meals, reading, travelling by car and so on).

In order to ease completion by the elderly, rather than asking to remember for how many hours and minutes they performed each type of activity on average per day, they were asked to choose between six options (<10 minutes, 10-30 minutes, 30 min-1 hour, 1-2 hours, 2-3 hours, >3 hours). In fact less than 10 minutes is considered not sufficient physical activity (Sun, Norman et al. 2013), while more than 3 hours can be considered as a very high level of physical activity for the 65-84 age group.

This allowed to compute an overall energy expenditure estimate in Metabolic Equivalent Total (MET)-units, a standard and comparable way to measure the energy “cost” of physical activities: it allows to summarize in a single number diverse types of activities. The Total weekly MET minutes were obtained from multiplying duration of activity times frequency of activity times MET intensity, as provided by the IPAQ guidelines (IPAQ-Group 2005). Low physical activity was considered when total weekly MET were lower than 600, moderate between 600 and 3000, high levels when higher than 3000.

### *TV Viewing*

Time spent viewing TV in the previous week was obtained through the use of a self report instrument. Similarly to the questions regarding physical activity, people were asked to specify on how many days they happened to watch TV during the previous week (0-7) and to choose for how long on average each day between six options (<10 minutes, 10-30 minutes, 30 min-1 hour, 1-2 hours, 2-3 hours, >3 hours). The weekly TV viewing hours was calculated by multiplying the average time spent daily (eg. for the “1-2 hours” category we considered 150 minutes) by the number of days (range 0-1260 minutes per week).

### *Demoralization Scale*

The Demoralization Scale (DS) is a 24 questions on 5-points Likert scale (0= never; 4= always) on people’s issues around Demoralization Syndrome in the previous 2 weeks (Kissane, Wein et al. 2004; Mullane, Dooley et al. 2009). It was initially validated on 100 patients with different types of advanced cancer and 5 subscales were identified, corresponding to the core dimensions of demoralization (i.e. loss of meaning, dysphoria, disheartenment, helplessness, and sense of failure). The DS has been validated within oncology patients in several countries, including Germany (Mehnert, Vehling et al. 2011), Ireland (Mullane, Dooley et al. 2009), Taiwan (Lee, Fang et al. 2012) and Hungary (Hadnagy, Csikos et al. 2012).

## ***2.2 Specific research questions***

In this work we propose to investigate some specific research questions arising from the previously mentioned role of people's lifestyles on their physical and mental health, in particular in the elderly population. More specifically we were interested in the role of TV viewing as possible unhealthy sedentary choice or as potential risk factor within the delicate health of the elderly.

Our research questions (RQ) are therefore:

**RQ1. What is the association of TV viewing habits with physical health?**

**RQ2. What is the association of TV viewing habits with people's mental (including cognitive) health?**

**RQ3. What is the association of TV viewing habits with Demoralization?**

**RQ4. Which are the mental and/or physical problems that are mostly associated with TV viewing?**

The instruments used were consequently:

CIDI 65+ (in particular for the socio-demographic data and the diagnoses of main mental disorders, as well as for the list of medical problems and chronic conditions); IPAQ modified (including TV viewing); WHO-QoL; Mini Mental State Examination; Demoralization Scale.

Concerning possible covariates we also included the data from the WHODAS II as measure of level of functioning (or disability) as it could give an indication of the actual possibility for people to move.

### ***2.3 Sample***

For the present analyses we used the data of the first wave (cross-sectional) of the MentDis\_ICF65+ study. All participants underwent the assessment during individual meetings either at their homes or at the local research structures between January and October 2011 and gave written informed consent for participation according to the local institutional Ethics Committees (Andreas, Haerter et al. 2013). Of the 3142 total participants to the MentDis study, in this work we examined results from a subsample of 1383 subjects from three centres - Italy, Switzerland and Germany - where specific additional data on TV viewing and physical activity were gathered.

#### *Socio-demographic characteristics*

The sample was made of 725 (52.4%) male, 658 female (47.6%), mean age 72.5 (S.D. 5.69), 35.1% (n= 486) from Ferrara (Italy), 27.5% (n= 380) from Hamburg (Germany) and 37.4% (n= 517) from Geneva (Switzerland).

The majority of people interviewed were living with one or more other people (70.8%) while only 29.2% were living alone. Regarding their marital status, 877 (63.5%) were married, 440 (31.8%) were separated, divorced or widowed, 65 (4.7%) had never been married). The participants attended school for 10.3 years on average (SD= 2.8 years) and most graduated from the last school they attended (88.7%).

At the time of the interview the vast majority of participants were retired (91.3%). More than half of the participants (831, 60.3%) rated their financial situation as “good” or “very good”, while 39.3% (n= 548) affirmed it was “just enough”, “low” or “very low”.

Table 3 reports the same socio-demographic characteristics, divided by male and female subjects.

**Table 3 - Socio-demographic characteristics of the sample**

	<b>Female</b>	<b>Male</b>
<b>Age</b>	73.2 ( 5.44)	73.2 ( 5.28)
<b>Years of Schooling</b>	10.03 ( 2.97)	10.7 (2.75)
<b>Graduated last school</b>	552 (85.6%)	654 (91.6%)
<b>Lives alone</b>	286 (43.5%)	117 (16.2%)
<b>Financial Situation</b>		
Very good	96 (14.6%)	83 (11.5%)
Good	297 (45.3%)	355 (49.1%)
Just enough/ low /very low	263 (40.1%)	285 (39.4%)
<b>Work status</b>		
Working	620 (95.7%)	677 (93.9%)
Not working	28 (4.3%)	44 (6.1%)
<b>Study Centre</b>		
Hamburg	177 (26.9%)	203 (28.0%)
Ferrara	216 (32.8%)	270 (37.2%)
Geneva	265 (40.3%)	252 (34.8%)

## **2.4 Statistics**

IBM SPSS 20.0 was used to perform all statistical analyses.

We computed TV viewing outcomes and covariates in relation to the main research variables, i.e. self-rated mental health, psychiatric diagnoses (mainly depression and anxiety) and cognitive functioning for RQ1, self-rated physical health and medical diagnoses for RQ2, Demoralization scale for RQ3, all of the above for RQ4. We tested differences with  $\chi^2$  analyses, T-test or ANOVA test where appropriate.

Stepwise multiple regression analyses, adjusted for covariates (gender, age, level of education, employment status, financial situation, living status, study centre, physical activity level (weekly MET total), Level of Functioning (WHODAS II score) were performed to test the association between TV viewing as dependant variable (between 0 and 1260 minutes per week)) and the RQ corresponding questions variables.

### 3. Results

Of the initial group of questionnaires, 166 had to be excluded because the questionnaires were not complete (IPAQ-Group 2005). The sample was therefore made of a total of 1383 subjects.

Concerning sedentary habits, we found that the average daily hours of TV viewing was 1.81 (S.D. 0.94, range 0-3), sitting only was 2.01 (S.D. 0.96 range 0-3) and total daily sedentary time was 3.7 (S.D. 1.44, range 0-6) (see Table 4).

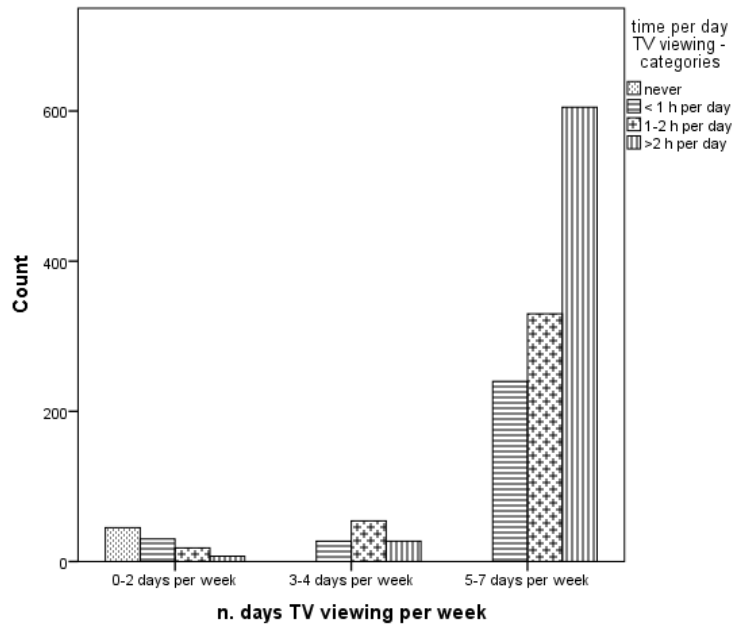
**Table 4** - Physical activity, sedentary habits and Level of Function average scores

<b>N= 1383</b>	<b>Mean</b>	<b>SD</b>
<b>Physical activity - Weekly MET total</b>	3516.64	(3506.1)
<b>Daily hours sitting</b>	2.01	(0.96)
<b>Daily hours of TV watching</b>	1.81	(0.94)
<b>Total daily sedentary hours (TV + sit)</b>	3.7	(1.44)
<b>Level of Functioning: WHODAS II simple sum score<sup>^</sup></b>	16.38	(5.67)

<sup>^</sup> score > 13= some disability

Furthermore, 85.5% (n= 1175) of the sample watched 5-7 days/week (43.75% (n= 605) for >2 hours per day, 23.9% (n= 330) for 1-2 hour per day, 17.4% (n= 240) for < 1 hour per day), 7.8% (n= 108) watched for 3-4 days, 7.2% watched between 0 and 2 days (n= 100), only 3.3% (n= 45) of the total sample declared to have never watched TV in the previous week (p< 0.001) (see Graph 1).

**Graph 1** - Distribution of days and hours of TV viewing in the sample



Overall, of the total weekly sedentary time (25.83 hours or more), 45.4% was occupied by TV viewing.



### **3.1 RQ1. What is the association of TV viewing habits with physical health?**

In order to answer this question we referred to two sources of information within the data set. First one was a list of physical health problems that people had to identify for their personal situation (with yes or no answer), based on a subjective evaluation of how they currently were. These included problems such as “persistent pain”, “weakness”, “hypertension” and so on (see Appendix for the complete list). The second one was a list of medical problems that people could have had in the previous 12 months, such as “coronary heart disease”, “tension headache”, “arthrosis” and so on (see appendix for the complete list), that were actually diagnosed by a doctor (yes/no here too).

#### **3.1.1 Self-reported current health problems**

The overall t-tests comparing average physical activity, sedentary habits - except for the daily hours sitting variable - and level of functioning highlight an association between these variables and currently having or not one or more physical problems. In general people who have one or more physical problem tend to move less, watch more TV and have a lower level of functioning (see Table 5).

**Table 5** - T-test results comparing people with one or more current self-reported physical health problem (yes/no) on sedentary habits and Level of Functioning

<b>SELF-REPORTED PHYSICAL HEALTH</b> (n= 1382)	<b>No problems</b> (n= 215)	<b>One or more problem</b> (n= 1168)	<b>p value</b>
<b>Physical activity - Weekly MET total</b>	4027.5 (241.0)	3422.5 (102.2)	p< 0.05
<b>Daily hours sitting</b>	2.05 (0.06)	2.00	p= 0.52
<b>Daily hours of TV watching</b>	1.39 (0.06)	1.72 (0.02)	p< 0.001
<b>Total daily sedentary hours (TV + sit)</b>	3.44 (0.08)	3.73 (0.04)	p< 0.01
<b>Level of Functioning: WHODAS II simple sum score<sup>^</sup></b>	13.46 (0.14)	16.92 (0.17)	p< 0.001

<sup>^</sup> score > 13= some disability

Such association could in fact be expected and in order to better highlight which problems in particular were related to a higher level of TV viewing, we performed t-test analyses for each problem. Results are described in Table 6, and show that there is a statistically significant higher time spent watching TV for people who reported to have persistent pain, heart disease, hypertension, diabetes, problems breathing, physical handicap, and visual problems.

