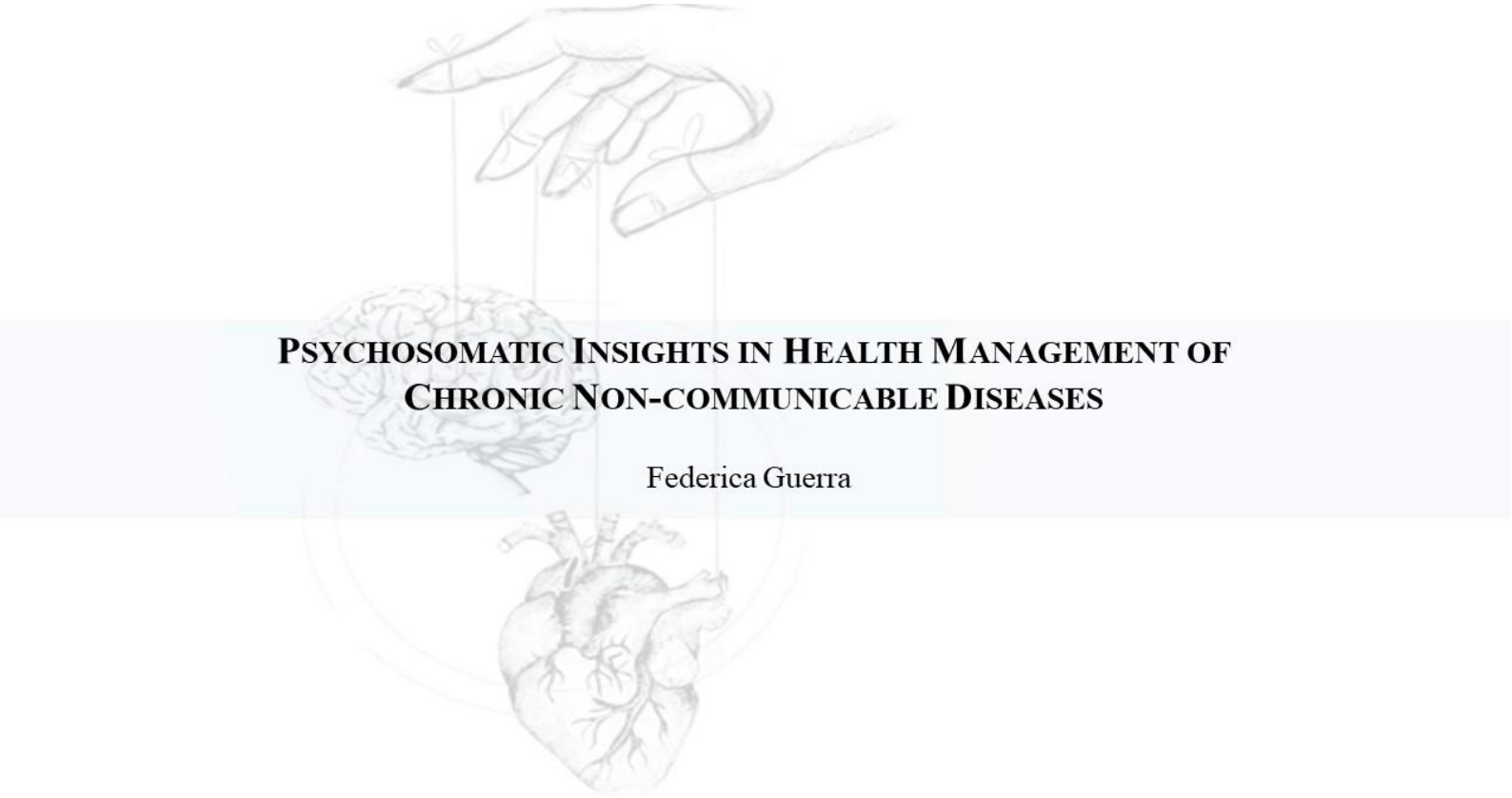
UNIVERSITÀ DEGLI STUDI DELL'AQUILA

DIPARTIMENTO DI MEDICINA CLINICA SANITÀ PUBBLICA SCIENZE DELLA VITA E DELL'AMBIENTE

Dottorato di Ricerca in Medicina clinica e sanità pubblica

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PSYCHOSOMATIC INSIGHTS IN HEALTH MANAGEMENT OF CHRONIC NON-COMMUNICABLE DISEASES

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PSYCHOSOMATIC INSIGHTS IN HEALTH MANAGEMENT OF CHRONIC NON-COMMUNICABLE DISEASES

Federica Guerra

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Abstract

In recent decades there has been an increasing predominance of Chronic non communicable diseases (CNCDs) with a significant increase in those living with chronic diseases which can negatively affect their Quality of Life. The development of chronic disease is often a life-changing event, with significant physiological, social, and psychological consequences. As such, the development of severe disease and living with the burden of the disease could both lead to long-term changes in self-perception. Consequently, emotion regulation, experience, processing, and modulation of the emotional response are needed to manage common emotional stressors in chronic disease patients. The objectives of the thesis were to conduct scientific investigations in the clinical setting focused on the psychosomatic aspects in the management of chronic diseases in the diagnosis, medical care, and post-treatment phase. The scientific perspective concerned the identification of a new target of patients, the detection of emotional dimensions and the unmet needs of the patients, the identification of personality traits that can be predictive for the increase of self-care and compliance skills. N.4 cross-sectional studies have been described who investigated the emotional characteristics of Chronic Kidney Disease patients (CKD), patients diagnosed with chronic diseases which include cardiovascular, digestive and locomotor system diseases. The studies have been conducted by the collaboration of Internal Medicine and Nephrology (Director Prof. Claudio Ferri), Transplantation Surgery Division (Director Prof. Francesco Pisani), and Dialysis Division (Resp. Dott. Marilena Tunno) at the San Salvatore Hospital, ASL1 Abruzzo. These studies were approved by the Institutional Review Board of the University of L'Aquila. Informed consent was obtained from each participant, and the study adhered to the Declaration of Helsinki (WMA, 2018). Demographic and clinical data were collected; participants completed the measures during their scheduled follow- up. Data were collected anonymously. All participants underwent a standardized psychological battery composed by self-report to analyze emotional variables (stress, anxiety, depression, and psychological distress), QoL, self-care ability (maintenance, management, monitoring and self-efficacy), emotion regulation, and personality traits. Statistical analyses were performed using SPSS Statistics 22.0. and Jamovi software. Descriptive statistics were calculated for baseline characteristics and outcome measures. One-way analysis of variance (ANOVA) and analysis of covariance, MANOVA, Pearson's correlation, post-hoc analysis, linear regression was conducted to detect the statistical significance of the overall differences between examined psychological variables and the clinical condition. In accordance with literature, our studies evidenced the emerging clinical and research topic regarding the strengthening of patient-centred approach in CNCDs. Overall, the findings highlighted that CNCDs should be managed by adopting medical protocols tailored for biological and physical symptoms, also taking mental disease and behavioral maladaptation into

consideration. According to the literature, healthcare should go beyond the effects of disease or treatment, thus improving the patient approach by the empowerment of individuals managing their own health conditions as well as doctors to the active patient for met needs to reduce the burden of CNCDs.

PREFACE

PhD program in Clinical Medicine and Public Health 'Epidemiology, preventive, rehabilitative and occupational medicine' - XXXIV cycle

The thesis is based on studies performed at Department of Medicine and Public Health during XXXIV doctoral course, curriculum "Epidemiology, preventive, rehabilitative and occupational medicine' (Coordinator Prof. Claudio Ferri) from 2018-2021, under supervision Prof. Domenico Passafiume and, Prof. Dina Di Giacomo.

Doctoral Programme expected learning of the experimental techniques and methodologies of scientific research, through access to different types of patients by age, clinical pathology, psychopathology and, need for intervention.

Doctoral Course was divided in two dimensions:

a) Clinical research training

b) Scientific thematic study of the clinical area

Clinical research training was performed by participation in research projects on patients with chronic diseases with collaboration in two Academic Laboratories: the Psychology and Psychoncology Laboratory (Resp. Prof. Dina Di Giacomo), Neuropsychology Laboratory (Resp. Prof. Domenico Passafiume) and, San Salvatore Hospital ASL1 Abruzzo; the activities have been finalized in scientific productivity reported in the appendix of the publications (pag. 121), and in the appendix of the presentation at national and international congresses (pag.125).

Research activities was conducted on young, adult and, old population affected by chronic diseases to explore emotional characteristics, protective and health risk factors during medical treatments and/or survivorship.

Person-centered approach was applied by clinical interviews, measurements in one-to-one interaction, and/or online survey.

Studies can be grouped into 3 research lines:

a) Exploration of the emotional trigger and strengths for better psychological adaptation during survivorship in the management of chronic diseases;

b) Promotion of the Healthy Aging in the third generation;
c) Investigation of the risk factors for post-traumatic stress symptoms during the global Covid-19 pandemic

Studies conducted in research field on the *exploration of the emotional triggers and the strengths for better psychological adaptation during survivorship in the management of chronic diseases* aimed to: a) highlight the emotional impact and long-term effects of surgical interventions (kidney transplant, vascular access surgery) on the adult population diagnosed with chronic kidney diseases; b) identify the strengthens (personality traits, cognitive reserve) and risk factors for the development of psychological well-being after a diagnosis of chronic disease with the possible presence of other clinical comorbidities; c) to examine modifications in satisfaction degree and Quality of Life after surgery and intensive clinical treatments; d) detect the long-term effects of chronic diseases (disorders of the cardiovascular, digestive and locomotor systems) on the psychological adaptation; e) evaluate impact on mental health and body image perception following surgery.

Studies conducted in research field on *promotion of the Healthy Aging in the third age generation* aimed: a) to examine the digital confidence on old population and to identify behavioral models for the technology, related at the cognitive ability; b) to identify the role of the cognitive reserve in adhering to digital solutions among the elderly; c) to investigate the impact of the technophobia on the Quality of Life in inclusion perspective; d) to experiment intervention protocols, cognitive stimulation and Montessori's method in subjects with Alzheimer's type dementia.

Studies conducted in the field of research on *investigation of the risk factors for post-traumatic stress symptoms during the global Covid-19 pandemic* aimed to: a) investigate the risk of developing post-traumatic stress disorder (PTSD) among health workers (medical doctor, nurses, and mental health professionals); b) investigate the relationships among emotional distress and personality traits; c) analyze the emotional dimensions of the health workers during the COVID-19 pandemic; d) to determine the psychological impact of the prolonged public health emergency and restrictive measures; e) identify the buffering effect of the e-learning for undergraduates during the pandemic.

The scientific investigations in clinical area have been focused on psychosomatics aspects in the management of chronic diseases during diagnosis, medical treatments and post-treatment.

The established academic-healthcare network favored innovative research protocols in the clinical psychology regard to the chronic diseases; the scientific perspective concerned the identification of a new target of patients, the detection of emotional dimensions and the unmet needs of the patients, the identification of personality traits that can be predictive for the increase of self-care and compliance skills.

Below the list of Projects approved by Ethical Boards regarding the research membership during PhD Program.

Team ***Member in Research*** Protocols***:***

Project	*Ethical Board*	*Partners*
Patient Engagement in Hemodialysis Treatment (SET IN)	Comitato Etico ASL1 Abruzzo 42227/2022	UOC Medicina Interna e Nefrologia dell'Ospedale San Salvatore dell'Aquila (Dir. C. Ferri); UOSD Dialisi PO L'Aquila (Dir. Marilena Tunno); Laboratorio di Psicologia Clinica e Psiconcologia (Resp. D. Di Giacomo);
Multidisciplinary Health Management For Pda Burdens' Outpatients (LEG UP)	IRB UNIVAQ 119772/2021	UOC Medicina Interna e Nefrologia dell'Ospedale San Salvatore dell'Aquila (Dir. C. Ferri); Laboratorio di Psicologia Clinica e Psiconcologia (Resp. D. Di Giacomo)
Dignicap Technology In Chemotherapy Treatment: Emotional Regulation, Resilience And Quality Of Life In Oncological Senology (CRISTAL)	IRB UNIVAQ 60902/2020	UOC Oncologia Medica (Dir. E. Ricevuto); Laboratorio di Psicologia Clinica e Psiconcologia (Resp. D. Di Giacomo)
Quality Of Life & Well-Being In Chronic Diseases (DEAL WITH)	IRB UNIVAQ 107750/2019	UOC Medicina Interna e Nefrologia dell'Ospedale San Salvatore dell'Aquila (Dir. C. Ferri); Laboratorio di Psicologia Clinica e Psiconcologia (Resp. D. Di Giacomo)
L'impatto emotivo e comportamentale della dialisi nei pazienti adulti	IRB UNIVAQ 34614/2020	UOSD Dialisi PO L'Aquila (Dir. Marilena Tunno); Laboratorio di Neuropsicologia Clinica (Resp. D. Passafiume);
Dolore pelvico cronico: qualità della vita dalla diagnosi all'implementazione di trattamenti riabilitativi innovativi (EASE ON)	IRB UNIVAQ 79326/2020	Pelvic Center dell'Ospedale San Salvatore dell'Aquila (Resp. Angela D'Alfonso); Laboratorio di Psicologia Clinica e Psiconcologia (Resp. D. Di Giacomo)
Balancing psychological wellbeing and stress among healthcare professionals in hospital setting (COOL DOWN)	IRB UNIVAQ 107751/2020	UOC Medicina Interna e Nefrologia dell'Ospedale San Salvatore dell'Aquila (Dir. C. Ferri); Laboratorio di Psicologia Clinica e Psiconcologia (Resp. D. Di Giacomo)
Qualità della vita e del benessere prima e dopo il trapianto di rene	26656/2019	UOC Chirurgia Generale e dei Trapianti d'Organo dell'Ospedale San Salvatore dell'Aquila (Dir. F. Pisani); Laboratorio di Neuropsicologia Clinica (Resp. D. Passafiume);
La tecnologia Dignicap nel trattamento chemioterapico: regolazione emotiva, resilienza e qualità della vita nella senologia oncologica"	IRB UNIVAQ 55738/2019	UOC Oncologia Medica (Dir. E. Ricevuto); Laboratorio di Psicologia Clinica e Psiconcologia (Resp. D. Di Giacomo)

Il benessere dei pazienti oncologici giovani e adulti nel trattamento clinico: un nuovo modello di survivorship (ALIANTE)	IRB UNIVAQ 16372/2019	UOC Oncologia Medica (Dir. E. Ricevuto); Laboratorio di Psicologia Clinica e Psiconcologia (Resp. D. Di Giacomo)

The Doctoral Thesis entitled '**PSYCHOSOMATIC INSIGHTS IN HEALTH MANAGEMENT OF CHRONIC NON-COMMUNICABLE DISEASES**' is composed of three sections:

a. Background section

b. Experimental section

c. Development section.

The Background Section developed the chronic disease topic exploiting the epidemiological scenario (chronic renal failure, disorders of the cardiovascular system - e.g. hypertension - digestive - e.g. Chron's disease - and locomotor - e.g. rheumatoid arthritis), the emotional impact of pathology and the Quality of Life.

In the Experimental Section have been reported the experimental studies. N.4 cross-sectional studies have been described who investigated the emotional characteristics of Chronic Kidney Disease patients (CKD), patients diagnosed with chronic diseases which include cardiovascular, digestive and locomotor system diseases.

Objectives of the studies have been to investigate the clinical characteristics and the unmet needs of patients during the survivorship, noting the strengthens and risk factors for psychological distress and psychosomatics symptoms.

Finally, the Development section summarized the research that are currently underway and that represent the clinical-scientific growth of experienced PhD program.

BACKGROUND SECTION

CHAPTER 1. EPIDEMIOLOGICAL DATA AND QUALITY OF LIFE

1.1. Introduction

Chronic non communicable diseases (CNCDs) are characterized as chronic, slow-progressing diseases, with a sharply increasing burden. CNCDs contribute to 41 million deaths annually worldwide (71% of total deaths). Deaths from CNCDs are expected to reach 52 million by 2030. Cardiovascular disease, cancer, chronic respiratory diseases, and diabetes are NCDs with sequentially the highest mortality rates.

The development of chronic disease is often a life-changing event, with significant physiological, social, and psychological consequences. As such, the development of severe disease and living with the burden of the disease could both lead to long-term changes in self-perception (Sutin RA., et al., 2013). Consequently, emotion regulation, experience, processing, and modulation of the emotional response are needed to manage common emotional stressors in chronic disease patients (Wierenga KL., et al., 2017). Optimizing emotion regulation promotes adaptation in the presence of aversive stressors (Gratz & Roemer, 2008), while the inability to effectively manage the emotions triggered by a health event can decrease self-care activities and impact on mental and physical health (Appleton AA., et al., 2013; de Ridder D., et al., 2008; Evers S., et al., 2010). A psychosomatic disorder is a physical disorder that is closely related to psychosocial factors that affect the onset or clinical course of the disease. For most patients the mind-body relationship is related to psychosocial stress. Psychosomatic disorders can be described as psychosocial-derived organic disorders. Moreover,

psychosomatic disorders occur more often among women than among men (Bielejewska A. et al., 2017).

In recent decades there has been an increasing predominance of CNCDs with a significant increase in those living with chronic diseases which can negatively affect their Quality of Life (Megari K., 2013). The increase in chronic diseases is also due to improved treatment methods with the consequent increase in survival rates. Cancer treatments, for example, have transformed cancer from an acute to a chronic disease for many patients. Similarly, renal insufficiency, through treatment and kidney transplant surgery, requires the patient to pay constant attention to the symptoms of their body, all adherence to therapies and participation in follow-up visits over time. Clinical treatments such as dialysis and kidney transplantation for patients with kidney failure and anticancer treatments for cancer patients are also vital, have important implications for a person's work, social, sexual, and family life. Psychosocial factors also appear to have an impact on the development and progression of chronic diseases such as coronary, metabolic, neurodegenerative, and oncological disease. Similarly, psychosocial interventions have been shown to improve the Quality of Life of patients with established disease and appear to influence the biological process designed to improve disease progression (Schneiderman N., et al., 2001). Emotional distress, such as depression, can contribute to poor interactions, which in turn exacerbate health problems (Uchino B. & Eisenberger NI., 2019). On the other hand, the treatment of a medical condition (for example, the use of steroids) can also affect the patient's mood, as well as the disease process itself (for example, hypoxia and infection in a patient with chronic respiratory disease can have a direct brain impact on mood). Similarly, anxiety, stress and emotional dysregulation can be incisive for the appearance of other disorders that can include the stomach and musculoskeletal pain. (Rostislav AG et al., 2020). Moreover, the correlation between psychosomatic disorders and the cardiovascular system has been demonstrated (Bielejewska A. et al., 2017)

Countless studies have examined the widely suspected relationship between reported emotions, such as anger and anxiety, and hypertension. No more than 50% of clinical coronary heart disease is explainable in terms of classic cardiac risk factors. Evidence is being gathered that psychological abnormalities, particularly depressive illness, anxiety states, including panic disorder and mental stress, are involved here, "triggering"

clinical cardiovascular events and possibly even contributing to the development of atherosclerosis.

However, the functional limitations imposed by the disease can cause "understandable" distress, and some physicians find it difficult to conceptualize this distress as a depressive disorder. Indeed, the distinction between an adaptive reaction and a depressive illness is often unclear. Clarification of the diagnosis can be aided by examining the patient's risk factors for depression, i.e. whether they have a history of depression, severe functional impairment or pain, thus also considering the patient's psychosocial background in report to your pathology of hers.

Considering this, health systems and the professionals working within them are expected to provide continuous, patient-centred care and support patients in active self-management of their chronic conditions. Support for self-management is very important in the management of chronic conditions and multimorbidity. Self-management is based on the central premise that individuals need to take care of themselves in a series of health care practices daily between medical appointments. Greater self-efficacy is associated with better outcomes and that better outcomes reduce the burden of health services. There is evidence that a more person-centred care approach can enhance self-efficacy in single diseases (e.g. acute coronary syndrome, stroke) and that self-management support in CNCDs improves self-efficacy and patient outcomes (Peters M., et al., 2019). Chronic disease therefore determines a continuous psychological adaptation for patients and their families from the moment of diagnosis / treatment up to the time of a presumed surgery and in the post-operative phase. Addressing the quality of life (QoL) and the psychosocial challenges a patient encounters (Avis N., et al. 2005) upon returning to the community after treatment for the disease is an increasingly important issue that needs to be addressed. In addition to the threat to their life and the fear of recurrence of the disease, they suffer from the possibility of physical and aesthetic ailments. In addition, they undergo lifelong follow-up since, in the case of cancer, metastases can occur more than 20 years after diagnosis (Shields FA., et al. 1985; Gunduz K., et al. 1998) and, in the case of transplantation of kidney, the transplanted kidney may lose its function again. QoL is one of the most studied issues in these survivors and demonstrates that most long-term survivors report retrospectively that the disease has had a positive or almost no long-term impact on their lives.

However, QoL is reduced because of pain, physical deformities, or social isolation (Frenkel S., et al, 2018). Different psychological strategies could positively or negatively influence the approach to the disease. Appropriate adaptation to the disease process implies effective control of the patient's disease behaviour and emotions, mental flexibility, as well as an appropriate interaction with the patient's environment. These variables promote the management of their own resources to cope with the stressful situation. Resilience involves protective personal attributes including cognitive flexibility, positive emotions, and active coping. Literature has demonstrated that certain coping strategies are more adaptive and widely used than others, leading to a more constructive, positive, and active coping processes. In fact, coping effectiveness can vary depending on several factors, such as the stage of the disease, the time since diagnosis, medical treatment, etc. For instance, some authors have found that coping strategies such as acceptance, positive reappraisal and seeking social support are associated with higher adaptation, well-being, and quality of life in cancer. On the contrary, maladaptive coping strategies such as self-blame, avoidance and negation are related to poorer mental health outcomes; on the other hand, many studies have confirmed the importance of negative affects personality traits and distress in the perception of symptoms and in the estimation of HRQoL in different groups of diseases. Personality traits, for example, could play a central role in understanding the impact and management of the disease. Neuroticism expresses a person's reactivity and emotional stability, with high neuroticism meaning high emotional instability and low neuroticism meaning more emotional stability. In the general population, neuroticism is a significant contributor to the number of symptoms typical for somatization, and this association is independent of distress or gender. Also, according to Bolger et al., 1995 (Bolger KE., et al., 1995), high neuroticism is associated with greater exposure and reactivity to stressful events; extroversion, on the other hand, expresses a person's level of arousal and stimulation-seeking. In long-term research on the normal population, extroversion predisposed participants to experience objective life events more positively, in contrast to more negative experiences with neuroticism. Psychological distress describes the actual psychological status of a patient – the current presence of anxiety and depressive symptoms – and is generally associated with CNCDs. Moreover, it is associated with the severity of a disease and its social impact on functional limitations rather than with

a particular diagnosis. The recognition of behavioural factors is important for the experimentation of preventive measures and the adaptation of personalized psychological paths for the patient as well as the development of greater awareness of patients' own health and better self-care skills.

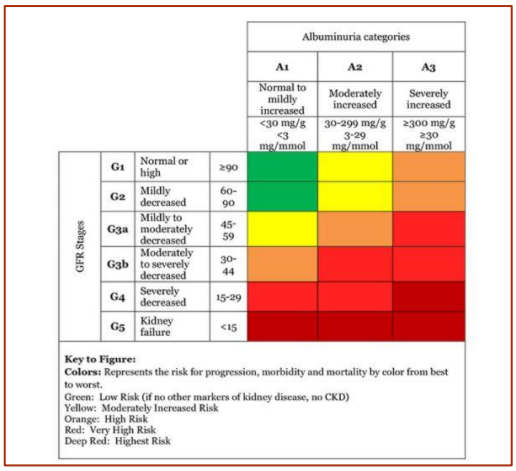
1.2. Chronic kidney disease

Chronic Kidney Disease (CKD) is a public health problem that tends to take dimensions of epidemic and has serious impact on quality of patient's life. CKD is an irreversible and progressive kidney failure where body fails to maintain metabolic and electrolytic balance, resulting in uremia, metabolic acidosis, anemia, electrolyte imbalances and endocrine disorders (Stavroula K. et al., 2014). The onset of CKD, in addition to being linked to specific kidney diseases that become chronic, is closely related to age and modifiable risk factors such as diabetes, hypertension, heart disease, obesity, smoking and depends on proper dietary-pharmacological treatment. *(Ministero della salute, documento di indirizzo per la malattia renale cronica).* The disease is classified according to 5 stages of increasing severity. Glomerular Filtration Rate - Estimated GFR (e), the gold standard in assessing kidney function, is used for residual level of kidney function and to determine the stage of kidney disease (National Kidney Foundation). Based on the eGFR, progressive renal failure is divided into five different stages of severity in ascending order: stage 1 (normal filtration rate of about 90-100 ml per minute); stage 2 (renal failure with mild glomerular filtration loss of 60-89 ml per minute); stage 3 (mild to moderate loss at glomerular filtration rate of 45-59 mL per minute); stage 3b (moderate to severe loss at glomerular filtration rate of 30 to 44 mL per minute); stage 4 (severe loss at glomerular filtration rate of 15 to 29 ml per minute); stage 5 (kidney failure, glomerular filtration rate less than 15ml per minute). (**Fig.1**)

CKD is a dangerous clinical condition for two reasons:

1. It can progress towards End Stage Renal Disease (ESRD), that is the final stage of kidney disease where dialysis and transplantation are the necessary treatments for survival;
2. Amplifies the risk of cardiovascular complications.

Incidence. The Global Burden 2018 (GB-CKD) report shows how the worldwide incidence of CKD has gone from 11˙299˙557 of individuals in 1990, to 21˙328˙971 in 2016, with an increase of 89% in 27 years. According to data provided by the Global Burden and relating to the time 1990-2016, population growth and the increase in the average length of life are the factors most responsible for the increased incidence of CKD globally. The Era-Edta Registry, register of 2018 reports a higher incidence in men than women **(Fig. 2)**



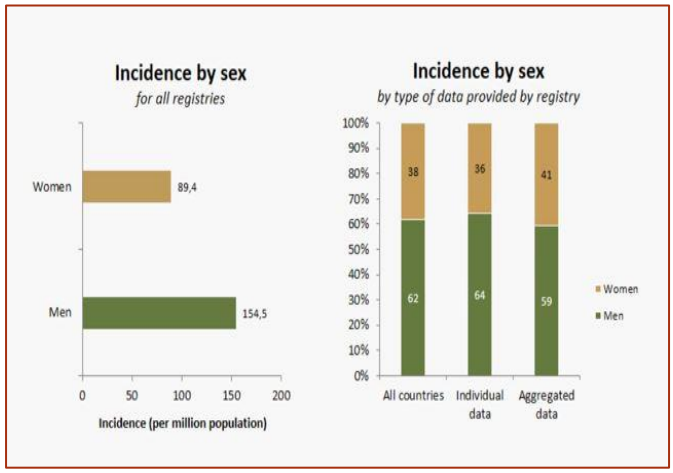


Fig. 1*- Stage of Chronic Kidney Diseases (Ministero della salute, documento di indirizzo per la malattia renale cronica);* ***Fig. 2****- Incidence of CKD by sex (Era Edta annual report 2018)*

Prevalence. The prevalence of CKD (GFR <60 and / or Ualb / Ucreat ≥30 mg / g) was 7.5% in men and 6.5% in women with a prevalence greater than early stages (± 60%) 1 and 2 of CKD, compared to stages 3-5 with CKD (equal to 40%) (**Table 1**)

	Total	Men	Women
MRC stages			
1	2,6 (2,3-3,0)	2,7 (2,2-3,2)	2,6 (2,1-3,2)
2	1,5 (1,3-1,8)	2,1 (1,7-2,6)	0,9 (0,6-1,3)
3	2,1 (1,8-2,5)	2,0 (1,5-2,4)	2,3 (1,8-2,8)
3b	0,5 (0,4-0,7)	0,5 (0,3-0,7)	0,5 (0,3-0,8)
4	0,2 (0,1-0,3)	0,2 (0,1-0,4)	0,1 (0,0-0,3)
5	0,1 (0,0-0,2)	0,1 (0,0-0,3)	0,1 (0,0-0,3)
CKD Total	7,1 (6,5-7,7)	7,5 (6,7-8,4)	6,5 (5,8-7,4)

Table 1- Prevalence of CKD by stage and gender *(Ministero della salute, documento di indirizzo per la malattia renale cronica)*

In addition, age also appears to be a determining factor: the disease increases the risk of presenting itself as we age **(Fig. 3)** .

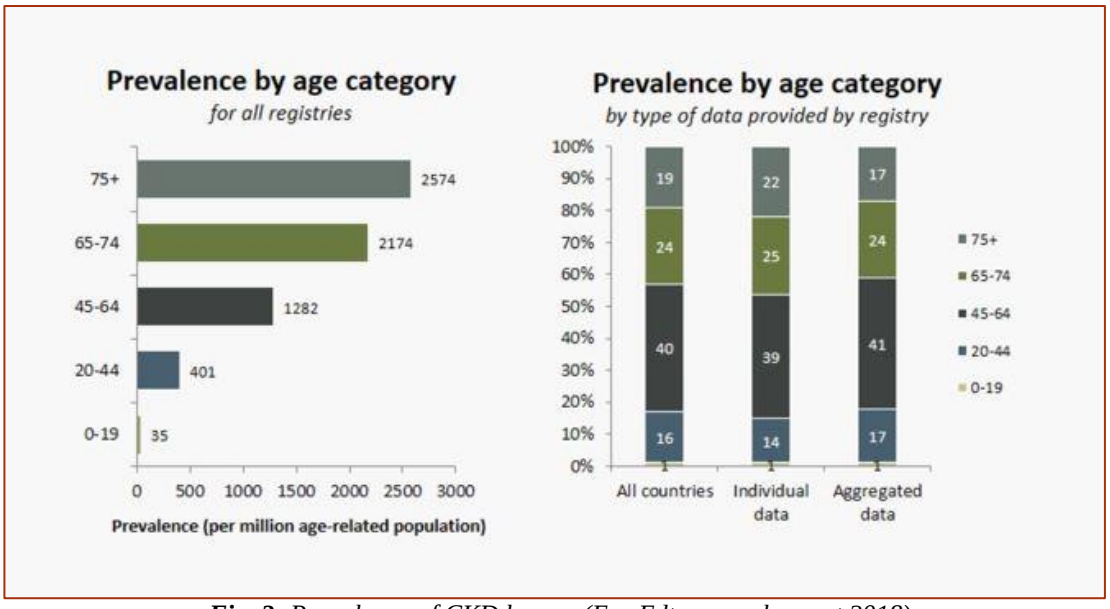


Fig. 3- *Prevalence of CKD by age (Era Edta annual report 2018)*

Mortality. Patients with CKD stage 4 to 5 have a risk of mortality from cardiovascular disease 2-4 times higher than that of the general population, while patients with end-stage renal disease have a risk of up to 20 times higher.

Treatment. Dialysis treatment is a valid therapy that completely replaces renal function in renal patients, increasing survival rates, contributing to the maintenance of health and the balance of the organism while waiting for the new kidney. Dialysis aims to replace impaired renal activity, carrying out the function of filtering water and waste substances from the blood and helping to keep blood pressure under control *(National Kidney Foundation, 2019).*

It is of two types:

1. ***Haemodialysis:*** it is a procedure in which the patient's blood is filtered from toxic substances and from liquids taken with food. At the start of a hemodialysis treatment, two needles are inserted into the arm, which are connected to the dialysis machine. This procedure takes place through a tube attached to the dialysis device that circulates the blood, purifies it and returns it to the subject. This is done in the hospital three times a week for about four hours per session. This type of dialysis can be done in the hospital or at home, with the help of a trained nurse.
2. ***Peritoneal Dialysis***: Peritoneal dialysis uses the lining of the abdomen or womb (the peritoneum) to filter blood within the body. A few weeks before starting peritoneal dialysis, the person performs a minor surgery in which a soft tube, the catheter, is inserted into the belly. The dialysis solution flows from a bag through the catheter into the belly, absorbing waste and extracorporeal fluid. Over time, filtering slows down. For this reason, the process is repeated four to six times a day. This type of dialysis can be done at home *(National Institute of Diabetes and Digestive and Kidney Disease).*

The effects of dialysis that kidney patients may experience are: nausea, dizziness, sleep disturbances, itching, joint pain, erectile dysfunction and decreased sexual desire, dry mouth and anxiety. They must also follow a certain food plan as an accumulation of fluids leads them to significantly increase body weight, have heart and respiratory difficulties (Xiao-QingYe et al., 2008). Kidney transplantation (KT) represents a recovering phase for patients affected by end-stage renal disease (ESRD). The increase in innovative and personalised medicine solutions in kidney surgery can improve patients' chances of survival. *(*Cukor D., 2007). The data in the ERA-EDTA registry,

show that the majority of patients perform hemodialysis (50%); the remainder go to peritoneal dialysis (5%) and 45% get a transplant; present data vary according to age: younger patients (<65 years) get the transplant earlier than those over 65 years old **(Fig 4).**

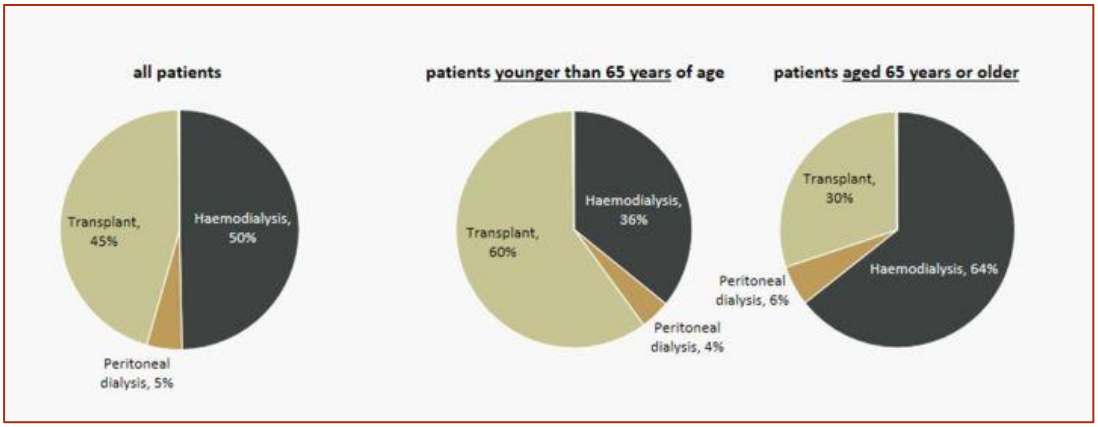


Fig. 4*- Prevalence by modality of treatment*

Quality of Life. Although clinical treatments such as dialysis and kidney transplantation are vital for patients with kidney disease, they have important implications for a person's working, social, sexual and family life. CKD therefore determines a continuous psychological adaptation for patients and their families starting from the moment of diagnosis / dialysis until the moment of transplantation and in the post-operative phase. In particular, the time of dialysis is particularly significant for patients, as it requires them to accept their new image and adapt to the new dialysis condition. In addition, the quality of life of patients requiring dialysis is significantly affected by strong changes in their daily habits and lifestyle both for themselves and their families. At the same time, their physical health, their functional status, their personal relationships and their social and economic status are greatly affected. The occurrence of chronic pain in dialysis patients is usually between 37% and 50%, while 82% of them show moderate to severe pain. The etiology of pain is multifactorial and may be due to the dialysis process or the existence of systemic diseases and pain syndromes. Pain is the most common symptom - patient discomfort causing significantly reduced quality of life. This is because the incidence of chronic pain is associated with the onset of affective disorders (anxiety, depression), social disorders (isolation, neglect) and economic

impact (eg. Inability to keep a job). (Gerogianni, SK et al., 2014). Similarly, even the moment of kidney transplantation can be experienced with great ambivalence: if on the one hand it can arouse feelings of hope, on the other it arouses feelings of profound discomfort accompanied by an attempt to deny the gravity of the situation. On the other hand, the multiplicity of phases that characterize this type of intervention require the person to continuously adapt and consequently there is a continuous change in emotional experiences, very different from one phase to another (Consoli E., 2009).

