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A new concept of resilience for good clinical practice. A retrospective study on bariatric surgery candidate

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INTRODUCTION

This thesis originates from the interest to investigate the individual virtues of resilience that leads a person to resist stressful situations and evolve positively despite the complexity of life circumstances. This process allows maintaining a good level of well-being that is functional to the constant achievement of an optimal relationship with reality. It is a reflection on the concept of resilience and therefore on the common elements that characterize those who manage to persevere in a development perspective, while experiencing the adversities of life.

Therefore, the first chapter of this thesis describes the historical evolution of the concept of resilience from its origins and the main studies investigating resilience in different areas of application.

The second chapter reviews the definitions of the term "psychological resilience", aimed at identifying shared elements of the construct across the examined literature. Findings were used for proposing a broad definition of psychological resilience that takes into account various theoretical background.

In the third chapter, the systematic literature review on the concept of individual resilience was applied to the clinical area of bariatric surgery. In particular, an observational retrospective study was carried out on a sample of patients candidates for bariatric surgery during the psychological assessment phase, which was necessary to assess the patient's suitability for the operation, according to national and international guidelines. Particular attention was paid to the analysis of those resilience resources that are hypothesized to be useful for the psychological assessment and represent a reference parameter for the purposes of the patient's eligibility for bariatric surgery.

Chapter 1

THE RESILIENCE

1. THE HISTORICAL AND CULTURAL EVOLUTION OF THE RESILIENCE CONCEPT

In the last thirty years, research on factors allowing an individual to resist stressful situations and to evolve positively despite traumas have represented a new paradigm, as they have led to focus research on the healthy parts of the individual and on resources, developing methodologies to improve them (Putton, & Fortugno, 2012). Recent literature data confirm the need to pay equal attention to protective factors as well as risk factors, replacing the term invulnerability with resilience. In fact, resilience is not only the ability to deal with environmental stress, but it implies a positive dynamic, an ability to evolve, allowing to reconstruct a life path (Lecomte, & Vanistendael, 2002). Therefore, particular attention is paid to the "healthy" component of personal functioning, which was left in the shade for a long time. This constitutes the core of the "salutogenic" approach, originally promoted by Aron Antonovsky (1987) and now pursued by several lines of research: studies focus on what allows man to confront himself with complex life circumstances, maintaining a level of well-being that is functional to the constant achievement of an optimal relationship with reality. Thus the need emerges to reflect on the common elements characterizing those who succeed in maintaining a development perspective, even when adversity arise.

Those who have sought answers to this question have focused on the construct of resilience. We use it to broadly refer to a set of factors that define the ability to succeed in living and developing positively, in a socially acceptable way, in the presence of a stress factor or adverse circumstances that pose a strong risk of negative outcome (Cyrulnik, 2001).

Being resilient means, in short, knowing how to positively re-organize one's own existence, thanks to a life project capable of integrating suffering and vulnerability with personal, family, relational and existential resources and to expand them according to one's needs. Over the years, multiple definitions

of the term resilience have been developed in the literature. While differing in their theoretical references and in highlighted factors, they all have as their common element the vision of the complexity of this phenomenon and the identification of different variables interacting.

The term resilience finds its origin in the context of a different scientific domain, that of physics, to designate the ability of a material to withstand a sudden impact and endure efforts applied abruptly, without breaking and without propagating cracks. While in engineering, resilience is the fragility of a material, in computer language , on the contrary, it denotes the ability of a system to continue functioning in spite of anomalies. It is therefore an ability to adapt and be flexible, and it is necessary to adopt new behaviours when it is clear that the previous ones are not effective.

In biology, the term resilience means the ability of a fabric to repair itself after damage. For example, through the mechanism of neuronal plasticity, our nervous system succeeds in recovering a function lost due to damage to a neural pathway, by creating an alternative pathway.

The term resilience is also used in the economic field to refer to the quality of a Business Continuity Plan, an emergency plan, set up to deal with the possible incidents that can threaten the vital functions of a company, an organization or an economic system.

In the field of human sciences, the concept is used to define a particular process to respond to adverse circumstances, implemented by subjects who are, therefore, greatly vulnerable: this process is characterized by a high capacity of resistance, coherently with the original meaning of the term, and it is also characterized by a marked orientation towards "transformation", in order to develop towards a new and more advantageous condition (Malaguti, 2005). It is therefore an anti-homeostatic adaptation process, in which the onset of complexity urges the subject to activate personal available resources to re-elaborate, allowing enrichment and growth through the difficulty, more than to resist the impact and return to the previous condition, which is typical of coping processes, (Magrin, Scrignaro, & Viganò, 2006).

As a result of the historical and cultural evolution of the concept, many other terms have been used to describe the construct, but they are not necessarily interchangeable with the concept of resilience.

It has been defined as stoicism, tolerance, courage, survival instinct and resistance. Literature has also presented multiple definitions: stress buffering (Haggerty, et al., 1996), solidity (Kobasa, 1978) capacity for psychic growth after stress (Aldwin, 2007) invulnerability (Cohler, 1987), etc.

In fact, studies on resilience focus on the understanding of why some individuals are able to react to stressful events and transform them into growth and new adaptation (Fletcher & Sarkar, 2013).