**Table 6** - T-test results comparing people with each self-reported physical health problem (yes/no) on sedentary habits and Level of Functioning

SELF REPORTED PHYSICAL HEALTH	N cases with problem (%)	Physical activity (weekly MET total)	Daily hours sitting	Daily hours TV viewing	Total daily sedentary hours (TV + sit)	Level of Functioning (WHODAS II score)
Persistent pain	246 (17.8%)	<b>Yes 2388.5</b>	Yes 2.12	<b>Yes 1.90</b>	<b>Yes 4.03</b>	<b>Yes 20.39</b>
		<b>No 3760.7 ***</b>	No 1.99	<b>No 1.62 ***</b>	<b>No 3.61 ***</b>	<b>No 15.52 ***</b>
Recurrent pain	389 (28.1%)	Yes 3546.1	Yes 2.04	Yes 1.68	Yes 3.73	<b>Yes 17.9</b>
		No 3505.1	No 2.00	No 1.66	No 3.67	<b>No 15.7 ***</b>
Weakness	152 (11.0%)	Yes 3071.2	<b>Yes 2.17</b>	Yes 1.78	<b>Yes 3.96</b>	<b>Yes 21.21</b>
		No 3571.6	<b>No 1.99 *</b>	No 1.66	<b>No 3.65 *</b>	<b>15.79 ***</b>
Heart disease	204 (14.8%)	<b>Yes 3072.3</b>	Yes 2.10	<b>Yes 1.83</b>	<b>Yes 3.94</b>	<b>Yes 18.57</b>
		<b>No 3593.5 *</b>	No 1.99	<b>No 1.64 *</b>	<b>No 3.64 **</b>	<b>No 16.01 ***</b>
Hypertension	561 (40.6%)	<b>Yes 3259.1</b>	Yes 1.98	<b>Yes 1.83</b>	<b>Yes 3.82</b>	<b>Yes 16.92</b>
		<b>No 3692.4 *</b>	No 2.03	<b>No 1.56 ***</b>	<b>No 3.59 **</b>	<b>No 16.02 **</b>
Diabetes	152 (11.0%)	Yes 3132.7	<b>Yes 2.21</b>	<b>Yes 2.04</b>	<b>Yes 4.25</b>	<b>Yes 17.43</b>
		No 3564.1	<b>No 1.99 **</b>	<b>No 1.62 ***</b>	<b>No 3.61 ***</b>	<b>No 16.25 *</b>
Gastrointestinal problems	207 (15.0%)	Yes 3244.6	Yes 2.00	Yes 1.81	Yes 3.81	<b>Yes 18.45</b>
		No 3564.5	No 2.01	No 1.65	No 3.66	<b>No 16.02 ***</b>
Problems breathing (lung)	159 (11.5%)	Yes 3465.3	Yes 1.99	<b>Yes 1.98</b>	<b>Yes 3.98</b>	<b>Yes 19.25</b>
		No 3523.3	No 2.01	<b>No 1.63 ***</b>	<b>No 3.65 **</b>	<b>No 16.01 ***</b>
Cancer	63 (4.6%)	Yes 2973.4	Yes 2.15	Yes 1.83	Yes 3.98	<b>Yes 18.87</b>
		No 3542.5	No 2.00	No 1.66	No 3.67	<b>No 16.26 **</b>
Incontinence	95 (6.9%)	<b>Yes 2571.2</b>	Yes 2.01	Yes 1.81	Yes 3.82	<b>Yes 19.85</b>
		<b>No 3591.5 **</b>	No 2.01	No 1.66	No 3.67	<b>No 16.11 ***</b>
Physical handicap	122 (8.8%)	Yes 3408.2	<b>Yes 2.35</b>	<b>Yes 1.85</b>	<b>Yes 4.21</b>	<b>Yes 23.17</b>
		No 3527.1	<b>No 1.98 ***</b>	<b>No 1.65 *</b>	<b>No 3.63 ***</b>	<b>No 15.72 ***</b>
Hearing Problems	318 (23.0%)	Yes 3418.9	Yes 1.97	Yes 1.69	Yes 3.66	<b>Yes 17.85</b>
		No 3545.8	No 2.02	No 1.66	No 3.69	<b>No 15.94 ***</b>
Visual problems (or blindness)	385 (27.8%)	Yes 3246.8	Yes 1.99	<b>Yes 1.84</b>	<b>Yes 3.83</b>	<b>Yes 17.84</b>
		No 3620.7	No 2.02	<b>No 1.60 ***</b>	<b>No 3.63 *</b>	<b>No 15.82 ***</b>
Neurological disease	60 (4.3%)	Yes 2879.5	Yes 2.14	Yes 1.78	Yes 3.92	<b>Yes 21.4</b>
		No 3542.4	No 2.00	No 1.66	No 3.67	<b>No 16.16 ***</b>

In bold statistically significant differences between subjectively having (Yes) and not having (No) the specific problem; \* p< 0.05, \*\* p< 0.01, \*\*\* p< 0.001

By performing a stepwise regression analysis including as covariates gender, age, study centre, years of education, living status, level of functioning, number of medical diagnosis and physical activity and as dependent variable the weekly minutes of TV viewing, we obtained a 8 variable model explaining 0.11% of variance ( $R^2$ ), see Table 7. In such model the variables influencing TV viewing result to be level of education (with inverse proportion), having Diabetes, Level of Functioning, work status, having Hypertension and problems breathing, living alone, and level of physical activity (in inverse proportion).

**Table 7 - Regression analyses between TV viewing, self-reported physical problems and covariates**

	<b>Standardized coefficient - Beta</b>	<b>t</b>	<b>Sig.</b>
(Constant)		6.257	p< 0.001
Years of schooling	-0.188	-7.164	p< 0.001
Physical health, Diabetes	0.111	4.256	p< 0.001
WHODAS II simple sum score	0.087	3.205	p< 0.01
Work status	-0.115	-4.451	p< 0.001
Physical health, Hypertension	0.098	3.730	p< 0.001
Physical health, Problems breathing (lung)	0.074	2.818	p< 0.01
Household members number of people: None, lives alone	0.063	2.419	p< 0.05
weekly MET TOTAL	-0.060	-2.276	p< 0.05

Regression statistics based on linear regression analyses (adjusted for gender, age, study centre, years of education, living status, level of functioning, number of medical diagnosis and physical activity). Corrected R2= 0.11.

Therefore, in terms of self-reported current health status there are three areas mainly associated with TV viewing, i.e. diabetes, hypertension and problems breathing.

### 3.1.2 Medical problems according to diagnosis in the previous 12 months

Same analyses were performed considering the list of actual medical problems diagnosed in the previous 12 months. In terms of differences between having no medical problems or one or more, results are in Table 8 and show that, apart from time spent sitting, there are statistically significant differences between the two groups, and people with one or more problems tend to be less physically active, watch more TV, spend more overall sedentary time and have a lower level of functioning.

**Table 8 - T-test results comparing people with one or more diagnosed medical problem (yes/no) on sedentary habits and Level of Functioning**

<b>DIAGNOSED MEDICAL PROBLEMS (n= 1382)</b>	<b>No problems (n= 220)</b>	<b>One or more problem (n= 1162)</b>	<b>p value</b>
<b>Physical activity - Weekly MET total</b>	4020.91 (245.3)	3416.07 (101.8)	p< 0.05
<b>Daily hours sitting</b>	1.93 (0.06)	2.03 (0.02)	= 0.17
<b>Daily hours of TV watching</b>	1.46 (0.06)	1.71 (0.02)	p< 0.01
<b>Total daily sedentary hours (TV + sit)</b>	3.4 (0.08)	3.7 (0.04)	p< 0.01
<b>Level of Functioning: WHODAS II simple sum score<sup>^</sup></b>	14.31 (0.3)	16.78 (0.17)	p< 0.001

<sup>^</sup> score > 13= some disability

When analyzing the single medical diagnoses, again, daily hours sitting do not differ if having or not a specific medical diagnose. On the other side, focusing on TV viewing time the diagnoses that result statistically associated are: heart/circulatory system disease, musculoskeletal disease, respiratory system disease, stomach/digestive system disease, Endocrinological disease (Table 9 **Errore. L'origine riferimento non è stata trovata.**).

**Table 9** - T-test results comparing people with each diagnosed physical health problem (yes/no) on sedentary habits and Level of Functioning

<b>DIAGNOSED MEDICAL PROBLEMS</b>	<b>N cases with problem (%)</b>	<b>Physical activity (weekly MET total)</b>	<b>Daily hours sitting</b>	<b>Daily hours TV viewing</b>	<b>Total daily sedentary hours (TV + sit)</b>	<b>Level of Functioning (WHODAS II score)</b>
<b>Heart /circulatory system disease</b>	656 (46.5%)	Yes 3322.6	Yes 2.06	<b>Yes 1.78</b>	Yes 3.85	<b>Yes 17.19</b>
		No 3683.1	No 1.96	<b>No 1.57 ***</b>	No 3.56	<b>No 15.66 ***</b>
<b>Nervous system disease</b>	118 (8.5%)	Yes 3493.35	Yes 2.01	Yes 1.83	Yes 3.84	<b>Yes 20.25</b>
		No 3515.72	No 2.01	No 1.65	No 3.67	<b>No 16.02 ***</b>
<b>Musculoskeletal disease</b>	703 (50.9%)	<b>Yes 3214.1</b>	Yes 2.03	<b>Yes 1.75</b>	<b>Yes 3.78</b>	<b>Yes 17.82</b>
		<b>No 3824.13 **</b>	No 1.99	<b>No 1.59 **</b>	<b>No 3.58 **</b>	<b>No 14.89 ***</b>
<b>Respiratory system disease</b>	162 (11.7%)	Yes 3668.6	Yes 2.00	<b>Yes 1.88</b>	Yes 3.89	<b>Yes 17.94</b>
		No 3493.2	No 2.01	<b>No 1.64 **</b>	No 3.66	<b>No 16.17 ***</b>
<b>Stomach/digestive system Disease</b>	234 (16.9%)	<b>Yes 3110.8</b>	Yes 2.01	<b>Yes 1.82</b>	Yes 3.83	<b>Yes 17.56</b>
		<b>No 3594.2*</b>	No 2.01	<b>No 1.64 *</b>	No 3.66	<b>No 16.14 **</b>
<b>Genitourinary system disease</b>	125 (9.0%)	<b>Yes 2706.1</b>	Yes 1.95	Yes 1.70	Yes 3.66	<b>Yes 17.77</b>
		<b>No 3592.5 **</b>	No 2.02	No 1.67	No 3.69	<b>No 16.25 *</b>
<b>Endocrinological disease</b>	267 (19.3%)	Yes 3271.4	Yes 2.07	<b>Yes 1.91</b>	<b>Yes 3.99</b>	<b>Yes 17.35</b>
		No 3570.0	No 2.00	<b>No 1.61 ***</b>	<b>No 3.61 ***</b>	<b>No 16.15 **</b>
<b>Tumor/Cancer</b>	100 (7.2%)	<b>Yes 2784.6</b>	Yes 2.12	Yes 1.78	Yes 3.91	<b>Yes 17.80</b>
		<b>No 3569.1 *</b>	No 2.00	No 1.66	No 3.67	<b>No 16.27 *</b>
<b>Dermatological disease</b>	120 (8.7%)	Yes 3131.6	Yes 2.03	Yes 1.69	Yes 3.73	Yes 17.30
		No 3550.1	No 2.01	No 1.67	No 3.68	No 16.29

In bold statistically significant differences between subjectively having (Yes) and not having (No) the specific problem; \* p< 0.05, \*\* p< 0.01, \*\*\* p< 0.001

Such results were then further analyzed by dividing the two group of people according to their mobility and it came out that only within the group of people with no mobility problems did the previous differences appear. In other words, only within those who had no mobility problems emerged differences in terms of time spent TV viewing when having diagnoses of heart/circulatory system disease, musculoskeletal disease, stomach/digestive system disease, Endocrinological disease (Table 10). It emerged also that people with tumor/cancer (with no mobility problems) tended to spend more time watching TV.