1.3. Cardiovascular disease

Cardiovascular disease (CVD) is a chronic physical disease affecting the heart or blood vessels, and it is one of the main causes of death and disability but is can often largely be prevented by leading healthy lifestyle and by efficacy of pharmacological treatments for blood pressure (Masters SK. et al., 2020). CVD is a major cause of mortality and morbidity. Coronary heart disease is the leading cause of death attributable to cardiovascular disease (CVD), followed by stroke, hypertension, and heart failure. Nearly 80% of CVD deaths could be prevented through optimal management of risk factors, including smoking cessation and physical activity (Allegrante PJ. et al., 2019). The mechanisms of increased cardiac risk attributable to mental stress and psychiatric illness are not entirely clear, but activation of the sympathetic nervous system seems to be of prime importance; although whether chronic psychological distress leads to the development of coronary atherosclerosis remains a disputed issue, there is strengthening evidence from numerous population studies that psychological abnormalities, particularly depressive illness, anxiety, and chronic mental stress can contribute to atherogenesis; Panic disorder is characterized by unpredictable, overwhelming feelings of fear accompanied by symptoms such as sweating and palpitations. Often, chest pain is present and is so like angina that a typical panic disorder case history contains several emergency room visits leading to detailed cardiac work-up, the result of which is typically normal. Although panic disorder is distressing and disabling, until recently it had not been thought to constitute a risk to life. Recent well conducted, prospective epidemiological studies, however, indicate that there is substantially increased risk of death in patients with panic disorder (three to sixfold increase). Coronary artery spasm

accompanying SNS activation during panic attacks has been implicated in some patients. Co-release of adrenaline from the sympathetic nerves of the heart, a potential basis for ventricular arrhythmias, has also been documented (Esler M. et al., 2000). Psychosocial factors such as depression, anxiety, lowered quality of life, and low social status are associated with higher risk of development of a cardiovascular disease, along with worse prognosis after its manifestation. (Bielejewska A. et al., 2017). Improved preventive strategies could reduce the burden of disease.

Incidence. In recent years, there has been a reduction in the number of deaths associated with diseases of the circulatory system across several EU Member States. These changes may have occurred, at least in part, through the introduction of increased screening and new surgical procedures, the introduction of new forms of medication, as well as lifestyle changes for patients (for example, a reduction in the number of smokers).

Diseases of the circulatory system place a considerable burden on healthcare systems and government budgets. Indeed, in 2016 there were 1.68 million deaths resulting from diseases of the circulatory system in the EU, which was equivalent to 37.1 % of all deaths — considerably higher than the second most prevalent cause of death, cancer (malignant neoplasms; 25.8 %).

In 2017, there were 19.9 million new cases of CVD in the 54 ESC member countries with data available. National contributions were in part determined by population

The number of in-patients with diseases of the circulatory system discharged from hospitals across the EU was 10.4 million in 2018 (Cardiovascular diseases statistics, 2022).

Prevalence. The World Health Organization (WHO) estimates there will be about 20 million CVD deaths in 2015, accounting for 30 percent of all deaths worldwide (WHO, 2005). The projected trends in CVD mortality and the expected shifts from infectious to chronic diseases over the next few decades are shown in Figure 2.1. By 2030, researchers project that non-communicable diseases will account for more than three-quarters of deaths worldwide; CVD alone will be responsible for more deaths in low income countries than infectious diseases (including HIV/AIDS, tuberculosis, and malaria), maternal and perinatal conditions, and nutritional disorders combined. Thus,

CVD is today the largest single contributor to global mortality and will continue to dominate mortality trends in the future (WHO, 2009) (Fig. 5)

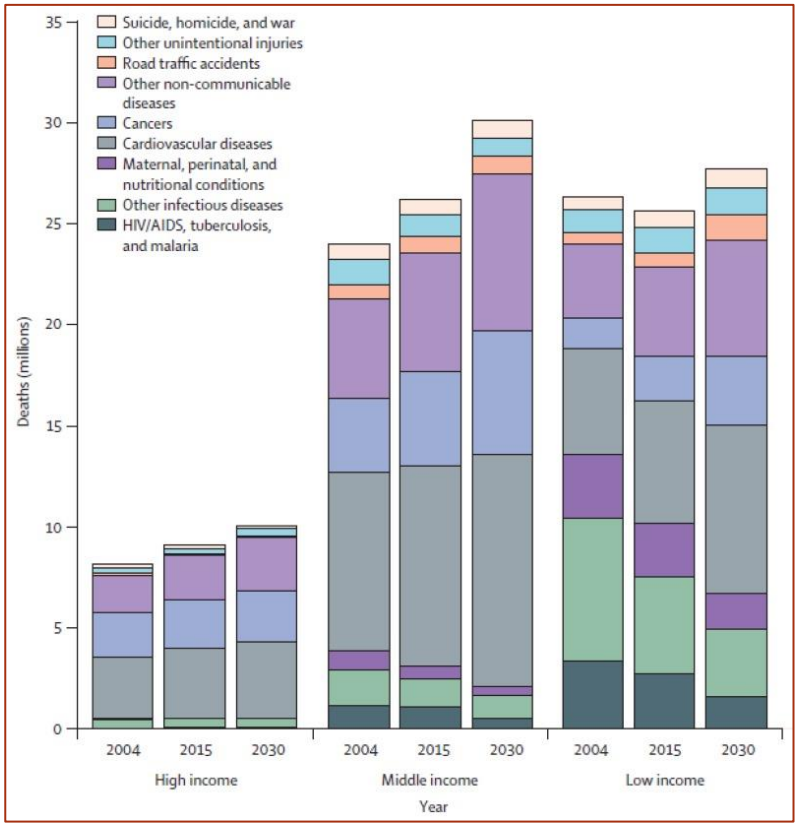


Fig. 5*- Prevalence of CVDs (Beaglehole and Bonita, 2008)*

Mortality. According to data from the World Health Organization, every year CVD is responsible for the death of 17.9 million people worldwide, which is equivalent to 31% of all deaths. CVDs occur almost equally in men and women. By 2010 CVD are estimated to have become the leading cause of death in developing countries, as well as developed ones (Cardiovascular diseases, WHO 2022). Indeed, in 2016 there were 1.68 million deaths resulting from diseases of the circulatory system in the EU, which was equivalent to 37.1 % of all deaths — considerably higher than the second most prevalent cause of death, cancer (malignant neoplasms; 25.8 %). There were five EU Member States where a higher proportion of men (than women) died from diseases of the circulatory system: in Denmark, the share of male deaths was 1.7 percentage points higher than that for women and in Ireland it was 1.6 percentage points higher; smaller differences were observed in Cyprus, Finland and Sweden. (Cardiovascular diseases statistics, 2022).

Quality of Life. Patients with history of CVD may experience various physical and emotional symptoms such as fatigue, edema, and sleeping difficulties that limit their physical and social activities which will in turn result in poor quality of life. Hospitalization and mortality have been associated with poor quality in people with history of CVD (Komalasari R., et al., 2019). Quality of life (QOL) is a major outcome indicator of patients with cardiac disease with or without comorbidities such as depression, other psychosocial factors, and a multitude of chronic non-communicable diseases. Among patients with cardiac disease, depression ranges between 20 and 40%. Depression is associated with worsened QOL (physical, mental, and social), medical morbidity, and mortality. A strong association has been observed between symptoms of depression and health status, symptom burden, physical limitation, QOL, and overall health among patients with coronary artery disease (CAD). Depression influences lifestyle habits such as smoking, eating, exercising, getting along with family members, social life, and work. It can lead to lowered productivity, personal losses, and increased family and state burden. Other accompanying cardiovascular risks can further compromise patient QOL. Many studies in developing countries have reported on poor QOL experienced by patients with cardiac disease with depression who are two times more likely to die after a cardiac event (Bahall M. et al., 2020). A study conducted by Bahall M., et al., 2020, revealed that QoL was generally worse as the number of comorbidities increased (Fig. 6).

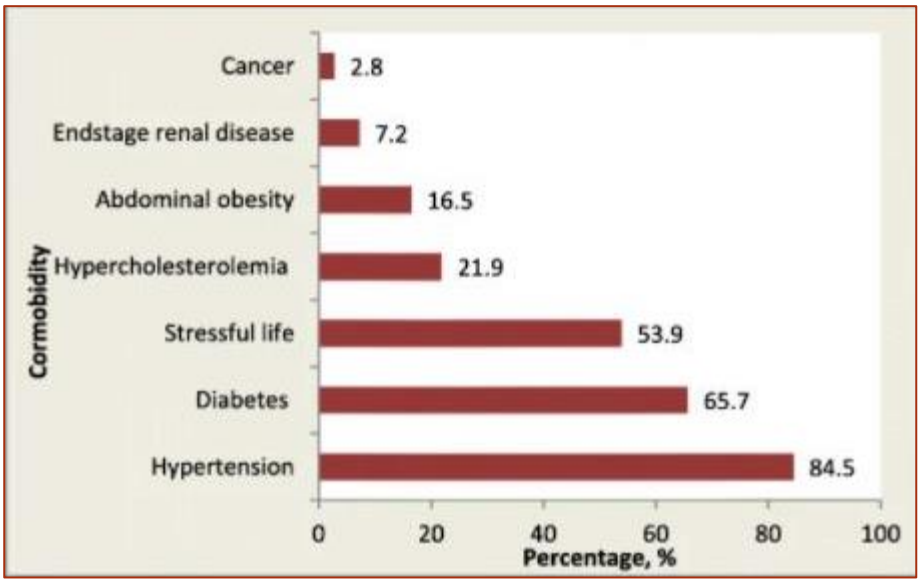


Fig. 6*- Quality of life among patients with cardiac disease: the impact of comorbid*

In several studies (Shad B., et al., 2017; Tušek-Bunc K, et al., 2016; Sertoz OO et al., 2016) it was in fact found that patients with CVD with comorbidities have an association between the presence of comorbidity in patients with heart failure (HF) and a lower QOL, which leads to an increased risk of mortality (Streng KW et al., 2018). Comorbid diabetes and depression have been associated with reduced survival rates and increased re-hospitalization in patients with heart failure. Another study observed significantly poorer health-related QOL among patients with coronary heart disease who had anxiety and depression in all domains, particularly, in physical functioning and role functioning (Rehman AU et al., 2016). Wang et al. (Wang W, et al., 2016) reported that depression is a predictor of mental health related QOL among patients with acute myocardial infarction. Cruz et al. Fond that depressed patients with ischemic heart disease had lower QoL scores than did their non-depressed counterparts in the mental health, emotional, and social functioning domains (Cruz LN, et al., 2016; Bahall M., et al.,2020).

1.4. Musculoskeletal disorders

Musculoskeletal disorders (MSDs) are conditions that can affect muscles, bones, and joints. Musculoskeletal conditions comprise more than 150 conditions that affect the locomotor system of individuals. They range from those that arise suddenly and are short-lived, such as fractures, sprains and strains, to lifelong conditions associated with ongoing functioning limitations and disability. Musculoskeletal conditions are typically characterized by pain (often persistent) and limitations in mobility, dexterity and overall level of functioning, reducing people's ability to work. Musculoskeletal conditions include conditions that affect:

- Joints, such as osteoarthritis, rheumatoid arthritis, psoriatic arthritis, gout, ankylosing spondylitis;
- bones, such as osteoporosis, osteopenia and associated fragility fractures, traumatic fractures;
- muscles, such as sarcopenia;
- the spine, such as back and neck pain;
- multiple body areas or systems, such as regional and widespread pain disorders and inflammatory diseases such as connective tissue diseases and vasculitis that have musculoskeletal manifestations, for example systemic lupus erythematosus.

Musculoskeletal conditions are also the highest contributor to the global need for rehabilitation (Musculoskeletal conditions, WHO 2021). Over the past decade, the Global Burden of Disease (GBD) has produced compelling evidence of the leading contribution of musculoskeletal pain conditions to the global burden of disability. Low back pain imposed the highest disability burden of all specific conditions assessed conditions. (Blyth FM et al., 2019). Relationship between work-related musculoskeletal disorder and psychosocial factors, as organizational characteristics, interpersonal relationships, temporal aspects of the job, and financial and community aspects, has been reported. Musculoskeletal pain is caused and exacerbated by job stress that is induced by psychosocial factors. (Kiook B. et al., 2018)

Incidence. Because of population increases and ageing, the number of people with musculoskeletal conditions is rapidly increasing. The disability associated with musculoskeletal conditions has been increasing and is projected to continue to increase in the next decades. Approximately 1.71 billion people have musculoskeletal conditions worldwide. Among musculoskeletal disorders, low back pain causes the highest burden with a prevalence of 568 million people. (Musculoskeletal conditions, WHO 2021)

Prevalence. MSD are highly prevalent worldwide, and in a steadily aging population with increased prevalence of obesity and reduced physical activity, the prevalence of many of MSD will increase in coming years (March L, et al., 2014). Globally, 21.3 % of years lived with disability was attributed to MSD in 2010 (44.7 % increase from 1990) (Vos T, et al., 2012.). MSD were considered as the fourth (third in developed countries) greatest contributor in disability-adjusted life years (DALYs) in 2010 (Cross M. et al., 2014).

Mortality. The World Health Organization has identified physical inactivity as the fourth leading risk factor for mortality globally. While less attention had been paid to mortality associated with MSD, a growing recognition of MSD-related mortality has been emerged in recent years (Myasoedova E., et al., 2009). Recent evidence suggests that MSD including rheumatoid arthritis (RA) and osteoarthritis (OA) are associated with excess all-cause and disease-specific mortality (Gonzalez A, et al., 2007; Nuesch E, et al., 2011; Barbour KE, et al., 2015; McBeth J, et al., 2009; Jordan KP, et al., 2010; Widdifield J, et al., 2015). In the Global Burden of Disease Study, MSD were considered as underlying cause of 153 500 deaths worldwide in 2010 (about 0.3 % of all causes deaths) and age-standardized mortality rate increased from 17 per million in 1990 to 23 per million in 2010 (a 37.8 % increase) (Lozano R, et al., 2012).

Quality of Life. Musculoskeletal conditions significantly limit mobility and dexterity, leading to early retirement from work, lower levels of well-being and reduced ability to participate in society (Musculoskeletal conditions, WHO 2021).

Musculoskeletal disorders cause pain and contribute to reduced mobility and impaired health-related quality of life (Warburton DE et al., 2001; McPhail SM, et al., 2012). Patients with musculoskeletal disorders experience loss of mobility, of independence, higher rates of institutionalization and higher mortality rates. As a consequence, all musculoskeletal disorders significantly impairs patients' health-related quality of life (HRQoL) (Xie F, et al 2016; Abimanyi-Ochom J, et al., 2015). Changes in quality of life associated with fragility fractures: Australian arm of the International Cost and Utility Related to Osteoporotic Fractures Study Tarride J-E et al 2016; Al-Sari UA, et al., 2016).

1.5. Digestive system diseases

The Digestive System made up of the gastrointestinal tract (GI), liver, pancreas, and gallbladder helps the body digest food (National Institute of Diabetes and Digestive and Kidneay Diseases, NIDDK). The spectrum of symptoms attributable to the gastrointestinal tract includes abdominal pain, diarrhoea, constipation, bloating, fullness, nausea, and vomiting. (Black JC et al., 2020).
Principal gastrointestinal disorders, represented by (Fookes C., 2021).:

- Irritable Bowel Syndrome (IBS)
- Crohn's disease
- Celiac disease
- Diverticular disease
- Gastroesophageal Reflux Disease (GERD)
- Peptic ulcer disease (PUD)
- Ulcerative colitis.

Psychosomatic concepts have long been postulated to account for IBS, for example, in the absence of other objective aetiology and biomarkers, and it is common knowledge that many chronic conditions are associated with psychological disorders. It is worth noting that ulcerative colitis was interpreted by psychosomatic theory until the discovery of immune dysregulation (Shah E., et al., 2014). In general, causal relationships are hard to establish. Clinical and population-based studies worldwide have found that some types of somatoform disorders (e.g., somatisation disorder, somatic-symptom-index,

and pain disorder) frequently co-occur with anxiety and depressive disorders. These findings could suggest either a causal relationship between those disorders or that they share certain aetiological factors. Irritable bowel syndrome occurs most frequently in young adults in response to emotional and other factors (Lieb R., et al., 2007). The relationship between psychological derangements (especially through the hypothalamic-pituitary-adrenal axis) and altered gut microbiota have been evaluated in animal studies in which a surgically induced state intended to mimic depression was associated with elevated corticotropin-releasing hormone leading to subsequently elevated serotonin levels and hyperactive colonic motility. Moreover, stress (and the subsequently increased levels of hormonal mediators) may mediate leaky intestinal epithelia and reduced mucosal protection which may be a mechanism by which patients who experience acute gastroenteritis develop subsequent post-infectious IBS (Vanuytsel T., et al., 2013).

Incidence. New epidemiological data suggest that the incidence and prevalence of the diseases are increasing, and medical therapy and disease management have changed significantly in the last decade. An estimated 2.5-3 million people in Europe are affected by IBD. The incidence of the inflammatory bowel diseases (IBD), Crohn's disease and Ulcerative colitis, in particular has increased steadily in the last few decades. These diseases primarily affect young people, with a younger of age of onset being reported more recently. The incidence of childhood GI diseases is increasing in many countries and the impact of these conditions on children's social and psychological wellbeing is often over-looked (Ruemmele FM. Et al., 2014). There is a geographical variation in the incidence of IBD. It is higher in Northern compared to Southern Europe, and higher in the West than in the East of Europe. The geographical variations may be explained by lifestyle factors such as diet, exercise, smoking habits and antibiotic consumption (Maaser C. et al., 2017). Many people with IBD have frequent relapses, or continuous active disease, that often results in complications requiring hospitalisation and/or surgery. Treatment strategies vary widely across Europe, due to access and affordability, which results in variable outcomes for patients.

The mean annual age-adjusted incidence of hospitalization for all GI diseases was 5539 per 100 000 people over 10 years. From 2005 to 2014, GI infections were the commonest discharge diagnosis, ranging from 1407 to 2642 per 100 000, followed by GI neoplasms. In 2014, there were 1836 discharges for GI infections and 1620

discharges for GI neoplasms, contributing more than 60% of total discharges of GI diseases. For GI neoplasms, colorectal cancer was the

major contributor to hospital admissions with 34% increase. The incidence of hospitalization has increased by 51% for non-infectious enterocolitis by 17% GI neoplasms and by 31% for GI

infections. Hospitalization for Crohn's disease showed the most significant rise with 126% increase over 10 years. In contrast, hospitalization for both bleeding and non-bleeding PUD

decreased from 399 to 234, liver disease from 465 to 355, and biliopancreatic disease from 633 to 553. There is a significant reduction of 66% for PUD-related bleeding over 10 years. Of particular note, Clostridium difficile infections increased by more than fivefold out of the 31% rise in bacterial GI infections. (Shui Ho Chan J., et al., 2018) **(Fig. 7).**

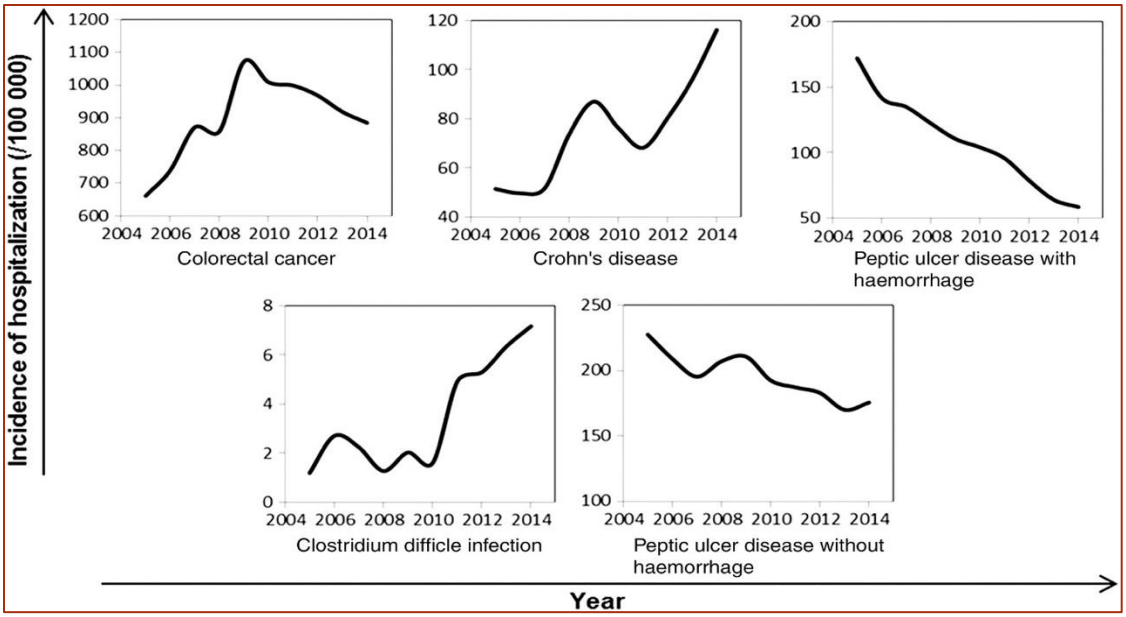


Fig. 7*. Trend of incidence of hospitalization of gastrointestinal diseases over 10 years. The incidences of hospitalization of selected gastrointestinal diseases are measured with number of discharges/100 000 from 2005 to 2014.* (Shui Ho Chan J., et al., 2018)

Prevalence. GI symptoms are widespread and carry heavy economic and social consequences. It is estimated that in the United States 11% of the population suffer from a chronic digestive disease, with a prevalence rate as high as 35% for those 65 years and

over. (Avramidou M., et al., 2018). The incidence and prevalence of many gastrointestinal disorders are highest among older people (Farthing M., et al., 2014).

Mortality. Mortality from (non-malignancy) gastrointestinal diseases overall is highest in eastern and north-eastern Europe and lowest in parts of Scandinavia and the Mediterranean islands. One and five-year survival following diagnosis with major gastrointestinal malignancies is usually highest in central and western European countries. Survival appears to be worse in parts of eastern Europe, although there is still a lack of data from some eastern European countries. Population-based mortality for colorectal cancer has been falling over several decades in almost all western, northern and central European countries. It is continuing to increase in many eastern European countries – particularly for men – and in some parts of southern Europe (Farthing M., et al., 2014). The overall in-hospital mortality of GI diseases was reduced from 7.2% to 5.0% over the past 10 years.

Quality of Life. The impact of IBD on patients' quality of life is substantial due to early onset, fluctuating disease course and the lack of a cure (Burisch J., et al., 2013). Inflammatory bowel disease, gastro-oesophageal reflux disease and hepatitis C have a major impact on work productivity, absenteeism, and work experiences across European countries. Inflammatory bowel disease and hepatitis C have also been shown to have a major impact on health-related quality of life across Europe. Independent epidemiological studies (Jones MP et al., 2017; Koloski NA, et al., 2012; Koloski NA, et al., 2016) suggest that in 50% of cases, GI begin with psychological distress, followed later by gastrointestinal symptoms, whereas in the other 50% of cases gut dysfunction occurs first, and psychological distress follows later. This observation has led to the hypothesis that a subset of patients have a disease process that begins in, and is primarily driven by, the gastrointestinal tract, which later induces systemic manifestations, including psychological dysfunction as an integral part of the disease process. Numerous studies have found an association between psychological distress and GI tract. Of the few prospective studies that have been conducted, only IBS has been assessed. Gwee et al evaluated 75 patients admitted to hospital for gastroenteritis (Gwee KA, et al., 1996). Of the 22 patients who subsequently developed IBS symptoms, they reported higher scores for anxiety, depression, somatic distress and neuroticism at their hospital

admission compared with those who returned to normal bowel function. (Black JC et al., 2020).

CHAPTER 2. HEALTH MANAGEMENT IN PATIENTS WITH CHRONIC DISEASES: FACTORS IMPROVING SELF-CARE & WELL-BEING

2.1. Psychological impact in Chronic Diseases

The increase in innovative and personalized medicine solutions in medicine can improve patients' chances of survival; however, during the clinical pathway, patients are exposed to many psychological challenges. Psychological distress, depression, and anxiety negatively impact the QoL and well-being of patients.

Chronic renal failure is a chronic medical condition characterized by a progressive and irreversible loss of kidney function. Up to 50% of patients undergoing dialysis experience symptoms of depression and anxiety.

Hemodialysis treatment is associated with a high burden of comorbidity and complications of ESRD due to the intrusiveness of treatment that is required: patients need to adapt themselves to eating and drinking restrictions, as well as fluid intake and chronic pain (Mollahadi, M., et al., 2010; Navidian, A., et al., 2006). King-Wing Ma and Kam-Tao La's review (King-Wing Ma T and Kam-Tao Li P., 2016) highlighted the influence of a wide range of somatic symptoms in renal disease negatively affecting occupational and social activities. In particular, they found that the combination of psychological distress and physical disturbance can significantly reduce the QoL of patients, leading to depression. The preoperative/waiting period for KT is an intensive

lifespan for patients exposed to a psychologically difficult time (Khoddam H and Wellisch DK., 2020).

The notion that psychological states can influence physical health is hardly new, and perhaps nowhere has the mind-body connection been better studied than in cardiovascular disease (CVD). Recently, large prospective epidemiologic studies and smaller basic science studies have firmly established a connection between CVD and several psychological conditions, including depression, chronic psychological stress, posttraumatic stress disorder (PTSD), and anxiety. In addition, numerous clinical trials have been conducted to attempt to prevent or lessen the impact of these conditions on cardiovascular health (Masters SK et al., 2020).

Among patients with cardiovascular disease, depression and/or anxiety are very common, with a prevalence ranging from 15% to 50%. Psycho-emotional disorders (in particular, depressive disorders) are associated with increased risk of incident cardiovascular events, rehospitalization, all-cause and cardiovascular mortality both in patients with overt cardiac disease: unhealthy lifestyle, inadequate adherence to medical prescriptions, themselves associated with psycho-emotional disorders are considered risk factors for reduced quality of life as well physical condition. The literature on negative psychological factors and CVD demonstrates that depression, anxiety, Post Traumatic Stress Disorder (PTSD) are risk factors for some, but not all, types of incident CVDs and recurrent CVD events. It remains unknown whether these psychological factors cause or are merely predictive of CVD. (Masters SK et al., 2020). Both behavioral and biological mechanisms are potential pathways linking depression with CVD risk. With respect to behavioral factors, depression has been associated with poor adherence to multiple risk reducing health behaviors including physical activity, smoking, and adherence to cardiovascular medications (Kronish IM et al., 2006; Bautista LE et al., 2016) and several studies suggest that these factors mediate, at least in part, the association between depression and poor prognosis (Whooley MA et al., 2008; Wu JR Lennie et al., 2013). With respect to biological mechanisms, there is a growing body of evidence linking depression with inflammatory processes (either as a byproduct of these processes and/or by increasing them), (Slavich GM et al., 2014) autonomic nervous system dysfunction (Sanchez-Gonzalez MA et al., 2013) and impaired coronary flow

reserve that increases risk of myocardial ischemia (Rieckmann N et al., 2013). There is also the potential for bidirectional influences and feedback loops linking behavioral and biological factors. For example, poor adherence to physical activity and anti-inflammatory medications may increase inflammation, which may, in turn, increase depressive symptoms. In order to improve the health of patients and increase well-being, Barello S., et al. (Barello S., et al, 2014), conducted a qualitative study on patients with heart failure in which they showed that crucial role of the physician in fostering the engagement process as their behaviors may reinforce or challenge patients' ability to engage in the healing process. Moreover, making patients autonomous in managing their care means that the doctor should gradually lead the patient to acquire the skills and confidence to effectively engage in the care process. This means also to attune communication style and adopted vocabulary to the level of patients' experience and understanding of their disease condition—as suggested by other studies in this field.

2.2. Psychosomatic role in issue

Research over the past several decades has documented psychosocial influences on the development and progression of several major medical illnesses. Current medical diagnosis reflects the prevailing biomedical model of disease. Evidence suggests that symptoms of psychological distress compound the effect of misconceptions on pain intensity and activity tolerance (Talaei-Khoei M., et al., 2018). There are evidence suggesting that specific psychological factors might group with specific types of illness (e.g., greater symptoms of health anxiety and nonspecific arm pain) (Vranceanu AM., et al., 2008). The bidirectional relationship between depression and pain is supported by several theoretical models, including neurobiological model the reformulated cognitive behavioral model, and the fear avoidance model (Vlaeyen & Linton, 2000). The comorbidity between pain and depression has also empirical support from studies in patients with various pain conditions including fibromyalgia (Chang et al., 2015), rheumatoid arthritis (Bruce, 2008; Dickens & Creed, 2001), migraine pain (Baksa et al., 2017), and persistent pain. A bidirectional association between pain and depression is also supported by several prior studies. The presence of pain is linked with increased symptoms of depression (Von Korff et al., 1988), such that the duration of pain, and the

number of pain sites predict the severity of depressive symptoms (Von Korff & Simon, 1996). On the other hand, the presence of depression in patients with pain leads to higher self-reported pain intensity, longer pain duration (Burton et al., 1995) and higher risk of chronicity (Gureje et al., 2001). Similarly, dozens of studies now link depressive symptoms with morbidity and mortality from heart disease (van Melle et al. 2004; Wulsin & Singal 2003).

Starting from Selye's research, W. Linford Rees (1975) has deepened the study of stress and the physiological changes it activates and has devised a new psychosomatic model of stress. Rees defined stress as any stimulus or modification of the internal environment or of such intensity or duration as to reach the limits of the organism's ability to adapt and to lead, in certain circumstances, to external behavioral and somatic dysfunction. Compared to Seyle's model, Rees emphasizes the importance of personality characteristics in influencing and determining the intensity of the distress experienced in response to stressful factors and the way in which it is expressed through the body. Therefore, according to this model, the etiology of psychosomatic disorders can be better understood as a dynamic interaction of intrinsic and extrinsic factors; interaction that determines the type of stress response and the type of target organ chosen by the organism.

A psychosomatic model consists of three principal characteristics:

1. Stressful factors;
2. Individual characteristics;
3. Consequent physiological processes.

Regarding the stressful factors, Rees evidenced that the main factors associated with the onset of psychosomatic diseases are the events as bereavement, family problems and problems related to the relationship with the partner, traumatic experiences, work and financial problems, life changes.

However, a central role of psychosomatic illness is played by the characteristics of each individual.

Regarding a individual characteristics, Rees evidenced the importance of both genetic factors and personality characteristics. In particular, most commonly personality traits found in people with psychosomatic illnesses are the general emotional instability,

shyness and lack of self-affirmation and tendency to anxiety. According to Rees's model, these personality traits, in the presence of a stressor, elicit states of emotional tension which, in turn, lead to the onset of psychosomatic disorders through the activation of physiological processes.

To explain why certain people are healthier than others, a wide variety of personality concepts and their relationships to health outcomes have been studied (Goodwin RD, et al., 2006; Marshall GN, et al., 1994). There are some suggestions that the 5-factor model of personality has the advantage over narrower personality traits in studying the relationships between individual differences and health (Smith TW, et al., 1992). The 5-factor model includes broad personality traits of extraversion, agreeableness, conscientiousness, neuroticism, and openness. Extraversion encompasses more specific traits such as talkativeness, energy, and assertiveness; agreeableness includes sympathy, kindness, and affection; conscientiousness includes organization, thoroughness, and ability to make plans; neuroticism includes tension, moodiness, and anxiety, while openness consists of traits like having wide interests and being imaginative and insightful. Research confirms that each of the 5 personality traits has an impact on various health-related outcomes (Goodwin RD, et al., 2006; Hampson SE, et al., 2006; Hampson SE, et al., 2007). The main mechanisms underlying their connections to health outcomes include their influence on health-related behaviours, symptoms reporting, exposure, and reactivity to stressful situations, seeking social support, etc. (Goodwin RD et al., 2006; Smith TW, et al., 2001). Numerous more narrowly defined personality traits were examined as predictors of various health outcomes (Hudek-Knežević J., et al., 2009). A study conducted by Jasna Hudek-Knežević et al., 2009 showed that health-related personality constructs significantly predicted all subjective health measures, above and beyond 5-factor personality dimensions. Regarding 5-factor personality dimensions, neuroticism was most consistently related to worse subjective health, openness and agreeableness were significantly but weakly related mainly to better subjective health outcomes, extraversion was mainly related to higher positive and lower negative mood, while conscientiousness did not predict any measure of subjective health. Several studies have been conducted on patients with cardiovascular disease and the association with personality traits. Swapnajeet Sahoo et al., (Swapnajeet Sahoo et al., 2018) have conducted a review on role of personality in cardiovascular diseases.