Since the Second World War, many studies have tried to investigate how human beings are able to react to exposure to traumatic events. The possibility of transforming a critical and destabilizing event into a personal search engine, the ability to integrate light and shadows, resources and vulnerability, suffering and courage become the primary object of interest, while trying to understand resilience processes.

Studying several cases of soldiers diagnosed with post-traumatic stress disorder and other forms of pathology, it was possible to observe the individual characteristics of war veterans and highlight that a significant number of subjects effectively process the experienced traumatic events (Grinker, & Spiegal, 1963). Subsequently, the analysis of risk and protective factors for mental health focused on developmental psychology, with the aim of exploring the different developmental trajectories traced by subjects who had endured traumatic experiences. The classical studies on this topic have been conducted mainly on a longitudinal basis and have been oriented towards the identification of those individual characteristics and relationships that can more easily ensure a normal development, even in particularly difficult family and environmental situations.

In particular, the studies that Rutter (1993) carried out on children with schizophrenic mothers showed that many of them, as adults, did not present any psychopathology or maladaptive behaviour. The Author proposed a first definition of resilience as a "positive" response of a subject to stress and adverse conditions, where "positive" means the absence of psychopathological consequences (behaviour or affective disorders, etc.).

In this context, the longitudinal study by Werner and Smith (1992) is paradigmatic. It was conducted on a sample of 698 children born in Kauai (Hawaii), for the extraordinary duration of 30 years. These

children were chosen because they were exposed to different risk factors (difficult birth, poverty, families with problems of alcoholism, mental illness, aggression, etc.) that could have influenced their development, directing them towards the onset of mental and social uneasiness. The survey enabled the evolution of the sample's emotional and relational adaptability to be monitored over time. A third of the subjects was considered "at high risk", given the extreme poverty and the problematic nature of their family environment. over time, many of these children developed severe symptoms of social and psychopathological maladjustment. However, the study showed that despite the presence of multiple risk factors, 28% of the subjects managed to achieve a good level of adaptation, becoming competent and self-confident adults with a satisfactory level of affective and social functionality. Therefore Werner defined resilience as the consolidation of the competences of the subject placed in stressful situations.

Starting from the first pioneering works by Werner (1992), there is a fundamental change of direction in the scientific landscape, which consists in moving the analysis from risk and discomfort factors to protective factors. We tried to identify what characterizes resilient human beings and what are the factors that enable the activation of positive processes, when exceptionally critical or suffering life conditions are encountered. The results of these first investigations showed that some subjects achieved satisfactory or positive evolutionary results, despite an unfavorable condition. These were defined as "resilient".

This evidence has given the concept of resilience an important visibility in the recent development of the salutogenic perspective as it constitutes a construct of wide heuristic scope and it extends to the understanding of normal health processes. In particular, in the late 1980s, Antonovsky (1987a; 1987b) argued that stress is an inevitable phenomenon; however, despite the adversities, a significant number of individuals can recover their own balance even in circumstances with a high emotional impact and they can grow and maintain a state of wellbeing.

The author underlines the importance of orienting research on those elements that make the above-entioned development possible and are at the basis of health (salutogenetic factors). Thus, researchers

focused on the study of subjects who maintained their own personal balance despite difficult circumstances, such as poverty and mental illness of family members (Garmezy, 1991; Masten, 1992). Subsequently, several studies were rapidly carried out in different areas: school psychology (Gu, & Day, 2007), military psychology (Palmer, 2008), sports psychology (Galli, & Vealey, 2008), developmental psychology (Brennan, 2008), work psychology (Jackson, Firtko, & Edenborough 2007).

2. TOWARDS A DEFINITION OF THE TERM

To date, literature agrees in stating that there are two necessary and sufficient conditions to identify the dynamics of the resilience process: "exposure to a significant risk" and "positive evolution in terms of psycho-social well-being, despite the threat to which one is subjected"(Cicchetti, & Cohen, 2006). The factors identifying the probability that a dysfunctional adaptation will occur are defined as "significant risk". In this perspective, resilient individuals can achieve a positive adaptation despite the surrounding conditions. If several factors are present simultaneously, the exposure to a significant risk can produce a maladjustment. Furthermore, the presence of protective factors can mitigate risk conditions. According to Rutter (1985), protective factors play a fundamental role in countering the negative effects of adverse life circumstances, allowing for the consolidation of feelings of self-esteem and effectiveness and favoring a positive adaptation.

From a review of the available literature, Garmezy and Masten (1991) identified different protection factors in resilient children and group them into three categories: individual, family and extra-family. The extensive and articulated research work conducted over the years on psychological resilience brought out the versatility of the construct. As a consequence, it is not easy to achieve a shared definition of the concept. In literature, a debate is still alive today between those who theorize that resilience is a stable trait of personality (Connor, & Davidson, 2003) and those who define it as a dynamic process that varies in relation to contexts.

Those who, according to the ego resiliency (Block, & Block, 1980), consider resilience in terms of trait argue that personality characteristics are the main protective factor against stressors.