In terms of physical activity those with heart/circulatory system disease, musculoskeletal disease, tumor/cancer (and no mobility problems) tended to be

less active than those who did not have such problems. On the other side, people with a genitourinary system disease tended to be more active.

**Table 10** - T-test results comparing people with each diagnosed medical problem (yes/no) on sedentary habits divided in two groups according to presence of mobility problems

DIAGNOSED MEDICAL PROBLEMS	No mobility problems				Some mobility problems			
	Physical activity (weekly MET total)	Daily hours sitting	Daily hours TV viewing	Total daily sedentary hours (TV + sit)	Physical activity (weekly MET total)	Daily hours sitting	Daily hours TV viewing	Total daily sedentary hours (TV + sit)
<b>One or more diagnoses / No diagnosis</b>	<b>Yes 3671.3</b> <b>No 4257.6 *</b>	Yes 1.96 No 1.93	<b>Yes 1.65</b> <b>No 1.39 **</b>	<b>Yes 3.61</b> <b>No 3.33 **</b>	Yes 2723.0 No 1434.1 °	Yes 2.22 No 1.91 °	Yes 1.88 No 2.10 °	Yes 4.11 No 4.02 °
<b>Heart /circulatory system disease</b>	<b>Yes 3514.3</b> <b>No 3990.5 *</b>	Yes 1.96 No 1.94	<b>Yes 1.72</b> <b>No 1.50 ***</b>	<b>Yes 3.69</b> <b>No 3.45 **</b>	Yes 2894.9 No 2295.2	<b>Yes 2.30</b> <b>No 2.07 *</b>	Yes 1.90 No 1.87	Yes 4.21 No 3.94
<b>Nervous system disease</b>	Yes 3571.14 No 3797.9	Yes 1.92 No 1.95	Yes 1.79 No 1.59	Yes 3.71 No 3.54	Yes 3394.6 No 2519.34	Yes 2.11 No 2.22	Yes 1.89 No 1.89	Yes 4.00 No 4.11
<b>Musculoskeletal disease</b>	<b>Yes 3520.6</b> <b>No 3992.1 *</b>	Yes 1.94 No 1.96	<b>Yes 1.69</b> <b>No 1.53 **</b>	Yes 3.63 No 3.50	Yes 2608.8 No 2791.4	Yes 2.22 No 2.16	Yes 1.86 No 1.94	Yes 4.09 No 4.10
<b>Respiratory system disease</b>	Yes 3533.9 No 3810.0	Yes 1.92 No 1.95	Yes 1.78 No 1.58	Yes 3.70 No 3.54	<b>Yes 3918.5</b> <b>No 2368.4 **</b>	Yes 2.16 No 2.22	Yes 2.06 No 1.84	Yes 4.22 No 4.07
<b>Stomach/digestive system Disease</b>	Yes 3434.4 No 3847.5	Yes 1.93 No 1.96	<b>Yes 1.76</b> <b>No 1.57 *</b>	Yes 3.69 No 3.53	Yes 2382.9 No 2733.2	Yes 2.20 No 2.21	Yes 1.94 No 1.87	Yes 4.15 No 4.09
<b>Genitourinary system disease</b>	<b>Yes 3021.4</b> <b>No 3848.3 *</b>	Yes 1.89 No 1.96	Yes 1.62 No 1.60	Yes 3.51 No 3.56	Yes 2104.8 No 2739.5	Yes 2.08 No 2.23	Yes 1.87 No 1.89	Yes 3.95 No 4.13
<b>Endocrinological disease</b>	Yes 3684.3 No 3803.6	Yes 1.94 No 1.95	<b>Yes 1.85</b> <b>No 1.55 ***</b>	<b>Yes 3.79</b> <b>No 3.51 *</b>	Yes 2485.9 No 2722.6	Yes 2.33 No 2.16	Yes 2.02 No 1.84	Yes 4.35 No 4.01
<b>Tumor/Cancer</b>	<b>Yes 2932.8</b> <b>No 3842.6 *</b>	Yes 2.01 No 1.95	<b>Yes 1.85</b> <b>No 1.58 *</b>	Yes 3.87 No 3.53	Yes 2469.7 No 2676.1	Yes 2.36 No 2.19	Yes 1.63 No 1.92	Yes 4.00 No 4.11
<b>Dermatological disease</b>	Yes 3494.3 No 3808.9	Yes 2.03 No 1.94	Yes 1.62 No 1.60	Yes 3.65 No 3.55	Yes 2296.1 No 2703.1	Yes 2.07 No 2.22	Yes 1.88 No 1.89	Yes 3.96 No 4.11

In bold statistically significant differences between subjectively having (Yes) and not having (No) the specific problem; \* p< 0.05, \*\* p< 0.01, \*\*\* p< 0.001; ° low number of people with some mobility problems and no medical diagnosis (n= 17)

When performing a stepwise multiple regression analyses with possible covariates, the two main medical problems emerging as significantly contributing to the model were heart/circulatory system disease and Endocrinological disease (Table 11).

**Table 11** - Regression analyses between TV viewing, diagnosed physical problems and covariates

	<b>Standardized coefficient Beta</b>	<b>t</b>	<b>Sig.</b>
(Constant)		4.019	p< 0.001
<b>Years of schooling</b>	-0.185	-6.987	p< 0.001
<b>WHODAS II simple sum score</b>	0.089	3.242	p< 0.01
<b>Work status</b>	-0.109	-4.181	p< 0.001
<b>Endocrinological disease</b>	0.083	3.102	p< 0.01
<b>Heart /circulatory system disease</b>	0.074	2.734	p< 0.01
<b>Weekly MET TOTAL</b>	-0.060	-2.260	p< 0.05
<b>Age</b>	0.054	2.023	p< 0.05

Regression statistics based on linear regression analyses (adjusted for gender, age, study centre, years of education, living status, level of functioning, number of medical diagnosis and physical activity). Corrected R<sup>2</sup>= 0.095

## **In Summary RQ1:**

- We found a significant association between sedentary habits, in particular TV viewing, and physical health
- The areas that appear to be more associated with TV viewing in terms of self-reported health are diabetes, hypertension and problems breathing.
- The areas that appear to be more associated with TV viewing in terms of diagnosed medical problems are musculoskeletal disease, stomach/digestive system disease and in particular heart/circulatory system disease and Endocrinological disease
- It emerged also that people with tumor/cancer (with no mobility problems) tended to spend more time watching TV.

## 3.2 RQ 2. What is the association of TV viewing habits with people's mental (including cognitive) health?

### 3.2.1 Self-reported Mental Health

In order to answer this Research Question we first analyzed the results coming from the self-reported Mental Health list (list A5). When comparing people who reported having one or more problems with people with no problems through a t-test, there are statistically significant differences: people reporting one or more problem have lower levels of physical activity, higher levels of TV viewing, higher levels of total daily sitting time and also lower levels of general functioning (see Table 12).

**Table 12** - T-test results comparing people with one or more self reported mental health problem (yes/no) on sedentary habits and Level of Functioning

<b>SELF-REPORTED MENTAL HEALTH (n= 1383)</b>	<b>No problems</b>	<b>One or more problem</b>	<b>p value</b>
	488 (35.3%)	895 (64.7%)	
<b>Physical activity - Weekly MET total</b>	4259.29 (181.7)	3111.72 (104,4)	< 0.001
<b>Daily hours sitting</b>	1.94 (0.04)	2.05 (0.03)	= 0.056
<b>Daily hours of TV watching</b>	1.59 (0.04)	1.72 (0.03)	< 0.05
<b>Total daily sedentary hours (TV + sit)</b>	3.53 (0.06)	3.77 (0.04)	< 0.05
<b>Level of Functioning: WHODAS II simple sum score<sup>^</sup></b>	14.23 (0.16)	17.56 (0.20)	< 0.001

<sup>^</sup> score > 13= some disability

When analyzing the single mental health problems reported, and considering the time spent watching TV it is possible to see that people who indicated feeling of sadness/depression ( $p < 0.01$ ), demoralization ( $p < 0.01$ ), nervousness ( $p < 0.05$ ), sleep problems ( $p < 0.05$ ), problems with appetite and weight ( $p < 0.01$ ), and low self-esteem ( $p < 0.01$ ), tended to spend more time watching TV than those who reported not having such problems (see Table 13).

It is interesting to note that the analysis of each problem reflected the overall tendency reported in Table 12 concerning activity levels and sedentary habits, where for each problem people tended to be less active, more sedentary and more TV watching (even though not for all at statistically significant level). This is not surprising for problems like “depression” or “demoralization”, where such feelings typically lead to a lower level of energy and motivation to be active. It might be less



obvious for a problem such as “nervousness” or “anger or aggression”. In any case, for all problems listed there was a statistically significant higher score in the WHODAS II indicating a lower level of functioning of people who had both one or more problems and each single problem.

**Table 13** - T-test results comparing people with each self reported mental health problem (yes/no) on sedentary habits and Level of Functioning

<b>SELF REPORTED MENTAL HEALTH</b>	<b>N cases (%)</b>	<b>Physical activity</b>	<b>Daily hours sitting</b>	<b>Daily hours TV viewing</b>	<b>Total daily sedentary hours</b>	<b>Level of Functioning</b>
<b>Sadness, Depression</b>	173 (12.5%)	no 3630.0	no 1.99	no 1.64	no 3.64	no 15.98
		yes 3248.4**	yes 2.15*	yes 1.88 **	yes 4.03**	yes 19.2 ***
<b>Demoralization</b>	135 (9.76%)	no 3621.1	no 2.0	no 1.64	no 3.65	no 15.96
		yes 2550.2*	yes 2.1	yes 1.91**	yes 4.01**	yes 20.39 ***
<b>Anxiety</b>	238 (17.2%)	no 3752.7	no 2.01	no 1.65	no 3.66	no 15.82
		yes 2458.9 ***	yes 2.02	yes 1.78	yes 3.80	yes 19.11 ***
<b>Worries</b>	337 (24.3%)	no 3751.5	no 1.99	no 1.67	no 3.66	no 15.88
		yes 2787.4 ***	yes 2.07	yes 1.68	yes 3.76	yes 17.93 ***
<b>Nervousness</b>	181 (13.1%)	no 3604.7	no 2.01	no 1.65	no 3.67	no 16.02
		yes 2931.5 *	yes 2.00	yes 1.81 *	yes 3.81	yes 18.76 ***
<b>Sleep Problems</b>	385 (27.9%)	no 3645.77	no 1.98	no 1.64	no 3.62	no 15.88
		yes 3176.7 *	yes 2.1*	yes 1.76 *	yes 3.85 **	yes 17.70 ***
<b>Nightmares</b>	41 (3.0%)	no 3548.5	no 2.01	no 1.66	no 3.68	no 16.25
		yes 2472.5	yes 2.04	yes 1.92	yes 3.96	yes 20.59 ***
<b>Fatigue, exhaustion</b>	211 (15.3%)	no 3517.4	no 1.98	no 1.67	no 3.66	no 15.72
		yes 3512.3	yes 2.17 **	yes 1.68	yes 3.85	yes 20.12 ***
<b>Sexual problems</b>	94 (6.8%)	no 3554.0	no 2.01	no 1.68	no 3.69	no 16.29
		yes 3004.2	yes 2.04	yes 1.55	yes 3.59	yes 17.69 *
<b>Appetite and weight</b>	138 (10.0%)	no 3610.48	no 2.01	no 1.65	no 3.66	no 16.02
		yes 2770.1 ***	yes 2.03	yes 1.87 **	yes 3.91	yes 19.62 ***
<b>Thoughts about terrible events</b>	54 (3.9%)	no 3500.8	no 2.01	no 1.67	no 3.69	no 16.26
		yes 3906.0	yes 1.99	yes 1.65	yes 3.64	yes 19.28 ***
<b>Low self-esteem</b>	75(5.4%)	no 3587.4	no 2.01	no 1.65	no 3.66	no 16.13
		yes 2282.4**	yes 2.08	yes 1.97 **	yes 4.05 *	yes 20.77 ***
<b>Irritability</b>	158 (11.4%)	no 3568.7	no 2.00	no 1.66	no 3.67	no 16.25
		yes 3112.6	yes 2.09	yes 1.71	yes 3.80	yes 17.39 *
<b>Insecurity</b>	95 (6.9%)	no 3560.8	no 2.02	no 1.66	no 2.68	no 16.06
		yes 2917.0 *	yes 1.93	yes 1.85	yes, 3.78	yes 20.07 ***
<b>Difficulty to decide</b>	97 (7.0%)	no 3586.1	no 2.02	no 1.66	no 3.68	no 16.11
		yes 2595.6**	yes 1.94	yes 1.76	yes 3.71	yes 19.98 ***
<b>Anger and aggression</b>	64 (4.6%)	no 3565.7	no 2.00	no 1.66	no 3.66	no 16.19
		yes 2503.7 **	yes 2.31*	yes 1.82	yes 4.14*	yes 20.30