They evidenced that present literature suggests that some personality characteristics may be associated with the development of CVDs and the presence of type D personality pattern was associated with poor physical and mental health status. Furthermore, it has also been found that patients with implantable cardioverter defibrillator with a type D personality report more depressive symptoms if they have a partner with type D personality (van den Broek KC et al., 2011). Cardiomyopathies, more particularly Takotsubo cardiomyopathy (commonly known as stress cardiomyopathy), has been found to be significantly associated with emotional triggers such as death of a close relative, failure in relationship, or unpredicted separation from one's partner (Compare A., et al., 2013) Furthermore, studies have found strong association between Type D personality and stress cardiomyopathy after acute emotional stressful triggers leading to acute cardiac events (Compare A, et al., 2014) Emotional competence that is the integration of one's emotional intelligence (ability to be aware of and control one's own emotions), metacognitive beliefs (ability to be aware of and regulate one's own thinking), and emotional processing deficits has been found to be quite dysfunctional (after adjusting for depression) in patients with Takotsubo cardiomyopathy who experience frequent emotional triggers (Compare A, et al., 2014; Compare A, et al., 2018). Therefore, it is further proved that certain psychological factors play significant role in the development of specific cardiomyopathies too.

S. Sahoo et al., (S. Sahoo et al., 2018) have been summarized the theories to explain relationship between personality and cardiovascular disorders (**Fig. 9**).

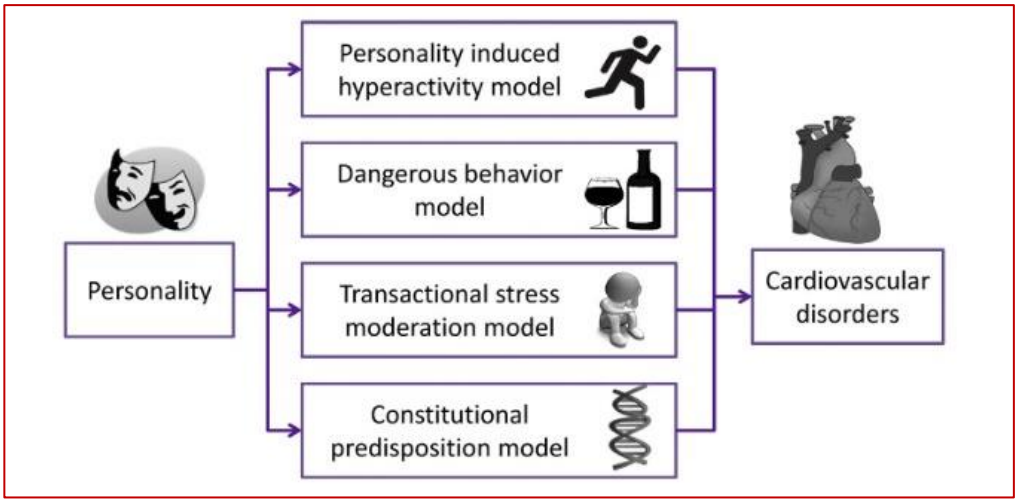


Fig. 9.

Representation of relationship between personality and cardiovascular disorders. (S. Sahoo et al., 2018) / Indian Heart Journal 70 (2018) S471eS477)

Few personality traits such as optimism, conscientiousness, openness, and curiosity have been found to be associated with positive health outcomes in subjects with CVDs and hence can be regarded as cardioprotective personality traits. Optimism, is a positive personality trait, which is defined as the tendency to expect good experiences in the future, has been found to be a protective factor against the risk of CAD in elderly (Kubzansky LD et al., 2001) has predicted better physical health and emotional health (lower depressive symptoms) after an acute coronary syndrome event,(Ronaldson A. et al., 2015) and has been associated with reduced pain intensity and physical symptom reporting after coronary artery by-pass graft surgery (Ronaldson A. et al., 2014). In contrast, pessimism (opposite of optimism) has been found to be a substantial risk factor for cardiovascular mortality (Pankalanein M., et al., 2016). Another personality trait of conscientiousness (which encompasses personality dispositions like self-efficacy, orderliness, dutifulness, achievement-striving, self-discipline and cautiousness) (Goldberg LR., 1993) has been found to predict longevity among apparently healthy persons (Kern ML, et al., 2008). In subjects with CVDs, low conscientiousness has been evaluated as a risk factor for all-cause mortality due to CVDs, stroke, and malignancies in prospective cohort studies conducted over a period of three and seventeen years (Hagger-Johnson G et al., 2012; Jokela M., et al., 2014). Openness to experience, a personality trait from the five-factor personality model that involves active imagination, artistic sensitivity, attentiveness to inner feelings, and intellectual curiosity, (Costa PT, et al., 1992) has also been found to be an independent protective factor for incident CHD/CVDs in the community after adjusting for all putative confounding factors including depression (Benjamin Lee H et al., 2014). Furthermore, curiosity, yet another personality characteristic probably related to the five-factor model trait of openness to experience, has been found to be associated with longevity, independent of medical risk factors and health behaviour.

2.3. Allostatic Load and Health

The concept of allostatic load refers to the cost of chronic exposure to fluctuating or heightened neural and neuroendocrine responses resulting from repeated or chronic environmental challenges that an individual reacts to as being particularly stressful (Sterling P, Eyer J., 1998). Characterization of allostatic load has been carried out by two distinct approaches. One is concerned with the use of biomarkers that reflect physiological derangements; the other is a clinical approach targeted to the more severe end of the spectrum of associated symptomatology, subsumed under the rubric of allostatic overload. Guidi J. et al., (2021) have been conducted a systematic review in which they elaborated several studies that have focused on identifying allostatic load through biological markers. Biomarkers such as, glucose levels, lipid profiles, interleukin-6, heart rate variability, have been recognized as having a role in the allostatic load response and were then included in a cumulative index of allostatic load, commonly known as the "allostatic load battery" (McEwen BS, 2015; Seeman TE et al., 2001; Juster RP, et al., 2011). Vitamin D levels (Frei R, et al., 2015) and serum carotenoid concentrations (Rosenberg N, et al., 2015) appear to be inversely associated with allostatic loading.

Several studies analyzed, showed correlations between allostatic load and gender, ethnicity, work, aging, early life events, cardiovascular diseases, caregiving, diabetes, cancer, gynecology and obstetrics, periodontal diseases, musculoskeletal disorders, post-traumatic stress disorder and psychotic disorder. (Guidi J. et al., 2021). The studies provide support to the clinical utility of the trans-diagnostic identification of allostatic load and overload in a variety of settings, with a number of potential applications. Allostatic load was linked to increased risk for cardiovascular diseases, particularly coronary heart disease (Gillespie SL, et al., 2019) ischemic heart disease (Sabbah W, et al., 2008) and peripheral arterial disease (Nelson KM,et al., 2007). In outpatients with essential hypertension and coronary heart disease, the presence of allostatic overload was characterized by a higher disease-related emotional burden, poor psychosocial (Porcelli P, et al., 2012) wellbeing and QoL (Guidi J, et al., 2019). A recent preliminary study on female outpatients with fibromyalgia found a prevalence allostatic overload, based on clinimetric criteria, as high as 25% of the sample (Leombruni P, et al., 2019).

2.3. Self-care skills in Chronic Diseases

Chronic Diseases (CD) such as diabetes, musculoskeletal disorders, cardiovascular diseases, neurological disorders, and cancers increase with age and place a burden on individuals and healthcare systems, and more they are associated with a lower Quality of Life (QoL) in the elderly. CD conditions suggested improvements of self-care investigations switching research perspectives from medication or dietary adherence, biological exams, or symptoms management to maintaining health through treatment adherence and health-promoting practices. Self-management education complements traditional patient education in supporting patients to live the best possible quality of life with their chronic condition. Chronically ill patients make daily decisions about self-management of their illnesses. This reality introduces a new paradigm of chronic disease: the patient-professional partnership, which involves collaborative care and self-management education. While traditional patient education offers technical information and skills, self-management education teaches problem-solving skills. A central concept in self-management is self-efficacy: the confidence to enact a behavior necessary to achieve a desired goal. Self-efficacy increases when patients are able to resolve the problems identified by the patient. In some circumstances, self-management education improves outcomes and can reduce costs for arthritis and possibly adult asthma patients. Evidence from controlled clinical trials suggests that programs that teach self-management skills are more effective than information-based patient education in improving clinical outcomes (Bodenheime T., et al. 2002). Self- care is an essential concept as a primary behavior necessary to manage chronic conditions and maintaining health at home in the community. As the number of persons living with chronic conditions continues to increase worldwide, continued is a need to understand our care response to living with chronic conditions at the individual, community and systems levels. Recent research key points on Chronic Diseases (CD) conditions suggested the improving of self-care investigations switching research perspective from medication or dietary adherence, biological exams or symptoms management to the maintaining health through treatment adherence and health-promoting practices (self-care

maintenance), behavior and condition monitoring (self-care monitoring), and managing signs and symptoms when they occur (self-care management) (Jaarsma T., et al., 2021). Clinical practice highlighted the lack of decision-making patient-approach comprising important parameters as compliance and adherence and QoL.

Adherence to the medical care. According to the World Health Organization, adherence is "the extent to which a person's behavior – taking medication, following a diet, and/or executing lifestyle changes – corresponds with agreed recommendations from a health care provider". Adherence to medication is the process by which patients take their medications as prescribed: it has three components: initiation, implementation, and discontinuation. Initiation is the time from prescription until first dose of the medication is taken; the implementation of the dosing regimen is defined as the extent to which a patient's actual dosing corresponds to the prescribed dosing regimen, from initiation until the last dose is taken; discontinuation marks the end of therapy, when the next dose to be taken is omitted and the treatment is interrupted thereafter. In clinical studies, about 4–5% of patients never starts their treatment despite being in a study and represents the non-initiation process. However, in clinical practice non-initiation is much more frequent with figures as high as 24% and this, whatever the disease (Fischer, MA., et al., 2011). The different processes are illustrated in **Fig.10**.

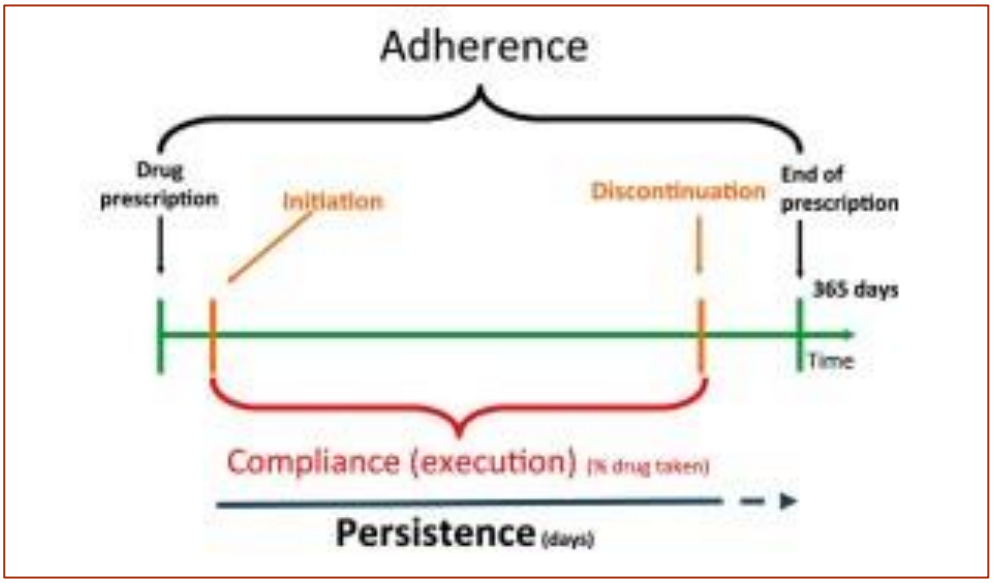


Fig. 10. *Illustration of the different components of drug adherence (M. Burnier, 2017)*

A significant proportion of the unnecessary health care utilization costs and poor health outcomes associated with the treatment of chronic diseases result, in large part, from the failure of patients to effectively self-manage their conditions in response to recommended medical therapy (Bodenheimer T, et al., 2002). Therefore, the development of intervention programs that can educate and assist people in adopting and maintaining long-term health behavior change, in their efforts to prevent further progression of disease and improve quality of life, is a continuing need (Bodenheimer T, et al., 2009; Peterson JC, et al., 2010). Disease self-management has been variously defined (Barlow J, et al., 2002) and is distinct from related concepts such as self-care (Riegel B, et al., 2009), patient activation (Hibbard JH, et al., 2013; Kinney RL, et al., 2015) and patient-centered care (Kuntz JL, et al., 2014). Grady & Gough (Grady PA, et al., 2014) have defined self-management "as the day-to-day management of chronic conditions by individuals over the course of an illness".

Digital Health. In last year's two methods were found to provide reliable information on drug adherence and are increasingly used either in clinical practice or clinical trials: the electronic monitoring and the direct measurements of plasma or urinary drug levels. Digital health, which is rapidly being incorporated into healthcare, can reduce barriers of the adherence at the therapies and self-management of the chronic conditions. Several trials have shown that cardiac rehabilitation programs delivered by technology with remote sensor monitoring and telephone or internet-based coaching can increase physical activity and yield similar outcomes when compared with conventional programs and that rates of adherence are significantly higher (Richardson CR et al., 2019). According to Lorig & Holman (Lorig KR, et al., 2003), for the patient, self-management involves three separate but related sets of tasks: medical or behavioral management of the disease, role management, and emotional management. Bandura (Bandura A. 2004) has proposed that "(s)elf-management operates through a set of psychological sub functions. People have to learn to monitor their health behavior and the circumstances under which it occurs, and how to use proximal goals to motivate themselves and guide their behavior". Moreover, because managing a chronic condition constitutes a problem-based endeavor, six self-management skills—problem solving, decision making, resource utilization, the formation and long-term maintenance of a patient–provider partnership, action planning, and self-tailoring—are central to the

successful self-management of chronic conditions. Patient participation is seen as something positive, which is substantiated by the fact that it improves quality of life and provides patients with an increased sense of ownership and management of their symptoms, their illness and their situation, giving them a sense of control and self-determination. Moreover, it also improves treatment processes (Sahlsten MJ et al., 2005) and quality of care (Coulter A, et al., 2007; Castro EM, et al., 2016) and it is argued that it leads to more effective services, implying economic benefits (Elstad TA, et al., 2009). Finally, it is argued that patient participation can reduce adverse incidents as the patient becomes the watchdog of their own care, taking precautionary measures against flaws in a pressured healthcare system (Storm M, et al., 2010). A study conducted in Spain showed that adhering to pharmacological treatment improves quality of life (Holt EW, et al., 2010), and a study conducted in the USA found low physical and mental quality of life scores in elderly people who did not adhere to their pharmacological treatment (Holt EW, et al., 2010). More factors should be considered to improve the health awareness tailored on disease toward to better patient engagement: usually, gender, aging, comorbidities, sample source, value set were assessed but could be enlarged to individual factors as emotional regulation and psychological dimensions. It is possible to predict which patients, while adhering to both their pharmacological and non-pharmacological treatment regimens, are most likely to experience improvements in Health Related Quality of Life (HRQoL).

2.4. Patient Engagement in clinical pathway

As the health system shifts toward population health approach, there is increasing attention to decreasing costs and improving quality. Measuring and improving patient engagement will become a requisite core competency for health systems and care providers. “Engagement” in the clinical care field of chronicity is an umbrella concept that includes and extends beyond other concepts such as adherence, compliance, empowerment, activation, health literacy, shared decision making. Engagement is a complex process that arises from the combination of different dimensions and

individual, relational, organizational, social, economic, and political factors that connote the quality of life of the patient (Graffigna G et al., 2020).

Approximately 70% of deaths and 40% of costs are attributable to a few chronic diseases, which are largely modifiable by practices such as smoking cessation, healthy eating, and exercise, each of which requires patients to play an active role in owning their health. Caregivers and the health system can support patient engagement, making it more likely that patients will take ownership for their health (Murali NS et al., 2019). The traditional medical model, which historically has focused on managing a specific disease condition as opposed to managing the patient, has proven to be both expensive and ineffective in the treatment of chronic diseases because many people have more than one chronic condition and competing life circumstances that impair patients' capacity to self-manage their conditions. The limitations of the medical model have resulted in a new and evolving chronic disease treatment paradigm that requires a patient–provider partnership involving collaborative care and education in chronic disease self-management to ensure the best possible health outcomes for the patient (Allegrante JP., et al., 2018; Bodenheimer T, et al., 2002; Grady PA, et al., 2014; Holman H, et al., 2000; Lorig KR, et al., 2003; Peterson JC, et al., 2014).

Person-Centred Approach. Improving healthcare safety, quality, and coordination, as well as quality of life, are important aims of caring for patients with multiple chronic conditions and/or functional limitations. Person-centred care is an approach to meeting these aims in a way that assures the primacy of individuals' health and life goals in their care planning and in their actual care. Person-centered care can expand and shift a traditional healthcare model from one in which the physician or other provider is in the primary decision-making role to one that supports individual choice and autonomy in healthcare decisions (Goodwin J., 2016). "Person-centred care" means that individuals' values and preferences are elicited and once expressed, guide all aspects of their health care, supporting their realistic health and life goals. Person-centred care is achieved through a dynamic relationship among individuals, others who are important to them, and all relevant providers. This collaboration informs decision-making to the extent that the individual desires. According to the model to Moira Stewart (Stewart M. et al., 2003), 'Patient-Centered Care' focuses on the six components of the patient-centred method: exploring both the disease and the illness experience; under-standing the whole

person; finding common ground; incorporating prevention and health promotion; enhancing the relationship; and being realistic. Under this model, patient-centered method reveals the commonalities between medical disciplines rather than their distinctions. In fact, it is a clinical method that it shares a lot with other healthcare professionals too.

Psychologists have important roles to play in reducing emotional distress, improving patient knowledge, and providing training in behavioural skills to promote successful self-management and to support patient-centred chronic conditions care. A review of seven studies about professionals delivering person-centred care in nursing homes found that this approach improved job satisfaction, reduced emotional exhaustion and increased the sense of accomplishment amongst professionals (van den Pol-Grevelink A, et al., 2012).

Over the past several decades, there has been an explosion of interest in the area of health psychology, fueled by mounting evidence that psychological factors have important implications for health. A relationship between psychosocial risk factors and clinical disease outcomes would be documented in a series of independent prospective epidemiologic studies that are well powered, carefully evaluate potential sources of confounding, and utilize meaningful clinical outcomes such as morbidity and mortality as endpoints. For example, several studies have shown that high levels of chronic stress are associated with subsequent increases in morbidity and mortality from a variety of diseases, including respiratory infection, cardiovascular disease, and HIV/AIDS (Krantz & McCeney 2002), as well as adverse clinical outcomes such as impaired wound healing. Several individual psychological characteristics have also emerged as robust risk factors for some diseases. For example, both hostility and depression have been linked repeatedly with the incidence and progression of cardiovascular disease (Miller et al. 2011; Rugulies R., 2002; van Melle et al. 2004; Wulsin & Singal 2003). At the broader level of analysis, features of the larger social environment such as low socioeconomic status (Adler NE., et al. 1993; Marmot & Wilkinson 2001) and social isolation (Berkman & Kawachi 2000; House et al. 1988) have proven to be robust predictors of adverse outcomes in the context of cardiovascular, respiratory, and infectious diseases, as well as certain cancers.

In Figure 10 are represented the influence of the principal social risk factors, as chronic stress, social isolation, depression and, low-socioeconomic status (SES) on the clinical outcomes as cardiovascular diseases, asthma and HIV infection (Miller G., et al., 2009).

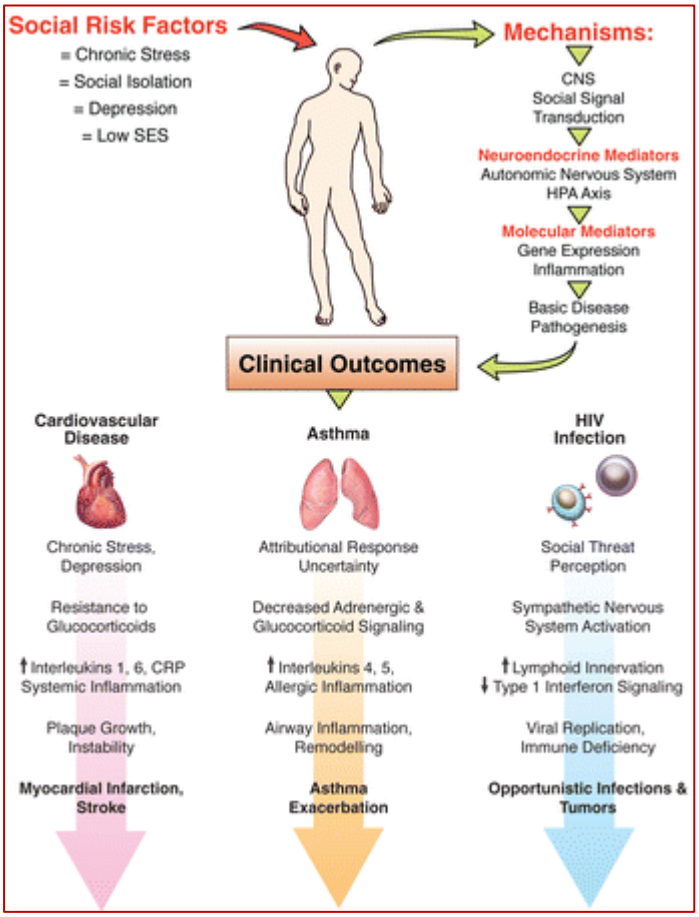


Fig. 10. *Representation of the mechanistic chain of events through which the social world gets inside the body to influence disease pathogenesis. (G. Miller et al., 2009)*

EXPERIMENTAL SECTION

CHRONIC DISEASES IN CLINICAL PRACTICE: THE PERSON-CENTERED APPROACH

Introduction

Advances in health care research and delivery, increased innovation and personalized medicine solutions in surgery have reduced disease mortality and extended life expectancy. During the disease process however, the patients are exposed to many psychological challenges.

Non communicable diseases (CNCDs) impose an enormous and growing burden on individuals, families, and society, as well as on health care systems (Allegrante John P. et al., 2019).

Adaptive psychological functioning is necessary to manage the myriad demands associated with chronic illness. To maintain optimal cognitive functioning and emotional balance, it is essential that cognitive resources are both conserved and restored (de Ridder et al., 2008; Folkman & Moskowitz, 2004).

Such patients must cope with a chronic condition yet the emotional dimensions of these conditions they are often overlooked when considering medical treatment. Patients with chronic conditions often must adjust their own aspirations, lifestyle, and occupation. Many grieve for their situation before adapting to it, but others have prolonged discomfort and may develop psychiatric disorders, most commonly depression or anxiety. A perspective general medical admissions study found that 13% of the men and 17% of the women had an affective disorder (Turner J., et al., 2000).

Comorbidity has an important role in the variation of health utility value. In addition to the number of comorbidities, different types of comorbidities can affect health utility values as well. Hypertension, diabete mellito (DM), coronary health diseases (CHD) hyperlipidemia, and stroke are the most common comorbid conditions (Zhou, T., et al., 2018).

There is currently limited research data on how the severity of chronic disease can affect both the health-related quality of life (HRQOL) and the development of depressive symptoms in patients and consequently adherence to therapies and the ability to self-care (Gazineo D., et al., 2021).

Many of the articles dealing with psychological constructs have not discussed the connections with the regulation of emotions and the management of chronic diseases. Of these associations, patients with chronic diseases and with reduced ability to regulate emotions showed more depressive symptoms and negative emotions than patients with greater ability to regulate emotions (Kravvariti et al., 2010; Messerli-Bürgy et al., 2012). In a review conducted by Kelly L. Wierenga et al., most of the studies conducted on chronic diseases found that depressive symptoms and anxiety were highly prevalent in populations with cardiovascular disease (Baeza-Velasco et al., 2012; Kravvariti et al., 2010) and were more common in younger patients (Kucukarslan, 2012). Furthermore, a history of psychological illness was predictive of the development of a chronic physical illness. This review indicated an association between psychological factors and emotion regulation for individuals with physical illnesses. Studies also demonstrated that factors such as female gender, lower levels of education, non-White race (Kubzansky & Thurston, 2007), and greater negative affect (Kravvariti et al., 2010) were associated with greater difficulty in regulating emotions.

Although these associations have been identified, more research is needed. However, the empirical literature showing the impact of chronic disease in populations has not been previously examined.

As an important predictor of outcomes, adherence to medication, diet and exercise regimens is an important theme in the study of patients with chronic diseases (Di Matteo RM et al., 2007; Kucukarslan SN et al., 2012). Adherence was mentioned in the systematic review by Kucukarslan (2012), which found that negative emotional reactions to health stressors reduce adherence to medications. Another study that looked

at HIV patients found no association between emotion regulation and adherence. In studies that evaluated self-regulation, patients who reported fewer difficulties with emotion regulation were better at managing their diets (Gianini LM et al., 2013).
The person-centered approach seems essential to improve general safety in the self-care and compliance process (Gray SL et al., 2018).
According to the literature on chronic diseases and more specifically, in the field of renal failure, breast cancer, cardiovascular, locomotor and gastrointestinal diseases, few studies have investigated the long-term effects of the disease and even more predictive and protective factors that improve disease management and compliance.
Following the transition from the biomedical model to the bio-psycho-social medical model, people have acquired a deeper awareness of health. Nowadays, health measurements not only evaluate life expectancy, but also the quality of life (Zhou, T., et al., 2018).
The aim of this research was to investigate the role of psychosomatics in the impact of the disease, from diagnosis to post-treatment on an adult population with chronic diseases. the studies focused on assessing the level and quality of the interaction between personality traits and chronic diseases of CNCDs such as vascular, gastrointestinal, locomotor and urogenital diseases by analysing the effectiveness of self-care and emotional dimensions (anxiety, stress, depression).

In *Experimental Section* are reported n.4 cross-sectional studies on chronic disease patients (CKD, gastrointestinal, locomotor and cardiovascular diseases).

The studies have been conducted by the collaboration of Internal Medicine and Nephrology (Director Prof. Claudio Ferri), Transplantation Surgery Division (Director Prof. Francesco Pisani), and Dialysis Division (Resp. Dott. Marilena Tunno) at the San Salvatore Hospital, ASL1 Abruzzo.

RESEARCH I. PSYCHOSOMATIC INTERACTIONS IN KIDNEY TRANSPLANTATION: ROLE OF PERSONALITY DIMENSIONS IN MENTAL HEALTH-RELATED QUALITY OF LIFE*

Objective

The study aimed to evaluate the role of personality dimensions and their impact on the behaviour of waiting-list patients towards the post-surgery adaptation process. Our scope was to examine the modelling of the emotional pattern of patients in the preoperative phase of KT in order to identify the subjective protective as well as predictive factors to support patients better. Moreover, our study was an in-depth investigation into the psychosomatic interactions in the renal disease.

Methods and Materials

Ethical approval

This study was approved by the Institutional Review Board of the University of L'Aquila, Italy (Prot. No. 26656/2019), and the San Salvatore Hospital, L'Aquila (IT). Informed consent was obtained from each participant, and the study adhered to the Declaration of Helsinki (WMA, 2018).

Participants

Participants in this study were 113 out-patients aged 18–70 years (mean age 54.7 years, SD±9.9) who were living in cent[1]ral Italy and had received a KT at least 3 years prior

* **Federica Guerra**, Jessica Ranieri, Domenico Passafiume, Diana Lupi, Daniela Maccarone, Francesco Pisani, Claudio Ferri, Dina Di Giacomo, *Psychosomatic interactions in kidney transplantation: role of personality dimensions in mental health-related quality of life.* Therapeutic Adcanves of Chronic Disease 2021, Vol. 12: 1–9 DOI: 10.1177/ 20406223211024359 (IF 5.0)

to the study. The gender distribution of the sample reflects the epidemiology of chronic renal failure, which is higher in males (F = 41, mean age 55.7, SD ± 9.7; M = 72 mean age 54.2, SD ± 10). The exclusion criteria were transplantation of an organ other than the kidney, premorbid depression and/or anxiety, alcohol or substance abuse, no previous history of rejection, and no previous history of a physical disease. The participants were approached to participate in the study at the General Surgery and Transplantation Division (Director Prof. F. Pisani) and Internal Medicine Division (Director Prof. C. Ferri) of S. Salvatore Hospital in L'Aquila (Italy).

We contacted 115 suitable patients, 113 of whom provided written informed consent. Two patients did not agree to participate in the experimental protocol. One was not interested in participating, while the other one had problems with sense organs. The demographic characteristics of the participants are presented in Table 1.

Gender	**Female (N.41)**	**Male (N.72)**	**Sample (N.113)**
Age	X 55.7 SD±9.7	X 54.2 SD±10	X 54.7 SD±9.9
Education			
No High school	57%	43%	46%
High school	35%	48%	43,4%
Undergraduate	7.5%	12.5%	11%
Marital Status			
Married/living with partner	65.5%	71%	72%
Single	13%	20%	17%
Divorced/widows	15%	10%	12%
Occupation			
Unemployed	25%	66%	40%
Employed	22%	37%	31%
Self employed	5%	10%	8%
Retired	8%	30%	22%
GFR stage			
Stage 1	5%	9%	8%
Stage 2	42%	21%	29%
Stage 3°	15%	20%	18%
Stage 3b	15%	37%	29%
Stage 4	18%	12.5%	15%
Stage 5	5%	3%	4%
WAITING LIST GROUP			
Brief Waiting (> 5 years)	36,5%	63,5%	55,8%
Long Waiting (< 5 years)	36%	64%	44,2%

Table 1. *Demographic characteristics of the sample*

Participants were eligible for enrolment in the study if they were diagnosed with chronic kidney disease (CKD) and had undergone KT surgery. Inclusion criteria were as follows: (a) 18–70 years old (b) diagnosis of CKD, and (c) KT. Exclusion criteria were: (a) comorbidity for secondary diseases and (b) psychiatric and neurological disorders before CKD diagnosis.

Procedure

Medical staff in the General Surgery and Organ Transplants Division (Director: Prof. Pisani) identified eligible patients, who were then enrolled during a scheduled follow-up by medical protocol. Informed consent was obtained at the time of enrolment. Trained clinical psychologists (blinded to the objectives of the study) conducted the psychological evaluations in a quiet, dedicated room. The evaluations lasted 20 min. Participants completed the measures during their scheduled follow- up. Data were collected anonymously. All of the participants were recruited after KT, in times that covered an interval between 1 and 3 years from the surgical intervention.

Measures

Sociodemographic variables. Demographic and clinical data were collected. Demographics were detected by self-reports during clinical interview: age and life living (e.g. having children, being employed, marital status) related to the time of transplantation and the waiting time for the transplantation. Then, clinical data were detected from medical records (current stage of glomerulonephritis, creatinine levels, and the type of dialysis performed). All data were merged in one database for elaboration data.

Glomerular filtration rate (GFR). Estimated GFR is the best test to measure the level of kidney function and determine the stage of kidney disease (National Kidney Foundation). Based on the GFR, progressive renal failure (or CKD) has been divided into five different stages of severity, in order of increasing severity: stage 1 (kidney damage with normal kidney function at 90% or higher of kidney function); stage 2 (kidney damage with mild loss of kidney function at 60–89% of kidney function); stage

3 (mild to moderate loss of kidney function, at 45–59% of kidney function); stage 3b (moderate to a severe loss of kidney function, at 30–44% of kidney function); stage 4 (severe loss of kidney function, at 15–29% of kidney function); stage 5 (kidney failure, less than 15% of kidney function). This chronic renal failure staging system was applied by clinical staff to monitor both the physical and mental well-being of patients following KT; data were obtained from the participants' records.

Psychological measurement. The psychological battery was composed of three standardized measurements assessing emotional traits (depression, anxiety, stress, and psychological distress) and personality dimensions; each standardized test was applied by the Italian adaptation and validation. Also, an experimental test was carried out and applied to evaluate the body image self-perception. *Depression Anxiety Stress Scales 21* (DASS-21; Bottesi et al., 2015). The DASS-21 is a self-administered questionnaire that measures the degree of severity of the core symptoms of depression, anxiety, and stress. It is composed of 21 questions with responses on a four-point Likert-type scale.

Psychological Distress Inventory (PDI; Morasso, 1996). This self-administered questionnaire measures the impact of psychological distress and related therapies. It is composed of 13 questions, and responses are indicated on a five-point Likert-type scale. The standard score estimates the presence/absence of psychological distress to measure global distress. This test was administered only to the participating group. The inventory demonstrated good reliability (a = 0.86).

Big Five Inventory-10 Italian Version (BFI-10; Guido et al., 2015). This self-administered questionnaire measures the five personality dimensions (agreeableness, conscientiousness, emotional stability, extroversion, and openness). It is composed of 10 questions with responses on a five-point Likert-type scale. Agreeableness describes an individual's tendency to put the needs of others before their own. People with a low level of agreeableness are primarily concerned with serving their own interests. Highly agreeable people are nice, cooperative, and accommodating. Conscientiousness describes a person's tendency to be persistent and determined in achieving their goals. People with a high level of conscientiousness tend to work hard to carry out their plans, while people who are low on this trait tend to change course and get distracted easily. Emotional stability describes an individual's response to stress. People with poor emotional stability are susceptible to anxiety, depression, anger, and other negative

emotions when subjected to stressful conditions. People with a high level of emotional stability resist stress and tend not to experience many negative emotions; Extroversion refers to the degree of pleasure experienced through social relationships. A high score indicates a person who is sociable, talkative, open to others, optimistic; on the contrary, a low score is typical in reserved, sober, not euphoric, quiet people; Openness refers to openness to creativity, non-conformism, and originality. Low scores indicate closure to experience, conformity, and lack of creativity.