The authors who define resilience in terms of process (Luthar, & Cicchetti, 2000; Rutter, 2007; Flach, 1988) consider it as a resource, and for them the success of the transaction between the individual and his system depends on it. According to this approach, the protective and risk factors act simultaneously and dynamically and their interaction produce the effect. Pursuant to this theory, the stressful event - the trauma - is the necessary condition for the resilience process to emerge and it is called the "agent of resilience".

Hence being resilient means building and rebuilding one's life path, being able to restore a new balance by producing a change in oneself. Resilience is therefore much more than the ability to continue developing one's skills despite adversity or to resist protecting one's self from external circumstances. It is the ability to react positively despite the difficulties, turning them into opportunities for growth. Psychological resilience refers to a dynamic process and it is therefore configured as a change that allows to find a new balance and to evolve positively despite adverse or traumatic living conditions.

In this process of change, the individual develops new skills and acquires a renewed feeling of personal efficacy and self-enhancement. This circular mechanism for acquiring skills and perceiving self-efficacy implements the resilience process, completing its development. Thus the change, in an allostatic process, becomes necessary to face an adaptation required by the environment. As a continuity, Sartori (2010) summarizes the constructive resilience as the ability to regain possession of one's internal power, to decide independently how to orient the existence by living in a free and authentic way, like the hidden strength of one's own identity.

In his model, Richardson (2002) attempts to "integrate" the two perspectives, considering resilience both as a genetically determined trait and as a process. According to the author, in each of us there is an innate propensity for resilience, which can allow each of us to face the difficulties and the breakdown of a pre-existing balance. The destabilization of an individual's life paradigm is the

motivation for an in-depth reflection on himself and a new redefinition of the Self. From the experience of insight and the search for one's own resources comes the identification and reinforcement of the resilient characteristics that will allow the subject to activate strategies aimed at facing the adverse condition and rebuilding the equilibrium condition.

This model assumes the circularity of the influence of the self and the environment insofar as resilience is at the same time part of the adaptation process and of its outcome. It is based on the conviction that the human being is - by his nature - inclined to personal growth by overcoming conditions of suffering or difficulty.

In his theoretical model, Kumpfer (2002) considers resilience as influenced by six different factors: stressful events, environmental contexts, transactional processes between the person and the environment, factors of internal resilience, resilience process, adaptation and reintegration. Inspired by the theories of Lazarus and Folkman (1984), the author claims that the stress is not directly linked to the nature of the event itself, but to the way the event is evaluated and perceived. People facing a situation evaluate it according to their perceptive patterns, their available resources to deal with it and the expected consequences. Stress will therefore derive from the personal assessment of the demand as excessive for one's coping skills and with the expectation of negative consequences.

It is also necessary to take into account the evaluation of the context in which this cognitive evaluation takes place: for most people stress levels increase when facing deeply unpleasant events, ambiguous situations or situations with an uncertain outcome. The relationship between the person and his/her environment is a dynamic interchange. People facing an event try to deal with it and in doing so they change the starting situation. The new situation is re-evaluated and people continue to try to cope. Furthermore, the perceived level of stress depends on the degree of correspondence between the requests deriving from an event and the personal resources available to react to that event. The ability to deal resiliently with stressful events is also influenced by some personal characteristics that can be summarized with the awareness of being an active agent. Awareness is closely related to self-confidence, self-efficacy, internal locus of control, optimism and hope. Kumpfer highlights how

people who have the above-mentioned qualities tend to be more persistent and determined and this influences being resilient.

3. RESILIENCE AND WELL-BEING, WHICH RELATIONSHIP?

In the attempt to achieve a consensual definition of the concept of resilience, different positions emerged and highlighted the complex relationship between resilience and well-being.

There is, in fact, a unanimous consensus about the salutogenic value of the process of resilience in terms of well-being, which is closely linked to the development, growth and generative capacity of the individual.

On the other hand, the theoretical landscape appears to be more heterogeneous if we consider the possibility that the processes of resilience can be accompanied by manifestations of different levels of psychological distress.

Bonanno (2004) underlines the protective value of resilience against the destructive potential contained in some life experiences, such that the well-being of people would be in some way "immunized" and would maintain its ordinary functioning level, without suffering any alteration.

According to this perspective, properly resilient people face the different circumstances of life, without suffering their harmful effects. This view aims to establish a clear distinction between the concept of resilience and other similar ones, such as the concept of "*Post-Traumatic Growth*", developed by Tedeschi and Calhoun (2004). The "*Post-Traumatic Growth*" refers to the process of positive restructuring of self-perception, of one's life, of its aims and interpersonal relationships, triggered by a potentially traumatic life event, which may be the onset of a serious pathology. As a result of the event, people identify pain and difficulties, maintain the necessary flexibility in relation to what happens and put into place processes of reworking the event both at an affective and a cognitive level that are functional to a process of growth.

The literature also highlights that the relationship between resilience and well-being varies also according to the context in which the phenomenon is considered.