In bold statistically significant differences between subjectively having (Yes) and not having (No) the specific problem; \* p< 0.05, \*\* p< 0.01, \*\*\* p< 0.001; for the items “Strange thoughts”, “Strange experiences”, “Alcohol problems”, “Medication use problems”, “Suicidal thoughts”, “Confusion” there were not enough people reporting the problem, and data were not included as not reliable

In turn, there is also statistically significant association at t-test between the Level of Functioning (no disability WHODAS II score < 13 vs some disability WHODAS II

score  $\geq 13$ ), and level of physical activity (4266.45 MET vs 3196.18 MET,  $t -5.20$ ,  $df$  1371,  $p < 0.001$ ), average daily TV hours (1.54 vs 1.72,  $t$  3.09,  $df$  1371,  $p < 0.01$ ) and total daily sitting time (3.53 vs 3.75,  $t$  2.65,  $df$  789.9,  $p < 0.01$ ), but not with sitting time alone.

In order to have a more precise view of the role of the Level of Functioning on sedentary habits we then divided the data file according to the results on the WHODAS II subscale “mobility” ( $<4$  no mobility problems,  $\geq 5$  some mobility problems), as it could provide an indication of the people who were actually somehow hampered in their possibility to move.

As could be expected, a simple t-test comparison of sedentary and activity levels between people with or without mobility problems showed consistent statistically significant differences, and people with mobility problems tended to move less, sit and watch TV longer than the others with no mobility problems (see Table 14).

**Table 14** - T-test sedentary and activity levels with or without mobility problems

		T-Test					
<b>WHODAS Subscale: mobility &lt;4 no probl, &gt;5 some probl</b>		<b>N</b>	<b>Mean</b>	<b>Std Dev</b>	<b>t</b>	<b>df</b>	<b>Sig. (2-tail)</b>
<b>Physical activity: weekly MET TOTAL</b>	no mobility problems	1050	3789.11	3495.44	5.18	549.83	$p < 0.001$
	some mobility problems	326	2655.83	3435.87			
<b>Average daily hours SIT only</b>	no mobility problems	1050	1.95	0.95	-4.23	534.72	$p < 0.001$
	some mobility problems	326	2.21	0.96			
<b>Average daily hours TV only</b>	no mobility problems	1050	1.60	0.95	-4.70	1374	$p < 0.001$
	some mobility problems	326	1.89	1.01			
<b>Average daily hours SIT and TV</b>	no mobility problems	1050	3.55	1.38	-6.07	1374	$p < 0.001$
	some mobility problems	326	4.10	1.53			

We successively performed a t-test as above by comparing average sedentary and physical activity levels between people with one or more self-rated mental health problems overall, and then with individual problems.

The results indicated that overall only people without mobility problems differed in terms of weekly MET total, TV viewing and total sit time (TV + sit) but not in terms of sitting time alone. In particular in the group of people with no mobility problems,

those with one or more mental health self-reported problems tended to move less (3366.25, vs 4410.96, weekly MET total,  $t -4.80$ ,  $df 1048$ ,  $p < 0.001$ ), view more TV (1.66 vs 1.51 average daily hours,  $t 2.43$ ,  $df 1048$ ,  $p < 0.05$ ), and have a longer total sitting time (3.64 vs 3.43 sit plus TV hours,  $t 2.58$ ,  $df 1048$ ,  $p < 0.05$ ). On the other side no statistically significant differences were found within people without mobility problems.

When analyzing the individual self-reported mental health problems, again keeping the two groups of people with or without mobility problems separated, it is possible to identify in which cases in particular there is a statistically significant difference in terms of physical activity and sedentary habits. Such cases are shown in Table 15 and it is possible to see that, concerning in particular TV viewing, only those with no mobility problems and with some specific self-reported mental health problems show statistically significant differences compared to those who do not show such problems. The specific problems are: sadness/depression, demoralization, sleep problems, appetite and weight and low self esteem. As previously indicated, in these cases people with the specific problem tend to spend longer time TV viewing than the others.

On the other side people with some mobility problems and with or without self-reported mental health problems do not result to show differences in terms of sedentary habits (neither TV viewing time nor sit time per se), while in some cases they show differences in terms of physical activity level. Looking at Table 15: people with anxiety and anger/aggression and some mobility problems tend to move even less than the others; only people who refer feeling fatigue and exhaustion show higher levels of MET (higher physical activity) than those without such feeling.

**Table 15** - T-test results comparing people with each self-reported mental health problem (yes/no) on sedentary habits divided in two groups according to presence of mobility problems

SELF REPORTED MENTAL HEALTH	No mobility problems				Some mobility problems			
	Physical activity (weekly MET total)	Daily hours sitting	Daily hours TV viewing	Total daily sedentary hours (TV + sit)	Physical activity (weekly MET total)	Daily hours sitting	Daily hours TV viewing	Total daily sedentary hours (TV + sit)
<b>Sadness, Depression</b>	<b>Yes 3114.6</b>	Yes	<b>Yes 1.84</b>	<b>Yes 3.87</b>	Yes 2082.1	Yes 2.35	Yes 1.93	Yes 4.29
	<b>No 3865.6 *</b>	3114.6 No 3865.6	<b>No 1.57 *</b>	<b>No 3.52 *</b>	No 2798.7	No 2.17	No 1.88	No 4.06
<b>Demoralization</b>	Yes 3241.2	Yes 2.02	<b>Yes 1.86</b>	Yes 3.89	Yes 1642.9	Yes 2.21	Yes 1.99	Yes 4.21
	No 3831.8	No 1.94	<b>No 1.58 *</b>	No 3.53*	No 2870.4	No 2.21	No 1.87	No 2.08
<b>Anxiety</b>	<b>Yes 2693.2</b>	Yes 1.90	Yes 1.72	Yes 3.62	<b>Yes 1777.6</b>	Yes 2.27	Yes 1.88	Yes 4.15
	<b>No 3977.4 ***</b>	No 1.96	No 1.58	No 3.54	<b>No 2955.7 ***</b>	No 2.19	No 1.89	No 4.08
<b>Worries</b>	<b>Yes 3075.2</b>	Yes 2.00	Yes 1.62	Yes 3.63	Yes 2130.4	Yes 2.24	Yes 1.81	Yes 4.06
	<b>No 3991.5 ***</b>	No 1.93	No 1.59	No 3.53	No 2901.9	No 2.19	No 1.93	No 4.12
<b>Nervousness</b>	Yes 3286.6	Yes 1.97	Yes 1.71	Yes 3.68	Yes 2317.0	Yes 2.05	Yes 1.98	Yes 4.03
	No 3850.9	No 1.91	No 1.59	No 3.54	No 2740.2	No 2.25	No 1.87	No 4.12
<b>Sleep Problems</b>	<b>Yes 3398.3</b>	Yes 2.03	<b>Yes 1.72</b>	<b>Yes 3.76</b>	Yes 2363.6	Yes 2.27	Yes 1.82	Yes 4.09
	<b>No 3923.2 *</b>	No 1.92	<b>No 1.56 *</b>	<b>No 3.48**</b>	No 2665.6	No 2.128	No 1.92	No 4.11
<b>Nightmares</b>	Yes 2584.2	Yes 1.78	Yes 1.89	Yes 3.67	Yes 2279.0	Yes 2.49	Yes 1.98	Yes 4.47
	No 3819.7	No 1.95	No 1.59	No 3.55	No 2674.0	No 2.20	No 1.88	No 4.08
<b>Fatigue, exhaustion</b>	Yes 3692.3	Yes 2.07	Yes 1.60	Yes 3.67	<b>Yes 3323.1</b>	Yes 2.29	Yes 1.78	Yes 4.07
	No 3800.6	No 1.93	No 1.60	No 3.54	<b>No 2369.0*</b>	No 2.17	No 1.94	No 4.12
<b>Sexual problems</b>	Yes 3292.4	Yes 1.99	Yes 1.52	Yes 3.52	Yes 2445.7	Yes 2.12	Yes 1.61	Yes 3.73
	No 3820.2	No 1.95	No 1.60	No 3.56	No 2678.6	No 2.22	No 1.92	No 4.14
<b>Appetite and weight</b>	<b>Yes 2609.8</b>	Yes 1.94	<b>Yes 1.84</b>	Yes 3.78	Yes 2748.5	Yes 2.15	Yes 1.92	Yes 4.08
	<b>No 3883.7 **</b>	No 1.95	<b>No 1.58 *</b>	No 3.54	No 2634.9	No 2.22	No 1.88	No 4.11
<b>Thoughts about terrible events</b>	Yes 3659.1	Yes 1.84	Yes 1.80	Yes 3.64	Yes 4325.7	Yes 2.24	Yes 1.39	Yes 3.64
	No 3793.4	No 1.95	No 1.59	No 3.55	No 2546.6	No 2.21	No 1.92	No 4.13
<b>Low self-esteem</b>	<b>Yes 2277.9</b>	Yes 1.93	<b>Yes 2.03</b>	<b>Yes 3.96</b>	Yes 2219.6	Yes 2.33	Yes 1.88	Yes 4.22
	<b>No 3855.2 **</b>	No 1.95	<b>No 1.58**</b>	<b>No 3.54 *</b>	No 2700.0	No 2.20	No 1.89	No 4.09
<b>Irritability</b>	Yes 3466.3	Yes 2.06	Yes 1.72	Yes 3.78	Yes 2314.7	Yes 2.14	Yes 1.70	Yes 3.85
	No 3826.5	No 1.94	No 1.59	No 3.35	No 2710.0	No 2.22	No 1.92	No 4.15
<b>Insecurity</b>	<b>Yes 2604.6</b>	Yes 1.72	Yes 1.80	Yes 3.57	Yes 3239.1	Yes 2.16	Yes 1.89	Yes 4.05
	<b>No 3848.3 *</b>	No 1.96	No 1.59	No 3.55	No 2564.8	No 2.22	No 1.89	No 4.11
<b>Difficulty to decide</b>	<b>Yes 2683.8</b>	Yes 1.84	Yes 1.70	Yes 3.54	Yes 2464.3	Yes 2.08	Yes 1.86	Yes 3.95
	<b>No 3853.7 *</b>	No 1.96	No 1.59	No 3.55	No 2681.8	No 2.23	No 1.89	No 4.12
<b>Anger and aggression</b>	Yes 3476.8	Yes 2.20	Yes 1.69	Yes 3.90	<b>Yes 1252.6</b>	Yes 2.45	Yes 1.99	Yes 4.45
	No 3800.2	No 1.94	No 2.20	No 3.54	<b>No 2787.6 *</b>	No 2.19	No 1.88	No 4.07

In bold statistically significant differences between subjectively having (Yes) and not having (No) the specific problem; \* p< 0.05, \*\* p< 0.01, \*\*\* p< 0.001; for the items "Strange thoughts", "Strange experiences", "Alcohol problems", "Medication use problems", "Suicidal thoughts", "Confusion" there were not enough people reporting the problem, and data were not included as not reliable

### **3.2.2 CIDI65+ Psychiatric Diagnoses and Cognitive Functioning**

As the main focus of the MentDis study was on mental disorders as defined in Psychiatric terms, we also wanted to test the hypothesis of a possible association between sedentary habits, and specifically TV viewing, and having one or more psychiatric diagnoses. We were also interested in the possible association of sedentary habits and cognitive functioning.