BODY SELF-PERCEPTION QUESTIONNAIRE (BSP-Q) is an ad-hoc experimental questionnaire aimed to evaluate body image perception based on three domains: 1) consequences of clinical treatment on body image (Treatment Consequences on Body Image [TCBI]); 2) well-being in social interaction (Social Wellness [SW]); and 3) well-being in the body (Physical Feeling [PF]). It consists of 15 items with a four-point response scale. The BSP-q was applied in a previous pilot study composed of a sample of 30 transplant patients (those patients were not included in the present study). The internal reliability of the scale was good (a=0.91).

Study design

We conducted an observational study to evaluate the emotional traits, body self-perception, and personality dimensions in KT patients to empower the reinforcement of the psychosomatic approach. Descriptive statistics were calculated for baseline characteristics and outcome measures. One-way analysis of variance (ANOVA) and analysis of covariance were conducted to detect the statistical significance of the overall differences between examined psychological variables and the waiting list condition. Pearson's correlation was applied to verify the relationship between personality dimensions and emotional traits.

Statistical analyses were performed using SPSS Statistics 22.0. According to the previous study by Gill12 a sample size of 22 patients was estimated to provide a 95% confidence interval (CI), a power of 80%, and α-value = 0.05, taking account of an expected percentage of losses around 50% of patients. Sample size calculation was performed by using NCSS-PASS software.

Results

Of the recruited patients, 99% (113 out of 115) took part in the psychological evaluations, whereas two participants refused to sign informed consent. Descriptive analyses based on sociodemographic characteristics showed no difference among all the variables (gender, education, marital status, and occupation); thus, our sample was homogeneous.

First, we wanted to evaluate the impact of the waiting list condition (from the time of diagnosis to the time of the KT) on emotional traits after treatment. Participants were divided into two groups based on the time of the surgery intervention (KT) as follows: (a) the brief waiting (BW) list (>5 years), composed of 63 patients (55.8%), and (b) the long waiting (LW) list (<5 years), composed of 49 patients (44.2%). Table 2 shows the raw scores by waiting list condition.

Tests		**SW** X SD	**LW** X SD
Emotional traits			
PDI		25,8±8,6	23.4±7.2
DASS-21			
	Depression	8,5±10,1	5,9±6,6
	Anxiety	9.5±9.4	7.5±7.8
	Stress	12,4±10.04	9.8±8.2
Body self- perception			
BSP-q			
	TCBI	3.2±2.8	2.8±2.6
	SW	4.2±2.9	3.9.2±2.7
	PF	6.2±2.6	5.5±2.6
	TOT	13.7±6.8	12.3±6.4

***Table 2**. Raw scores of psychological testing by waiting list condition (LW = long waiting list; BW = brief waiting list)*

An ANOVA 4x2 (4 emotional traits [psychological distress, depression, anxiety, stress] x 2 [BW, LW]) showed no significant differences in interaction effect between groups. Then, we examined the effect of the waiting list condition on body self-perception (BSP-q indexes). We divided the participants into three levels (low, moderate, and high) for each dimension (agreeableness, conscientiousness, emotional stability, extroversion, and openness) of BFI-10 (Table 3) and the waiting list conditions (BW, LW). The statistical analysis showed no significant difference in the distribution per dimension.

BFI-10	BW		LW	
	X	SD	X	SD
Agreeableness				
High	9.33	±0.70	9.06	±0.88
Moderate	6.13	±0.77	6.00	±0.75
Low	3.18	±0.87	3.41	±0.79
Conscientiousness				
High	8.94	±0.82	9.25	±0.88
Moderate	6.09	±0.74	6.33	±0.75
Low	3.00	±0.14	3.00	±0.70
Emotional Stability				
High	8.44	±0.52	9.00	±0.92
Moderate	5.90	±0.68	6.16	±0.65
Low	3.06	±0.79	3.38	±0.76
Extroversion				
High	9.50	±0.53	8.80	±0.94
Moderate	6.00	±0.68	5.75	±0.83
Low	3.36	±0.67	3.14	±0.89
Openness				
High	8.60	±0.81	8.75	±0.77
Moderate	6.26	±0.68	5.81	±0.69
Low	3.00	±0.81	3.44	±0.52

Table 3 *– Raw scores of BFI-10 distributed by 5 labels: Agreeableness, Conscientiousness, Emotional Stability, Extroversion, Openess*

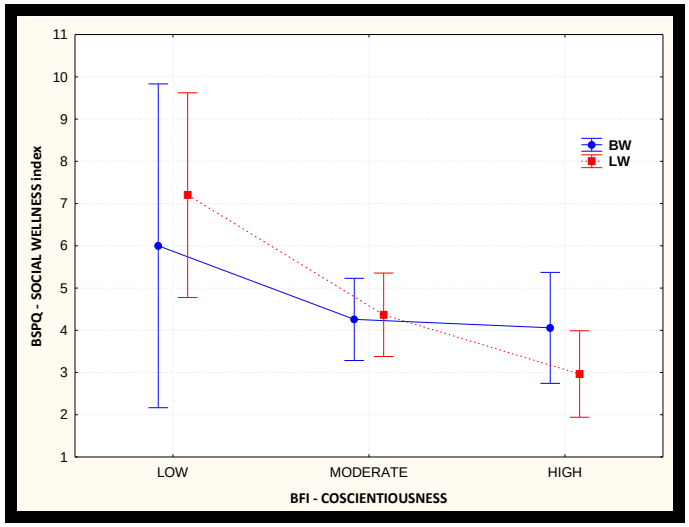
An ANOVA 3 × 2 [3 (TCBI, SW, PF) × 2 (BW, LW)] showed no significant differences between groups. Even the statistical analyses comparing the emotional traits and body image perception indexes by creatinine levels (abnormal; normal) as well as GFR staging showed no significant differences. Our data analysis showed that the emotional traits after KT were not significantly and directly related to the time of being on the waiting list.

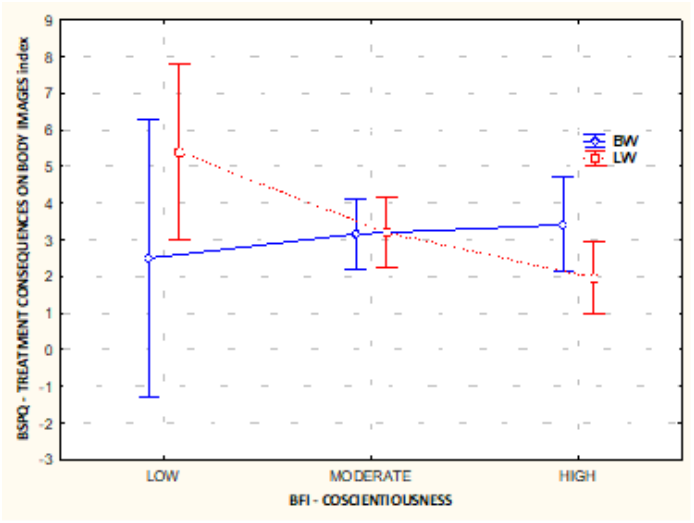
Then, we conducted a multivariate analysis of variance (MANOVA) 4 × 3 × 2 to compare emotional traits [4 (BFI index); 3 levels (high, moderate, and low); and waiting list (2: BW, LW)]. Statistical analyses were conducted for each index and the results showed that the conscientiousness index had a significant difference in psychological distress [$F(107, 2) = 5.3$; $p = 0.001$], depression [$F(107,2) = 3.9$; $p = 0.02$], anxiety [$F(107, 2) = 5.0$; $p = 0.001$], and stress [$F(107, 2) = 3.5$; $p = 0.03$].

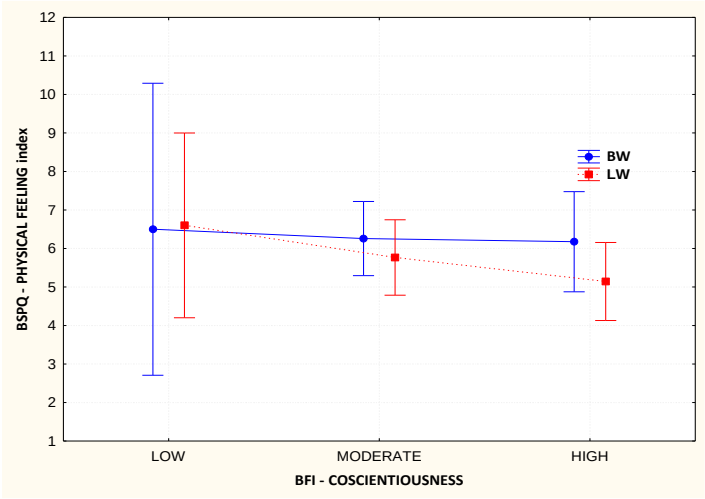
There was a significant interaction between conscientiousness and the waiting list condition in all emotional traits: psychological distress [$F(107,2) = 4.3$; $p = 0.01$], depression [$F(107, 2) = 5.0$; $p = 0.001$], anxiety [$F(107, 2) = 3.7$; $p = 0.02$], stress

[$F(107, 2) = 3.3$; $p = 0.03$]. Openness showed a significant difference in depression [$F(107, 2) = 3.1$; $p = 0.04$]. No significant differences were found in the agreeableness, emotional stability, and extroversion indexes. Subsequently, a MANOVA 3 × 3 × 2 was executed to analyse the relationships among the body self-perception indexes (3: TCBI, SW, PF), BFI index [3 levels (high, moderate, and low)], and waiting list (2: BW, LW). The results showed significant differences between conscientiousness levels in SW [$F(107, 2) = 5.3$; $p = 0.006$]. No significant interaction effect was found. In Figure 1 the performance of patients are reported by waiting list and BFI categorizations

Figure 1 – *Representation of BSPQ indexes by waiting list and BFI categorization*







Finally, we conducted a Pearson's correlation analysis between personality dimensions (agreeableness, conscientiousness, emotional stability, extroversion, openness) and emotional traits (psychological distress, depression, anxiety, and stress) to verify whether the post-surgery emotional condition depends on personality.

Then, we analysed whether personality dimensions could have affected the emotional and body self-perception indexes. Pearson's correlation analysis (Table 4) showed that the agreeableness index negatively correlated with PF (r = −0.196; p = 0.01); conscientiousness index correlated negatively with psychological distress (r = −0.239; p = 0.005), anxiety (r = −0.219; p = 0.01), SW (r = −0.220; p = 0.01), and TCBI (r = −0.213; p = 0.01); extroversion index negatively correlated with PF (r = −0.203; p = 0.01) and SW (r = −0.212; p = 0.01); openness index positively correlated with psychological distress (r = 0.173; p = 0.03) and stress (r = 0.157; p = 0.04); finally, no significant correlations were found in the emotional stability index.

		PDI	DASS Depression	DASS Anxiety	DASS Stress	BSPQ Physical Feeling	BSPQ Social Wellness	BSPQ Treatment Consequences on Body Images
BFI-Agreeableness	*r*	,101	,151	,084	,191*	-,196*	,070	-,057
	p	,143	,056	,189	,022	,019	,232	,274
BFI - Conscientiousness	*r*	-,239**	-,147	-,219**	-,153	-,096	-,220**	-,213*
	p	,005	,060	,010	,053	,156	,010	,012
BFI - Emotional Stability	*r*	-,120	-,099	-,151	-,114	-,129	-,041	-,124
	p	,104	,149	,056	,115	,086	,333	,096
BFI-Extroversion	*r*	-,070	-,146	-,052	-,088	-,203*	-,212*	-,051
	p	,229	,061	,292	,177	,016	,012	,296
BFI-Openness	*r*	,173*	,147	,123	,157*	,054	-,066	-,090
	p	,034	,061	,098	,049	,285	,245	,172

*p< .05; **p<.001

Table 4 *– Pearson correlation analysis between personality dimensions and emotional traits*

Then, we analysed if personality dimensions could have affected the emotional and body self-perception indexes. Pearson's correlation analysis (Table 4) showed that the agreeableness index negatively correlated with physical feeling (r = - 0.196; p = 0.01); conscientiousness index correlated negatively with psychological distress (r = - 0.239; p = 0.005), anxiety (r = - 0.219; p = 0.01), social wellness (r = - 0.220; p = 0.01), and treatment effects on body image (r = - 0.213; p = 0.01); extroversion index negatively correlated with physical feeling (r = - 0.203; p = 0.01) and social wellness (r = - 0.212; p = 0.01); openness index positively correlated with psychological distress (r = 0.173; p = 0.03) and stress (r = 0.157; p = 0.04); finally, no significant correlations were found in the emotional stability index.

However, considering significant correlations between personality traits and examined emotional dimensions, we conducted a linear regression to evaluate the predictive effect. Taking into account BFI traits, significant effect for anxiety by conscientiousness index [$R2$ = 0.15; Root-Mean-Square Error (RMSE) = 7.89; CI (−3.01, 0.003)], as well as emotional stability [$R2$ = 0.15; RMSE = 7.89; CI (2.18, 0.03)]; depression by agreeableness [$R2$ = 0.19; RMSE = 7.54; CI (−2.58, 0.01)], conscientiousness [$R2$ = 0.19; RMSE = 7.54; CI (2.53, 0.01)], openness [$R2$ = 0.19; RMSE = 7.54; CI (−2.49, 0.01)]; then stress by agreeableness [$R2$= 0.18; RMSE = 8.25; CI (−2.09, 0.03)], conscientiousness [R2 = 0.18; RMSE = 8.25; CI (2.45, 0.01)], emotional stability [$R2$ = 0.18; RMSE = 8.25; CI (1.99, 0.04)], openness [$R2$ = 0.18; RMSE = 8.25; CI (−2.25, 0.02)]; psychological distress by agreeableness [$R2$ = 0.17; RMSE = 7.17; CI (−2.07, 0.04)], conscientiousness [$R2$ = 0.17; RMSE = 7.17; CI (3.05, 0.002)], openness [$R2$ = 0.17; RMSE = 7.17; CI (−2.00, 0.04)]. In regard to the body self- perception indexes, the SW pattern showed a significant effect by conscientiousness [$R2$ = 0.17; RMSE = 2.55; CI (2.99, 0.003)].

Discussion

The results of this study showed that the personality dimensions can predict mental health-related QoL after KT. In particular, the dimensions play an important role in the behavioural ability to manage the QoL in ESRD and then post-KT. Psychological

distress and anxiety is relevant when related to a low level of the conscientiousness dimension. In addition, a high level of the openness dimension can be associated with a high level of psychological distress and stress. Moreover, body self-perception correlates with personality dimensions. A high level of agreeableness is associated with a low level of body self-perception aspects (psychical feeling and social wellness). A high level of the conscientiousness dimension could predict difficulties in social wellness and a low feeling of adaptation to the treatment effects on body image. Last, high extroversion is associated with a low level of positive physical feeling. Emotional stability seems not to be associated with KT fragility.

Considering Khoddam & Wellisch's study (2020), four key themes might affect the mental health of patients during the waiting period: 1) boredom, 2) frustration with delayed anxiety reduction/management (loss of control), 3) during prolonged hospitalisation, long-term psychological difficulties merge with current issues; forced dependency attachment patterns are played out in the hospital context, and 4) guilt over role abandonment in the family and loss of roles outside the family. Khoddam & Wellisch propose strategies for implementation based on cognitive behavioural therapy (CBT), acceptance and commitment therapy (ACT), and interpersonal therapy (IPT). According to the authors, the preoperative/waiting period for KT is an intensive lifespan for patients exposed to a psychologically difficult time. Our finding exploits this perspective: so far, researchers have scientifically focused on the external impact on patients; our data suggest putting more focus on the internal aspects of patients in terms of the personality dimensions and their influence in dealing with the complexity of living with KT. In our opinion, the combination of internal and external factors affects patient life, thus compromising their QoL during the waiting period. Following Cukor's (2007) suggestions, strategies for clinical intervention using the psychosomatic approach can be useful in laying the basis for the functional adaptive process to the present and future life to improve the patient's ability to have a positive personal perspective for a healthy and productive post-KT life.

There are several limitations in this study. First, there were differences of case numbers in the distribution criteria of participants for elaboration data (i.e. time of the surgery intervention, 63 *versus* 49 patients). Second, we did not include body image measurements, which cannot be avoided in most clinical studies. Third, the study used

clinical and self-reported demographic data, so many important clinical characteristics, such as patients' socioeconomic status, family function, and smoking status, were not available or not reliable.

Conclusions

In conclusion, personality dimensions can predict the behavioural reactions by combining emotional traits and body self-perception for each patient.

Personalized intervention could be applied by clinical psychologists modelling the treatments step by step and mitigating the negative effects of the whole KT disease and prompting the individual's adaptation to a new perspective on life. As suggested by King-Wing and Kam-Tao, the patient-centred approach is important in clinical intervention, balancing internal and external factors influencing the mental health of patients and addressing the negative impact of KT on their QoL.

RESEARCH II. CHRONIC NON-COMMUNICABLE DISEASES AND HEALTH AWARENESS OF PATIENTS: RANDOMIZED CLINICAL TRIAL STUDY FOR ANALYZING THE HEALTH ADAPTIVE BEHAVIORS THROUGH SELF-CARE SKILLS*

Objective

The present study aimed to examine the relationship between individual factors in self-care of patients dealing with CNCDs. This study aimed to evaluate the behavioural management of CNCDs by comparing different diseases exhibiting diverse side effects, as well as vascular, gastrointestinal, and other chronic diseases, analysing self-care efficacy and emotional dimensions (anxiety, stress, depression). We aimed to examine the ability of patients to become involved in health management, considering the emotional impact of disease and self-care skills development.

Materials and Methods

Ethical Statement

This study was approved by the Institutional Review Board of the University of L'Aquila, Italy (Prot. No. 37590/2021), and by the S. Salvatore Hospital, L'Aquila (IT), from which participants were recruited.

Participants

A total of 122 outpatients aged >18 years (mean age, 50.0 years; standard deviation ±13.8) were included in the study, and 59% of them were women; all participants were living in Middle Italy. They were enrolled at the Clinical Medicine Division (Director

* Dina Di Giacomo, Jessica Ranieri, **Federica Guerra**, Claudio Ferri, *Chronic non-communicable diseases and health awareness of patients: A randomized clinical trial analysing the health adaptive behaviours through selfcare skills*. Submitted Journal of Psychiatric Research. (IF 4.7)

Prof. C. Ferri) of S. Salvatore Hospital in L'Aquila, ASL1 Abruzzo, Italy. In table 1 was reported demographics characteristics of the outpatients.

Inclusion criteria were the following: (a) being aged 18–70 years; (b) being diagnosed with at least one CNCD; (c) being an outpatient; (d) undergoing pharmacological treatment. Exclusion criteria were the following: (a) having premorbid depression and/or anxiety; (b) alcohol or substance abuse; (c) not undergoing pharmacological treatment; (d) being an inpatient; (e) not speaking or understanding the Italian language. We contacted 129 eligible patients, 122 of whom provided informed consent; seven patients did not agree to participate in the experimental protocol: two patients were not interested in participating, three claimed they had no time to participate, and two did not satisfy the language criterium (i.e. they did not speak Italian).

Gender	**Female (N.71)**	**Male (N.51)**	**Sample (N.122)**
Age	X49.2 SD±14.3	X51 SD±13.3	X50 SD±13.8
Education			
No High school	24%	25,5%	25,5%
High school	46,5%	49%	47,5%
Undergraduate	29,5%	25,5%	27%
Marital Status			
Married/living with partner	68%	58,8%	64%
Single	32,4	41,2%	36%
Occupation			
Unemployed	34%	19,6%	27,8%
Employed	38%	45%	41%
Self employed	12,6%	15,8%	14%
Retired	15,4%	19,6	17,2%

Table 1. *Demographics characteristics of the sample*

Procedure

Medical staff in the Clinical Medicine Division (Director Prof. C. Ferri) identified eligible patients, who were then enrolled during a scheduled follow-up by medical protocol for the management of pharmacological treatment. Ninety-two participants were outpatients recruited from the day hospital regimen and 30 from the cardiology clinic. Written informed consent was obtained from all participants at the time of enrolment. Trained clinical psychologists (blinded to the objectives of the study) conducted the psychological evaluations in a quiet room. The evaluations lasted for 20

minutes. Participants completed the measures during their scheduled follow-up. Data were collected anonymously.

Measures

Sociodemographic variables

Two types of participant information were collected. First, demographics were collected through participant self-reports. We selected independent variables to be included in the analysis as they were age/stage of life characteristics (e.g. having children, being employed, and marital status) related to the time since diagnosis. Second, clinical data were obtained from the participants' medical records regarding the disease current stage, and the type of medical (pharmacological/surgery) treatment performed.

Psychological measurement

The psychological battery was composed of three standardised self-assessments measuring emotional traits (depression, anxiety, stress), QoL, and self-care variables. The participants took the tests after an individual clinical interview session. Each standardised test was conducted using an Italian population version.

Self-Care of Chronic Illness Inventory (SC-CII; De Maria M. et al., 2021). The SC-CII is a 20-item self-report questionnaire that assesses the self-care process followed by individuals with a variety of chronic conditions. It measures self-care, defined as a naturalistic decision-making process involving health-promoting practices and illness management, that includes self-care maintenance, self-care monitoring, and self-care management. Self-care maintenance primarily reflects health-promoting and maintenance behaviours such as exercise and taking medication as prescribed. Self-care monitoring involves checking oneself for changes in signs and symptoms. Self-care management reflects the response to changes in signs or symptoms, if and when they occur (e.g., adjusting diet or medication based on detection and interpretation of symptoms). Each self-care dimension is then measured by the relevance scale, where the score is standardised from 0 to 100. Scores >70 indicated adequate levels of self-care.

Depression Anxiety Stress Scales 21 (DASS-21; Bottesi G. et al., 2015). The DASS-21 is a self-administered questionnaire that measures the degree of severity of the core symptoms of depression, anxiety, and stress. It is composed of 21 questions with responses on a 4-point Likert-type scale.

World Health Organization Quality of Life (WHOQOL; De Girolamo G. et al., 2000). The WHOQOL is a test used to measure an individual's perception of their own position in life in the context of the culture and value systems in which the patient lives and in relation to their own goals, expectations, standards, and concerns. It is a 26-item test composed of the following four domains: (1) physical health (including items on mobility, daily activities, functional capacity, energy, pain, and sleep); (2) psychological health (including items on self-image, negative thoughts, positive attitudes, self-esteem, mentality, learning ability, memory concentration, religion, and mental status); (3) social relationships (contains questions on personal relationships, social support, and sex life); (4) environmental health (it covers issues related to financial resources, safety, health and social services, living physical environment, opportunities to acquire new skills and knowledge, recreation, general environment (noise, air pollution, etc.), and transportation. The WHOQOL-BREF also includes QOL and general health items. Each item is scored from 1 to 5 on a 5-point Likert-type scale.

Study design

We conducted an observational study to evaluate the emotional impact and QoL related to chronic diseases. All data were carefully double-checked for possible miscoding, distribution of values, and updating of missing values prior to analysis.

Descriptive statistics included one-way analysis of variance (ANOVA), multivariate analysis of variance (MANOVA), and least significant difference (Tukey) test (as a post-hoc test).

Statistical analyses were performed using the Jamovi stat (Jamovi Version 1.6, 2021) The level of significance was set at $\alpha < 0.05$.

Results

Descriptive analyses based on sociodemographic characteristics showed no differences among the variables (sex, education, marital status, and occupation); thus, our sample was homogeneous.

First, we aimed to evaluate the impact of chronic diseases on emotional traits. Participants were divided into three groups based on CNDCs as follows: (1) the gastrointestinal disease (GD) group included 36 patients (24.5%), (2) vascular disease (VD) group included 50 patients (40.9%), and (3) other chronic diseases (Oth) (urogenital and locomotor diseases) group included 36 patients (24.5%).

Table 2 reports the performance of the patient groups obtained for the psychological assessment.

Psychological Assessment	Chronic Disease	Mean	SD	SE
Depression Anxiety Stress Scales 21				
Depression	Vascular Disease	7.08	7.50	1.04
	Gastronintestinal disease	14.67	12.17	2.03
	Other Chronic Disease	12.00	11.23	1.87
Anxiety	Vascular Disease	8.23	7.92	1.10
	Gastronintestinal disease	13.06	10.93	1.82
	Other Chronic Disease	13.22	10.58	1.76
Stress	Vascular Disease	12.73	9.64	1.34
	Gastronintestinal disease	19.56	12.05	2.01
	Other Chronic Disease	17.50	10.55	1.76
Self Care of Chronic Illness Inventory				
Self Care - Maintenance	Vascular Disease	29.58	6.05	0.84
	Gastronintestinal disease	26.78	6.21	1.03
	Other Chronic Disease	27.64	6.19	1.03
Self Care - Monitoring	Vascular Disease	20.42	4.55	0.63
	Gastronintestinal disease	18.97	5.29	0.88
	Other Chronic Disease	19.61	5.03	0.84
Self Care - Management	Vascular Disease	19.81	5.20	0.72
	Gastronintestinal disease	22.47	5.01	0.84
	Other Chronic Disease	18.47	5.89	0.98
Self Care - Self Efficacy	Vascular Disease	40.17	7.37	1.02

Psychological Assessment	Chronic Disease	Mean	SD	SE
	Gastronintestinal disease	38.67	7.51	1.25
	Other Chronic Disease	39.08	6.22	1.04
World Health Organization Quality of Life				
Physical health	Vascular Disease	98.88	21.07	2.98
	Gastronintestinal disease	75.33	42.51	7.08
	Other Chronic Disease	87.11	25.05	4.17
Psychological health	Vascular Disease	86.72	16.90	2.39
	Gastronintestinal disease	64.91	36.34	6.14
	Other Chronic Disease	80.56	20.01	3.34
Social relationships	Vascular Disease	45.84	10.07	1.42
	Gastronintestinal disease	34.17	20.08	3.39
	Other Chronic Disease	42.89	12.16	2.03
Environmental health	Vascular Disease	119.52	19.94	2.82
	Gastronintestinal disease	91.54	49.37	8.35
	Other Chronic Disease	109.67	25.32	4.22

Table 2. *Raw score for psychological evaluation of the sample*

First, we performed statistical analyses (one-way ANOVA) on different psychological instruments to compare the three groups of chronic diseases (vascular, gastrointestinal, and other chronic diseases).

The data analyses are reported in the following sections.

Depression, anxiety, and stress: Descriptive analyses

Analysis of the emotional dimensions (DASS-21 test) revealed that depression, anxiety, and stress indices were significantly different (Depression = [$F(2,121)=6.36$; $\eta^2=0.10$;

p=0.002); Anxiety = (F(2,121)=3.90; η^2=0.06; p=0.002); Stress = (F(2,121)=4.81; η^2=0.07; p=0.009)]. Post-hoc analyses (Tukey test) showed that patients with GD were more depressed than patients with VD (p=0.002); there were no differences found between the VD and Oth groups, as well as between the GD and Oth groups in this regard; then, the Oth group experienced more anxiety than the VD group (p=0.04), and there were no differences found between the GD and VD, as well the Oth group in terms of anxiety. Finally, the GD group appeared more stressed than the VD group; no difference in stress was found between the Oth and GD groups, and the VD and Oth groups.

Then, we analysed the self-perception of QoL using the WHOQOL test with four indices. All indices were significantly different: physical health (F(2,121)=6.51; η^2=0.10; p=0.002), psychological health (F(2,121)=8.08; η^2=0.12; p=0.000), social relationship (F(2,121)=7.15; η^2=0.11; p=0.001), and environmental health (F(2,121)=7.65; η^2=0.11; p=0.000). By post-hoc analyses (Tukey test), the physical health index showed that patients with VD perceived better levels than patients with GD (p=0.001); in addition, no differences were observed between the VD and Oth, as well the GD and Oth groups. The psychological health index showed a lower level of GD than VD (p=0.000) and Oth (p=0.02); there was no difference between the VD and Oth groups. Similarly, the social relationship of the GD group was lower than that of VD (p=0.000) and Oth (p=0.02). Finally, the environmental health index evidenced GD patients lower than GD (p=0.002).

Next, we assessed self-care ability. Only SC Management index highlighted a significant difference (F(2,121)=5.25; η^2=0.08; p=0.006). With the Tukey test, the SC management index was lower for the Oth group than the GD group; there were no differences between Oth and VD.

We then executed the ANCOVA test to compare all the above psychological variables for chronic disease groups, sex, and disease timing, distributing the participants by time from diagnosis of disease (early disease <3 years; long disease >3 years), and covariated by age.

The ANCOVA results and significant effects are reported in Tables 3, 4, 5, 6 and 7.