Research aimed at the study of resilience processes in developmental age considers the phenomenon in a longitudinal perspective, taking into account the components aimed at favouring personal development and, eventually, at correcting or compensating over time for any problems encountered. In this perspective, resilience is a powerful factor in promoting well-being whose benefit will be verified over the long term. On the contrary, the study of resilience in adulthood pays more attention to the protective, safeguarding and, possibly, increase potential of an already acquired level of well-being. Possible corrections over time are very limited and the constraints present in environmental contexts, for example family or work, are usually much stronger and subject to less choice, as they are the result of already selected options. Moreover, as chronological age increases, so does the incidence of organic pathologies, whose harmful potential in terms of psychological well-being is known. It is no coincidence that, in this context, the study of resilience focuses on the identification of personal or environmental resources that seem to favor the "stability" of healthy functioning (Bonanno, Papa, & O'Neill, 2001).

The concept of health is considered in all its components, starting from the more properly organic ones, consistently with the "Positive human health" model by Carol Ryff and Burton Singer (1998). Over time, research has identified the different models linking resilience to variables that directly or indirectly express health status ("health outcomes"). Consequently, the variable considered can have direct effects on physiological, biological or neurological parameters, that is, it can indirectly act on the increase or development of salutogenic behaviors such as physical exercise or eating habits or can even intervene through the the so-called stress-buffering effect, that is to say intervening on the way in which people respond to stress, including stressors linked to acute and chronic illness (Ouellette, & Di Placido, 2001).

4. BEING RESILIENT: BETWEEN MYTHS AND REALITY

To better understand the construct of resilience, it also appears necessary to differentiate it from the notions of "invulnerability" and "self-sufficiency".

A few decades ago, Antony (1974) spoke of the invulnerable child syndrome. He, referring to many myths of the ancient world in which the hero's invulnerability is linked to the maternal intervention (Achilles) or to the hero's ability to create his own invulnerability through self-confidence (Hercules), he asks himself, if there is a psychological immunity to risk or if there is, rather, a higher stress threshold for some than for others. In reality the term "invulnerability" is misleading and should be replaced with the term resilience.

In an attempt to clarify the concept of risk and vulnerability/invulnerability, Anthony (1982) uses the "three dolls metaphor". If we take three dolls made of different materials (glass, plastic and steel) and give each doll a hammer stroke of equal intensity, the effects of the blow will be different depending on the material the doll is made of: the glass doll will shatter into a thousand pieces; the plastic doll will bear a permanent scar; the steel doll will not suffer any damage. Later, the concept of invulnerability was abandoned and replaced with the model of resilience. Similarly, the notion of invulnerability / vulnerability was overcome by the statement that subjects exposed to the same risks develop differently, bearing in mind the integration between risk and protective factors.

The clear danger, connected to the myth of invulnerability and the image of superhumans, consists in identifying vulnerability with weakness and invulnerability with force. In a historical moment when performance seem to be the paradigm of the value of the human being, there is a tendency to look away from suffering to immediately overcome the emergence of a crisis condition.

In reality, the ability to overcome a stressful condition should not be perceived as a casual overcoming of crises, as if in the experience there is no pain or suffering, as if around the person there was a protective sheath and every problem rebounded without procuring suffering and pain. The process of resilience actually involves a great challenge: perceiving at the same time pain and courage, facing difficulties in a competent manner, integrating the experience of the crisis into the complex web of

individual and interpersonal human events (Schwartz, 1997). People considered resilient may experience "resilience breaks", as showed by moments of failure, depression and discomfort. Moments of vulnerability constitute an integral part of the process of response to adverse circumstances, which is characterized not only by a high capacity of resistance - consistent with the original meaning of the term - but also by a marked orientation towards "transformation, to establish a new, more advantageous condition (Cyrulnik, 2005).

Hence, Dan Short and Casula (2004) define resilience as "the determined will to remove obstacles and overcome contingent difficulties, in order to move forward with conscious optimism. Resilient is one who knows how to endure pain without complaining, who knows how to face difficulties without despairing, who has the courage to undertake a tortuous path and knows how to carry out what has been undertaken. Resilient is someone who loves life and cultivates a virtue that moderates and limits fears of death, failure and destruction. Resilience is also dealing with one's own powerlessness and overcoming the fear of tomorrow. The most important thing is the ability to bear and resist the weight of situations and events that happen. Those who have learned to endure can resist. People who could not immediately change the course of events and have believed in their abilities to generate new opportunities have not failed in life. Resilience is also determination, perseverance and patience. Resilience is an antidote to any attempt at resignation and abandonment to destiny, to the tragedy or fatality of the superiority of events over the person. It is the capacity to accept wounds in the struggle for self-realization, which requires wisdom and discernment, so as not to be confused with blind impetus, irresponsibility and unconsciousness".

Chapter 2

TOWARDS A TRANSVERSAL DEFINITION OF PSYCHOLOGICAL RESILIENCE: A LITERATURE REVIEW

1. THE COMPLEXITY OF THE RESILIENCE PHENOMENON

The broad and articulated research carried out on resilience has highlighted the versatility of the construct and made the attempt to reach a shared definition of the concept more complex.