The present study focused on depressive disorders such as Dysthymic disorder (with hierarchy), Major depressive disorder (MDD), as well as anxiety disorders, including Agoraphobia, Generalized anxiety disorder (GAD6 - DSM-IV), Social phobia (lifetime), any Simple phobia, Panic disorder. In a preceding similar work by de Wit et al (de Wit, van Straten et al. 2011) the timeframe chosen for occurrence of diagnosis was the 6 months before the study. As our study only had current (one month), one year and lifetime available, in order to produce comparable data, we chose to select the one-year timeframe for inclusion as closer to the 6-months criterion.

Regarding psychiatry diagnoses, 13.4% (n= 216) presented a depressive disorder only (13.2% MDD and 3.0% Dysthymia), 15.6% (n=186) an anxiety disorder (3.3% agoraphobia, 3.0% GAD, 1.4% social phobia, 7.5% simple phobia, 2.9% PD) and 4.3% (n= 59) comorbid anxiety and depression disorder. The subjects with depressive and/or anxiety disorders were more often female ( $p < 0.001$ ), younger ( $p < 0.01$ ), living more often alone than controls ( $p < 0.05$ ), with lower levels of functioning ( $p < 0.001$ ) and a higher rate of medical diagnoses ( $p < 0.001$ ). Regarding the variable “financial situation”, those with depressive disorder more frequently reported to have a “good” situation than the others ( $p < 0.05$ ) (see

Table 16).

Concerning cognitive functioning 251 subjects (18.1%) presented a mild cognitive impairment (MCI) and 1132 (81.9%) no cognitive impairment. MCI was more common in female ( $p < 0.05$ ), older people ( $p < 0.001$ ), with lower levels of education ( $p < 0.001$ ), living alone ( $p < 0.05$ ), from Geneva ( $p < 0.001$ ), with lower levels of functioning ( $p < 0.001$ ), and with lower levels of physical activity ( $p < 0.001$ ). People with MCI watched an average of 1.91 (S.D. 0.95) hours TV per day while people with no cognitive impairment watched only 1.61 (S.D. 0.97) ( $p < 0.001$ ) (see

Table 16).

There was no association between having a diagnosis of depression, anxiety or both and time spent viewing TV ( $p= 0.61$ ) or any sedentary activity ( $p= 0.64$ ) nor levels of physical activity ( $p= 0.09$ ). However, there was a general difference between controls and people with a diagnosis in terms of physical activity levels (Weekly MET Total) ( $p < 0.05$ ,  $F= 10.462$ ,  $df 1381$ ).

Subjects with MCI presented a higher time spent watching TV ( $p < 0.001$ ) and total sedentary time (sitting plus TV viewing) ( $p < 0.001$ ) but not with higher time in other sitting time ( $p= 0.31$ ).

**Table 16** - Description of socio-demographic variables and TV viewing across depression, anxiety and cognitive functioning

	Value	N	%	Controls (n=1040; 75.2%)	Depressive disorder only (n= 216; 13.4%)	Anxiety disorder only (n= 186; 15.6%)	Co morbid depressive and anxiety disorders (n= 59; 4.3%)	P-value	Mini-Mental score (S.D.)	No cognitive impairment (n= 1132, 81.9%)	Mild Cognitive Impairment (n=251, 18.1%)	P-value
	TOTAL	1383							27.66 (1.65)			
Gender	Female	658	47.6	41.6	61.8	66.1	74.6	< 0.001	27.57 (1.74)	46.0	54.6	< 0.05
	Male	725	52.4	58.4	38.2	33.9	25.4		27.74 (1.56)	54.0	45.4	
Age	Mean age (S.D.)	73.14	(5.69)	73.37 (0.16)	72.46 (0.43)	72.5 (0.45)	71.49 (0.63)	< 0.01		72.67 (5.61)	75.23 (5.57)	< 0.001
Level of education	High (> 13 yrs)	544	39.4	39.6	45.2	33.9	33.9	0.12	27.87 (1.36)	42.2	26.8	< 0.001
	Intermediate (9-12 yrs)	460	33.4	31.9	35.0	40.9	37.3		27.54 (1.72)	32.1	39.2	
	Low (< 8 yrs)	375	27.2	22.5	19.7	25.2	28.8		27.52 (1.90)	25.7	34.0	
Employment status	Unemployed/retired	1297	94.7	94.8	94.9	92.9	96.6	0.73	27.65 (1.65)	95.4	96.0	0.2
	Employed	72	5.3	5.2	5.1	7.1	3.4		27.72 (1.75)	5.5	4.0	
Financial situation	Very good	179	13.0	13.0	12.8	14.2	10.2	< 0.05	27.75 (1.38)	13.7	9.6	0.19
	Good	652	47.3	45.8	60.9	45.7	40.7		27.61 (1.59)	46.7	49.8	
	Just enough, low or very low	548	39.7	41.2	26.3	40.2	49.2		27.69 (1.80)	39.5	40.6	
Living status	Alone	403	29.2	26.9	35.7	34.9	39.7	< 0.05	27.50 (1.64)	28.0	34.8	< 0.05
	Not alone	977	70.8	73.1	64.3	65.1	60.3		27.73 (1.66)	72.0	65.2	
Center	Ferrara	486	35.1	37.6	17.8	36.2	35.6	< 0.001	28.10 (1.48)	37.9	22.7	< 0.001
	Hamburg	380	27.5	29.4	15.3	26.0	28.8		27.71 (1.60)	27.6	27.1	
	Geneva	517	37.4	33.0	66.9	37.8	35.6		27.22 (1.73)	34.5	50.2	

	Value	N	%	Controls (n=1040; 75.2%)	Depressive disorder only (n= 216; 13.4%)	Anxiety disorder only (n= 186; 15.6%)	Co morbid depressive and anxiety disorders (n= 59; 4.3%)	P-value	Mini-Mental score (S.D.)	No cognitive impairment (n= 1132, 81.9%)	Mild Cognitive Impairment (n=251, 18.1%)	P-value
Physical activity	Low	208	15.0	14.2	13.4	21.3	20.3	0.09	27.20 (2.17)	13.4	22.3	< 0.001
	Moderate	589	42.6	41.8	51.0	39.4	40.7		27.71 (1.55)	43.3	39.4	
	High	586	42.4	43.9	35.7	39.4	39.0		27.78 (1.51)	43.3	38.2	
WHODAS II simple sum score	Mean (S.D.)	16.38	(5.67)	15.82 (5.22)	17.90 (7.03)	17.83 (6.13)	19.02 (6.14)	< 0.001		15.99 (5.21)	18.13 (7.14)	< 0.001
Medical problems past year	No	220	15.9	18.9	5.9	4.1	0.9	< 0.001		82.7	17.3	0.85
	Yes	1162	84.1	89.1	12.4	10.2	4.9			81.7	18.2	
Daily hours of TV watching	Mean (S.D.)	1.81	(0.94)	1.81 (0.9)	1.7 (1.0)	1.9 (0.9)	1.86 (0.9)	0.61		1.62 (.97)	1.91 (.95)	< 0.001
Daily hours sitting	Mean (S.D.)	2.01	(0.96)	2.0 (0.9)	2.1 (0.9)	1.99 (0.9)	2.07 (0.9)	0.64		2.07 (.94)	2.00 (0.96)	0.31
Total daily sedentary hours	Mean (S.D.)	3.7	(1.44)	3.67 (1.4)	3.6 (1.4)	3.7 (1.3)	3.7 (1.4)	0.89		3.62 (1.4)	3.98 (1.42)	< 0.001



Stepwise multiple regression analyses, adjusted for covariates (gender, age, study centre, level of education, living status, work status (employed vs. retired or unemployed), level of functioning, number of physical illnesses, physical activity), were employed to examine further the hypothesized association with either a general depressive or anxiety disorder, or more specific ones with time spent watching TV. According to the model produced no significant association was found between a general diagnosis of either anxiety or depression or both and time spent watching TV. There was only a significant negative association between the specific diagnosis of Major Depressive Disorder (MDD) and TV viewing (see Table 17). On the other side cognitive functioning (MMSE score) and TV viewing were inversely related, after adjusting for covariates. The results can be summarized in a model with 6 significant predictors of TV viewing. Lower average time of TV watching per day is significantly predicted by the following factors: higher level of education, active work status, higher cognitive functioning (as assessed by MMSE scores), higher level of physical activity, and presence of Major Depressive Disorder (MDD). In contrast, severity of comorbid physical illnesses (number of medical diagnoses) increases the risk for high average time of TV watching (see Table 17).

**Table 17** - Regression analyses between TV viewing, Mini Mental Score Evaluation, Depressive and Anxiety diagnoses and covariates

Model	Standardised coefficients		Sig.	Confidence interval 95.0% for B	
	Beta	t		Lower limit	Upper limit
(Constant)		9.911	0.000	1439.281	2149.625
Years of education	-0.176	-6.652	0.000	-32.722	-17.817
Number of medical diagnoses	0.0147	5.586	0.000	18.732	39.011
Work status	-0.137	-5.246	0.000	-173.024	-78.834
Mini Mental Status - score	-0.105	-4.056	0.000	-38.755	-13.489
Physical activity levels	-0.064	-2.441	0.015	-.013	-0.001
Major depressive disorder (MDD) (year)	-0.061	-2.333	0.020	-135.983	-11.758

Regression statistics based on linear regression analyses (adjusted for gender, age, study centre, years of education, living status, level of functioning, number of medical diagnosis and physical activity). Corrected R<sup>2</sup>= 0.105

## **In Summary RQ 2:**

- Concerning self-reported current Mental Health we found an association with TV viewing time.
- In particular, having separated people who had actual difficulties with mobility, there is a statistically significant higher TV time for people who listed problems such as Sadness/depression, Demoralization, Sleep problems, Appetite and Weight and Low self-esteem.
- There is no association with any problem and sitting time per se (i.e. excluding TV time).
- There are associations also with lower physical activity levels, in particular for problems such as Sadness/depression, Anxiety, Worries, Sleep problems, Appetite and Weight, Low self-esteem, Insecurity and Difficulty to decide.
- Concerning actual psychiatric diagnoses (in particular anxiety or depression) we found almost no specific association with time spent watching TV
- We found a statistically significant inverse association between TV viewing time and diagnosis of Major Depression
- A statistically significant association was found between TV viewing and lower cognitive functioning.

### **3.3 RQ3. What is the association of TV viewing habits with Demoralization?**

In order to answer this specific Research Question we computed the scores of the Demoralization Scale by Kissane (Kissane, Wein et al. 2004).

The Demoralization average global score was 24.31 (SD 9.08). Dividing the different DS scores into 3 categories as suggested by Mullane (Mullane, Dooley et al. 2009) (average DS score ( $24.31 \pm 1$  SD (9.01): low ( $\leq 15.2$ ), medium ( $\geq 15.3$ ,  $\leq 33.32$ ), high ( $\geq 33.33$ ) demoralization) the results are reported in Table 18.

**Table 18** - Demoralization scores in three categories

<b>DS Level</b>	<b>N</b>	<b>%</b>
<b>Low demoralization</b>	175	12,7
<b>Medium demoralization</b>	1020	73,8
<b>High demoralization</b>	188	13,6

Concerning the DS subscales values the results are reported in Table 19. The highest score was on the Sense of Failure scale, the lowest on the loss of Meaning scale.