ANCOVA - DASS-21 Depression index

	F	df1	df2	p
DASS-21				
Depression	6.36	2	121	0.002***
Anxiety	3.90	2	121	0.02*
Stress	4.81	2	121	0.009***
Self Care of Chronic Illness Inventory				
Maintenance	2.43	2	121	0.092
Monitoring	0.95	2	121	0.389
Management	5.25	2	121	0.006***
Self Efficacy	0.54	2	121	0.586
World Health Organization Quality of Life				
Physical health	6.51	2	121	0.002***
Psychological health	8.08	2	121	0.000***
Social relationships	7.15	2	121	0.001***
Environmental health	7.65	2	121	0.000***

* p < .05, ** p < .01, *** p < .001

***Table 3**. One-Way ANOVA (Fisher's) statistical analysis on psychological assessment comparing chronic disease groups.*

	Mean Square	F	p	η^2
Chronic Disease	518.49	5.53	0.0051	0.08
Disease Timing	0.22	0.00	0.9610	0.00
Sex	297.03	3.17	0.0778	0.02
Age	0.01	0.00	0.9938	0.00
Chronic Disease ✻ Disease Timing	126.90	1.35	0.2626	0.02
Chronic Disease ✻ Sex	152.68	1.63	0.2009	0.02
Disease Timing ✻ Sex	421.67	4.50	0.0362	0.03
Chronic Disease ✻ Disease Timing ✻ Sex	90.66	0.97	0.3834	0.01

Table 4. *ANCOVA test on DASS-21 Depression index by disease groups and timing, sex and covariate by age.*

Post Hoc Comparison Disease Timing ✻ Sex

Disease Timing	Sex		Disease Timing	Sex	Mean Difference	t	p_{tukey}	Cohen's d
LONG DISEASE	F	-	LONG DISEASE	M	7.82	3.25	0.0082	0.81

ANCOVA - DASS-21 Anxiety index				
	Mean Square	**F**	**p**	**η²**
Chronic Disease	148.60	1.67	0.1926	0.03
Disease Timing	4.38	0.05	0.8247	0.00
Sex	176.11	1.98	0.1621	0.02
Age	100.27	1.13	0.2905	0.01
Chronic Disease ✻ Disease Timing	48.87	0.55	0.5787	0.01
Chronic Disease ✻ Sex	20.30	0.23	0.7962	0.00
Disease Timing ✻ Sex	523.66	5.89	0.0168	0.05
Chronic Disease ✻ Disease Timing ✻ Sex	24.44	0.27	0.7601	0.00

Post Hoc Comparison Disease Timing ✻ Sex

Disease Timing	**Sex**	**Disease Timing**	**Sex**	**Mean Difference**	**t**	**p_{tukey}**	**Cohen's d**
LONG DISEASE	F	-LONG DISEASE	M	7.49	3.20	0.0097	0.79

Table 5. *ANCOVA test on DASS-21 Anxiety index by disease groups and timing, sex and covariate by age.*

ANCOVA - DASS-21 Stress index				
	Mean Square	**F**	**p**	**η²**
Chronic Disease	163.04	1.61	0.2054	0.02
Disease Timing	48.91	0.48	0.4891	0.00
Sex	161.64	1.59	0.2097	0.01
Age	479.49	4.72	0.0319	0.04
Chronic Disease ✻ Disease Timing	57.47	0.57	0.5694	0.01
Chronic Disease ✻ Sex	90.19	0.89	0.4143	0.01
Disease Timing ✻ Sex	444.23	4.38	0.0387	0.03
Chronic Disease ✻ Disease Timing ✻ Sex	197.76	1.95	0.1475	0.03

Post Hoc Comparison Disease Timing ✻ Sex

Disease Timing	**Sex**		**Disease Timing**	**Sex**	**Mean Difference**	**t**	**p_{tukey}**	**Cohen's d**
LONG DISEASE	F	-	LONG DISEASE	M	7.00	2.79	0.0307	0.69

Table 6*. ANCOVA test on DASS-21 Stress index by disease groups and timing, sex and covariate by age.*

ANCOVA - Self Care Score Management

	Sum of Squares	df	Mean Square	F	p	η^2
Chronic Disease	299.37	2	149.68	5.16	0.0072	0.08
Disease Timing	63.83	2	63.83	2.20	0.1409	0.02
Sex	4.13	2	4.13	0.14	0.7066	0.00
Age	28.91	2	28.91	1.00	0.3205	0.01
Chronic Disease ✻ Disease Timing	98.58	2	49.29	1.70	0.1878	0.03
Chronic Disease ✻ Sev	14.55	2	7.28	0.25	0.7787	0.00
Disease Timing ✻ Sex	36.13	2	36.13	1.24	0.2670	0.01
Chronic Disease ✻ Disease Timing ✻ Sex	66.73	2	33.36	1.15	0.3206	0.02

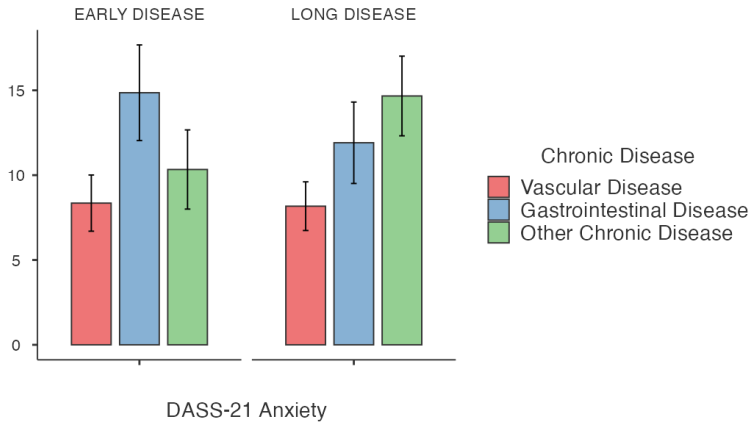
Post Hoc Comparisons - Chronic Disease

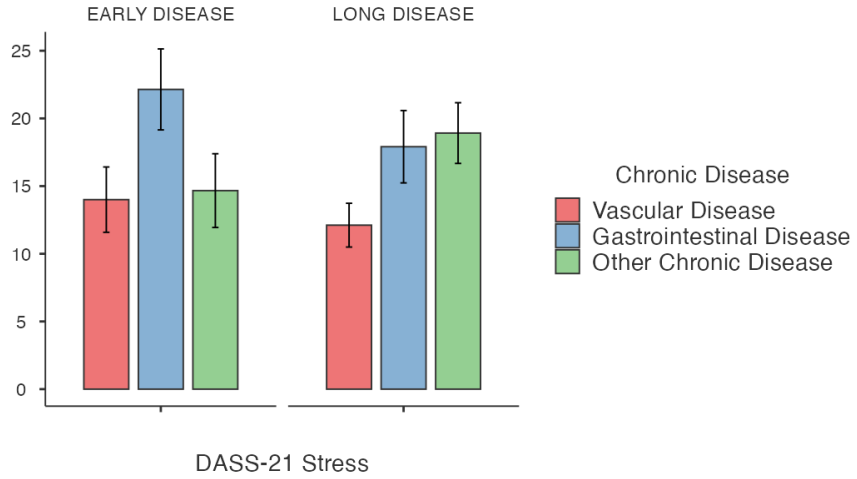
Comparison							
Chronic Disease		**Chronic Disease**	**Mean Difference**	**SE**	**t**	**p_{tukey}**	**Cohen's d**
Vascular Disease	-	Gastrointestinal Disease	-2.96	1.34	-2.21	0.0744	-0.55
	-	Other Chronic Disease	1.57	1.45	1.08	0.5263	0.29
Gastrointestinal Disease	-	Other Chronic Disease	4.52	1.46	3.10	0.0070	0.84

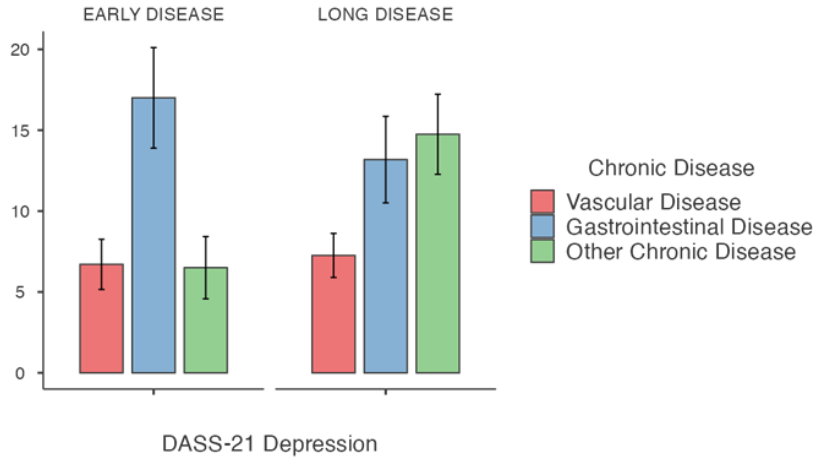
Note. Comparisons are based on estimated marginal means

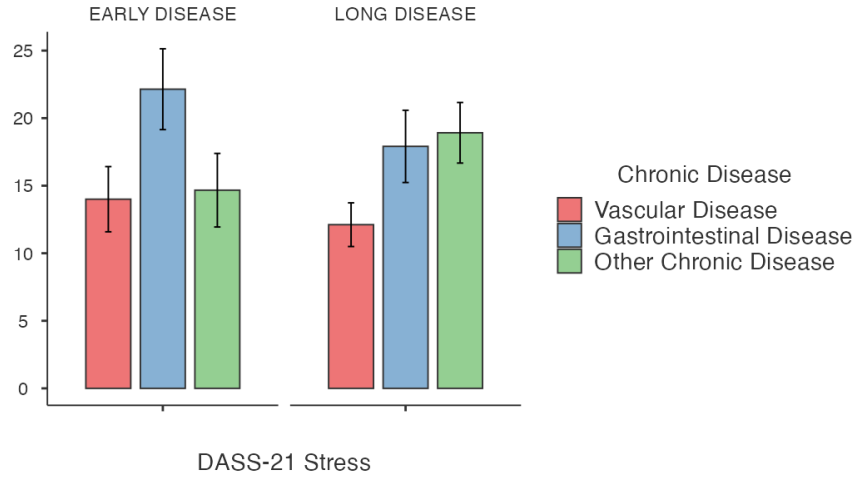
Table 7. *ANCOVA test on Self-Care Score Management index by disease groups and timing,* sex and covariate by age

The statistical analyses revealed a significant effect of disease stage depending on participants' sex on emotional dimensions (DASS-21 indices). Post-hoc tests showed that women who had chronic disease for a long time showed greater fragility than male patients (depression: $p = 0.008$; anxiety: $p = 0.009$; stress: $p = 0.03$). Figure 1 shows the performance of patient groups in emotional tests.


EARLY DISEASE
LONG DISEASE
15
10
5
0
Chronic Disease
Vascular Disease
Gastrointestinal Disease
Other Chronic Disease
DASS-21 Anxiety


EARLY DISEASE
LONG DISEASE
25
20
15
10
5
0
Chronic Disease
Vascular Disease
Gastrointestinal Disease
Other Chronic Disease
DASS-21 Stress


EARLY DISEASE
LONG DISEASE
20
15
10
5
0
Chronic Disease
Vascular Disease
Gastrointestinal Disease
Other Chronic Disease
DASS-21 Depression


EARLY DISEASE
LONG DISEASE
25
20
15
10
5
0
Chronic Disease
Vascular Disease
Gastrointestinal Disease
Other Chronic Disease
DASS-21 Stress

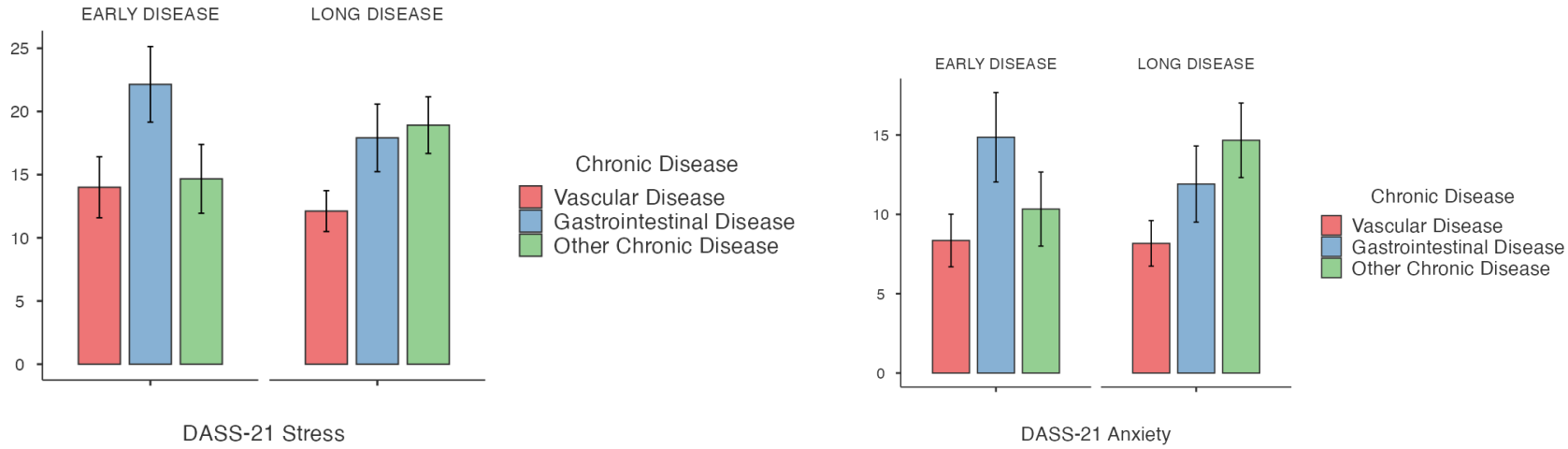


Fig. 1. *Representation of chronic disease groups by disease timing in emotional test (DASS-21)*

Relationship between self-care and Quality of Life

The ANCOVA test compared the chronic disease groups, the disease stage (early and long-time), the self-care indices, and sex, covariated for age, showing a significant effect on the management index only in chronic disease groups ($F(2,121)=5.16$; $\eta^2=0.08$; $p=0.007$); furthermore, the comparison of all variables did not result in significant differences. Post-hoc analysis revealed a significant difference between GD and Oth ($p=0.007$). The ANCOVA test conducted on WHOQOL indices demonstrated the same performance. Regarding the physical health index, a significant effect was observed between the chronic disease groups; no significant difference was observed among all other variables. The post-hoc test showed a significant difference between the VD and GD groups. The differences were, respectively, for the psychological health index in chronic disease groups ($F(2,121)=7.54$; $\eta^2=0.11$; $p=0.001$) and sex ($F(2,121)=4.56$; $\eta^2=0.03$; $p=0.03$, for the social relationship index in chronic disease groups ($F(2,121)=6.55$; $\eta^2=0.10$; $p=0.002$) and sex ($F(2,121)=5.54$; $\eta^2=0.04$; $p=0.02$), and for the environmental health index for chronic disease groups ($F(2,121)=5.14$; $\eta^2=0.08$; $p=0.007$) and sex ($F(2,121)=5.32$; $\eta^2=0.04$; $p=0.02$). Post-hoc tests showed that women perceived lower QoL than men in psychological health ($t=-2.13$; $p=0.03$, $d=-0.45$), social relationship ($t=-2.35$; $p=0.02$, $d=-0.49$), and environmental health ($t=-2.31$; $p=0.02$, $d=-0.48$). There were no effects on disease timing and interactions. Finally, in the psychological health index, a significant effect was between VD and GD groups ($t=3.82$; $p=0.001$, $d=0.98$) and GD and Oth groups ($t=-2.31$; $p=0.02$, $d=-0.48$); in social relationships, the difference was found between the VD and GD groups ($t=3.45$; $p=0.002$, $d=0.88$) and GD and Oth groups ($t=-2.62$; $p=0.02$, $d=-0.72$); finally, environmental health index evidenced lower performance of the GD than the VD group ($t=3.17$; $p=0.005$, $d=0.81$), and there were no differences found between the VD and CD groups.

Discussion and conclusions

Our study aimed to investigate the dynamics underlying the patient approach in the health management of CNCDs. We wanted to analyse the patient perspective in the

management of clinical affection by comparing different CNCDs to evaluate the related emotional dimensions, as well as QoL and self-care skills.

Our findings provide a clinical scenario useful in decision-making, in view of adopting the biopsychological approach. Among CNCDs, patients with GD appeared to be suffering more than those with VD and Oth. They were experiencing depression and stress in their everyday lives, and their QoL indicated compromised physical and psychological health management, social relationships, and environmental health maintenance. Patients with GD displayed a lower ability to deal with daily living. Analysis of self-care skills revealed that patients with GD seemed to perform better in the management of self-care; in addition, monitoring and self-efficacy variables did not appear compromised or difficult to perform.

To elaborate on demographic and clinical data, a gender gap emerged with regard to stage of disease and chronic disease: our findings evidenced better psychological outcomes in younger patients, but the negative emotional dimensions appeared to develop late in the disease; particularly women were affected by depression, anxiety, and stress. Furthermore, they experienced lower QoL, and GD seemed to lead to a lower QoL compared to other clinical conditions.

In accordance with literature, our study evidenced the emerging clinical and research topic regarding the strengthening of patient-centred approach in CNCDs (Engel G.L., 1977; Pequeno N., et al., 2020; Jaarsma et al., 2020; Guerra F., et al., 2021), suggesting that the following specific factors need to be considered in the health decision-making process to enhance the compliance and adherence of patients with the clinical expected results: (1) tailored clinical therapies; (2) side-effects of disease; (3) comorbidity; (4) those related to mental health. The harmonisation of these internal and external factors could offer a powered perspective for personalised medicine.

Overall, the findings highlighted that CNCDs should be managed by adopting medical protocols tailored for biological and physical symptoms, also taking mental disease and behavioural maladaptation into consideration. According to the literature, healthcare should go beyond the effects of disease or treatment, thus improving the patient approach by the empowerment of individuals managing their own health conditions as well as doctors to the active patient for met needs to reduce the burden of CNCDs (Pequeno N. et al., 2020).

Promising actions for a person-centred approach for better health outcomes in CNCDs could be planned to progressively include patients into global care. The priorities for decision-makers in clinical therapeutic planning involve preventing maladaptive behaviours, mentoring mental health, balancing emotional dimensions, reinforcing psychological barriers, and empowering self-care skills to overcome obstacles in daily living. All actions could be protective coping strategies to manage CNCDs, thus improving personalised medicine protocols toward patient health awareness. The limitations of the study are the restricted measurements and lack personality trait evaluations. Regarding the restricted measurements, the present study was oriented to the screening of emotional dimensions by standardised self-reports; the application of systematic psychometric evaluations could better draw the patient scenario. In addition, lacking personality trait evaluations is another weakness of the study, and the assessment of internal and individual factors could better drive the analysis of health behaviour and the related adaptive processes in dealing with CNCDs.

RESEARCH III. CHRONIC KIDNEY DISEASE AND ITS RELATIONSHIP WITH MENTAL HEALTH: ALLOSTATIC LOAD PERSPECTIVE FOR INTEGRATED CARE*

Objective

The present study aimed to investigate the individual factors (biomarkers and psychological dimensions) of ESRD patients dealing with dialysis by analyzing their predictor values for developing negative disease adaptations. In particular, the current study aimed to analyze the dynamics of emotional dimensions in ESRD patients undergoing HD therapy to investigate
mental health adaptations to HD therapy in chronic ESRD.

Materials and Methods

Ethical Statement

This study was approved by the Institutional Review Board of the University of L'Aquila, Italy (Prot. No. 34614/2020), and by the S. Salvatore Hospital, L'Aquila (IT), from which participants were recruited.

Participants

A total of 35 patients age range of 32–79 years (mean = 55.4; SD ± 11.3) affected by kidney disease participated in the study; the gender distribution of the sample reflects

* **Guerra, F.**; Di Giacomo, D.; Ranieri, J.; Tunno, M.; Piscitani, L.; Ferri, C. *Chronic Kidney Disease and Its Relationship with Mental Health: Allostatic Load Perspective for Integrated Care*. Journal of Personalized Medicine 2021, 11, 1367. https://doi.org/10.3390/ jpm11121367 (IF 3.5)

chronic renal failure epidemiology, as the disease is more prevalent in males (F = 9, mean

age 54.8, SD ± 11.9; M = 26 mean age 55.5; SD ± 11.3). Education distribution was as follows: high school graduate (45.71%), graduate (7.15%), and not graduated (47.14%). Further, 58.57% of study participants were unemployed. Patients have been enrolled in S. Salvatore Hospital (L'Aquila, IT) for clinical follow-up and hemodialysis treatment. We contacted 40 eligible patients, and 35 of them provided informed consent. Demographic characteristics of the participants were reported in Table 1;

	DT (N = 35)
Age (years)	X55.4 SD±11.32
Age groups: n (%)	
≤ 54 years	17 (48.57)
> 54 years	18 (51.43)
Gender: n (%)	
Male	26(74.3.00)
Female	9(25.7.00)
Marital Status: n (%)	
Single	9(25.7)
Married	26(74.3)
Educational level: n (%)	
High school graduate	18 (51.43)
No graduate	17 (48.57)
Occupational status: n (%)	
Unemployed	21 (60.00)
Employed	14 (40.00)

Table 1. *Demographic characteristic of the sample.*

Medical staff identified suitable patients, and recruitment was voluntary. Eligible participants met the following inclusion criteria: (a) CKD diagnosis; (b) undergoing hemodialysis therapy; (c) age >18 years; (d) willingness to participate in the study and provide signed informed consent. The exclusion criteria were as follows: presence of serious chronic illnesses or significant physical or psychological disabilities that could invalidate informed consent or their responses.

Procedure

The medical staff of the San Salvatore Hospital identified suitable patients, who were then enrolled during clinical follow-up according to medical protocol during dialysis therapy. Informed consent was obtained at the time of enrolment. Trained clinical psychologists (blinded as to the study's objectives) conducted the psychological assessments in a private, dedicated room. The evaluations lasted 20 min. The Dialysis Treatment participants (DT) completed the measurements during the dialysis treatment. The data was collected
anonymously.

Measures

Sociodemographic Variables

Demographic data were collected by self-reports detecting individual data (e.g., age, educational level, occupational status, having children, being employed, and marital status) and clinical data (diagnosis, dialysis therapy, dialysis timing, surgical intervention).

Psychological Measurement

The psychological battery was composed of three standardized tests measuring emotional traits (depression, anxiety, stress, and psychological distress) and personality dimensions.

Tests were applied following the clinical interview session. Each standardized test was applied using its Italian population adaptation.

DEPRESSION ANXIETY STRESS SCALES 21 (DASS-21; Bottesi G. et al., 2015). The DASS-21 is a self-report that measures the degree of severity of the core symptoms for emotional dimensions rather than a categorical conception of a psychological disorder. It is composed of 21 questions with responses on a 4-point Likert-type scale, and it measures 3 sets of self-report scales designed to measure the emotional states of depression, anxiety, and stress. The inventory demonstrated good reliability ($\alpha = 0.90$).

PSYCHOLOGICAL DISTRESS INVENTORY (PDI; Morasso, 1996). This self-administered questionnaire measures the impact of psychological distress and related therapies. It is

composed of 13 questions, and responses are indicated on a 5-point Likert-type scale. The standard score estimates the presence/absence of psychological distress to measure global distress. This test was administered only to the participating group. The inventory demonstrated good reliability ($\alpha = 0.86$).

BIG FIVE INVENTORY-10 ITALIAN VERSION (BFI-10; Guido et al., 2010*).* This self-administered questionnaire measures the five personality dimensions (agreeableness, conscientiousness, emotional stability, extroversion, and openness). It is composed of 10 questions with responses on a 5-point Likert-type scale. Agreeableness describes an individual's tendency to put the needs of others before their own; conscientiousness describes a person's tendency to be persistent and determined in achieving their goals; emotional stability describes an individual's response to stress; extroversion refers to the degree of pleasure experienced through social relationships; openness refers to openness to creativity, non-conformism, and originality. The reliability of test was Cronbach's a c > 90. People with a high level of agreeableness are nice, cooperative, and accommodating; on the contrary, a low score in this domain is typical in competitive and self-interested people. People with a high level of conscientiousness tend to work hard to carry out their plans, while people who attain a low score on this trait tend to change course and get distracted easily. People with poor emotional stability are susceptible to anxiety, depression, anger, and other negative emotions when subjected to stressful conditions, but on the contrary, people with a high level of emotional stability resist stress and tend not to experience many negative emotions. A high score in extroversion indicates a person who is sociable, talkative, open to others, and optimistic; on the contrary, a low score is typical in reserved, sober, not euphoric, and quiet people. Low scores of openness indicate closure to experience, conformity, and lack of creativity, while high scores indicate ideas which are creative, original, and innovative.

Study design

We conducted an observational study to evaluate the correlation between emotional traits and personality dimensions in ESRD patients. The data were carefully checked for possible coding errors or misattribution of values, and missing data were updated before

the analysis was conducted. Participants were divided into groups based on gender (male, female) and age group (young, old by median value).

Descriptive statistics (t-test) were conducted to analyze the characteristics of the sample, and hierarchical regression analysis was performed to investigate the relationship between pathological medical conditions and psychological dimensions. The Jamovi stat was applied for statistical analyses. The level of significance adopted was $\alpha < 0.05$.

Results

Correlation among the Study Variables. Table 2 reported the raw scores (mean values and standard deviations) obtained on the psychological testing battery.

	DT	**Total**
	x SD	x SD
PDI	26.1±7.9	25.7±9.4
DASS-21		
Depression	9.03 ± 9.4	8.43 ± 10.2
Anxiety	8.46 ± 6.3	9.31 ± 8.3
Stress	12.2 ± 9.6	12.0 ± 9.6
BFI-10		
Ag	6.51 ± 1.99	6.26 ± 1.9
Co	7.66 ± 2.1	7.41 ± 2.1
Es	5.69 ± 1.4	5.73 ± 1.6
Ex	6.49 ± 2.1	6.44 ± 2.0
Op	6.83 ± 2.2	6.71 ± 2.1

***Table 2**. Raw score (mean/standard deviation) by psychological evaluations distributing sample in patient condition groups.*

One sample t-Test analysis showed a significant effect for the investigated emotional dimensions, as reported in Table 3.

		Statistic	df	*p*	Mean difference		Effect Size
PDI index	Student's t	19.30	34.00	<0.0001	26.06	Cohen's d	3.26
Depression.	Student's t	5.63	34.00	<0.0001	9.03	Cohen's d	0.95
Anxiety	Student's t	7.84	34.00	<0.0001	8.46	Cohen's d	1.33
Stress	Student's t	7.46	34.00	<0.0001	12.17	Cohen's d	1.26

***Table 3**. One sample t-test analysis on emotional dimensions of ESRD patients.*

Subsequently, we conducted a Spearman correlation analysis between emotional dimensions and creatinine levels, as reported in Table 4. Creatinine level is positively associated with PDI score and Stress index. Furthermore, PDI score is positively associated with depression ($r = 0.78$, $p = 0.0001$), anxiety ($r = 0.55$, $p = 0.0006$) and stress ($r = 0.80$, $p = 0.0001$), and finally, even anxiety and stress are associated with one another ($r = 0.78$ to 0.79, $p = 0.0001$). Because the variable "time of dialysis", "time from diagnosis" and "age" are not significantly associated with any dependent variable, they were omitted from the subsequent analysis.

		Creatinine	Distress	Depression	Anxiety	Stress	Time of Dialysis	Age	Time from Diagnosis
Creatinine	Spearman's rho								
	p-value								
Distress	Spearman's rho	0.39							
	p-value	0.0199							
Depression	Spearman's rho	0.20	0.78						
	p-value	0.2441	<0.0001						
Anxiety	Spearman's rho	0.01	0.55	0.78					
	p-value	0.9619	0.0006	<0.0001					
Stress	Spearman's rho	0.36	0.80	0.75	0.63				
	p-value	0.0352	<0.0001	<0.0001	<0.0001				
Time of Dialysis	Spearman's rho	-0.05	-0.19	-0.02	-0.07	-0.15			
	p-value	0.7965	0.2761	0.8937	0.6756	0.4005			
Age	Spearman's rho	-0.14	-0.05	0.05	0.09	0.13	0.25		
	p-value	0.4209	0.7569	0.7712	0.6250	0.4637	0.1472		
Time from diagnosis	Spearman's rho	0.09	0.09	0.17	-0.01	0.05	0.38	-0.11	
	p-value	0.5957	0.5876	0.3162	0.9735	0.7912	0.0253	0.5187	

Table 4. *Correlation matrix (Spearman test) comparing emotional dimensions and creatinine levels.*

Testing Direct Effects and Moderating Effects. Considering the significant correlations between creatinine levels and emotional dimensions (stress and distress labels) in ESRD patients, a regression analysis was conducted to analyse the predictive effect, as reported in Table 5.

Overall Model Test						
Model	**R^2**	**Adjusted R^2**	**F**	**df1**	**df2**	***p***
1	0.14	0.12	5.59	1	33	0.0241
2	0.16	0.11	3.11	2	33	0.0584

Table 5. *Regression analysis on stress and dialysis timing covaried by creatinine level.*

We included creatinine level and dialysis timing such that patients were divided into 2 groups by dialysis timing, taking the median value (median value = 24 months): T0 (HD therapy > 24 months) and T1 (HD therapy < 24 months). The main moderation model turned out to be significant (model 1: creatinine; model 2: dialysis timing). In model 1

(R2 = 0.14, F(1,33) = 5.56, p = 0.02), it was revealed that the stress index was moderated by creatinine level and not dialysis timing. In model 2 (R2 = 0.16, F(1,33) = 3.11, p = 0.05), a borderline effect emerged (Figure 2).

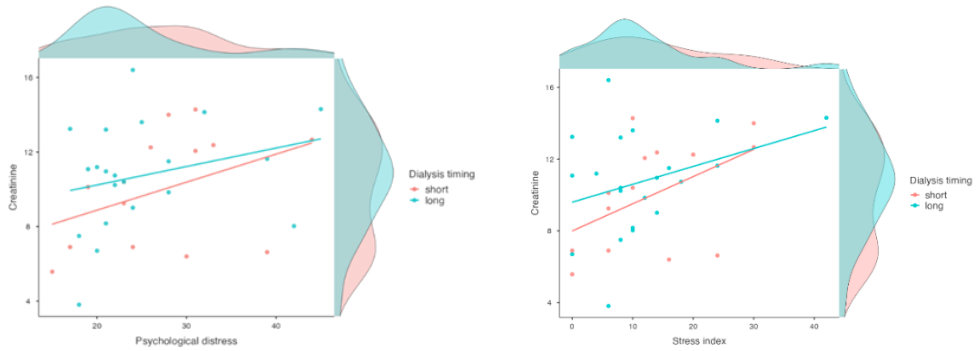


Fig. 2. *Scatter plots of negative emotions in dialysis groups divided by (median value) timing of treatment.*

No significant correlational effect between emotional dimensions and personality traits were found. Subsequently, Spearman's correlation was conducted to investigate the relationship between emotional dimensions and personality traits. Data elaboration evidenced no significant effect among them.

Discussion and Conclusions

The aim of the current study was to investigate the relevance of the allostatic load of ESRD patients regarding HD therapy. Biomarkers and psychological dimensions were analysed to understand their predictive value. As expected, the findings of the present study demonstrated the impact of HD therapy in this chronic condition, confirming negative emotional signs such as anxiety, depression, stress, and psychological distress (Navidian, A., et al., 2006; Heidarigorji, A. et al., 2014; van Sandwijk, M.S. et al., 2018; Silva, A. et al., 2014; Da˛browska-Bender, M. et al., 2018; Thomas, C.V., et al., 2016; Guerra, F. et al., 2021) several researchers highlighted that HD patients were reported to have fewer functional coping strategies and had more mental health issues. Some authors highlighted the impact of personality traits on health management when dealing with high/low adherence and compliance to medical prescriptions: positive traits can enhance the active care from the patients being engaged in their own health behaviour.

According to the literature, our study highlighted the psychological unbalancing of HD patients, but offered a new perspective joining the (positive and/or negative) psychological dimensions to their medical records. Furthermore, and as expected, our findings showed that personality traits can be the individual factors driving enhanced physical caring for mental health. However, our findings showed the involvement of personality traits in health management, but they can be considered a protective factor for HD patients, as no moderating effect emerged for positive emotional adaptations. That is, ESRD patients seemed to suffer negative emotions related to biomarker levels and personality traits, and psychological dimensions did not help them to deal significantly with the impact of the side-effects of chronic disease. Conversely, creatinine levels (biomarkers) appeared predictive for negative emotional adaptations: high level of creatinine were found to be positively associated with high stress levels as well as psychological distress. Our findings suggested that the managing of ESRD patients' mental health is featured by changing the time dependently to the variability of biological markers (in our case creatinine) impacting psychological dimensions. According to the allostatic paradigm, ESRD patients could experience an allostatic load and more overload towards poor health outcomes; integrated biological and psychological measurements could prevent negative mental health-related outcomes. The complex measurement process could be even more decisive in the detection of mental health comorbidities, allowing for the tailoring of psychological interventions to decrease the negative impact of toxic stress on health.

One interesting point within this study was the absence of a significant correlation among personality traits and emotional dimensions: positive personality traits did not seem to be adequate protective factors when dealing with the impact of HD treatments over time. In our opinion, this finding is evidence for the need for the health management of ESRD patients by a multidisciplinary team by a holistic approach based on physical and psychological well-being interventions. By adopting the above operative perspective based on allostatic load in ESRD, the power of integrated assessment could contribute to a better understanding of the signs and symptoms planning the care. The patient-centered approach, in which the mental and physical interaction is central, is enhanced by the allostatic paradigm towards the improvement of the quality of life of ESRD patients in HD treatment. There are some limitations to

this study. This is a single-center study with a small sample. Regardless, the power of our finding is enough to be relevant for clinical practice because it is in line with a previous study (Thomas, C.V. et al., 2016). The impact of personality traits could be positive on the medical pathway and also contribute to adaptations in the clinical experience, allowing different degrees of wellbeing according to the reduced influence of personality dynamics on health management. Furthermore, the patients in this study were enrolled in a non-random way, which would result in bias which could interfere with the evaluation of effectiveness. Therefore, a large sample size and multi-center randomized controlled trial is needed in the future. Lastly, another limitation of the study was the period detection data: as reported above, the detection data was in the range time from January 2020 to June 2021 during the COVID-19 worldwide pandemic. However, we monitored psychological stress for COVID-19 and all patients included in the sample showed no related emotional issue.

RESEARCH IV. CARDIOVASCULAR DISEASE AND SELF-CARE PROCESSES IN ADULT PATIENTS: OBSERVATIONAL STUDY ON BALANCING MENTAL HEALTH NEEDS*

Objective

Aim of our study was to understand the predictive factors of disease management by evaluating emotional characteristics, emotion regulation, self-care process, and quality of life (QoL) in adult CVD patients. We wanted to analyze the relationship between psycho-emotional dimensions and cardiovascular disease and investigate the ability of patients to manage their own health and QoL.

Materials and Methods

Ethic Approval

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Institutional Review Board of the University of L'Aquila, Italy (Prot. No.37590/2021).

Participants

Participants of the study have been 61 patients (39F, 22M) in range age 18-75 years (mean = 56.4 ± SD 12.0). The following criteria were used to determine eligibility: a) age <18 years; b) diagnosis of cardiovascular disease; c) being an outpatient; and d) following cardiovascular pharmacological treatment. The exclusion criteria were: a)

* Jessica Ranieri, **Federica Guerra**, Eleonora Cilli, Claudio Ferri, Dina Di Giacomo. *Cardiovascular disease, self-care and emotional regulation processes in adult patients: Balancing unmet needs and Quality of Life*. Submitted to Biopsychosocial Medicine (IF 2.3)

premorbid depression and/or anxiety, b) alcohol or substance abuse, c) no pharmacological treatment, and e) inability to speak Italian. We contacted 70 eligible patients, and 61 of them provided informed consent. Two patients were not interested in participating, five were unable to participate due to time constraints, and two were unable to speak Italian. The demographic characteristics of the participants are presented in Table 1.

	CVD (N = 61)
Age (years)	X 55.4 SD±11.32
Age groups: n (%)	
≤ 58 years	31 (50.82)
> 58 years	30 (49.18)
Gender: n (%)	
Male	22 (36.07)
Female	39 (63.93)
Marital Status: n (%)	
Single	17 (27.87)
Married	44 (72.13)
Educational level: n (%)	
Graduate	14 (22.95)
No graduate	47 (77.05)
Occupational status: n (%)	
Unemployed	31 (50.82)
Employed	30 (49.18)

Table 1. *Demographic characteristics of the sample*

Procedure

Medical staff in the Clinical Medicine Division (Director Prof. C. Ferri) identified eligible patients who were enrolled during follow-up according to the medical protocol for the management of pharmacological treatment. Written informed consent was obtained from all participants at the time of enrolment. Trained clinical psychologists (blinded to the objectives of the study) conducted psychological evaluations in a quiet, private room. The evaluations lasted for 20 minutes. The participants completed the measures during their scheduled follow-up. Data were collected anonymously.

Measures

Sociodemographic variables

Two types of participant information were also collected. First, demographic, and clinical variables were collected from medical records. Demographic data included marital status, having children, employment, and education. The clinical data were related to triggers, disease severity, and pharmacological treatment. Second, psychological measurements were conducted through digital testing using a touchscreen technological solution (tablet).

Psychological measurement

The psychological battery was composed of standardized tests measuring emotional traits (depression, anxiety, and stress), quality of life, self-care, and emotion regulation variables. Psychological assessments were conducted during scheduled medical follow-ups. All tests were adapted for the Italian population.

DEPRESSION ANXIETY STRESS SCALES 21 (DASS-21; Bottesi et al., 2015). The DASS-21 is a test that measures the degree of severity of three emotional indices: depression, anxiety, and stress. It comprises 21 items based on a four-point Likert-type scale.

SELF-CARE OF CHRONIC ILLNESS INVENTORY (SC-CII; M. De Maria, 2021). The SC-CII is a 20-item questionnaire that assesses self-care competence in chronic diseases. Self-care is the decision-making process involving illness management related to health promotion. It is characterised by four indexes: a) self-care maintenance, b) self-care monitoring, c) self-care management, and d) self-efficacy. Self-care maintenance primarily reflects health-promoting and maintenance behaviours, such as exercising and taking medication as prescribed. Self-care monitoring involves checking for changes in signs and symptoms. Self-care management reflects the response to changes in signs or symptoms when and if they occur (e.g. adjusting diet or medication based on the detection and interpretation of symptoms). The scoring is based on a subscale for each self-care index (cut-off = 70).