Over the years, many definitions of the term resilience have been proposed to describe the construct. Although differing in their theoretical references and for the factors highlighted, they share a common vision of resilience as a complex phenomenon and the identification of numerous interacting variables. To date, the literature agrees that there are two necessary and enough conditions for identifying the dynamics of the resilience process: exposure to a significant risk and positive evolution in terms of psycho-social well-being, despite the threat to which one is subjected (Luthar 2015). A 'significant risk' refers to any element of a situation that is perceived as lacking a reachable solution and that can lead to a dysfunctional adaptation and to a condition of psychological distress (Garmezy 1993; Stephens 2013). In this perspective, resilient individuals would be able to rework their individual existence thanks to a 'positive evolution' of their life project, despite the surrounding conditions. They develop the ability to integrate suffering and psychic vulnerability with personal, family, relational and existential resources, managing to expand them according to their own needs. Though there seems to be a common ground in the work of researches, focusing on the process of psychological resilience, the concept is used in many ways depending in part on the area of application, with several implications from a theoretical and practical point of view. Consequently, these discrepancies hinder a shared definition of the construct and limits comparisons among research

results, making objective measurement difficult. Thus, the importance of moving towards a conceptual unification of the term becomes evident.

Based on this premise, we engaged in a literature review of definitions of the term 'psychological resilience' aimed at identifying shared elements in defining the construct across the works examined. Findings were used for proposing a broad definition of psychological resilience that considers the multidisciplinary and various theoretical backgrounds associated with it and the different areas of application. This conceptual unification could be a useful starting point for future research focused on identifying effective training strategies to promote and support resilience resources and thus the personal well-being.

2. MATERIALS AND METHODS

A literature review of the term 'psychological resilience' was performed by using the electronic database 'PubMed' and 'PsycINFO'. Scientific articles published between 2002 and May 2019 were reviewed according to the following key terms: 'psychological', 'resilience', and 'definition'. The initial search in PubMed, using the keywords 'psychological' and 'resilience', produced 7553 results. Subsequently an additional filter was added, the keyword 'definition', in order to focus exclusively on the articles that consider definitions of psychological resilience. This filter significantly reduced the number of publications to 82. These studies were further filtered by applying the following exclusion criteria.

Articles not written in English and those that did not contain a definition of the resilience, after the full text screening, were removed. In the end, 58 articles are selected through this process for the identification and analysis of the definitions, highlighting recurrent elements and specific characteristics.

The same search with the same filters was repeated in the PsycINFO online database. As a result, 22 articles were singled out, as showed in Figure 1.

The search ultimately produced 126 definitions of psychological resilience developed by 109 work groups and each of them has been catalogued by content and authors. Data were independently reviewed by two authors, and then compared and discussed to reach a consensus. After analyzing these results, five macro-categories were identified by taking into account the specific elements of each definition.

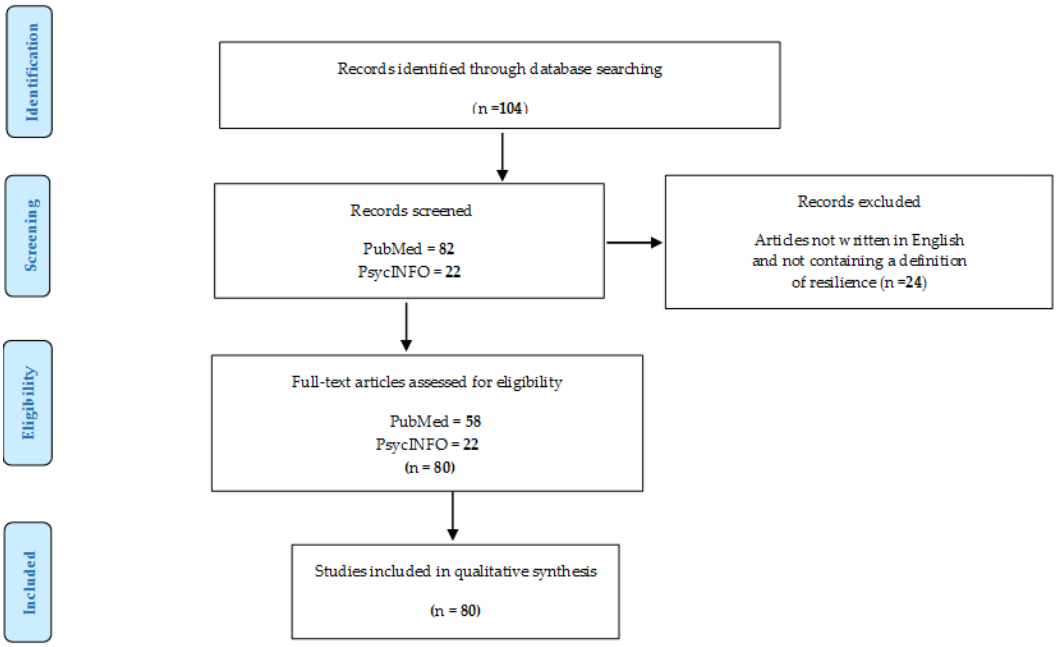


Figure 1. PRISMA checklist showing process of articles selection for inclusion in the literature review.