**Table 19** - Demoralization subscales scores

<b>DS Scales</b>	<b>Mean</b>	<b>St. Dev.</b>
<b>Loss of Meaning</b>	0.32	0.554
<b>Dysphoria</b>	0.87	0.643
<b>Disheartenment</b>	0.62	0.649
<b>Helplessness</b>	0.51	0.606
<b>Sense of failure</b>	1.27	0.674

Various socio-demographic variables (gender, level of education, financial situation etc), and other variables such as physical activity levels, showed a statistically significant association with the DS score (Table 20).

**Table 20** - Socio-demographic variables and Demoralization score

	<b>Value</b>	<b>N</b>	<b>%</b>	<b>Demoralization total score (SD)</b>
	<b>TOTAL</b>	1354		24.31 (9.08)
<b>Gender</b>	Female	637	47.0	25.34 (9.61)**
	Male	717	53.0	23.39 (8.49)**
<b>Level of education</b>	Low (< 8 yrs)	366	27.1	25.08 (10.04)*
	Intermed. (9-12 yrs)	444	32.9	24.58 (8.65)*
	High (> 13 yrs)	540	39.9	23.57 (8.73)*
<b>Financial situation</b>	Very good	178	13.2	22.85 (7.74)*
	Good	643	47.6	23.96 (8.80)*
	Just enough, low or very low	529	39.2	25.24 (9.76)*
<b>Cognitive Impairment (MMSE)</b>	No cognitive impairment	241	17.4%	23.92 (8.77)*
	Mild cognitive impairment	1113	80.5%	26.08 (10.24)*
<b>Living status</b>	Alone	390	28.9	26.26 (10.58)**
	Not alone	961	71.1	23.53 (8.29)**
<b>Physical activity</b>	Low (< 600 MET)	205	15.1	26.49 (11.35)*
	Moderate	582	43.0	23.99 (8.61)*
	High (> 3000 MET)	567	41.9	23.85 (8.53)*
<b>Level of Functioning</b>	No disability (=12)	400	29.8	21.20 (6.61)**
	Mild disability (13-16)	497	37.0	23.67 (8.42)**
	Moderate disability (17-21)	260	19.3	26.43 (8.95)**
	Severe disability (> 22)	187	13.9	29.61 (11.92)**
<b>Medical problems previous year</b>	No	217	16.0	22.40 (7.59)*
	Yes	1136	84.0	24.67 (9.30)*

\*p&lt; 0.05 \*\*p&lt; 0.001

In particular being female, having a low level of education, defining the current personal financial situation as “just enough, low or very low”, having a Mild Cognitive Impairment, living alone, having a low level of weekly physical activity, having a severe or moderate disability and having one or more medical problem can each increases the total score of the Demoralization scale.

On the other side, age, employment status and study centre had no statistically significant relationship with Demoralization.

The ANOVA showed a significant difference in terms of demoralization between people watching TV for more (25.39 (SD 9.76)) or less than 2 hours (23.54 (SD 8.49), p<0.001) (Table 21, Graph 2).

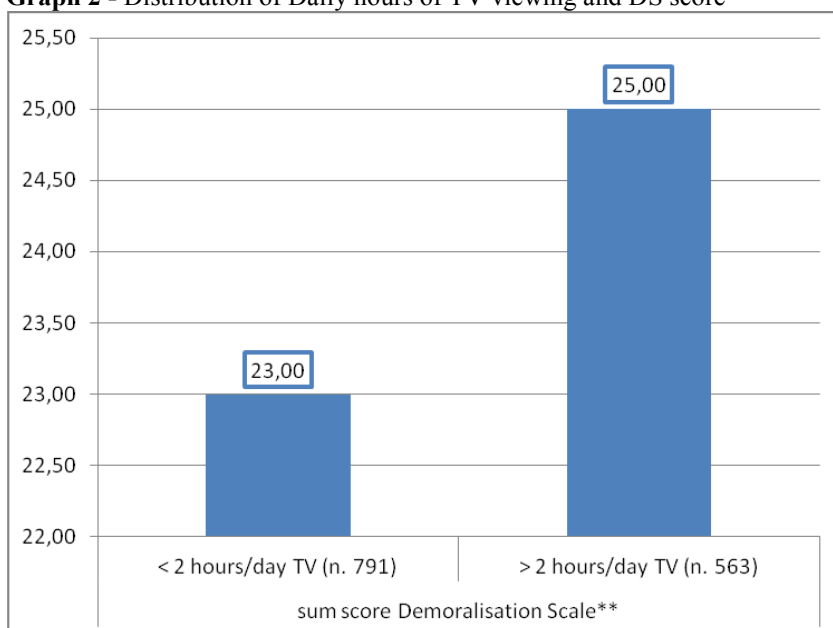
**Table 21** – ANOVA test of association between Daily hours of TV viewing and DS score

	Value	N	%	Demoralization total score
<b>Daily hours TV viewing</b>	< 2h/day	791	58.4	23.54 (8.49)**
	> 2h/day	563	41.6	25.39 (9.76)**

ANOVA: F (1, 1352)= 13.67; p< 0.001

\*\*p< 0.001

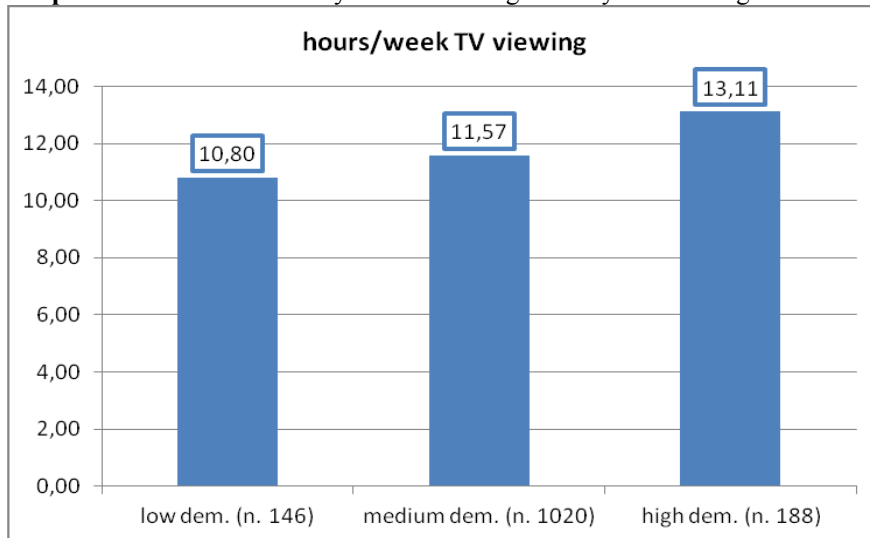
**Graph 2** - Distribution of Daily hours of TV viewing and DS score



\*\* p< 0.001

Dividing the different DS scores into 3 categories as above (Table 18) and performing an ANOVA test with weekly TV time as dependent variable, we found a significant association where the higher the DS score, the longer the TV time (ANOVA: F (2, 1351)= 5.46; p< 0.01) (Graph 3).

**Graph 3** - Distribution of Daily hours of average weekly TV viewing hours and DS score category (p< 0.01)



A stepwise multiple regression was applied with possible covariates: the association between TV viewing time and demoralisation score was confirmed (corrected  $R^2= 0.075$ ;  $F_{4,1327}$ ,  $\beta = 0.074$ ,  $t= 2.65$ ,  $p<0.01$ ).

Furthermore, when comparing people who watched less than 2 hours with those watching more than 2 hours of TV viewing on average per day, there were statistically significant differences within the different Demoralization subscales. As shown in Table 22 in fact, people who watched TV for more than 2 hours a day on average scored higher in terms of Loss of Meaning, Disheartenment and Helplessness. No statistically significant differences were found for the subscales of Dysphoria and Sense of Failure.

**Table 22** - ANOVA test comparing people who watch less and more than 2 hours TV on average per day for each Demoralization Subscale

DS Subscales	Daily TV viewing	N	Average	St. Dev.	df	F	Sig.
<b>Loss of Meaning</b>	< 2 hours TV	790	0.29	0.51	1	8.35	p< 0.01
	> 2 hours TV	567	0.38	0.61	1355		
<b>Dysphoria</b>	< 2 hours TV	792	0.85	0.62	1	3.13	0.07
	> 2 hours TV	568	0.92	0.67	1358		
<b>Disheartenment</b>	< 2 hours TV	794	0.57	0.60	1	11.20	p< 0.01
	> 2 hours TV	565	0.69	0.71	1357		
<b>Helplessness</b>	< 2 hours TV	789	0.46	0.56	1	13.38	p< 0.001
	> 2 hours TV	567	0.58	0.66	1354		
<b>Sense of failure</b>	< 2 hours TV	774	1.27	0.64	1	0.11	0.73
	> 2 hours TV	552	1.28	0.72	1324		

Similarly we performed an ANOVA test to see possible differences in the DS subscales based on weekly physical activity level (low/moderate/high). Table 23 shows that similarly to TV viewing, there are significant differences on most subscales (only exception Dysphoria) and people who are more active from a physical point of view have lower scores in terms of Demoralization.

**Table 23** - ANOVA test comparing different levels of Physical Activity for each Demoralization Subscale

Demoralization Scale	WEEKLY PHYSICAL ACTIVITY LEVEL	N	Mean	St. Dev.	df	F	Sig.
<b>Sum score</b>	Low	205	26.49	11.35	2	7.08	p< 0.01
	Moderate	236	23.78	8.55	1351		
	High	913	23.95	8.58	1353		
<b>Loss of Meaning</b>	Low	205	0.49	0.72	2	11.71	p< 0.001
	Moderate	235	0.34	0.55	1354		
	High	917	0.29	0.50	1356		
<b>Dysphoria</b>	Low	205	0.96	0.73	2	2.47	.085
	Moderate	238	0.83	0.62	1357		
	High	917	0.87	0.63	1359		
<b>Disheartenment</b>	Low	206	0.89	0.87	2	22.61	p< 0.001
	Moderate	239	0.62	0.60	1356		
	High	914	0.56	0.59	1358		
<b>Helplessness</b>	Low	205	0.70	0.79	2	11.76	p< 0.001
	Moderate	237	0.47	0.55	1353		
	High	914	0.48	0.57	1355		
<b>Sense of failure</b>	Low	203	1.45	0.71	2	10.11	p< 0.001
	Moderate	232	1.33	0.66	1323		
	High	891	1.22	0.66	1325		

Low physical activity has been considered when total weekly MET were lower than 600, moderate between 600 and 3000, high levels when higher than 3000.

On the other side we found no statistically significant differences on the global DS score when comparing people sitting for more or less than 2 hours per day. The only difference was found in the subscale Sense of Failure (1.30 vs 1.23, t 2.01, df 1175.9, p< 0.05).

### **In Summary RQ3:**

- The findings showed relatively low levels of demoralization in the general elderly population
- Higher demoralization scores appear to be associated with longer TV viewing
- Differences were found in terms of Demoralization subscales scores (Loss of Meaning, Disheartenment and Helplessness) when comparing people who watch more or less than 2 hours TV per day on average, and similarly for the Physical activity level. The only subscale that in both cases did not show statistically significant differences was Dysphoria.



### ***3.4 RQ4. Which are the mental and/or physical problems that are mostly associated with TV viewing?***

Since for each of the previous Research Questions some associations were found between TV viewing and some aspects of people’s mental or physical health, it was interesting for us to evaluate the differences in terms of “weight” of each variable in relationship with TV viewing as dependent variable.

In order to answer this final general question we performed a stepwise regression analysis including all the variables we have been investigating in the previous RQ (and controlling covariates). The results indicated a 8 variables model reported in Table 24.

The variables that explain the most the total weekly time of TV viewing are: self reported physical health (number of problems), the Mini Mental Status score (in inverse relationship), financial situation, having a diagnosis of Endocrinological problems, the total score of the Demoralization scale, the total weekly physical activity level, having one or more heart disease diagnosis and finally age.