WORLD HEALTH ORGANISATION QUALITY OF LIFE – BRIEF (WHOQOL; De Girolamo G., 2000). The WHOQOL is a test to measure self-perception in life, in the context of the culture and value systems in which the patient lives and in relation to their own goals, expectations, standards, and concerns; it is a 26-item test composed of 4 domains: 1) physical health (includes items on mobility, daily activities, functional capacity, energy, pain, and sleep), 2) psychological health (includes items on self-image,

negative thoughts, positive attitudes, self-esteem, mentality, learning ability, memory concentration, religion, and the mental status), 3) social relationships (contains questions on personal relationships, social support, and sex life), 4) and environmental health (that covers issues related to financial resources, safety, health and social services, living physical environment, opportunities to acquire new skills and knowledge, recreation, general environment (noise, air pollution, etc.), and transportation. The WHOQOL-BREF also includes QoL and general health items. Each item was scored from 1 to 5 on a five-point Likert scale.

DIFFICULTIES IN EMOTION REGULATION SCALE 20 (DERS; Lausi G., 2020). The DERS is a test to assess individual differences in the ability to identify, accept, and manage emotional experiences and is composed of six indexes: a) non-acceptance, b) goals, c) impulse, d) awareness, e) strategies, and f) clarity.

Statistical analyses

We conducted an observational study to evaluate the emotional characteristics, emotion regulation, self-care processes, and quality of life (QoL) of young patients with CVD. All data were double-checked for possible miscoding, distribution of values, and updating of the missing values. Participants were divided into two groups based on acute triggers: mental and physical triggers. Descriptive statistics were conducted to analyse the emotional dimensions, behavioral characteristics, and QoL. Pearson's correlations and linear regression were applied to detect the relationship across the psychological variables. Then, a general mediation analysis was conducted to verify the effect of psychological dimensions on patients' QoL. For the statistical analyses, the Jamovi Stat was applied. The level of significance was set at $\alpha < 0.05$.

Results

Descriptive analyses were conducted on emotional and behavioral data, and Table 2 reports the mean values (and standard deviations) of the participants in the psychological testing.

	Mean	SD	Minimum	Maximum
WHOQOL-BREF				
Physical	98.8	21.6	48	140
Psychological	86.6	16.9	52	120
Social	44.4	10.7	12	60
Environment	117.3	21.4	64	160
DASS-21				
Depression	9.4	9.5	0	42
Anxiety	9.6	9.7	0	42
Stress	15.3	10.4	0	42
DERS				
Non Acceptance	10.5	5.5	5	25
Awareness	9.5	3.0	4	17
Goals	9.0	3.8	4	19
Clarity	5.4	2.7	2	15
Impulse	7.0	3.3	4	18
SELF CARE				
Maintenance	65.3	18.2	12.5	100
Monitoring	61.9	17.3	24	80
Management	58.4	21.3	0	100
Self Efficacy	39.2	7.3	18	50

***Table 2**. Psychological characteristics of participants*

First, we sought to investigate the relationship between acute triggers and emotional outcomes. The participants were distributed into two groups according to acute triggers: mental triggers (MT) and physical triggers (PT). A t-test statistical analysis was performed to compare the acute trigger groups and behavioral (WHOQOL) and emotional (DERS, DASS-21, SELF-CARE) data.

Test	Physical Trigger		Mental Trigger		t	df	p	Cohen's d
	M	SD	M	SD				
WHOQOL								
Physical	65	21.02	62	18.07	-0.55	59	0.58	-0.14
Psychological	64.78	17.69	66.18	17.66	0.14	59	0.88	0.03
Social	70.75	21.02	64.96	23.82	-1.03	59	0.30	-0.26
Environment	70.03	17.57	67.09	16.21	-0.63	59	0.52	-0.16
DASS-21								
Depression	8.50	7.88	10.18	10.87	0.68	59	0.49	0.17
Anxiety	7.07	8.11	11.81	10.56	1.94	59	0.05	0.49
Stress	12.92	10.17	17.39	10.45	1.68	59	0.09	0.43
DERS								
Non Acceptance	11.32	5.95	9.81	5.10	-1.06	59	0.29	-0.27
Awareness	9.21	3.11	9.84	3.09	0.79	59	0.42	0.20
Goals	9.67	3.83	8.51	3.78	-1.18	59	0.23	-0.30
Clarity	5.71	2.77	8.52	2.66	-0.67	59	0.50	-0.17
Impulse	6.64	2.57	7.45	3.96	0.93	59	0.35	0.23
SELF CARE								
Maintenance	64.28	18.52	66.28	18.33	0.42	59	0.67	0.10
Monitoring	61.14	16.54	62.66	18.29	0.33	59	0.73	0.08
Management	54.71	22.65	61.69	19.92	1.28	59	0.20	0.32
Self-efficacy	38.96	7.14	39.51	7.55	0.29	59	0.77	0.07

Table 3 *– Comparison of participants with mental and physical acute triggers on WHOQOL-BREF score*

Table 3 shows the results of the comparison between the acute trigger groups (MT and PT) on each domain of QoL (physical, psychological, social, and environmental) detected by the WHOQOL test. The results showed no significant differences between participants diagnosed with acute triggers. Table 3 shows the results of the comparison between the trigger groups for each emotional dimension (depression, anxiety, and stress) detected by the DASS-21 test. The results showed no significant differences. Table 3 shows the results of the comparison between trigger groups for each behavioral index (non-acceptance, awareness, goals, clarity, and impulse) detected by the DERS test. The results showed no significant differences. Table 3 shows the results of the comparison between trigger groups for each self-care ability (maintenance, monitoring,

management, and self-efficacy) detected by the SELF-CARE test. The results showed no significant differences.

Considering the acute triggers, mental or physical factors of CVD onset did not seem to influence psychological dimensions or self-care behaviours.

Consequently, we wanted to analyse the correlation between the examined psychological dimensions. Pearson's test showed a positive effect between emotional regulation (DERS) and psychological distress (DASS-21) dimensions ($r = 0.59$, $p < 0.001$), whereas negative effects emerged between emotional regulation and QoL (WHOQOL) ($r = -0.71$, $p < 0.001$), and QoL and psychological distress ($r = -0.52$, $p < 0.001$).

We subsequently sought to verify the predictive effect of psychological distress and emotional dysregulation on quality of life. Hierarchical linear regression was performed with QoL dependent variables, controlling for emotional and physical triggers, emotional dysregulation, and psychological distress as covariates. Triggers were added as a controlling variable in the first block, the total score of DERS in the second block, and the total score of DASS-21 in the third block. Statistical analyses showed a predictive effect of emotional dysregulation ($R2 = 0.52$; $p < 0.001$) and no difference in triggers. Table 4 presents the results.

Model fit measures

Model	R	R^2
1	0.07	0.06
2	0.72	0.52
3	0.72	0.52

Comparison

Model	Model	ΔR^2	F	df1	df2	p
1-	2	0.51	62.03	1	58	<.001
2-	3	0.09	1.03	2	57	0.31

Model fit measures

Model	R	R^2

Model Coefficients -WHOQOL

Predictor	Estimate	SE	t	p
Trigger:				
Physical Stressor – Mental Stressor	12.72	12.43	1.02	0.31
DERS	-3.29	0.59	-5.56	<.001
DASS-21	-0.29	0.28	-1.01	0.31

[a]Rapresent reference level

Table 4 *– Comparison of participants with mental and physical acute triggers on DASS-21 score*

A mediation analysis was performed to test the hypothesis that emotional dysregulation might influence QoL through acute triggers. Figure 1 shows a diagram of the statistical analysis. The outcome variable was QoL, and the mediator was the emotional dysregulation index. To ascertain the impact of the trigger, it was added as an independent variable in the model. The results revealed that some emotional dysregulation had an effect on QoL: a significant effect of awareness index (β = 0.02; SE = 1.82; p < 0.02; CI = -7.79 to -0.63); significant effect of goal index (β = - 0.54; SE = 1.48; p < 0.001; CI = -5.21– -0.54); and a significant effect of clarity (β = - 0.21; SE = 2.08; p < 0.03; CI = -8.58– -0.41). The results also suggest that the mediated effect accounted for awareness index was 18.7% (R2 = 0.18) of the variance, with a goal index of 62.8% (R2 = 0.62) of the variance, and the significant mediating effect of clarity was 58.8% (R2 = 0.58) of the variance. This evidence suggests that the relationship between triggers and QoL is mediated by the emotional dysregulation indices.

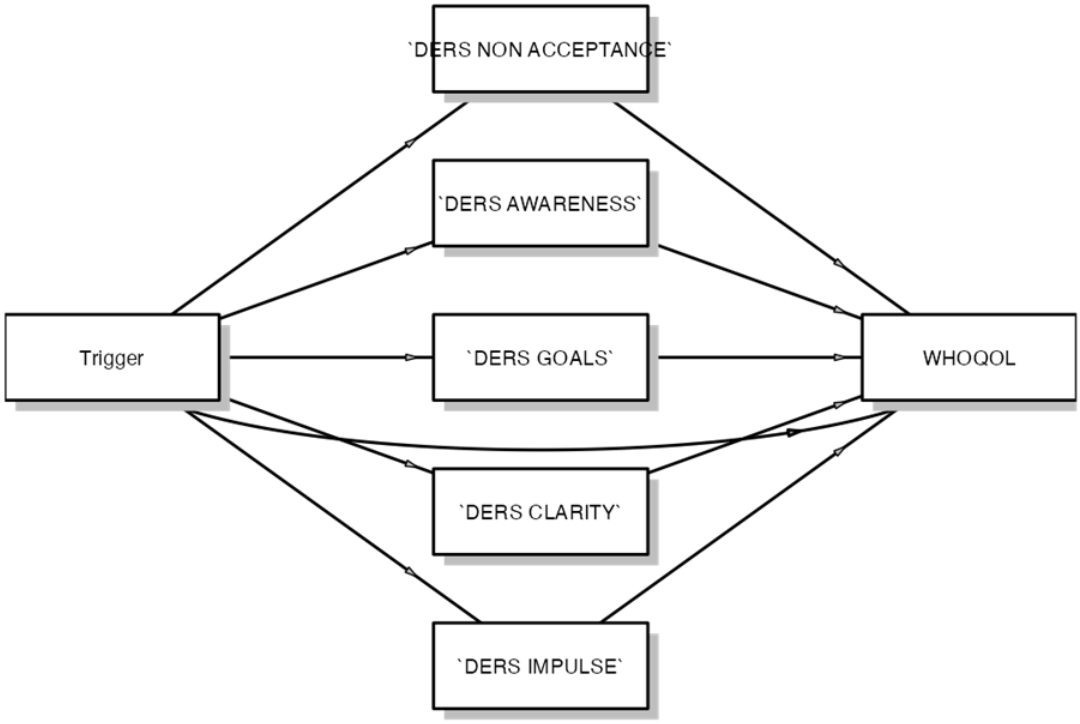


Figure 1. *Diagram model of mediation analysis*

Discussion

This study aimed to examine the relationship between individual psychological dimensions, QoL, and self-care processes of outpatients toward CVD health management.

Findings revealed the impact of cardiovascular disease on QoL through emotional regulation processes and emotional dimensions. There was no significant direct effect of acute triggers on emotional and behavioural aspects, highlighting the CVD patients' ability with regard to psychological adaptation to their own health condition; the emotional regulation process positively impacted the QoL and well-being. In the scenario of the onset of cardiovascular disease, acute triggers did not appear to be relevant. In contrast, the emotional regulation process resulted in QoL and psychological

adaptation: awareness, goals, and clarity indices significantly impacted CVD patient outcomes, being related to the causal pathway. Those psychological dimensions can mediate QoL.

Depression, anxiety, and stress did not appear to be significantly relevant to acute triggers: CVD patients may experience some negative psychological emotions, but they cannot be linked to disease onset in our study.

Several studies have evaluated the emotional vulnerability of patients with CDV based on the incidence of psychopathological outcomes that could affect QoL and reduce well-being (Conversano C., 2019; Silverman A.L. et al., 2019). An interesting review highlighted the high incidence of psycho-emotional issues as a predictive factor for the risk of recurrence of cardiovascular events and rehospitalization (Monami M., et al., 2007). The secondary effect could be the unexpected pharmacological treatment outcomes and the exacerbated vulnerability of older CVD patients, reducing adherence to the prescribed medical therapy (Forman D., et al., 2018). Considering the mentioned side-effects of poor adherence, QoL and health management may have serious adverse effects in terms of morbidity and mortality, and non-persistence is one of the most common causes of poor adherence in patients with CVD (Vrjens B., et al., 2012). In line with this perspective, our findings showed negative correlations between emotional regulation and patients' ability to monitor and recognize early signs and symptoms of CVD, self-efficacy in carrying out specific self-care behaviors, and QoL. From the patient's perspective, the psychological dimensions have an important role in CVD disease management: low awareness about one's own mental and physical conditions, no well-defined disease-oriented goals, and lack of clarity about one's own feelings emerged as significant factors for QoL mediating (positively/negatively) CVD physical and health management. Medical actions and health management strategies may involve individuals in a complex patient engagement process.

Clinical follow-up and biomarker examinations need to be integrated by psychological dimensions into a biopsychosocial approach for efficient health management: joining mental and physical treatments, patients with CVD might improve their adherence and related health outcomes. Tailored awareness, well-progressively defined goals (step by step), and focus on emotional health could be key points in the medical-patient

relationship to reinforce and improve QoL and persistent behaviors, basic adherence to medications, and finally, boost coping strategies for effective compliance.

Furthermore, our findings resulted in the identification of a similar impact of acute triggers. Physical and mental triggers did not affect self-care ability and emotional regulation differently; CVD patients appeared to overcome the onset of disease by focusing on the pathology. Some studies have highlighted the relevance of mental triggers in vulnerable individuals, referring to stress, anxiety, and depression as mechanisms for acute triggers in CVD onset. However, the topic is controversial (Strike P., et al., 2015; Edmondson D., et al., 2013). According to a contrasting view, the absolute impact of acute emotional triggers will be greater among individuals with an elevated baseline CVD risk, such that the effect of two episodes of daily anger outbursts would vary from approximately one excess cardiovascular event per 1000 person-years in a low-risk population (Mittlemann M., et al., 2011; Steptoe A., et al., 2012; French D.P. et al., 2011; Strike P., et al., 2004).

Although vulnerable individuals could reflect multifactorial clinical symptoms and comorbidity for ongoing psychopathological signs, the present study did not confirm the prodromal aspects of offsetting each other.

Conclusions

In conclusion, poor adherence to CVD pharmacological therapy could be addressed by identifying the emotional characteristics, subjective emotional ability, and the self-care process of patients who are or may be at risk of non-persistence. In clinical practice, psychological screening can be an effective tool for detecting predictive factors in the management of CVD patients' health and adherence to medical treatment. The screening of predictive psychological factors allows good clinical condition management and self-care empowerment to increase psychological well-being and quality of life by planning adequate integrated and multidisciplinary support. The identification and appropriate correction of these factors may result in clinical benefits.

DEVELOPMENT SECTION

SCIENTIFIC AND APPLICATION PERSPECTIVES

Introduction

From the results of our previous studies, new challenges emerge in the integrated approach to the patient diagnosed with chronic disease, as the clinical path extends beyond primary health care and continues in the long phase of survival. Chronic patients express new psychological needs from the moment of diagnosis, as they need to adapt to the new condition of the disease which requires a change in their habits based on the problems encountered.

Communication is the corner stone of the relationship with the patient in all medical settings with the main aims of creating a good inter-personal relationship, exchanging information, and making treatment-related decisions. In a rapidly changing cultural and social context, the paternalistic approach of doctors knowing the best and deciding what should be done for a patient has been replaced by a shared decision-making approach, with patients being advised to educate themselves, ask questions and influence the course of the discussion with their doctors. Thus, a need for an improvement in the communication skills of physicians is extremely important for patients affected by serious physical illness (e.g. cancer, HIV infection, multiple sclerosis, amyotrophic lateral sclerosis). Certain attitudes, behavior and skills (e.g. capacity to impart confidence, being empathetic, relating on a personal level, being forthright, being respectful, and being thorough) are part of effective communication. However, some specific aspects influencing doctor-patient communication and relationships, such as personality variables, coping and attachment styles, as well as cultural factors, should also be taken in to account (Balon R., et al., 2015). Chronic conditions can often worsen in severity and complexity over time, reducing individuals' functional status and thereby reducing quality of life and emotional health. The manifestation of various chronic conditions and their impact on functioning can vary, for example, among cancer survivors, conditions such as osteoarthritis are linked to impaired physical function, while chronic psychological conditions, including depression, are strongly linked to the

emotional function. The prevalence of multimorbidity - the co-occurrence of two or more chronic conditions - increases with age and is higher among those with lower household incomes and lower education levels. Given the increasing prevalence of chronic conditions and recognizing that poor mental health-related physical and mental quality of life is associated with increased all-cause mortality, planning of disease survival care taking into account the conditions chronic remains extremely important. (Arneja J., et al., 2021).

Future development. Therefore, from this point of view, future research developments are twofold. On the one hand, the deepening of the emotional problems related to the physical side effects of chronic diseases and their impact on daily life, on the other hand, the development of specific and personalized psychological supports based on the personological characteristics and the type of the chronic diagnosis. An aspect that has not yet been investigated in the literature is the impact of the use of tools and brief psychological therapies that promote patient engagement during therapies to alleviate the symptoms of chronic disease and increase compliance. As the health system focuses on an approach to population health, there is a growing focus on reducing costs and improving quality. Measuring and improving patient engagement will become a core skill needed by health systems and health professionals. In according to Kouidi E. et al.,1984; Lim P. et al., 2000, (Kouidi E., et al 1997; Lim P., et al., 2000), skeletal muscular atrophy is common and insidious in End Stage Renal Diseases (ESRD) and is associated with metabolic and functional deficits and reduced quality of life. Objective of the SET IN Project is to promote the patient engagement during hemodialysis treatment. The purpose is the encourage the patients to assume the active role during hemodialysis treatment making the time of dialysis therapy not only a moment of treatment but a moment of increasing one's well-being. Breast cancer induce the alopecia due to chemotherapy. Scalp cooling technology (DIGNICAP) allows you to reduce hair loss during chemotherapy. Although this treatment has been available in Europe for over a decade, the effectiveness of the technology has not been extensively investigated to date, on the one hand, satisfaction, acceptability, impact on patients' well-being and decision-making process (on the other) (Shaw et al, 2016), and the literature has not yet come to a unanimous conclusion. From a systematic review of the

literature by Marks et al. (2019) emerges that the cooling system is not necessarily associated with the improvement of the patient's quality of life and well-being. However, the measures used to date in the detection of these variables are not domain-specific, the studies are conducted on small samples, different methodologies are adopted in the studies, and different outcomes are reported for clinicians and for patients, who evaluate differently, objectively, and subjectively, the severity of alopecia. In fact, while the cooling of the scalp contributes to the well-being of patients who undergo it, at the same time it also seems to cause further distress in patients who lose their hair despite the use of preventive intervention, experiencing a mismatch between expectations and the subsequent hair loss experience (van den Hurk et al, 2010). In addition, many eligible patients refuse cooling technology, not giving priority to hair loss during the specific time of chemotherapy. The objective of the CRISTAL Project will be to detect the expectations and satisfaction of young patients with breast cancer with respect to the use of DigniCap technology at the beginning and completion of chemotherapy treatment. A diagnosis of chronic illness is often a life-changing event with significant physiological, social and psychological consequences. Consequently, emotion regulation, experience, processing, and modulation of the emotional response are necessary to manage common emotional stressors in patients with chronic disease (Kelly L Wierenga et al., 2017). A prevalent problem in patients with chronic diseases is non-adherence to the treatment plan prescribed by the medical staff. Many patients with chronic disease have problems following the prescribed regimen as they are unable to obtain optimal clinical benefit (J Dunbar-Jacob et al., 2000). The objective of the DEAL WITH Project will be to evaluate emotional impact of the chronic diseases and to investigate the compliance and adherence at the medical therapies by personal and emotional characteristics. On the other hand, objective of the LEG UP Project will be to evaluate emotional impact and quality of life in patients with Peripheral Arterial

Disease (PAD). Below, research in progress are reported:

1) SET IN Project Pag. 114
2) LEG UP Project Pag. 115
3) DEAL WITH Project Pag. 116
4) CRISTAL Project Pag. 117

SET IN PROJECT



PATIENT ENGAGEMENT IN HEMODIALYSIS TREATMENT	
Comitato Etico ASL1 Abruzzo Approved	42227/2022
Coordinator Center *Membership:*	UOC Internal Medicine and Nephrology, San Salvatore Hospital, L'Aquila (Dir. Claudio Ferri); UOSD Dialisi PO L'Aquila (Dir. Marilena Tunno); Laboratorio di Psicologia Clinica e Psiconcologia (Dir. Dina Di Giacomo); Venue: UOSD Dialisi PO L'Aquila (Dir. Marilena Tunno)
Duration	36 months
Study Design	Observational study
Objectivies	The aim of the study is to verify the benefits of psychological interventions and physical exercise on the hemodialysis population. The aim is to identify good practices for planning and scheduling personalized interventions modulated on the needs of patients with chronic kidney diseases during dialysis treatment in order to promote patient engagement

LEG UP PROJECT



MULTIDISCIPLINARY HEALTH MANAGEMENT FOR PDA BURDENS' OUTPATIENTS	
IRB Università dell'Aquila Approved	119772/2021
Coordinator Center	Laboratorio di Psicologia Clinica e Psiconcologia, Dip. MESVA (Dir. Dina Di Giacomo);
Membership:	UOC Internal Medicine and Nephrology, San Salvatore Hospital of L'Aquila (Dir. Claudio Ferri)
Duration	24 months
Study Design	Observational study
Objectives	The aim of this study is to promote self-care behaviors in patients diagnosed with PAD and to build a multidisciplinary model focused on the person, identifying the predictive traits of chronic disease management that would allow to improve the Quality of Life and the Well -being during survival.

DEAL WITH PROJECT



QUALITY OF LIFE & WELL-BEING IN CHRONIC DISEASES	
IRB Università dell'Aquila Approved	107750/2020
Coordinator Center *Membership:*	Laboratorio di Psicologia Clinica e Psiconcologia, Dip. MESVA (Dir. Dina Di Giacomo); UOC Internal Medicine and Nephrology, San Salvatore Hospital of L'Aquila (Dir. Claudio Ferri)
Duration	24 months
Study Design	Observational study
Objectivies	The aim of the study is to evaluate behavioral management of CNCDs chronic disease comparing different diseases providing diverse side-effects, as well vascular, gastrointestinal other chronic diseases analyzing the self-care efficacy and the emotional dimensions (anxiety, stress, depression). The aim of the study is to analyze ability of patient to be involved in the health management considering the emotional impact of disease and the self-care skill development.

CRISTAL PROJECT



DIGNICAP TECHNOLOGY IN CHEMOTHERAPY TREATMENT: EMOTIONAL REGULATION, RESILIENCE AND QUALITY OF LIFE IN ONCOLOGICAL SENOLOGY	
IRB Università dell'Aquila Approved	60902/2019
Coordinator Center *Membership:*	Laboratorio di Psicologia Clinica e Psiconcologia, Dip. MESVA (Dir. Dina Di Giacomo); UOC Oncologia Medica, San Salvatore Hospital of L'Aquila (Dir. Enrico Ricevuto)
Duration	24 months
Study Design	Observational study
Objectivies	The study aims to investigate the changes in the emotional experience, the perception of the body image and the quality of life before and after the chemotherapy treatment in combination with the DigniCap technology, in the different moments of the clinical path, identifying the trend of psychological well-being, before and after emergency phase

Appendix A: Scientific Publications

SUBMITTED:

1. **Guerra F**, Ranieri J, Cilli E, Di Giacomo D, Dialysis Distress Questionnaire (DDQ): validity of screening test for patients undergoing dialysis therapy, submitted in Journal of Renal Care, 2022
2. Ranieri J, Di Giacomo D, **Guerra F**, Cilli E, Ciciarelli V, Ventura A, Fargnoli MC, Early diagnosis of melanoma and breast cancer in women: influence of body image perception submitted in International Journal of Environmental Research and Public Health, 2022
3. Cilli E, Ranieri J, **Guerra F**, D'Alfonso A, Martelli A, Perilli E, Di Giacomo D, Binge eating disorders and psychological well-being in prolonged COVID-19 pandemic: retrospective cross-sectional study on undergraduate students, submitted in Eating Behaviours, 2022
4. Cilli E, Ranieri J, **Guerra F**, Cielo F, Claudio F, Di Giacomo D, Naturalizing digital & Quality of Life in chronic diseases: realistic review to research perspective into technological advancing & personalized medicine, submitted in Digital Health Editorial Office, 2022
5. Ranieri J, **Guerra F**, Cilli E, Santilli J, Di Giacomo D, Ferri C, Cardiovascular disease, self-care, and emotional regulation processes in adult patients: Balancing unmet needs and quality of life, submitted in BioPychosocialMedicine, 2022
6. Ranieri J, **Guerra F**, Cilli E, Ferri C, Di Giacomo D, Chronic non-communicable diseases and health awareness of patients: A randomized clinical trial analyzing the health adaptive behaviors through self-care skills, submitted in Therapeutic in Advanced in Chronic Diseases, 2022

PUBLISHED:

1. **Guerra F**, Di Giacomo D, Ranieri J, Tunno M, Piscitani L, Ferri C, Chronic kidney disease mental health-related: allostatic load perspective for integrated care, Journal of Personalized Medicine, 2021, DOI: 10.3390/jpm11121367
2. Di Giacomo D, **Guerra F**, Cannita K, Di Profio A, Ranieri J, Digital Innovation in

Oncological Primary Treatment for Well-Being of Patients: Psychological Caring as Prompt for Enhancing Quality of Life, 2021, DOI: 10.3390/curroncol28040224

3. **Guerra F**, Ranieri J, Passafiume D, Lupi D, Maccarone D, Pisani F, Ferri C, Di Giacomo D, Psychosomatic interactions in kidney transplantation: role of personality dimensions in mental health-related quality of life, Therapeutic Advances in Chronic Disease, 2021, DOI: 10.1177/20406223211024359
4. Di Giacomo D, Ranieri J, **Guerra F**, Cilli E, Ciciarelli V, Ventura A, Fargnoli M C, Early stage melanoma diagnosis and mental health-related: emotional influence of body self-perception, Journal of Affective Disorders Reports, 2021. DOI: 10.1016/j.jadr.2021.100188
5. Ranieri J, Fiasca F, **Guerra F**, Perilli E, Mattei A, Di Giacomo D, Examining the Post-operative Well-Being of Women Who Underwent Mammoplasty: A Cross-Sectional Study, Frontiers in Psychiatry, 2021, DOI: 10.3389/fpsyt.2021.645102
6. Ranieri J, **Guerra F**, Di Giacomo D, Mental health-related impact applying a scalp cooling technology solution in chemotherapy: a scoping review, Research Square, 2021, DOI: 10.21203/rs.3.rs-223562/v1
7. Di Giacomo D, **Guerra F**, Ranieri J, Cilli E, Predictive Factor for Emotional Fragility in Early-Stage Melanoma Diagnosis, Research Square, 2021, DOI: 10.21203/rs.3.rs-244192/v1
8. Ranieri J, **Guerra F**, Martelli A, Fanelli V, Di Giacomo D, Impact of Cybersex and Intensive Internet Use on the Well-Being of Generation Z: An Analysis Based on the EPOCH Model, Journal of Technology in Behavioral Science, 2021, DOI: 10.1007/s41347-021-00197-4
9. Ranieri J, **Guerra F**, Angione A L, Di Giacomo D, Passafiume D, Cognitive Reserve and Digital Confidence among Older Adults as New Paradigm for Resilient Aging, Gerontology and Geriatric Medicine, 2021, DOI: 10.1177/2333721421993747
10. Ranieri J, **Guerra F**, Di Giacomo D, Predictive risk factors for post-traumatic stress symptoms among nurses during the Italian acute COVID-19 outbreak, Health Psychology Report, 2021, DOI: 10.5114/hpr.2020.101249
11. Di Giacomo D, Martelli A, **Guerra F**, Cielo F, Ranieri J, Mediator Effect of Affinity for E-Learning on Mental Health: Buffering Strategy for the Resilience of University Students, International Journal of Environmental Research and Public Health, 2021, DOI: 10.3390/ijerph18137098
12. Ranieri J, **Guerra F**, Perilli E, Passafiume D, Maccarone D, Ferri C, Di Giacomo D, Prolonged COVID 19 Outbreak and Psychological Response of Nurses in Italian Healthcare System: Cross-Sectional Study. Frontiers in Psychology, 2021, DOI: 10.3389/fpsyg.2021.608413
13. Ranieri J, Fiasca F, **Guerra F**, Perilli E, Mattei A, Passafiume D, Di Giacomo D, The effects

of augmentation and reconstruction surgery on the post-operative well-being of women: A prospective evaluation, 2021, DOI: 10.3389/fpsyt.2021.645102

14. Ranieri J, Fiasca F, **Guerra F**, Mattei A, Di Giacomo D, Breast surgery on the post-operative well-being of women: a cross-sectional study, Research Square, 2020, DOI:10.21203/rs.3.rs-130761/v2
15. D. Di Giacomo, **F. Guerra**, E. Perilli, J. Ranieri, Technophobia as emerging risk factor in aging: Investigation on computer anxiety dimension, Health Psychology Research, 2020, doi:10.4081/hpr.2020
16. Ranieri J., **Guerra F**., Passafiume D., Di Giacomo D., Emotional pattern and body pereption: Cross-sectional study on risk factors for health management in young women, Recenti Porgressi in Medicina, 2020, doi:10.1701/3294.32652
17. J. Ranieri, **F. Guerra**, E. Cilli, D. Di Giacomo, An integrated approach for a new pattern in paediatric primary care, Front. Pediatr, 2020, doi: https://doi.org/10.3389/fped.2020.00530
18. J. Ranieri, **F. Guerra**, D. Di Giacomo, Role of metacognition thinking and psychological traits in breast cancer survivorship, Behav Sci (Basel) 2020 Sep 7;10(9):135. doi: 10.3390/bs10090135
19. Ranieri J., **Guerra F**., Passafiume D., Di Giacomo D. Risk of post-traumatic stress symptoms among nurses exposed to coronavirus patients during Italian acute COVID-19 outbreak Health Psychology Report, 2020, 9(2), 180–185, doi: https://doi.org/10.5114/hpr.2020.101249
20. Di Giacomo D., Ranieri J., D'Amico M., **Guerra F**., Passafiume D., Behaviour & Information Technology, Technophobia As Emerging Risk Factor For Quality Of Life In Digital Living: Preliminary Italian Investigation For Better Health And Wellness, submitted, June 2019
21. D. Di Giacomo, J. Ranieri, **F. Guerra**, E. Perilli, M. Gea Sanchez, Domenico Passafiume, K. Cannita, C. Ficorella, La sopravvivenza nelle giovani donne con diagnosi di cancro al seno precoce: studio cross- sectional dei tratti emotivi in una prospettiva a tre anni, Riv. Psichiatria 2019, Minerva Psichiatrica
22. Di Giacomo D., Ranieri J., Nasta L., Moscato S., **Guerra F**., Passafiume D., Psychological distress in Interstitial Cystitis/Bladder Pain Syndrome: a cross-sectional study on emotional patterns, 2019, Mediterranea Journal of Clinical Psychology

Appendix B: Presentation at National and International Congresses

1. 27-30 settembre 2022: "XXX Congresso Associazione Italiana Psicologia", AIP, Padova, **F. Guerra**, *Cognitive reserve index in ESRD patients: a new paradigm for personalized medicine in clinical pathway*
2. 20-23 giugno 2022: "XXVI Congresso Nazionale della Società Italiana di Psicopatologia", SOPSI, Roma, **F. Guerra**, J. Ranieri, F. Pisani, C. Ferri, E. Cilli, D. Di Giacomo, *Kidney Transplantation and Mental Health in Quality Of Life: Psychosomatic Highlights*
3. 24-26 aprile 2022: "International Psychological Applications Conference and Trends", InPACT, **F. Guerra**, J. Ranieri, E. Cilli, D. Di Giacomo, C. Ferri, *Health Management In Patients With Chronic Diseases: Factors Improving Self-Care Mastering,;* , J. Ranieri, **F. Guerra**, E. Cilli, D. Di Giacomo, C. Ferri, *Self-Care Process In Cardiovascular Disease: Observational Study On Outpatients' Pathway*
4. 10-13 novembre 2021: "14th International Congress of Clinical Psychology" **F. Guerra,** J. Ranieri, D. Di Giacomo, *Innovative Solutions in Chemotherapy: Efficacy and Emotional Impact Of Scalp Cooling Technology*
5. 17-19 settembre 2021: "XXII Congresso Nazionale Associazione Italiana Di Psicologia Sezione Di Psicologia Clinica E Dinamica", AIP, Lecce, **F. Guerra,** *Psychosomatic Determinants In Chronic Kidney Diseases*
6. 24-26 Aprile 2021*: "*International Psychological Applications Conference and Trends", InPACT, **F. Guerra,** J. Ranieri, C. Ferri, Di Giacomo, *Emotional Impact In Frontline And Secondline Healthcare Professionals: Covid-19 And II Wave,*
7. 23-26 Maggio 2020*: "*6° virtual Congress European Academy of Neurology (EAN)", Parigi, **F. Guerra,** D. Passafiume, J Ranieri, D Di Giacomo, *Emotional Impact on Relapsing Remitting Multiple Sclerosis*
8. 18-19 Settembre 2020*: "*Giornate di studio nella sezione di Psicologia Clinica e Dinamica dell'Associazione Italiana di Psicologia (AIP)", D Di Giacomo, **F. Guerra,** J. Ranieri, A. Angione, D. Passafiume, *Cognitive, Reserve and Technology Confidence in Elderly: pathwais to successful aging*

9. 3-6 Novembre 2020: "94° Congresso Nazionale SIDeMaST", **F. Guerra**, J. Ranieri, E. Cilli, V. Ciciarelli, A. Ventura, MC Fargnoli *Body Image Perception ed impatto della diagnosi precoce di melanoma nelle giovani donne;* Ranieri J, **Guerra F**, Cilli E, Ciciarelli V, Ventura A, Fargnoli M C, *La Riserva Cognitiva come fattore protettivo e predittivo della resilienza nella diagnosi di melanoma*
10. 7-9 Novembre 2019: "XVI Congresso Nazionale Psiconcologia Italiana 2.0 SIPO", Napoli
11. 21-23 Novembre 2019: "43° Congresso Nazionale Società Italiana dei Trapianti D'Organo e di Tessuti SITO", Roma
12. 5-8 Dicembre 2019: Meeting "European Society for the Study of BPS (ESSIC)", Amsterdam, Di Giacomo D., Ranieri J., Nasta L., Moscato S., **Guerra F**., Passafiume D., *Emotional Impact, and Interstitial Cystitis/Bladder plain syndrome: cross sectional study on Italian women, European Society for the Study of BPS*
13. 11-13 Settembre 2019: 25TH World Congress of the International College of Psychosomatic Medicine, "The Psychosomatic Perspective", Firenze,
14. 27-29 Settembre 2019: "XXI Congresso nazionale Associazione Italiana di Psicologia, sezione di Psicologia Clinica e Dinamica" (AIP), Università degli studi di Milano-Bicocca, Milano
15. 1-2 Ottobre 2019: "3° Congresso Nazionale "I giovani si prendono cura di sé? Prevenire per mantenersi in salute", Fondazione ONDA (Osservatorio Nazionale sulla salute della donna e di genere), Milano, Ranieri J., **Guerra F**., Di Giacomo D., Passafiume D, *Stile di vita e percezione del benessere tra i giovani italiani: indagine secondo il modello EPOCH*
16. 02-05 Luglio 2019: "Congresso Europeo, "European Congress of Psychology 2019", Mosca, D. Passafiume, **F. Guerra**, J. Ranieri, D. Di Giacomo, *Are Alzheimer Patients appropriate in the interpretation of emotional situation?*
17. 7-10 Aprile 2019: "The fifth learning and plasticity meeting", Äkäslompolo, Finland, Passafiume D., Ranieri J., **Guerra F**., Di Giacomo D, *Singing old song do help naming in Alzheimer patients*
18. 23-25 Maggio 2019: "XIII Congresso Nazionale Associazione SIPSA Società Italiana di Psicologia della Salute", Napoli, J. Ranieri, D. Di Giacomo, **F. Guerra**, D. Passafiume, *Percezione del benessere in età giovanile: approccio positivo all'arco della vita; Aderenza ai trattamenti psicologici delle pazienti oncologiche giovani: punti di forza e debolezza*

REFERENCES

BACKGROUND SECTION REFERENCES

Chapter 1

Abimanyi-Ochom J., Watts J.J., Borgström F., Nicholson G. C., Shore-Lorenti C., Stuart A.L., Zhang Y., Iuliano S., Seeman E., Prince R., March L., et al. (2015). Changes in quality of life associated with fragility fractures: Australian arm of the International Cost and Utility Related to Osteoporotic Fractures Study (AusICUROS). Osteoporos Int 26:1781–1790, doi: 10.1007/s00198-015-3088-z.