3. RESULTS

The five macro-areas identified summarize what has been reported in the literature in recent years concerning description of the resilience phenomenon. They serve as a preliminary and necessary step to identify the transversal elements that can comprise a broad definition of 'psychological resilience'. Each macro-category focuses on a specific feature of the resilience construct, helping to highlight its complex nature and its several implications in the various interacting contexts. Below is an overview of the key aspects of the following five macro-categories:

1. Ability to recover
2. Type of functioning that characterizes the individual
3. Capacity to bounce back
4. Dynamic process evolving over time
5. Positive adaptation to life conditions

3.1 ABILITY TO RECOVER

Many authors focused on what makes people capable of dealing with the adversities of life, traumas, stressors, trying to understand why some manage to recover after having experienced tragic events or particularly significant losses. In this regard, resilience has been defined as the ability to recover, despite adverse conditions, looking ahead through a dynamic process of adaptation supported by a deeper knowledge of oneself and influenced by personal characteristics, family and social resources (see Table 1).

Table 1. Ability to recover.

Reference Articles	Definition proposed	Citation Source
Stephens [2013]	*Resilience is the capacity to recover from extremes of trauma, deprivation, threat, or stress.*	Atkinson [2009]
Barber [2013]	*Resistance referring to maintained functioning under stressful conditions and resilience describing quick or full recovery from significant decrements in functioning upon exposure to stress.*	Bonanno [2008]; Masten [2001]
Barber [2013]	*Resilience as intrinsic recovery, a fundamental characteristic of normal coping, not a sign of exceptional strength.*	Bonanno [2008]
Caldeira [2016]	*Resilience is the ability to recover from perceived adverse or changing situations, through a dynamic process of adaptation, influenced by personal characteristics, family and social resources, and manifested by positive coping, control and integration.*	Caldeira [2017]
Whitson [2015]	*Resilience has been defined as the capacity to remain well, recover, or even thrive in the face of adversity*.	Hardy [2004]
Okvat [2011]	*By resilience, we mean the capacity to sustain well-being and recover fully and rapidly from adversity.*	Zautra [2008]
De Terte [2014]	*Psychological resilience has been defined as the ability of an individual to rebound or recover from adversity.*	Leipold [2009]
De Terte [2014	*Resilience has been defined as the ability of an individual to recover quickly from the psychological effects of an adverse event.*	Bonanno [2010]
Kokufu [2012]	*Psychological resilience is a mental quality that leads to adaptive recovery in difficult situations despite the feeling of pain.*	Kokufu [2012]
Vahia [2011]	*Resilience is broadly defined in physiological terms as the ability to return to homeostasis in the presence of stressful experiences that would be expected to bring about negative effects.*	Rutter [2006]
Stainton [2018]	*The term resilience is used in the literature for different phenomena ranging from prevention of mental health disturbance to successful adaptation and swift recovery after experiencing life adversities and may also include post-traumatic psychological growth.*	Rutten et al [2013]
Stainton [2018]	*It has also been hypothesized that resilience may result from the experience of prior stresses or adversities. Circumstances which are stressful enough to challenge, but not overwhelm, the individual, can provide the opportunity to learn skills or identify attributes which can help the individual to overcome future risks*	Harris et al [2016]

Johnston [2015]	*Resilience has been referred to as a kind of plasticity hat influences the ability to recover and achieve psychosocial balance after adverse experiences and as the ability to bounce back in the face of adversity. Resilience in older people has been described as the ability to achieve, retain, or regain physical or emotional health after illnesses or losses.*	Lundman [2012]
Dias [2005]	*Resilience is not invulnerability to stress, but, rather, the ability to recover from negative events.*	Cowan [1996]
Barber [2013]	*Basic conceptualizations of resilience (particularly, resistance) imply that it reflects uncommon imperviousness to expected injury or an unusual ability to quickly recover from it.*	Barber [2013]
Davydov, [2010]	*Some researchers describe mental resilience in terms of quick and effective recovery after stress. This parallels somatic recovery mechanisms after pathogen invasion through external and internal protective barriers, and describes the ability to 'spring back' to initial levels of mental, emotional and cognitive activity after an adversity (such as functional limitation, bereavement, marital separation, or poverty).*	Tugade [2004]
Dulin [2018]	*Defined resilience as the "ability to resist negative psychological responses when confronted with stress or trauma.*	Pecoraro [2016]

3.2 TYPE OF FUNCTIONING THAT CHARACTERIZES THE INDIVIDUAL

Resilience is described in the literature as a peculiar response of the individual identified through the use of their personal characteristics to face difficult conditions. Since, it is assumed that serious adversities destabilize most people, resilient functioning in such situations is considered extraordinary. It manifests itself in adaptive attitudes and behaviors that allow one to remain psychologically healthy, or even foresee personal growth, after exposure to stressful life events. The capacity for positive adaptation is given by specific personal attitudes and qualities promoting balance in the face of change (see Table 2).

Table 2. Type of functioning that characterizes the individual.