**Table 24 - Stepwise regression model**

<b>Linear Regression Model</b>	<b>Standardized coefficient</b> Beta	<b>t</b>	<b>Sig.</b>
(Constant)		2.895	p< 0.05
<b>Sum score physical health (List A5)</b>	0.062	1.952	p< 0.05
<b>Mini Mental Status – score</b>	-0.100	-3.679	p< 0.001
<b>Financial situation</b>	0.107	3.931	p< 0.001
<b>Endocrinological disease (CX2)</b>	0.085	3.039	p< 0.05
<b>Sum score Demoralisation Scale</b>	0.079	2.935	p< 0.05
<b>Weekly MET TOTAL</b>	-0.059	-2.194	p< 0.05
<b>Heart disease (CX2)</b>	0.060	2.037	p< 0.05
<b>Age</b>	0.057	2.029	p< 0.05

Corrected R<sup>2</sup>: 0.072; p< 0.05, \*\* p< 0.01, \*\*\* p< 0.001;

#### **In Summary RQ4**

- Physical health plays a certain role in terms of association with TV viewing, in particular Endocrinological and Heart diseases.
- However also mental health, in particular cognitive functioning and Demoralization result being associated with TV viewing time.
- The relationship with physical activity is also meaningful and, as expected, of inverse direction.

## **4. Discussion**

The results presented in this work can add some confirmations on the possible role of sedentary habits, in particular TV viewing, on people's mental and physical health.

### ***4.1 RQ 1 Physical health***

Concerning physical health we confirmed results coming from the literature. We found in fact an association between TV and heart/circulatory system disease and Endocrinological diseases (Hu, Li et al. 2003; Thorp, Healy et al. 2010; Gardiner, Healy et al. 2011; Grontved and Hu 2011; Smith and Hamer 2014).

We also found an association between TV viewing and some other specific health problems such as musculoskeletal disease and stomach/digestive system disease. The first area has already been addressed in previous works mainly concerning children's TV habits (Straker, Pollock et al. 2006; Harris, Straker et al. 2012; Palmer, Ciccarelli et al. 2014) and only recently on the elderly (Gianoudis, Bailey et al. 2015). Concerning stomach/digestive system diseases, while there is a strong focus on the negative effects of eating while watching TV (Bowman 2006; Ramos, Costa et al. 2013; Lee, Kim et al. 2014; Tal, Zuckerman et al. 2014; Anderson, Khodabandeh et al. 2015), there are no specific studies on such diseases neither on the young population and even less on the older one. An area to further explore could be to assess how widespread is the habit of having meals or in general eating while watching TV. Such practice could in fact be quite common and the consequences for people's health could, also in this case, be quite heavy.

A specific interesting result refers also on the possible association with having a tumour and watching more TV (even after controlling for the presence of mobility problems). This area has also been explored before and associations with TV viewing and low levels of physical activity have been found in particular for increased risk of endometrial, liver and lung cancer (Ukawa, Tamakoshi et al. 2013; Schmid and Leitzmann 2014; Ukawa, Tamakoshi et al. 2014).

It has to be noted also for this area that after controlling for the variable "mobility problems", those who had some mobility problems did not differ that much among

them. Those who did not have mobility problems and had some of the previously indicated medical problems tended either to be less physically active or to watch more TV or both.

#### ***4.2 RQ 2 Mental health***

It was interesting to note that having some mobility problems can obviously influence people's sedentary time and lower their physical activity. However, once such variable is controlled by dividing people in two groups, for those who do have mobility problems there is no difference if having or not a specific mental health problem. On the other side the interesting element is that for those who do not have mobility problems, those who report having felt sadness, demoralization, sleep problems, problems with appetite and weight and low self-esteem there is an increase in TV time and decrease in physical activity levels. Therefore, concerning self-reported mental health we did find an association between TV viewing and an area of mental health that refers to feeling somehow depressed, as found in previous works (Hamer, Stamatakis et al. 2010; Lucas, Mekary et al. 2011; Hamer, Poole et al. 2013).

On the other side, a general association between TV viewing and general actual psychiatric diagnoses of depression, anxiety or both was not found, even though it emerged that persons with a Major Depressive Disorder (MDD) tended to watch less Television than those without such a diagnosis. These results were significant after controlling for possible covariates.

This result is in general not in line with other studies that found a relationship between sedentary behaviour and mental health (Hamer, Stamatakis et al. 2010; Teychenne, Ball et al. 2010; Lucas, Mekary et al. 2011; Arredondo, Lemus et al. 2013; Hamer and Stamatakis 2013).

Nevertheless it was demonstrated that, even after controlling for possible covariates, subjects with lower cognitive functioning have a tendency to spend more time viewing television than those with no cognitive impairment. This is in agreement with previous research (Lindstrom, Fritsch et al. 2005; Fogel and Carlson 2006; Rundek and Bennett 2006; Wang, Zhou et al. 2006; Kesse-Guyot, Charreire et al. 2012; Hamer and Stamatakis 2013).

### ***4.3 RQ 3 Demoralization***

To the best of our knowledge there are no other published researches investigating the relationship between Demoralization and TV viewing in a Elderly sample. The results were interesting and indicated a relationship between these two areas, where higher levels of Demoralization were associated with longer TV time (and lower physical activity).

Even though the direction of the influence between Demoralization and TV viewing could not be derived from this study, as both being Demoralized and watching long TV hours are risk factors for mental and physical issues, these result should be taken into account in future research and when designing programs for a more active and healthier ageing.

### ***4.4 RQ4 Physical and mental health***

This Research Question came as a consequence and combination of the first three. Results showed that actual TV viewing habits could be explained by a combination of factors, and that both physical and mental health have a role in that.

In general the previous works have been focused either on mental health or physical health associations with sedentary habits, but not on the two areas at the same time. According to the ICF model, that derives from the Bio-Psycho-Social model of health, it would be more useful to start considering mental and physical health variables together in order to have a multi-dimensional and more accurate definition of people's wellbeing.

## **5. Conclusions**

The main strength of these findings, in comparison with the previously cited studies, regards the target sample, since, to our knowledge, this is the first study investigating the association of TV viewing on the general elderly population mental health, cognitive functioning and physical health across different European Countries.

Furthermore, the need to separately evaluate different types of sedentary activity, in particular to assess TV viewing time, as there are different associations and effects (Kesse-Guyot, Charreire et al. 2012; Hamer and Stamatakis 2013), was confirmed in our study. Sitting time alone in fact did not show almost any association with the various physical or mental health variables considered.

It was also the first study focusing on Demoralization Syndrome on a general elderly population and in relation with sedentary habits.

The main limitation of this study refers to the measure of TV viewing. More specifically, the time categories proposed (maximum value “3 hours or more”) limited the power of the analyses and reflected only a normal use of the TV and sitting time, not the extremes or abuses. A scale with up to 12 hours per day would have been more accurate in measuring the real behaviour.

Another limitation is the cross-sectional nature of the study as it prevents us from inferring any causal relationship between variables, and we can only describe associations.

We also are aware of the fact that self-report measures generally tend to underestimate the real behaviour (Harvey, Chastin et al. 2013) and both TV viewing and sitting time could have been even higher than what was reported.

Moreover, since the Mini Mental State Examination is mainly a screening tool, not specifically designed to perform a detailed evaluation of cognitive functioning (Folstein, Folstein et al. 1975), more specific measures of cognitive efficiency should be used in further studies.

Finally, regarding the selection process it is possible that the final sample did not include the most fragile or sick at the time of the recruitment therefore our subjects could be slightly more “sane”, and probably more active, than the real population.

In conclusion, even with such limits, this research has provided further evidence of the association between time spent watching Television and some specific health issues, in particular feeling somehow depressed, Mild Cognitive Impairment (MCI), some specific physical health problems (mainly coronary/heart disease and Endocrinological diseases) and demoralization syndrome in the 65+ population.

Television viewing might displace more physically and/or mentally challenging activities (Sugiyama, Healy et al. 2008; Teychenne, Ball et al. 2008) thus preventing people from engaging in a healthier lifestyle. The inverse association between Television time and Physical activity levels found in our data would also support such statement. However recent studies demonstrated that sitting for long time (thus typically TV viewing) per se could be harmful for health, independently of time spent on physical activities (Hamilton, Hamilton et al. 2004; Ekelund, Brage et al. 2006; Hamilton, Hamilton et al. 2007; Hamilton, Healy et al. 2008; Katzmarzyk, Church et al. 2009).

The current research developments on neuroplasticity could also provide some further implications concerning people's mental health and cognitive functioning. Since the brain is constantly modifying according to the experiences, in particular to those who are repeated day by day (Merzenich, Van Vleet et al. 2014; Sale, Berardi et al. 2014), we could assume that the experience of watching TV for long hours, day by day, could modify our brain, even at adult and older age.

Such influence has already been demonstrated in children. A Japanese research group in fact, in a cross-sectional and longitudinal work, analysed correlations between the duration of TV viewing and longitudinal changes in the brain structures through brain magnetic resonance that occurred a few years later among 111 boys and 105 girls. They found actual modifications attributable to time spent watching TV in the following brain areas: frontopolar and medial prefrontal areas, white matter density of the visual cortex, regional grey matter volume of the hypothalamus/septum and sensorimotor areas. Such modifications were also correlated with reduction in intellectual abilities.

In another work the researchers found that, compared to having the book read by their mother in person, seeing their mother reading the same book through watching her videotaped in Television implicated a reduction in activity of the

frontal lobes of the children involved in the study (Ohgi, Loo et al. 2010). We have no studies yet on the adults or elderly's brain, but we could assume similar effects.

Therefore, while more and more “brain training” methods are being developed on the basis of the new knowledge about our neuroplasticity (Mahncke, Connor et al. 2006; Gates, Sachdev et al. 2011; Gutchess 2014; Hannan 2014; Merzenich, Van Vleet et al. 2014), the actual, daily repeated for an average of at least two hours “activity” is TV viewing. Considering also that in a recent UK survey two fifths all older people (about 3.9 million) said the television was their main company (Age-UK 2013), it is as if people were very scrupulously training in a deprived environment to achieve the opposite of mental and cognitive fitness. In other words we are trying innovative and quite complex interventions to maintain people's cognitive functioning, while one of the first and least expensive could be at least to prevent them from doing something potentially quite harmful.

It is well known how challenging it could be to modify people's habits and, for example, increase their physical activity (Sun, Norman et al. 2013). An important step to promoting a better ageing could be to start from increasing awareness of the negative impact of sitting time and design programs aimed at drastically reduce the time spent viewing TV while increasing time spent on other more challenging mental activities such as reading, playing cards, interacting with other people (Fratiglioni, Paillard-Borg et al. 2004; Wang, Zhou et al. 2006; Chen, Jiang et al. 2012; Paillard-Borg, Fratiglioni et al. 2012). As the recent developments in Neurosciences indicate in fact, these are the main ingredients of the so-called “enriched environment” (Sale, Berardi et al. 2014) that can maintain a good cognitive functioning thus preventing serious problems such as Dementia.

As Hamer points out, “even small adverse health effects of this behaviour (TV viewing) could have profound impact at the population level” (Hamer and Stamatakis 2013). We could therefore turn it by saying that the wider the awareness of sedentary habits' (especially TV viewing) consequences among the population, the better for everybody's health.