Allegrante J.P., Wells M. T., and Peterson J.P. (2019). Interventions to Support Behavioral Self-Management of Chronic Diseases. Annual Review of Public Health, Vol. 40:127-146, https://doi.org/10.1146/annurev-publhealth-040218-044008

Appleton AA., Buka S. L., Loucks B.E., Gilman E.S., Kubzansky L.D. (2013). Divergent associations of adaptive and maladaptive emotion regulation strategies with inflammation. Health Psychol;32(7):748-56. doi: 10.1037/a0030068.

Avis N. E., Crawford S., and Janeen Manuel (2005). Quality of Life Among Younger Women with Breast Cancer. J Clin Oncol, 2005, by American Society of Clinical Oncology, DOI: 10.1200/JCO.2005.05.130

Avramidou M., Angst F., Angst J., Aeschlimann A., Rössler W., & Schnyder U. (2018). Epidemiology of gastrointestinal symptoms in young and middle-aged Swiss adults: prevalences and comorbidities in a longitudinal population cohort over 28 years. BMC Gastroenterology, 2018, vol. 18, https://doi.org/10.1186/s12876-018-0749-3

Bahall, M., Legall, G. & Khan, K. (2020). Quality of life among patients with cardiac disease: the impact of comorbid depression. Health Qual Life Outcomes 18, 189. https://doi.org/10.1186/s12955-020-01433-w

Barbour KE, Lui LY, Nevitt MC, Murphy LB, Helmick CG, Theis KA, Hochberg M.C., Lane E.N. et al. (2015). Hip Osteoarthritis and the Risk of All-Cause and Disease-Specific Mortality in Older Women: A Population-Based Cohort Study. Arthritis Rheumatol.;67(7):1798–805.; doi:10.1002/art.39113.

Bielejewska A., Arkadiusz B., Ślusarczyk R., Sadowski M. (2017). Cardiac disorders with psychosomatic background. Medical Studies; 33 (4): 316–320; doi: https://doi.org/10.5114/ms.2017.72486

Black J., C., Drossman A. D., Talley N., J., Ruddy J., Ford A. C. (2020). Functional gastrointestinal disorders: advances in understanding and management. The Lancet, vol. 396, Issue 10263, Pages 1664-1674; https://www.sciencedirect.com/science/article/abs/pii/S0140673620321152?via%3Dihub

Blyth, F. M., Briggs A. M., Schneider C. H., Hoy G. D., March L., N. (2019). The Global Burden of Musculoskeletal Pain-Where to From Here? American journal of public health vol. 109,1:35-40. doi:10.2105/AJPH.2018.304747

Bolger, N., & Zuckerman, A. (1995). A framework for studying personality in the stress process. Journal of Personality and Social Psychology, 69(5), 890–902. https://doi.org/10.1037/0022-3514.69.5.890

Cardiovascular diseases statistics, 2022 https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Cardiovascular_diseases_statistics#Self-reporting_of_hypertensive_diseases

Consoli Elena (2020). L'Approccio Centrato sulla Persona nella Medicina dei Trapianti D'Organo. Psicoanalisi e Scienza, https://www.psicoanalisi.it/psicosomatica/4352/

Cross M, Smith E, Hoy D, Nolte S, Ackerman I, Fransen M, Bridgett L, Williams S, Guillemin F, Hill CL, et al. (2014). The global burden of hip and knee osteoarthritis: estimates from the global burden of disease 2010 study. Ann Rheum Dis.;73(7):1323-30. doi: 10.1136/annrheumdis-2013-204763

Cruz LN, Fleck MP, Polanczyk CA (2010). Depression as a determinant of quality of life in patients with chronic disease: data from Brazil. Soc Psychiatry Psychiatr Epidemiol. https://doi.org/10.1007/s00127-009-0141-2

Cukor D., Scott D. C., Rolf A. P., Paul L.K. (2007). Psychosocial aspects of chronic disease: ESRD as a paradigmatic illness. J Am Soc Nephrol;18(12):3042-55. doi: 10.1681/ASN.2007030345.

De Ridder D., Rinie G., Roeline K., Henriët van M. (2008). Psychological adjustment to chronic disease. Lancet;372(9634):246-55. doi: 10.1016/S0140-6736(08)61078-8.

Era Edta annual report 2018, https://academic.oup.com/ckj/article/14/1/107/6046935

Esler M., Kaye D. (2000). Sympathetic Nervous System Activation in Essential Hypertension, Cardiac Failure and Psychosomatic Heart Disease, Journal of Cardiovascular Pharmacology: Volume 35 - Issue - p S1-S7, https://journals-lww-com.univaq.clas.cineca.it/cardiovascularpharm/Fulltext/2000/00004/Sympathetic_Nervous_System_Activation_in_Essential.1.aspx.

Evers C., Marijn S. F., Denise T, de Ridder D. (2010). Feeding your feelings: emotion regulation strategies and emotional eating. Pers Soc Psychol Bull;36(6):792-804. doi: 10.1177/0146167210371383

Farthing M., Stephen E. R., David G S., John G. W., Kymberley T., Sian Morrison-Rees, Ann J., Ashley A. and Judy C Williams (2014). Survey of digestive health across Europe: Final report. Part 1: The burden of gastrointestinal diseases and the organisation and delivery of gastroenterology services across Europe. United European Gastroenterolgy Journal, 2014; DOI: 10.1177/2050640614554154

Fookes Carmen (2021). Gastrointestinal Disorders. Drugs.com; https://www.drugs.com/article/gastrointestinal-disorders.html

Gabriel SE, Michaud K. (2009). Epidemiological studies in incidence, prevalence, mortality, and comorbidity of the rheumatic diseases. Arthritis Res Ther;11(3):229Arthritis Rheum.;56(11):3583–7; doi: 10.1186/ar2669.

Gerogianni SK, Fotoula Babatsikou (2014). Psychological aspects in chronic renal failure. Health Science Journal, 8(2):205-214; https://www.researchgate.net/publication/286355459_Psychological_aspects_in_chronic_renal_failure

Global Health Estimates Summary Tables (2018). Projections of Deaths by Cause, Age and Sex by World Bank Income Category and WHO Region. Geneva:World Health Organization; Available from:http://www.who.int/healthinfo/global_burden_disease/GHE_DthWHOReg7_Proj_2015_2030.xls?ua=1)

Gwee K A, J C Graham, M W McKendrick, S M Collins, J S Marshall, S J Walters, N W Read (1996). Psychometric scores and persistence of irritable bowel after infectious diarrhoea. Lancet, 20;347(8995):150-3. doi: 10.1016/s0140-6736(96)90341-4.

Johan B., Jess T., Martinato M., Lakatos P.L. (2013). The burden of inflammatory bowel disease in Europe. Journal of Crohn's and Colitis, vol. 7, Issue 4, Pages 322–337, https://doi.org/10.1016/j.crohns.2013.01.010

Jordan KP, Croft P. (2010). Mortality and cancer in patients with new musculoskeletal episodes: a cohort study. Br J Gen Pract.;60(572):e105–11;

Kaan G., Shields J. A., Shields C.L., Eagle R.C., (1998). Cutaneous melanoma metastatic to the vitreous cavity. Ophthalmology, vol. 105, Issue 4, Pages 600-605; https://doi.org/10.1016/S0161-6420(98)94011-8

Kiook B., Seonhee Y., Miyoung L., Insung C. (2018). The Association of Workplace Psychosocial Factors and Musculoskeletal Pain Among Korean Emotional Laborers. Safety and Health at Work Volume 9, Issue 2, Pages 216-223; https://doi-org.univaq.clas.cineca.it/10.1016/j.shaw.2017.09.004

Koloski N. A, Jones M., Kalantar J., Weltman M., Zaguirre J., Talley N. J. (2012). The brain--gut pathway in functional gastrointestinal disorders is bidirectional: a 12-year prospective population-based study. Gut.;61(9):1284-90. doi: 10.1136/gutjnl-2011-300474.

Koloski N. A., Jones M., Talley N.J. (2016). Evidence that independent gut-to-brain and brain-to-gut pathways operate in the irritable bowel syndrome and functional dyspepsia: a 1-year population-based prospective study. Aliment Pharmacol Ther.;44(6):592-600. doi: 10.1111/apt.13738.

Komalasari R., Nurjanah, Yoche MM. (2019). Quality of Life of People with Cardiovascular Disease: A Descriptive Study. Asian Pac Isl Nurs J.;4(2):92-96. doi:10.31372/20190402.1045

Lieb R., Meinlschmidt G., Araya R. (2007). Epidemiology of the association between somatoform disorders and anxiety and depressive disorders: an update. Psychosom Med.;69(9):860-3. doi: 10.1097/PSY.0b013e31815b0103.

Lozano R., Naghavi M., Foreman K., Lim S., Shibuya K., Aboyans V., Abrham J., Adair T., Aggarwal R., Ahn S. Y. (2012). Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet;380(9859):2095–128; https://doi.org/10.1016/S0140-6736(12)61728-0

Maaser C., Langholz E., Gordon H., Burisch J., Ellul P., Hernández Ramirez P., Karakan T., Katsanos H.K., Krustins E., Levine A. et al. (2017). European Crohn's and Colitis Organisation Topical Review on Environmental Factors in IBD. J Crohns Colitis;11(8):905-920. doi:10.1093/eccojcc/jjw223.

March L., Smith EU., Hoy D.G., Cross M.J., Sanchez-Riera L., Blyth F., Buchbinder R., Vos T., Woolf T.A. (2014). Burden of disability due to musculoskeletal (MSK) disorders. Best Pract Res Clin Rheumatol.;28(3):353–66

Masters, K.S., Shaffer, J.A. & Vagnini, K.M. (2020). The Impact of Psychological Functioning on Cardiovascular Disease. Curr Atheroscler Rep 22, 51. https://doi-org.univaq.clas.cineca.it/10.1007/s11883-020-00877-1

McBeth J., Symmons D.P., Silman A.J., Allison T., Webb R., Brammah T. Macfarlane G., J. (2009). Musculoskeletal pain is associated with a long-term increased risk of cancer and cardiovascular-related mortality. Rheumatology (Oxford);48(1):74–7.; doi: 10.1093/rheumatology/ken424.

Megari Kalliopi (2013). Quality of Life in Chronic Disease Patients. Health Psychol Res;1(3):e27. doi: 10.4081/hpr.2013.e27.

Michael P. J., Tack J.,Van Oudenhove L., Walker M.M., Holtmann G., Koloski N.A., Talley N.J. (2017). Mood and Anxiety Disorders Precede Development of Functional Gastrointestinal Disorders in Patients but Not in the Population. Clin Gastroenterol Hepatol.;15(7):1014-1020.e4. doi: 10.1016/j.cgh.2016.12.032.

Ministero della salute, documento di indirizzo per la malattia renale cronica, https://www.salute.gov.it/imgs/C_17_pubblicazioni_2244_allegato.pdf

Musculoskeletal conditions, WHO 2021 https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions

Myasoedova E., Davis rd J.M., Crowson C.S., Gabriel S.E. (2010). Epidemiology of rheumatoid arthritis: rheumatoid arthritis and mortality. Curr Rheumatol Rep.;12(5):379–85;

National Institute of Diabetes and Digestive and Kidney Disease, 2022 https://www.niddk.nih.gov/

National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), https://www.niddk.nih.gov/health-information/digestive-diseases

National Kidney Foundation 2019, https://www.kidney.org/

Noncommunicable diseases country profiles 2018, World Health Organization; https://www.who.int/publications/i/item/9789241514620

Nuesch E., Dieppe P., Reichenbach S., Williams S., Iff S., Juni P. (2011). All cause and disease specific mortality in patients with knee or hip osteoarthritis: population based cohort study. BMJ 342:d1165.; https://doi.org/10.1136/bmj.d1165

Peters M., Potter C.M., Kelly L., & Fitzpatric R. (2019). Self-efficacy and health-related quality of life: a cross-sectional study of primary care patients with multi-morbidity. Health and Quality of Life Outcomes, vol. 17, https://doi.org/10.1186/s12955-019-1103-3

Rehman A.U., Kazmi S.F., Perveen S., Jabeen T. (2016). Health related quality of life among coronary heart disease patients, with and without anxiety & depression. Pak Heart J. https://doi.org/10.6084/m9.figshare.4263296.v1

Rosenne F.S.H, Briscoe D., Hendler K., Bereket R., Molcho M., Pe'er J. (2018). Long-term uveal melanoma survivors: measuring their quality of life. Acta Ophthamologica, vol. 96, Issue4, Pages e421-e426; https://onlinelibrary.wiley.com/doi/full/10.1111/aos.13655?casa_token=t9dsRTXsAIQAAAAA%3A0xgKYsKT86EroBAAKktMlxgwmIxTCDmoFS0Dld-piQVXXxUzoklx8zUw6QJJgegKQIU0-2iQdD-NGA

Rostislav A Grekhov, Suleimanova, Galina P. Trofimenko, Andrei S., Shilova, Liudmila N. (2020). Psychosomatic Features, Compliance and Complementary Therapies in Rheumatoid Arthritis. Current Rheumatology Reviews, vol. 16, Number 3, pp. 215-223(9); DOI: https://doi.org/10.2174/1573397115666191212114758

Ruemmele F.M., Veres G., Kolho K.L., Griffiths A., Levine A., Escher J. C., Amil Dias J., Barabino A., Braegger C. P., Bronsky J. et al. (2014). Consensus guidelines of ECCO/ESPGHAN on the medical management of pediatric Crohn's disease. J Crohns Colitis;8(10):1179-207. doi: 10.1016/j.crohns.2014.04.005.

Sertoz O.O., Aydemir O., Gulpek D., Elbi H., Ozenli Y., Yilmaz A., Ozan E., Atesci F., Abay E., Semiz M. (2013). The impact of physical and psychological comorbid conditions on the quality of life of patients with acute myocardial infarction: a multi-center, crosssectional observational study from Turkey. Int J Psychiatry Med. https://doi.org/10.2190/PM.45.2.a

Shad B., Ashouri A., Hasandokht T., Rajati F., Salari A., Naghshbandi M., Mirbolouk F. (2017). Effect of multimorbidity on quality of life in adult with cardiovascular disease: a cross-sectional study. Health Qual Life Outcomes. https://doi.org/10.1186/s12955-017-0820-8;

Shah E., Rezaie A., Riddle M., Pimentel M. (2014). Psychological disorders in gastrointestinal disease: epiphenomenon, cause or consequence? Ann Gastroenterol;27(3):224-230; https://pubmed.ncbi.nlm.nih.gov/24974805/

Shields A. F., Hackman R. C., Fife H. F., Corey L., and Meyers J.D. (1985). Adenovirus Infections in Patients Undergoing Bone-Marrow Transplantation. N Engl J Med 1985; 312:529-533; DOI: 10.1056/NEJM198502283120901

Shui Ho Chan J., Chien Wei Chao A., Chi Ho Cheung V., Sau Kuen Wong S., Tang W., Che Yuen Wu J., Lik Yuen Chan H., Ka Leung Chan F., Jao Yiu Sung J., Chien Ng. S. (2018). Gastrointestinal disease burden and mortality: A public hospital-based study from 2005 to 2014. Gastroenterology and Hepatology Journals; vol 34, pp 124-131; https://onlinelibrary.wiley.com/doi/full/10.1111/jgh.14377

Stewart M., Brown JB, Weston WW, McWhinney IR, McWilliam CL, and Freeman RT. (2003). Patient-Centered Medicine – Transforming the Clinical Method. 2nd EditionRadcliffe Medical PressISBN 1 85775 981 8

Streng K.W., Nautaa J.0.F, Hillegea H.L., Ankerb S.D., Clelandc J.G., Dickstein K. (2018). Non-cardiac comorbidities in heart failure with reduced, mid-range and preserved ejection fraction. Int J Cardiol. https://doi.org/10.1016/j.ijcard.2018.04.001

Sutin A. R, Zonderman A.B., Ferrucci L., Terracciano A. (2013). Personality Traits and Chronic Disease: Implications for Adult Personality Development. The Journals of Gerontology, vol 68, Issue 6, Pages 912–920, https://doi.org/10.1093/geronb/gbt036

Tarride J-E, Burke N., Leslie W.D., Morine N. S., Adachi J.D., Papaiouannou A., Bessette L., Brown P.J., Pericleous L., Muratov S. (2016). Loss of health related quality of life following low-trauma fractures in the elderly. BMC Geriatr 16:84; Al-Sari UA, https://bmcgeriatr.biomedcentral.com/articles/10.1186/s12877-016-0259-5#citeas

Tobias J., Clark E. (2016) Health-related quality of life in older people with osteoporotic vertebral fractures: a systematic review and meta-analysis. Osteoporos Int 27:2891–2900

Tušek-Bunc K., Petek D. (2016). Comorbidities and characteristics of coronary heart disease patients: their impact on health-related quality of life. Health Qual Life Outcomes. https://doi.org/10.1186/s12955-016-0560-1;

Uchino Bert N., Eisenberger N. (2019). Emotions in Social Relationships and Their Implications for Health and Disease: Introduction to the Special Issue of Psychosomatic Medicine - Volume 81 - Issue 8 - p 676-680 doi: 10.1097/PSY.0000000000000741

Vanuytsel T., Sander van Wanrooy, Vanheel H., Vanormelingen C., Verschueren S., Houben E., Salim Rasoel S., Tóth J., Holvoet L., Farré R., et al. (2014). Psychological stress and corticotropin-releasing hormone increase intestinal permeability in humans by a mast cell-dependent mechanism. Gut.;63(8):1293-9. doi: 10.1136/gutjnl-2013-305690.

Vos T., Flaxman A.D., Naghavi M., Lozano R., Michaud C., Ezzati M., Shibuya K., Salomon A. J., Abdalla S., et al. (2012). Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet;380(9859):2163–96

Wang W., Chow A., Thompson D.R., Koh K., Kowitlawakul Y., He H.G. (2016). Predictors of health-related quality of life among patients with myocardial infarction. West J Nurs Res. https://doi.org/10.1177/0193945914546201

Warburton D.E., Glendhill N., Quinney A. (2001). The effects of changes in musculoskeletal fitness on health. *Can J Appl Physiol.* 2001;26(2):161–216.; https://doi.org/10.1139/h01-012

McPhail S.M., Dunstan J., Canning J., Haines T.P (2012). Life impact of ankle fractures: qualitative analysis of patient and clinician experiences. *BMC Musculoskelet Disord.*;13(1):224; doi: https://doi.org/10.1186/1471-2474-13-224

Widdifield J., Bernatsky S., Paterson J.M., Tomlinson G., Tu K., Kuriya B., Thorne J.C., Pope J.E., Hollands S., Bombardier C. (2015). Trends in Excess Mortality Among Patients With Rheumatoid Arthritis in Ontario, Canada. Arthritis Care Res (Hoboken);67(8):1047–53; doi: 10.1002/acr.22553

Wierenga K. L., Lehto R. H., & Given, B. (2017). Emotion Regulation in Chronic Disease Populations: An Integrative Review. Research and theory for nursing practice, 31(3), 247–271. https://doi.org/10.1891/1541-6577.31.3.247

Xiao-QingYe, Wei-Qing, Chenb Jian-XiongLin, Rao-PingWang, Zhao-HuiZhang, XiaoYang, Xue-QingYu (2008). Effect of social support on psychological-stress-induced anxiety and depressive symptoms in patients receiving peritoneal dialysis. Journal of Psychosomatic Research, vol. 65, Issue 2, Pages 157-164, https://doi.org/10.1016/j.jpsychores.2008.04.007

Xie F., Kovic B., Jin X., He X., Wang M., Silvestre C. (2016). Economic and humanistic burden of osteoarthritis: a systematic review of large sample studies. Pharmacoeconomics 34:1087–1100; doi: 10.1007/s40273-016-0424-x

Ziade N., Jougla E., Coste J. (2008). Population-level influence of rheumatoid arthritis on mortality and recent trends: a multiple cause-of-death analysis in France, 1970–2002. J Rheumatol.;35(10):1950–7;

Chapter 2

Adler N.E., Boyce W.T., Chesney M.A., Folkman S., Syme S.L. (1993). Socioeconomic Inequalities in Health: No Easy Solution. JAMA;269(24):3140–3145. doi:10.1001/jama.1993.03500240084031

Allegrante J.P. (2018). Advancing the Science of Behavioral Self-Management of Chronic Disease: The Arc of a Research Trajectory. Health Educ Behav.;45(1):6-13. doi: 10.1177/1090198117749010. Epub 2017 Dec 19. PMID: 29258348.

Barello S., Graffigna G., Vegni E., Savarese M, Lombardi F., Bosio AC. (2014). Engage me in taking care of my heart': a grounded theory study on patient–cardiologist relationship in the hospital management of heart failure. BMJ;5:e005582.doi:10.1136/bmjopen-2014-005582

Compare A., Bigi R., Silva Orrego P., Proietti R., Grossi E., Steptoe A. (2013). Type D Personality Is Associated with the Development of Stress Cardiomyopathy Following Emotional Triggers, Annals of Behavioral Medicine, vol. 45, Issue 3, Pages 299–307, https://doi.org/10.1007/s12160-013-9474-x

Baksa, Dániel and Gonda, Xénia and Juhász, Gabriella (2017). Why are migraineurs more depressed? A review of the factors contributing to the comorbidity of migraine and depression. Neuropsychopharmacologia Hungarica; 19 (1). pp. 37-44. ISSN 1419-8711; http://real.mtak.hu/57342/

Bandura A. (2004). Health Promotion by Social Cognitive Means. Health Education & Behavior.;31(2):143-164. doi:10.1177/1090198104263660

Barlow J., Wright C., Sheasby J., Turner A., Hainsworth J. (2002). Self-management approaches for people with chronic conditions: a review. Patient Educ Couns.;48(2):177-87. doi: 10.1016/s0738-3991(02)00032-0. PMID: 12401421.

Bautista L.E., Vera-Cala LM Colombo C Smith P. (2012). Symptoms of depression and anxiety and adherence to antihypertensive medication. Am J Hypertens.; 25:505–511

Bodenheimer T., Chen E., Bennett H.D. (2009). Confronting the growing burden of chronic disease: can the U.S. health care workforce do the job? Health Aff (Millwood);28(1):64-74. doi: 10.1377/hlthaff.28.1.64. PMID: 19124856.

Bodenheimer T, Lorig K, Holman H, Grumbach K. Patient self-management of chronic disease in primary care. JAMA. 2002 Nov 20;288(19):2469-75. doi: 10.1001/jama.288.19.2469. PMID: 12435261.

Bodenheimer T., Lorig K., Holman H., Grumbach K. (2002). Patient self-management of chronic disease in primary care. JAMA. 20;288(19):2469-75. doi: 10.1001/jama.288.19.2469. PMID: 12435261.

Bodenheimer T., Wagner E.H., Grumbach K. (2002). Improving primary care for patients with chronic illness. JAMA.;288(14):1775-9. doi: 10.1001/jama.288.14.1775. PMID: 12365965.

Bruce O Tavis. (2008). Comorbid depression in rheumatoid arthritis: pathophysiology and clinical implications. Curr Psychiatry Rep.;10(3):258-64. doi: 10.1007/s11920-008-0042-1.

Burnier M. (2017). Drug adherence in hypertension. Pharmacological Research, vol. 125, Pages 142-149;https://doi.org/10.1016/j.phrs.2017.08.015

Burton A.K., Tillotson K.M., Main C.J., Hollis S. (1995). Psychosocial predictors of outcome in acute and subchronic low back trouble. Spine (Phila Pa 1976);20(6):722-8. doi: 10.1097/00007632-199503150-00014

Castro E.M., Van Regenmortel T., Vanhaecht K., Sermeus W., Van Hecke A. (2016). Patient empowerment, patient participation and patient-centeredness in hospital care: A concept analysis based on a literature review. Patient Educ Couns.;99(12):1923-1939. doi: 10.1016/j.pec.2016.07.026.

Chang Meng-Han, Ju-WeiHsu, Kai-LinHuang, Tung-PingSu, Ya-MeiBai, Cheng-TaLi, Albert C.YangWen-HanChang, Tzeng-JiChen, Shih-JenTsai, Mu-HongChen (2015). Bidirectional Association Between Depression and Fibromyalgia Syndrome: A Nationwide Longitudinal Study. The Journal of Pain, vol. 16, Issue 9, Pages 895-902; https://doi.org/10.1016/j.jpain.2015.06.004

Compare A., Brugnera A., Spada M.M., Zarbo C., Tasca G.A., Sassaroli S., Caselli G., Ruggiero G.M., Wittstein I. (2018). The Role of Emotional Competence in Takotsubo Cardiomyopathy. Psychosom Med.;80(4):377-384. doi: 10.1097/PSY.0000000000000564.

Compare A., Grossi E., Bigi R., Proietti R., Shonin E., Orrego P.S., Poole L. (2014). Stress-induced cardiomyopathy and psychological wellbeing 1 year after an acute event. J Clin Psychol Med Settings.;21(1):81-91. doi: 10.1007/s10880-013-9380-1.

Compare A., Mommersteeg P.M., Faletra F., Grossi E., Pasotti E., Moccetti T., Auricchio A. (2014). Personality traits, cardiac risk factors, and their association with presence and severity of coronary artery plaque in people with no history of cardiovascular disease. J Cardiovasc Med (Hagerstown).;15(5):423-30. doi: 10.2459/JCM.0b013e328365cd8c

Costa P., T. McCrae, Robert R. (1992). Normal personality assessment in clinical practice: The NEO Personality Inventory. Psychological Assessment, 1992, Vol 4(1), 5-13

Coulter A., Ellins J. (2007). Effectiveness of strategies for informing, educating, and involving patients. BMJ; 335 doi: https://doi.org/10.1136/bmj.39246.581169.80

Dickens C. & Creed F. (2001). The burden of depression in patients with rheumatoid arthritis. Rheumatology (Oxford); 40(12):1327-30. doi: 10.1093/rheumatology/40.12.1327.

Elstad T.A., Eide A.H. (2009). User participation in community mental health services: exploring the experiences of users and professionals. Scand J Caring Sci.;23(4):674-81. doi: 10.1111/j.1471-6712.2008.00660.x.

Fischer M.A., Choudhry N.K., Brill G., Avorn J., Schneeweiss S., Hutchins D., Liberman J.N., Brennan T.A, Shrank W.H. (2011). Trouble getting started: predictors of primary medication nonadherence. Am J Med;124(11): 1081.e9-22. doi: 10.1016/j.amjmed.2011.05.028. PMID: 22017787.

Frei R., Haile S.R., Mutsch M., Rohrmann S. (2015). Relationship of Serum Vitamin D Concentrations and Allostatic Load as a Measure of Cumulative Biological Risk among the US Population: A Cross-Sectional Study. PLoS One.;10(10):e0139217. doi: 10.1371/journal.pone.0139217

Gillespie S.L., Anderson C.M., Zhao S., Tan Y., Kline D., Brock G., Odei J., O'Brien E., Sims M., Lazarus S.A., Hood D.B., Williams K.P., Joseph J.J. (2019). Allostatic load in the association of depressive symptoms with incident coronary heart disease: The Jackson Heart Study. Psychoneuroendocrinology;109:104369. doi: 10.1016/j.psyneuen.2019.06.020

Goldberg, L. R. (1993). The structure of phenotypic personality traits. American Psychologist, 48(1), 26–34. https://doi.org/10.1037/0003-066X.48.1.26

Goodwin Carol (2016). Person-Centered Care: A Definition and Essential Elements. The American Geriatrics Society Expert Panel on Person-Centered Care, DOI: 10.1111/jgs.13866

Goodwin R.D., Friedman H.S. (2006). Health Status and the Five-factor Personality Traits in a Nationally Representative Sample. Journal of Health Psychology.;11(5):643-654. doi:10.1177/1359105306066610

Grady, P. A., & Gough, L. L. (2014). Self-management: a comprehensive approach to management of chronic conditions. American journal of public health, 104(8), e25–e31. https://doi.org/10.2105/AJPH.2014.302041

Graffigna G., Barello S., Riva G., Corbo M., Damiani G., Iannone P., Bosio A.C., Ricciardi W. (2020). Italian Consensus Statement on Patient Engagement in Chronic Care: Process and Outcomes. Int. J. Environ. Res. Public Health, 17, 4167; doi:10.3390/ijerph17114167

Guidi J., Lucente M., Piolanti A., Roncuzzi R., Rafanelli C., Sonino N. (2020). Allostatic overload in patients with essential hypertension. Psychoneuroendocrinology;113:104545. doi: 10.1016/j.psyneuen.2019.104545. Epub 2019 Dec 16. PMID: 31862612.

Guidia J., Lucente M., Sonino N., Fava G.A. (2001). Allostatic Load and Its Impact on Health:

Gureje O, Simon GE, Von Korff M. A cross-national study of the course of persistent pain in primary care. Pain.;92(1-2):195-200. doi: 10.1016/s0304-3959(00)00483-8

Hagger-Johnson G., Sabia S., Nabi H., Brunner E., Kivimaki M., Shipley M., Singh-Manoux A (2012). Low conscientiousness and risk of all-cause, cardiovascular and cancer mortality over 17 years: Whitehall II cohort study. J Psychosom Res.;73(2):98-103. doi: 10.1016/j.jpsychores.2012.05.007

Hampson S.E., Goldberg L.R., Vogt T.M., Dubanoski J.P. (2006). Forty years on: teachers' assessments of children's personality traits predict self-reported health behaviors and outcomes at midlife. Health Psychol.;25(1):57-64. doi: 10.1037/0278-6133.25.1.57

Hampson S. E., Goldberg L. R., Vogt, T. M., & Dubanoski, J. P. (2007). Mechanisms by which childhood personality traits influence adult health status: Educational attainment and healthy behaviors. Health Psychology, 26(1), 121–125. https://doi.org/10.1037/0278-6133.26.1.121

Hibbard J.H., Greene J. (2013). What the evidence shows about patient activation: better health outcomes and care experiences; fewer data on costs. Health Aff (Millwood) ;32(2):207-14. doi: 10.1377/hlthaff.2012.1061. PMID: 23381511.

Hochang Benjamin L., Offidani E., Ziegelstein R. C., Bienvenu O., J., Samuels J., Eaton W.W., Nestadt G. (2014). Five-Factor Model Personality Traits as Predictors of Incident Coronary Heart Disease in the Community: A 10.5-Year Cohort Study Based on the Baltimore Epidemiologic Catchment Area Follow-Up Study, Psychosomatics, vol. 55, Issue 4, Pages 352-361, https://doi.org/10.1016/j.psym.2013.11.004.