Reference Articles	**Definition proposed**	**Citation Source**
Barber [2013]	*Resilience, by definition, is a unique, nonnormative type of functioning that can be exhibited only in the face of adversity. Because severe adversity is presumed to disable most people, resilient functioning in such contexts is viewed as extraordinary. As the argument goes, this would be the case especially in severely adverse contexts such as war and other forms of violent political conflict wherein simply escaping psychopathology would qualify as resilience.*	Barber [2013]
Barber [2013]	*Related is the debate about whether resilience should be considered as resistance or recovery. For some, rather than revealing competent adjustment, the construct describes a distinctive response in the face of challenge or risk that is variously characterized as resisting, escaping, being less vulnerable, not struggling as much as others, or having a heightened ability to handles stress.*	Hoge [2007]; Westpahl [2007]; Wexler[2009]
Çuhadar [2016]	*Psychological resilience is defined as the ability of an individual to successfully overcome negative conditions and adopt to them even when faced with difficult conditions such as serious health problems and is a personal property as a source of resistance when faced with stressful life events.*	Luthar [2000]; Reis [2004]; Terzi [2008]; Öz [2009]; Basim [2011]; Wright [2013]; Schumacher [2014]
McAllister [2015]	*Resilience refers to one's ability to deal with stress and adversity and is influenced by genetic, epigenetic, developmental, neurochemical and psychosocial factors.*	Connor [2003]; Evers [2011]; Karoly [2006]; Wu [2013]
Patel [2017]	*Resilience as an ability of adults to "maintain relatively stable, healthy levels of psychological and physical functioning.*	Bonanno [2004]

Johnston et al [2015]	*Resilience is the ability to maintain healthy levels of function over time despite adversity or to return to normal function after adversity.*	Bonanno [2007]; Bonanno [2008]; Costanzo [2009]; Bonanno [2010]; Scali [2012]; Lam [2010]; Taylor [2011]
Sharpley [2014]	*Psychological resilience is an intervention or buffer variable between stress and depression, possibly working by an active physiological process that reduces autonomic responses to stressors.*	Luthar Cicchetti [2000]; Charney [2004]
Sudom [2014]	*Resilience can be viewed as a personal characteristic or set of characteristics that protects individuals from the adverse effects of stress on well-being.*	Connor [2003]; Luthar, [2000]
Garcia-Dia [2013]	*Defined resilience as the ability of adults in otherwise normal circumstances, who were exposed to an isolated and potentially highly disruptive event, to maintain relatively stable and healthy levels of psychological and physical functioning and the capacity for generative experiences and positive emotions.*	Bonanno [2004]
Ungar [2013]	*Resilience is ''an interactive concept that is concerned with the combination of serious risk experiences and a relatively positive psychological outcome despite those experiences''.*	Rutter [2006]
De Terte [2014]	*The ability of an individual to remain psychologically healthy or stable despite the fact that they have been exposed to an adverse event.*	Bonanno [2004]
Earvolino-Ramirez [2007]	*The literature on ego-resiliency refers to personal characteristics of the individual as encompassing a set of traits reflecting general resourcefulness and sturdiness of character.*	Block Block [1980]
Patel [2017]	*Resilience "as an attribute (e.g., ability, capacity), a process, and/or an outcome associated with successful adaption to, and recovery from adversity" and that it "differs depending on context and purpose.*	Pfefferbaum [2015]
Davydov [2010]	*Resilience (or 'resiliency') as an individual trait, or an epiphenomenon of adaptive temperament.*	Ong [2006]; Wachs [2006]
Harvey [2004]	*Resilience was largely determined by innate factors,and was therefore relatively unaffected by development or by interaction with the environment.*	Rutter [1991]
Stephens [2013]	*We describe a resilient individual as someone who has not only survived adversity but has also learned from the experience with resulting personal growth.*	McAllister [2011]
Barber [2013]	*Resilience refers explicitly and exclusively to functioning in contexts of substantial risk or adversity.*	Rutter [2006]
Barber [2013]	*Resilience is a unique form of competent functioning that can only be apparent in the face of considerable adversity.*	Rutter [2012]
De Terte, [2014]	*Resilience is the ability to maintain psychological and physical health despite exposure to a traumatic event.*	Bonanno [2004]
Brodsky [2013]	*Resilience consists of internal, local level goals that are aimed at intrapersonal actions and outcomes—adapting, withstanding, or resisting the situation as it is. Empowerment is enacted socially—aimed at external change to relationships, situations, power dynamics, or contexts—and involves a change in power, along with an internal, psychological shift.*	Cattaneo [2010]
Kim-Cohen [2012]	*Resilience is theorized to result from a dynamic interplay among multiple factors that threaten adaptive functioning, as well as multilevel factors that protect against adversity and promote positive adjustment.*	Cicchetti [2006]; Luthar [2007]; Masten [2012]; Rutter [2006]
Cuhadar [2016]	*Psychological resilience depends on various factors involving cognitive flexibility, positive affect and optimism, humor, acceptance, active coping and religion/ spirituality, altruism, social support, role models, exercise, capacity to recover from negative events, and stress inoculation.*	Southwick [2005]
Hilliard [2015]	*Resilience is the demonstration of emotional, behavioral, or health outcomes that match or surpass normative developmental milestones, behavioral functioning, or emotional well-being, despite exposure to the substantial challenges of living with and managing a medical or developmental condition. These resilient outcomes should first focus on explicitly positive experiences or the maintenance of a typical trajectory, but could also include the absence of negative experiences, such as low levels of distress or dysfunction.*	Hilliard [2016]
Graber [2004]	*Resilience is associated with lowered psychological distress and health-promoting lifestyles.*	Black [2004]; Campbell-Sills [2006]
Tan [2019]	*Resilience can potentially refer to preexisting personality traits, the dynamic process of adaptation, a psychosocial outcome or a mixture of all three.*	Luthar [2000]; Bonanno [2011]; Southwick [2014]
Tan [2019]	*Specific qualities comprising resilience have been identified including optimism, active coping skills and maintaining a social network.*	Iacoviell [2014]
Eshel [2018]	*Resilience has thus been defined as a stable trajectory of healthy functioning after a highly adverse event.*	Southwick [2014]
Eshel [2018]	*Resilience has thus been defined as the balance of individual strength (protective factors) and vulnerability (risk factors) following an adversity or a traumatic event.*	Eshel [2016]; Eshel [2016]
Eshel [2018]	*Resilience represents an integration of strength and vulnerability, and that understanding adaptation to adversities requires a concurrent examination of protective processes and risk factors*	Masten [2011]
Stainton [2018]	*Healthy, adaptive, or integrated positive functioning over the passage of time in the aftermath of adversity.*	Southwick [2014]