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# **APPENDIX**

## **Questionnaires used**

From CIDI 65+:

Socio-demographic data sheet

List A5, self-reported current physical and psychological health problems;

CX2 list, medical and chronic diseases

IPAQ (including TV viewing)

WHODAS II

Demoralization Scale



<b>SOCIO-DEMOGRAPHIC SHEET</b>	
<b>1. Country born:</b>	
Country born:	.....
Citizenship:	.....
Ethnic background:	.....
Parents born in same country	Y N
<b>2. Marital status (tick appropriate)</b>	
<input type="checkbox"/> married	
<input type="checkbox"/> separated	
<input type="checkbox"/> divorced	
<input type="checkbox"/> widowed,	since ___/___ years
<input type="checkbox"/> never been married	
<b>3. School/education</b>	
Years of schooling	number ___/___
<input type="checkbox"/> Graduated last school	
<b>4. Work status</b>	
Last main profession (specify NA if none)	
Specify:	.....
<input type="checkbox"/> Retired,	since ___/___ years
<input type="checkbox"/> Homemaker/housewife	
<input type="checkbox"/> Working/employed	
<input type="checkbox"/> Unemployed,	since ___/___ years
<input type="checkbox"/> other:	.....
Currently ill/sick, specify: .....	
Currently disabled,	since ___/___ years
Specify:	.....
Rate whether physical or emotional or both	
<input type="checkbox"/> physical	
<input type="checkbox"/> emotional	
<b>5. Household members</b>	
Number of people	
<input type="checkbox"/> None –lives alone	number ___/___
<input type="checkbox"/> spouse/partner	age ___/___
<input type="checkbox"/> own children	number ___/___
<input type="checkbox"/> grandchildren	number ___/___
<input type="checkbox"/> other family	number ___/___
<input type="checkbox"/> other	number ___
number in household aged < 10	___
number in household aged 10-18	___
number in household aged 19-40	___
number in household aged 41-65	___
<b>6. If spouse or cohabiting partner:</b>	
Status	
<input type="checkbox"/> Retired	
<input type="checkbox"/> Homemaker/housewife	
<input type="checkbox"/> Working/employed	
<input type="checkbox"/> Unemployed	
<input type="checkbox"/> other	
Rate degree of care burden	
<input type="checkbox"/> no burden	
<input type="checkbox"/> some burden	
<input type="checkbox"/> a lot of burden	
<b>7. Number of children</b>	
number of children	___/___
number of grandchildren	___/___

<b>8. Close relationships</b>	
Number of current close significant	___/___
Most important, specify:	.....
<b>9. Finances</b>	
Sources household income	
<input type="checkbox"/> salary own	
<input type="checkbox"/> salary partner	
<input type="checkbox"/> pension	
<input type="checkbox"/> federal, local subsidy, welfare assistance	
<input type="checkbox"/> financial children	
<input type="checkbox"/> savings, investments	
<input type="checkbox"/> other	
<b>Rate financial situation</b> ___(enter number)	
1 = very good	
2 = good	
3 = just enough	
4 = poor	
5 = very poor	
<b>Rate frequency financial problems</b> ___(enter number)	
1 = never	
2 = rarely	
3 = often	
4 = always	
<b>10. Rate religious affiliation</b>	
<b>Rate religious affiliation</b> ___ (enter number)	
1 = very important	
2 = somewhat important	
3 = not very important	
4 = not at all	
<b>Rate attendance religious services</b> ___(enter number)	
1 = >1/ week	
2 = about 1/ week	
3 = 1-3 times/ month	
4 = <1/month	
5 = less frequently	
6 = never	
<b>Rate frequency comfort or advice</b> ___ (enter number)	
1 = often	
2 = sometimes	
3 = rarely	
4 = never	

Please mark with an "x" all problems that you currently have. Please start with column 1 (physical health):

- | 1. Physical health  | 2. Mental health                                     | 3. Everyday life and relationships                   |
|---|--|--|
| <input type="radio"/> Persistent pain                                 | <input type="radio"/> Sadness, depression            | <input type="radio"/> Financial situation            |
| <input type="radio"/> Recurrent pain                                  | <input type="radio"/> Demoralization                 | <input type="radio"/> Work problems                  |
| <input type="radio"/> Weakness  | <input type="radio"/> Anxiety                        | <input type="radio"/> Care for my sick partner       |
| <input type="radio"/> Heart disease                                   | <input type="radio"/> Worries                        | <input type="radio"/> Care for sick family members   |
| <input type="radio"/> Hypertension                                    | <input type="radio"/> Nervousness                    | <input type="radio"/> Problems with my partner       |
| <input type="radio"/> Diabetes  | <input type="radio"/> Sleep problems                 | <input type="radio"/> Problems with my children      |
| <input type="radio"/> Gastrointestinal problems                       | <input type="radio"/> Nightmares                     | <input type="radio"/> Living alone                   |
| <input type="radio"/> Problems breathing (lung)                       | <input type="radio"/> Alcohol problems               | <input type="radio"/> Feeling isolated               |
| <input type="radio"/> Cancer  | <input type="radio"/> Medication use problems        | <input type="radio"/> Few close friends              |
| <input type="radio"/> Incontinence                                    | <input type="radio"/> Fatigue, exhaustion            | <input type="radio"/> Problems with living situation |
| <input type="radio"/> Physical handicap                               | <input type="radio"/> Sexual problems                |  |
| <input type="radio"/> Hearing problems                                | <input type="radio"/> Appetite and weight            |  |
| <input type="radio"/> Hearing problems                                | <input type="radio"/> Suicidal thoughts              |  |
| <input type="radio"/> Neurological disease (i.e. Parkinson, Dementia) | <input type="radio"/> Thoughts about terrible events |  |
|   | <input type="radio"/> Confusion                      |  |
|   | <input type="radio"/> Low self esteem                |  |
|   | <input type="radio"/> Irritability                   |  |
|   | <input type="radio"/> Insecurity                     |  |
|   | <input type="radio"/> Difficulties to decide         |  |
|   | <input type="radio"/> Anger and aggression           |  |
|   | <input type="radio"/> Strange thoughts               |  |
|   | <input type="radio"/> Strange experiences            |  |

## List

## WHODAS II

This questionnaire asks about difficulties due to health conditions. Health conditions include diseases or illness, other health problems that may be short or long lasting, injures, mental or emotional problems, and problems with alcohol or drugs.

Think back over the last 30 days and answer these questions thinking about how much difficulty you had doing the following activities. For each question, please circle only one response.

In the last 30 days, how much difficulty did you have in:		None	Mild	Moderate	Severe	Extreme
1.*	Standing for long periods such as 30 minutes?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	Taking care of your household responsibilities?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	Learning a new task, for example, learning how to get to a new place?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	How much of a problem did you have joining in community activities (for example, festivities, religious or other activities) in the same way as anyone else can?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	How much have you been emotionally affected by your health problems?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.	Concentrating on doing something for ten minutes?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.*	Walking a long distance such as a kilometer [or equivalent]?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.	Washing your whole body?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.	Getting dressed?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10.	Dealing with people you do not know?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11.	Maintaining a friendship?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12.	Your day to day work?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13.	Overall, how much did these difficulties interfere with your life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

\* mobility scale questions

**In the past 12 months has a doctor or other health professional told you that you had any of the following illnesses? Or have you been treated for any of these diseases, for example in a hospital or emergency room?**

1. **Heart disease and disease of the circulatory system** (e.g. coronary heart disease, myocardial infarct/heart attack, angina pectoris, heart insufficiency/heart failure, high blood pressure, disturbance of circulation, disease of the vein)
2. **Disease of the nervous system** (e.g. migraine, tension headache, stroke, multiple sclerosis, Parkinson disease)
3. **Musculoskeletal and inflammatory disease** (e.g. arthrosis, arthritis, osteoporosis, back pain)
4. **Disease of the respiratory system** (e.g. chronic lung disease, like chronic obstructive pulmonary disease, or emphysema, bronchitis, asthma bronchiale)
5. **Stomach disease/disease of the digestive system** (e.g. ulcer in your stomach or intestine, gastritis, inflammation of the gall-bladder, gallstone, diseases of the liver)
8. **Disease of the genitourinary system** (e.g. inflammation of the renal pelvis, pyelonephritis, renal colic, kidney stone)
9. **Endocrinological disease** (e.g. diabetes, or high blood sugar, metabolic syndrome, thyroid disease)
10. **Tumor/ Cancer (neoplasm)**, please specify:  
\_\_\_\_\_
12. **Dermatological Disease** (e.g. neurodermitis, psoriasis)
13. **Any other serious diseases?**  
-----

Questionnaire on Physical Activity	N. days per week (on average)	N. hours per day (on average)
<p>1. During the <b>last 7 days</b>, on how many days did you do <b>vigorous</b> physical activities? <b>For how long every day (hours per day on average)?</b></p> <p>Vigorous activities make you breathe much harder than normal and may include heavy lifting, digging, aerobics, or fast bicycling. Think only about those physical activities that you did for at least 10 minutes at a time.</p>	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7	<input type="checkbox"/> < 10' <input type="checkbox"/> 10'-30' <input type="checkbox"/> 30'-1h <input type="checkbox"/> 1h-2h <input type="checkbox"/> 2h-3h <input type="checkbox"/> >3h
<p>2. During the <b>last 7 days</b>, on how many days did you do <b>moderate</b> physical activities? <b>For how long every day (hours per day on average)?</b></p> <p>Moderate physical activities make you breathe somewhat harder than normal and may include carrying light loads, bicycling at a regular pace, or doubles tennis. <b><u>Do not include walking.</u></b></p>	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7	<input type="checkbox"/> < 10' <input type="checkbox"/> 10'-30' <input type="checkbox"/> 30'-1h <input type="checkbox"/> 1h-2h <input type="checkbox"/> 2h-3h <input type="checkbox"/> >3h
<p>3. During the <b>last 7 days</b>, on how many days did you <b>walk</b> for at least 10 minutes at a time? <b>For how long every day (hours per day on average)?</b></p> <p>This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.</p>	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7	<input type="checkbox"/> < 10' <input type="checkbox"/> 10'-30' <input type="checkbox"/> 30'-1h <input type="checkbox"/> 1h-2h <input type="checkbox"/> 2h-3h <input type="checkbox"/> >3h
<p>4. During the last 7 days, how much time did you usually spend <b>sitting</b>? <b>For how long every day (hours per day on average)?</b></p> <p>Include time spent at work, at home, while doing course work, and during leisure time. This may include time spent sitting at a desk, visiting friends, reading BUT NOT sitting or lying down to watch television.</p>	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7	<input type="checkbox"/> < 10' <input type="checkbox"/> 10'-30' <input type="checkbox"/> 30'-1h <input type="checkbox"/> 1h-2h <input type="checkbox"/> 2h-3h <input type="checkbox"/> >3h
<p>5. During the last 7 days, how much time did you usually spend <b>watching television</b>? <b>For how long every day (hours per day on average)?</b></p>	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7	<input type="checkbox"/> < 10' <input type="checkbox"/> 10'-30' <input type="checkbox"/> 30'-1h <input type="checkbox"/> 1h-2h <input type="checkbox"/> 2h-3h <input type="checkbox"/> >3h

**DS**

For each statement, please indicate how strongly you have felt this way over the **last two weeks**. Please tick the corresponding box:

	never	seldo m	some- times	often	all the time
1. There is a lot of value in what I can offer others. (SoF)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. My life seems to be pointless (LoM)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. There is no purpose to the activities in my life. (LoM)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. My role in life has been lost. (LoM)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I no longer feel emotionally in control. (Hel)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I am in good spirits. (Dis)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. No one can help me. (Hel)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I feel that I cannot help myself. (Hel)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. I feel hopeless. (Hel)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. I feel guilty. (Dys)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. I feel irritable. (Dys)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. I cope fairly well with life. (SoF)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. I have a lot of regret about my life. (Dys)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Life is no longer worth living. (LoM)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. I tend to feel hurt easily. (Dys)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. I am angry about a lot of things. (Dys)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. I am proud of my accomplishments. (SoF)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. I feel distressed about what is happening to me. (Dis)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. I am a worthwhile person. (SoF)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. I would rather not be alive. (LoM)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. I feel sad and miserable. (Dis)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22. I feel discouraged about life. (Dis)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23. I feel isolated or alone. (Dis)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24. I feel trapped by what is happening to me. (Dis)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Legenda:** LoM= Loss of Meaning Scale; Dys= Dysphoria Scale; Dis= Disheartenment ; Hel= Helplessness; SoF= Sense of Failure Scale