Holman H., Lorig K. (2000). Patients as partners in managing chronic disease. Partnership is a prerequisite for effective and efficient health care. BMJ.;320(7234):526-7. doi: 10.1136/bmj.320.7234.526

Holt E.W., Muntner P., Joyce C.J., Webber L., Krousel-Wood M.A. (2010). Health-related quality of life and antihypertensive medication adherence among older adults. Age Ageing;39(4):481-7. doi: 10.1093/ageing/afq040

House James S., Landis K. R., Umberso D. (1988). Social Relationships and Health. Science, vol 241, pp. 540-545 • DOI: 10.1126/science.3399889

Hudek-Knežević Jasna, Igor Kardum (2009). Five-factor Personality Dimensions and 3 Healthrelated Personality Constructs as Predictors of Health. Public Health, doi: 10.3325/cmj.2009.50.394

Jaarsma T., Hill L., Bayes-Genis A., La Rocca H.B., Castiello T., Čelutkienė J., Marques-Sule E., Plymen C.M., Piper S.E., Riegel B. et al. (2020). A. Self-care of heart failure patients: practical management recommendations from the Heart Failure Association of the European Society of Cardiology. Eur J Heart Fail. 2021 Jan;23(1):157-174. doi: 10.1002/ejhf.2008

Jokela M., Pulkki-Råback L., Elovainio M., Kivimäki M. (2014). Personality traits as risk factors for stroke and coronary heart disease mortality: pooled analysis of three cohort studies. J Behav Med.;37(5):881-9. doi: 10.1007/s10865-013-9548-z

Juster R.P., Bizik G., Picard M., Arsenault-Lapierre G., Sindi S., Trepanier L., Marin M.F., Wan N., Sekerovic Z., Lord C. (2011). A transdisciplinary perspective of chronic stress in relation to psychopathology throughout life span development. Dev Psychopathol.;23(3):725-76. doi: 10.1017/S0954579411000289

Kate R. Lorig P.H., Halsted R., Holman, M.D. (2003). Self-management education: History, definition, outcomes, and mechanisms, Annals of Behavioral Medicine, vol. 26, Issue 1, Pages 1–7, https://doi.org/10.1207/S15324796ABM2601_01

Kawachi I., and Berkman, L. (2000) Social Cohesion, Social Capital, and Health. In: Berkman, L.F. and Kawachi, I. Eds., Social Epidemiology, Oxford University Press, New York, 174-190; https://www.scirp.org/(S(351jmbntvnsjt1aadkposzje))/reference/ReferencesPapers.aspx?ReferenceID=1119775

Kern M.L., Friedman H.S. (2008). Do conscientious individuals live longer? A quantitative review. Health Psychol.;27(5):505-12. doi: 10.1037/0278-6133.27.5.505. PMID: 18823176.

Khoddam H., and Wellisch D. K. (2020). Psychological distress in hospitalized patients awaiting organ transplantation: case examples, thematic exploration, and suggestions for intervention. J Clin Psychol Med Settings 2020; 27: 622–63; doi: 10.1007/s10880-019-09656-w

King-Wing Ma T., and Kam-Tao Li P. (2016). Depression in dialysis patients. Nephrology (Carlton); 21: 639–646; https://doi.org/10.1111/nep.12742

Kinney R.L., Lemon S.C., Person S.D., Pagoto S.L., Saczynski J.S. (2015). The association between patient activation and medication adherence, hospitalization, and emergency room utilization in patients with chronic illnesses: a systematic review. Patient Educ Couns.;98(5):545-52. doi: 10.1016/j.pec.2015.02.005

Krantz D.S., McCeney M.K. (2002). Effects of psychological and social factors on organic disease: a critical assessment of research on coronary heart disease. Annu Rev Psychol.; 53:341-69. doi: 10.1146/annurev.psych.53.100901.135208

Krista C., van den Broek, Versteeg H., Ruud A.M. Erdman, Pedersen S., S. (2011). The distressed (Type D) personality in both patients and partners enhances the risk of emotional distress in patients with an implantable cardioverter defibrillator, Journal of Affective Disorders, vol. 130, Issue 3, Pages 447-453; https://doi.org/10.1016/j.jad.2010.10.044.

Kronish I.M., Rieckmann N., Halm E.A., Shimbo D., Vorchheimer D., Haas D.C., Davidson K.W. (2006). Persistent depression affects adherence to secondary prevention behaviors after acute coronary syndromes. J Gen Intern Med; 21:1178–1183; https://doi.org/10.1111/j.1525-1497.2006.00586.x

Kubzansky L.D., Sparrow D., Vokonas P., Kawachi I. (2001). Is the glass half empty or half full? A prospective study of optimism and coronary heart disease in the normative aging study. Psychosom Med.;63(6):910-6. doi: 10.1097/00006842-200111000-00009

Kuntz J.L., Safford M.M., Singh J.A., Phansalkar S., Slight S.P., Her Q.L., Lapointe N.A., Mathews R., O'Brien E., Brinkman W.B., et al. (2014). Patient-centered interventions to improve medication management and adherence: a qualitative review of research findings. Patient Educ Couns.;97(3):310-26. doi: 10.1016/j.pec.2014.08.021

Leombruni P., Zizzi F., Pavan S., Fusaro E., Miniotti M. (2019). Allostatic Overload in Patients with Fibromyalgia: Preliminary Findings. Psychother Psychosom.;88(3):180-181. doi: 10.1159/000496229

Marmot M., Wilkinson R., G. (2001). Psychosocial and material pathways in the relation between income and health: a response to Lynch et al. BMJ; 322 doi: https://doi.org/10.1136/bmj.322.7296.1233

Marshall G. N., Wortman C. B., Vickers R. R., Kusulas J. W., & Hervig L. K. (1994). The five-factor model of personality as a framework for personality-health research. Journal of Personality and Social Psychology, 67(2), 278–286. https://doi.org/10.1037/0022-3514.67.2.278

Masters K.S., Shaffer J.A. & Vagnini K.M. (2020). The Impact of Psychological Functioning on Cardiovascular Disease. Curr Atheroscler Rep 22, 51. https://doi-org.univaq.clas.cineca.it/10.1007/s11883-020-00877-1

McEwen BS. (2015). Biomarkers for assessing population and individual health and disease related to stress and adaptation. Metabolism.;64(3 Suppl 1):S2-S10. doi: 10.1016/j.metabol.2014.10.029.
Miller G., Edith C., and Steve W. Cole. (2009). Health Psychology: Developing Biologically Plausible Models Linking the Social World and Physical Health. Annual Review of Psychology, vol. 60:501-524; https://doi-org.univaq.clas.cineca.it/10.1146/annurev.psych.60.110707.163551
Miller G., Hughes-Cromwick P., Roehrig C. (2011). National spending on cardiovascular disease, 1996-2008." Journal of the American College of Cardiology vol. 58,19: 2017-9. doi:10.1016/j.jacc.2011.08.018
Mollahadi M., Tayyebi A., Ebadi A., Daneshmandi M. (2010). Comparison of anxiety, depression and stress among hemodialysis and kidney transplantation patients. Iranian Journal of Critical Care Nursing, vol. 2, Issue 4; 1 https://www.researchgate.net/publication/286283538_Comparison_of_anxiety_depression_and_stress_among_hemodialysis_and_kidney_transplantation_patients
Murali N.S., Deao C.E. (2019). Patient Engagement. Prim Care ;46(4):539-547 ; doi: 10.1016/j.pop.2019.07.007. Epub 2019 Jul 31. PMID: 31655750.
Navidian, A., Arbabisarjou, A. Kikhai, A. (2006). Frequency of mental disturbances in hemodialysis patients referred to hemodialysis ward of Khatam-Al-Anbia hospital in Zahedan. J. Guilan Univ. Med. Sci., 15, 61; https://www.sid.ir/en/Journal/ViewPaper.aspx?ID=78322
Nelson K.M., Reiber G., Kohler T., Boyko E.J. (2007). Peripheral arterial disease in a multiethnic national sample: the role of conventional risk factors and allostatic load. Ethn Dis.;17(4):669-75; doi: https://pubmed.ncbi.nlm.nih.gov/18072377/
Pänkäläinen, M., Kerola, T., Kampman, O., Kauppi M., Hintikka J. (2016). Pessimism and risk of death from coronary heart disease among middle-aged and older Finns: an eleven-year follow-up study. BMC Public Health, 1124. https://doi.org/10.1186/s12889-016-3764-8
Peterson J.C., Allegrante J.P., Pirraglia P.A., Robbins L., Lane K.P., Boschert K.A., Charlson M.E. (2010). Living with heart disease after angioplasty: A qualitative study of patients who have been successful or unsuccessful in multiple behavior change. Heart Lung;39(2):105-15. doi: 10.1016/j.hrtlng.2009.06.017
Peterson J.C., Link A.R., Jobe J.B., Winston G.J., Marina Klimasiewfski E., Allegrante J.P. (2014). Developing self-management education in coronary artery disease. Heart Lung.43(2):133-9. doi: 10.1016/j.hrtlng.2013.11.006
Porcelli P., Laera D., Mastrangelo D., Di Masi A. (2012). Prevalence of allostatic overload syndrome in patients with chronic cardiovascular disease. Psychother Psychosom.;81(6):375-7. doi: 10.1159/000341179
Rees L. W. (1976). Stress, Distress and Disease, "Brit. F. Psychiat.", 128, pp. 3-18
Richardson C.R, Franklin B., Moy M.L., Jackson E. A. (2019). Advances in rehabilitation for chronic diseases: improving health outcomes and function BMJ; 365 :l2191 doi:10.1136/bmj.l2191
Rieckmann N., Kronish I.M., Shapiro P.A., Whang W., Davidson K.W. (2013). Serotonin reuptake inhibitor use, depression, and long-term outcomes after an acute coronary syndrome: a prospective cohort study. JAMA Intern Med; 173:1150–1151; doi: 10.1001/jamainternmed.2013.910
Riegel B., Moser D.K., Anker S.D., Appel L.J., Dunbar S.B., Grady K.L., Gurvitz M.Z., Havranek E.P., Lee C.S., Lindenfeld J., Peterson P.N., Pressler S.J., Schocken D.D., Whellan D.J. (2009). State of the science: promoting self-care in persons with heart failure: a scientific statement from the American Heart Association. Circulation. 22;120(12):1141-63. doi: 10.1161/CIRCULATIONAHA.109.192628
Ronaldson A., Molloy G.J., Wikman A., Poole L., Kaski J.C., Steptoe A. (2015). Optimism and recovery after acute coronary syndrome: a clinical cohort study. Psychosom Med.;77(3):311-8. doi: 10.1097/PSY.0000000000000155
Ronaldson A., Poole L., Kidd T., Leigh E., Jahangiri M., Steptoe A. (2014). Optimism measured pre-operatively is associated with reduced pain intensity and physical symptom reporting after coronary artery bypass graft surgery. J Psychosom Res.;77(4):278-82. doi: 10.1016/j.jpsychores.2014.07.018.
Rosenberg N., Park C.G., Eldeirawi K. (2015). Relationship of serum carotenoid concentrations with allostatic load as a measure of chronic stress among middle-aged adults in the USA. Public Health Nutr.;18(2):313-21. doi: 10.1017/S1368980014000056
Rugulies R. (2002). Depression as a predictor for coronary heart disease. a review and meta-analysis. Am J Prev Med.;23(1):51-61. doi: 10.1016/s0749-3797(02)00439-7
Sabbah W., Watt R.G., Sheiham A., Tsakos G. (2008). Effects of allostatic load on the social gradient in ischaemic heart disease and periodontal disease: evidence from the Third National Health and Nutrition Examination Survey. J Epidemiol Community Health.;62(5):415-20. doi: 10.1136/jech.2007.064188
Sahlsten M.J., Larsson I.E., Lindencrona C.S., Plos K.A. (2005). Patient participation in nursing care: an interpretation by Swedish registered nurses. J Clin Nurs.;14(1):35-42. doi: 10.1111/j.1365-2702.2004.00957.x
Sanchez-Gonzalez M.A., May R.W., Koutnik A.P., Kabbaj M. Fincham F.D. (2013). Sympathetic vasomotor tone is associated with depressive symptoms in young females: a potential link between depression and cardiovascular disease. Am J Hypertens; 26:1389–1397; doi: 10.1093/ajh/hpt131.
Seeman T.E., McEwen B.S., Rowe J.W., Singer B.H. (2001). Allostatic load as a marker of cumulative biological risk: MacArthur studies of successful aging. Proc Natl Acad Sci U S A. 10;98(8):4770-5. doi: 10.1073/pnas.081072698
Slavich G.M., Irwin M.R. (2014). From stress to inflammation and major depressive disorder: a social signal transduction theory of depression. Psychol Bull; 140:774–815; doi: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4006295/

Smith, T. W. and Gallo, L. C. (2001). Personality traits as risk factors for physical illness. In: Baum, A., Revenson, T. A. and Singer, J. E., Eds., Handbook of Health Psychology, Lawrence Erlbaum Associates, Mahwah, 139-157; doi: https://www.scirp.org/(S(i43dyn45teexjx455qlt3d2q))/reference/ReferencesPapers.aspx?ReferenceID=1045241

Sterling, P., & Eyer, J. (1988). Allostasis: A new paradigm to explain arousal pathology. In S. Fisher, & J. Reason (Eds.), Handbook of life stress, cognition and health (pp. 629-649). New York: John Wiley & Sons; https://www.scirp.org/(S(351jmbntvnsjt1aadkposzje))/reference/ReferencesPapers.aspx?ReferenceID=846297

Storm M., Davidson L. (2010). Inpatients' and providers' experiences with user involvement in inpatient care. Psychiatr Q.;81(2):111-25. doi: 10.1007/s11126-009-9122-6

Sahooa S., Kumar Padhy S., Padhee B., Singla N., Sarkar S. (2018). Role of personality in cardiovascular diseases: An issue that needs to be focused too!. Indian Heart Journal, vol. 70, Supplement 3, Pages S471-S477; https://doi.org/10.1016/j.ihj.2018.11.003

Talaei-Khoei M., Fischerauer S.F., Jha R., Ring D., Chen N., Vranceanu A.M. (2018). Bidirectional mediation of depression and pain intensity on their associations with upper extremity physical function. J Behav Med.;41(3):309-17; doi: https://doi.org/10.1007/s10865-017-9891-6

van den Pol-Grevelink A., Jukema J.S., Smits C.H. (2012). Person-centred care and job satisfaction of caregivers in nursing homes: a systematic review of the impact of different forms of person-centred care on various dimensions of job satisfaction. Int J Geriatr Psychiatry.;27(3):219-29. doi: 10.1002/gps.2719

van Melle, Joost P., de Jonge, Peter, Spijkerman, Titia A., Tijssen, Jan G. P., Ormel, Johan, van Veldhuisen, Dirk J., van den Brink, Rob H. S. (2004). Prognostic Association of Depression Following Myocardial Infarction With Mortality and Cardiovascular Events: A Meta-analysis, Psychosomatic Medicine: vol. 66 - Issue 6 - p 814-822 doi: 10.1097/01.psy.0000146294.82810.9c

van Melle, J. P., de Jonge, P., Spijkerman, T. A., Tijssen, J. G., Ormel, J., van Veldhuisen, D. J., van den Brink, R. H., & van den Berg, M. P. (2004). Prognostic association of depression following myocardial infarction with mortality and cardiovascular events: A meta-analysis. Psychosomatic medicine: journal of the American Psychosomatic Society, 66(6), 814-822; doi: https://pure.uvt.nl/ws/portalfiles/portal/971439/Prognostic.pdf

Vlaeyen & Linton Steven J. (2000). Fear-avoidance and its consequences in chronic musculoskeletal pain: a state of the art. Pain,;85(3):317-332. doi: 10.1016/S0304-3959(99)00242-0.2000

Von Korff, M., & Simon, G. (1996). The Relationship Between Pain and Depression. British Journal of Psychiatry, 168(S30), 101-108. doi:10.1192/

Vranceanu A.M., Safren S., Zhao M., Cowan J., Ring D. (2008). Disability and psychologic distress in patients with nonspecific and specific arm pain. Clin Orthop Relat Res.;466(11):2820-6; doi: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2565030/

W. Smith Timothy, Paula G. Williams (1992). Personality and Health: Advantages and Limitations of the Five-Factor Model. Personality, vol. 60, Issue2, Pages 395-425; https://doi.org/10.1111/j.1467-6494.1992.tb00978.x

Whooley M.A., de Jonge P., Vittinghoff E., Otte C., Moos R., Carney R.M., Ali S., Dowray S., Na B Feldman M.D., Schiller N.B., Browner W.S. (2008). Depressive symptoms, health behaviors, and risk of cardiovascular events in patients with coronary heart disease. JAMA; 300:2379–2388; doi: https://doi.org/10.1001/jama.2008.711

Wu JR Lennie T.A., Dekker R.L., Biddle M.J., Moser D.K. (2013). Medication adherence, depressive symptoms, and cardiac event-free survival in patients with heart failure. J Card Fail2013; 19:317–324; doi: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3699198/

Wulsin, Lawson R., and Singal Bonita M. (2003). Do Depressive Symptoms Increase the Risk for the Onset of Coronary Disease? A Systematic Quantitative Review, Psychosomatic Medicine: March – vol. 65 - Issue 2 - p 201-210 doi: 10.1097/01.PSY.0000058371.50240.E3

Wulsin, Lawson R., and Singal, Bonita M. (2003). Do Depressive Symptoms Increase the Risk for the Onset of Coronary Disease? A Systematic Quantitative Review, Psychosomatic Medicine- vol. 65 - Issue 2 - p 201-210 doi: 10.1097/01.PSY.0000058371.50240.E3

Wyatt C. M., Winston J. A., Malvestutto C., Fishbein D. Barash I., Cohen A. Klotman M., Klotman P. (2007). Chronic kidney disease in HIV infection: an urban epidemic, AIDS: vol. 21 - Issue 15 - p 2101-2103 doi: 10.1097/QAD.0b013e3282ef1bb4

EXPERIMENTAL SECTION REFERENCES

Allegrante J. P., Martin T. Wells, and Janey C. P. (2019). Interventions to Support Behavioral Self-Management of Chronic Diseases. Annual Review of Public Health, Vol. 40:127-146; https://doi-org.univaq.clas.cineca.it/10.1146/annurev-publhealth-040218-044008

Baeza-Velasco Carolina, Solange Carton, Caroline Almohsen, Francis Blotman, Marie Christine Gély-Nargeot (2012). Alexithymia and emotional awareness in females with Painful Rheumatic Conditions, Journal of Psychosomatic Research, Volume 73, Issue 5, Pages 398-400, ISSN 0022-3999, https://doi.org/10.1016/j.jpsychores.2012.08.008.

Bottesi G., Ghisi M., Altoè G., Conforti E., Melli G., Sica C., (2015). The Italian version of the depression anxiety stress scales-21: factor structure and psychometric properties on community and clinical samples. Compr Psychiatry; 60: 170–181; doi: 10.1016/j.comppsych.2015.04.005

C. Conversano (2019). Common Psychological Factors in Chronic Diseases. Front. Psychol., vol. 10, p. 2727; doi: https://psycnet.apa.org/doi/10.3389/fpsyg.2019.02727

Cukor D. (2007). Use of CBT to treat depression among patients on hemodialysis. Psychiatr Serv; 58: 711 722; doi: 10.1176/ps.2007.58.5.711.

D. Forman M. S., Maurer C., Boyd R., Brindis M. E., Salive F. M., Horne S. P., Bell T., Fulmer D. B., Reuben S., Zieman e M. W. Rich (2018). Multimorbidity in Older Adults With Cardiovascular Disease. Journal of the American College of Cardiology, vol. 71, n. 19, p. 2149–2161; doi: https://doi.org/10.1016/j.jacc.2018.03.022

Dabrowska-Bender, M., Dykowska, G., Z˙ uk, W., Milewska, M., Staniszewska A. (2018). The impact on quality of life of dialysis patients with renal insufficiency. Patient Prefer. Adherence, 12, 577–583; doi: https://doi.org/10.2147/ppa.s156356

Dąbrowska-Bender, M., Dykowska, G., Żuk, W., Milewska, M., Staniszewska, A. (2018). The impact on quality of life of dialysis patients with renal insufficiency. Patient Preference and Adherence, 12, 577–583 https://doi.org/10.2147/PPA.S156356

De Girolamo G., Rucci P., Scocco P., Becchi A., Coppa F., D'Addario A., Darù E., De Leo D., Galassi G., Mangelli L., et al., (2000). Quality of life assessment: Validation of the Italian version of the WHOQOL-Brief. Epidemiologia e Psichiatria Sociale 9(1):45-55; doi: 10.1017/S1121189X00007740

De Maria M., Matarese M., Strömberg A., Ausili D., Vellone E., Jaarsma T., Osokpo O., Daus M., Riegel B., e Barbaranelli C. (2021). Cross-cultural assessment of the Self-Care of Chronic Illness Inventory: A psychometric evaluation,» International Journal Nursing Studies, vol. 116, p. 103422; doi: https://doi.org/10.1016/j.ijnurstu.2019.103422

De Ridder D, Geenen R, Kuijer R, van Middendorp H. (2008). Psychological adjustment to chronic disease. Lancet.;372(9634):246-55. doi: 10.1016/S0140-6736(08)61078-8. PMID: 18640461.

Di Matteo M. Robin, Kelly B Haskard ZolnierekKelly B Haskard ZolnierekLeslie R MartinLeslie R Martin (2012). Improving patient adherence: A three-factor model to guide practice. Health Psychology Review, 6(1):74-91; DOI: 10.1080/17437199.2010.537592

Edmonson D., Kronish M. I., Shaffer A.J., Falzon L., Burg M.M. (2013). Posttraumatic stress disorder and risk for coronary heart disease: A meta-analytic review. American Heart Journal, vol. 166, Issue 5, 806-814; doi: https://www.sciencedirect.com/science/article/pii/S0002870313005334?casa_token=aaKlRQaKSCoAAAAA:Xu4YhqQY_YF-u8qVB2mTwJk21VKAmI7pHs5sJpfe-kejDXM1f7UAY9wBuv5ehqSL6w4WePG6yA

Engel G.L. (1977). The Need for a New Medical Model: A Challenge for Biomedicine. SCIENCE;

Folkman, S., & Moskowitz, J. T. (2004). Coping: Pitfalls and Promise. The Annual Review of Psychology, 55, 745-774. http://dx.doi.org/10.1146/annurev.psych.55.090902.141456

French P., Senior V., Weinman J., e T. M. & Marteau (2001). Causal attributions for heart disease: A systematic review. Psychology & Health, vol. 16, n. 1, pp. 77-98; doi: https://doi.org/10.1080/08870440108405491

G. Lausi, A., Quaglieri, J. Burrai, E. Mari e A. M. Giannini (2020). Development of the DERS-20 among the Italian population: a study for a short form of the Difficulties in Emotion Regulation Scale. Mediterranean Journal of Clinical Psychology, vol. 8; doi: https://cab.unime.it/journals/index.php/MJCP/article/view/2511

Gazineo, D., Godino, L., Bui, Mouttaqi L.E., Franciosi E., Natalino A., Ceci G., Ambrosi E. (2021). Health-related quality of life in outpatients with chronic liver disease: a cross-sectional study. BMC Gastroenterol 21, 318; https://doi.org/10.1186/s12876-021-01890-7

Gray S.L., Marcum Z.A., Schmader K.E., Hanlon J.T. (2018). Update on Medication Use Quality and Safety in Older Adults, J Am Geriatr Soc.;66(12):2254-2258. doi: 10.1111/jgs.15665

Guerra F., Ranieri, J., Passafiume, D., Lupi, D., Maccarone D., Pisani, F., Ferri, C., Di Giacomo, D. (2021). Psychosomatic interactions in kidney transplantation: Role of personality dimensions in mental health-related quality of life. Ther. Adv. Chronic Dis., 12, 1–9; doi: 10.1177/20406223211024359

Guido G., Peluso A.M., Capestro M., Miglietta M. (2015). An Italian version of the 10-item big five inventory: an application to hedonic and utilitarian shopping values. Pers Individ Dif ; 76: 135–140; doi: 10.1016/j.paid.2014.11.053

Heidari Gorgj M., A., Abbaskhani Davanloo, A., Heidarigorji, A., M. (2014). The efficacy of relaxation training on stress, anxiety, and pain perception in hemodialysis patients, Indian J Nephrol; 24(6): 356–361 doi: 10.4103/0971-4065.132998

Heidarigorji, A., Davanloo, A.A. (2014). The efficacy of relaxation training on stress, anxiety, and pain perception in hemodialysis patients. Indian J. Nephrol., 24, 356–361; doi: https://doi.org/10.4103/0971-4065.132998

Jaarsma T, Hill L, Bayes-Genis A, La Rocca HB, Castiello T, Čelutkienė J, Marques-Sule E, Plymen CM, Piper SE, Riegel B. et al. (2021). Self-care of heart failure patients: practical management recommendations from the Heart Failure Association of the European Society of Cardiology. Eur J Heart Fail. 23(1):157-174. doi: 10.1002/ejhf.2008

Khoddam H. and Wellisch D.K. (2020). Psychological distress in hospitalized patients awaiting organ transplantation: case examples, thematic exploration, and suggestions for intervention. J Clin Psychol Med Settings; 27: 622–631; doi: 10.1007/s10880-019-09656-w.

King-Wing Ma T and Kam-Tao Li P. (2016). Depression in dialysis patients. Nephrology (Carlton); 21: 639–646; doi: https://doi.org/10.1111/nep.12742

Kravvariti Evrydiki, Katerina Maridaki-Kassotaki, Kravvaritis Eleftherios (2010). Emotional Intelligence and Coronary Heart Disease: How Close Is the Link? Global Journal of Health Science 2(1),; DOI: 10.5539/gjhs.v2n1p127

Kubzansky L.D., Thurston R.C. (2007). Emotional Vitality and Incident Coronary Heart Disease: Benefits of Healthy Psychological Functioning. Arch Gen Psychiatry.;64(12):1393–1401. doi:10.1001/archpsyc.64.12.1393

Kucukarslan S.N. (2012). A review of published studies of patients' illness perceptions and medication adherence: lessons learned and future directions. Res Social Adm Pharm.;8(5):371-82. doi: 10.1016/j.sapharm.2011.09.002. PMID: 22986176.

Kucukarslan SN. (2012). A review of published studies of patients' illness perceptions and medication adherence: lessons learned and future directions. Res Social Adm Pharm.;8(5):371-82. doi: 10.1016/j.sapharm.2011.09.002. PMID: 22986176.

Loren M. Gianini, Marney A. White, Robin M. Masheb (2013). Eating pathology, emotion regulation, and emotional overeating in obese adults with binge eating disorder, Eating Behaviors,

Messerli-Bürgy Nadine, Jürgen Barth,Roland von Känel,Jean-Paul Schmid,Hugo Saner,Hansjörg Znoj (2012). Maladaptive Emotion Regulation is Related to Distressed Personalities in Cardiac Patients. Stress & Health; vol. 28, Issue4; https://doi.org/10.1002/smi.2420

Mittleman M., e Mostofsky E. (2011). Physical, psychological and chemical triggers of acute cardiovascular events. Circulation , vol. 124, pp. 346-354; doi: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3139921/

Monami M. & Marchionni N. (2007). Disturbi psico-affettivi e malattie cardiovascolari [Psychological disorders and cardiovascular diseases], Giornale italiano di cardiologia, vol. 8, n. 6, p. 335–348; doi: http://dx.doi.org/10.1714/681.7923

Morasso G., Costantini M., Baracco G., Borreani C., Capelli M. (1996). Assessing psychological distress in cancer patients: validation of a self-administered questionnaire. Oncology; 53: 295–302; doi: https://doi.org/10.1159/000227576

Navidian, A., Arbabisarjou, A., Kikhai, A. (2006). Frequency of mental disturbances in hemodialysis patients referred to hemodialysis ward of Khatam-Al-Anbia hospital in Zahedan. J. Guilan Univ. Med. Sci., 15, 61.

Pequeno, N.P.F., Cabral, N.L.d., Marchioni, D.M., Carla S., Lima C.V., Lyra Olivera C. (2020). Quality of life assessment instruments for adults: a systematic review of population-based studies. Health and Quality of Life Outcomes volume 18, Article number: 208; doi: https://doi.org/10.1186/s12955-020-01347-7

Sandwijk, M., S., V., Arashi, M., S., Hare, F., M., Rolien, J., M., Kersten, M., J., Bijlsma, A., J., Ineke, J., M., Bemelman, J., F. (2018). Fatigue, anxiety, depression and quality of life in kidney transplant recipients, haemodialysis patients, patients with a haematological malignancy and healthy controls. Nephrology Dialysis Transplantation, vol. 34, Issue 5, May 2019, Pages 833–838, https://doi.org/10.1093/ndt/gfy103

Silva A., Moratelli, L., Costa A., Carminatti M., Bastos M., Colugnati, F., Grincenkov, F., Sanders-Pinheiro H. (2014). Waiting for a Kidney Transplant: Association with Anxiety and Stress. Transplant. Proc., 46, 1695–1697; doi: https://doi.org/10.1016/j.transproceed.2014.05.020

Silva L., A., N., Moratelli, L., Costa, A., B., Carminatti, M., Bastos, M., G., Colugnati, F., A., B., Grincenkov, F., R., S., Sanders-Pinheiro, H. (2014). Waiting for a Kidney Transplant: Association With Anxiety and Stress. Transplantation Proceedings, 2014, 46, Issue 6, Pages 1695-1697, https://doi.org/10.1016/j.transproceed.2014.05.020

Silverman A.L., Herzog A.A., e Silverman D.I. (2019). Hearts and Minds: Stress, Anxiety, and Depression: Unsung Risk Factors for Cardiovascular Disease. Cardiology in review, vol. 27, n. 4, p. 202–207; doi: https://doi.org/10.1097/crd.0000000000000228

Steptoe A., Wikman A., Molloy G., Kaski J.C. (2012). Anaemia and the development of depressive symptoms following acute coronary syndrome: longitudinal clinical observational study.,» BMJ Open , vol. 2; doi: http://dx.doi.org/10.1136/bmjopen-2011-000551

Strike P., e Steptoe A. (2004). Psychosocial factors in the development of coronary artery disease. Prog Cardiovasc Dis , vol. 46, n. 337-347; doi: 10.1016/j.pcad.2003.09.001.

Strike P., Steptoe A. (2005). Behavioral and emotional triggers of acute coronary syndromes: a systematic review and critique. Psychosom Med , vol. 67, n. 179-186; doi: https://doi.org/10.1097/01.psy.0000155663.93160.d2

Thomas C., V., de Castro E., K, Antonello I. (2016). Personality traits and clinical/biochemical course in the first year after kidney transplant. Ren Fail, 38(9):1383-1390. doi: 10.1080/0886022X.2016.1216712

Thomas C.V., de Castro, E.K., Antonello, I.C.F. (2016). Personality traits and clinical/biochemical course in the first year after kidney transplant. Ren. Fail., 38, 1383–1390; doi: https://doi.org/10.1080/0886022x.2016.1216712

Turner J., Kelly B. (2000). Emotional dimensions of chronic disease. West J Med;172:124-128; doi: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1070773/

van Sandwijk, M.S., Al Arashi, D., van de Hare, F.M., van der Torren, J.M.R., Kersten, M.-J., A Bijlsma, J., Berge, I.J.M.T., Bemelman, F.J. (2018). Fatigue, anxiety, depression and quality of life in kidney transplant recipients, haemodialysis patients, patients with a haematological malignancy and healthy controls. Nephrol. Dial. Transplant, 34, 833–838; doi: https://doi.org/10.1093/ndt/gfy103

Vol 196, Issue 4286; pp. 129-136; doi: 10.1126/science.847460

Volume 14, Issue 3, Pages 309-313, https://doi.org/10.1016/j.eatbeh.2013.05.008

Vrijens B., De Geest S., Hughes D.A., Przemyslaw K., Demonceau J., Ruppar T., Dobbels F., Fargher E., Morrison V., Lewek P. et al. (2012). A new taxonomy for describing and defining adherence to medications. British journal of clinical pharmacology, vol. 73, n. 5, p. 691–705; doi: https://doi.org/10.1111/j.1365-2125.2012.04167.x

Zhou, T., Guan, H., Yao, J. Xiong X., Ma A. (2018). The quality of life in Chinese population with chronic non-communicable diseases according to EQ-5D-3L: a systematic review. Qual Life Res 27, 2799–2814; https://doi-org.univaq.clas.cineca.it/10.1007/s11136-018-1928-y

DEVELOPMENT SECTION REFERENCES

Arneja J., Brooks D.J. (2021). The impact of chronic comorbidities at the time of breast cancer diagnosis on quality of life, and emotional health following treatment in Canada. PLoS ONE 16(8): e0256536. https://doi-org.univaq.clas.cineca.it/10.1371/journal.pone.0256536

Dunbar-Jacob J, Erlen JA, Schlenk EA, Ryan C.M., Sereieka S.M.Doswell W.M. (2000). Adherence in chronic disease. Annual Review of Nursing Research.18:48-90. DOI: 10.1891/0739-6686.18.1.48.

Kelly L. Wierenga, Rebecca H., Lehto, and Barbara Given (2017). Emotion Regulation in Chronic Disease Populations: An Integrative Review. Res Theory Nurse Pract.; 31(3):247-271; doi: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5992894/

Kouidi E, Iacovides A, Iordanidis P, Vassiliou S, Deligiannis A, Ierodiakonou C, Tourkantonis A. (1997). Exercise renal rehabilitation program: psychosocial effects. Nephron;77(2):152-8. doi: 10.1159/000190266.

Lim P., Cheng Y., Wei Y. (2000). Large-scale mitochondrial DNA deletions in skeletal muscle of patients with end-stage renal disease. Free Radic Biol Med 29: 454–463; doi: https://doi.org/10.1016/s0891-5849(00)00334-8

Marks, D.H., Okhovat, JP., Hagigeorges, D. et al. The effect of scalp cooling on CIA-related quality of life in breast cancer patients: a systematic review. Breast Cancer Res Treat 175, 267–276 (2019). https://doi.org/10.1007/s10549-019-05169-0

Shaw, J., McLean, K. C., Taylor, B., Swartout, K., & Querna, K. (2016). Beyond resilience: Why we need to look at systems too. Psychology of Violence, 6(1), 34–41. https://doi.org/10.1037/vio0000020

Van den Hurk Corina J.G., Floortje Mols, Ad J. J. M. Vingerhoets, Wim P. M. Breed (2010). Impact of alopecia and scalp cooling on the well-being of breast cancer patients. Psycho-Oncology19: 701–709; doi: 10.1002/pon.1615