Stainton [2017]	*In the context of exposure to significant adversity, resilience is both the capacity of individuals to navigate their way to the psychological, social, cultural, and physical resources that sustain their wellbeing, and their capacity individually and collectively to negotiate for these resources to be provided and experienced in culturally meaningful ways.*	Ungar [2011]
Stainton [2018]	*Resilience is a dynamic capability which can allow people to thrive on challenges given appropriate social and personal contexts.*	Howe [2012]
Dulin [2018]	*Resilience as a mechanism for the protective effects of conscientiousness on health outcomes*	O'Cleirigh [2007]
Dulin [2018]	*Defined resilience as "a combination of personality characteristics and successful coping that allows an individual to function adaptively in the face of or following adversity."*	Dale [2014]
Casale [2019]	*Resilience is broadly defined as a protective factor that makes people less vulnerable to future adverse life events.*	Ayed [2018]
Li [2015]	*Resilient people have the ability to adjust and cope successfully in the face of adversity, exhibiting a stable trajectory of healthy functioning across time and the capacity for positive emotions after having experienced stressful life events.*	Bonanno [2001]
Sharpley [2014]	*Psychological resilience defined as a set of specific behavioural or attitudinal skills which help an individual cope effectively with stress and avoid becoming depressed.*	Von Ammon [2001]; Bitsika [2011]; Sharpley [2012]
De Terte,[2014]	*Psychological resilience is as a combination of cognitions, behaviors, and environmental factors. These factors are optimism, adaptive coping, adaptive health practices, and social support from colleagues.*	De Terte, [2014]

3.3 CAPACITY TO BOUNCE BACK

Many authors define psychological resilience as the ability to recover and at the same time as the development of one's resources and potential in the face of difficulties or stressful events. Understood in this way, the resilience construct is configured as an attitude to adopt effective negotiation strategies that allow one to confront adversity and to bounce back from the negative experience by promoting a process of personal growth (see Table 3).

Table 3. Capacity to bounce back.

Reference Articles	**Definition proposed**	**Citation Source**
Silverman [2017]	*Resilience is defined in the positive psychology literature as the human capacity to persist, bounce back and flourish when faced with stressors.*	Bonanno [2004]
Chen [2016]	*Resilience is the capacity to adapt to and bounce back from adversity and stressful events.*	Davidson et al. [2005]; Prince-Embury [2013]
Brush [2011]	*Resilience as the ability to bounce back or cope successfully despite substantial adversity.*	Earvolino-Ramirez [2007]
Netuveli [2008]	*Resilience is having good outcomes despite adversity and risk and could be described in terms of preserving the same level of the outcome or rebounding back to that level after an initial set back. Using the latter definition, resilience as "bouncing back". Resilience could involve either rebounding after adversity.*	Garmezy, [1993]
Violanti [2008]	*The term resilience is often used to imply an ability to bounce back. Consequently, the definition adopted here embodies the notion of adaptive capacity.*	Klein [2003]
Earvolino- Ramirez [2007]	*Resilience, the ability to bounce back or cope successfully despite substantial adversity.*	Rutter [1993]
Kalisch [2015]	*The process of effectively negotiating, adapting to, or managing significant sources of stress or trauma. Assets and resources within the individual, their life and environment facilitate this capacity for adaptation and*	Windle [2011]

	"bouncing back" in the face of adversity. Across the life course, the experience of resilience will vary.	
Xing [2013]	*Psychological resilience is defined as an individual's ability to effectively adapt to and rebound from negative experience.*	Lazarus [1993]
Sharpley [2014]	*Various aspects of this construct of psychological resilience have been identified, including the ability to rebound from disappointments, positive adjustment behaviors in adverse circumstances, or simply successful adaptation to challenging life stressors.*	Brooks [2005; Tedeschi [2005]; Alvord [2005]

3.4 DYNAMIC PROCESS EVOLVING OVER TIME

In the literature, it also emerges that coping with situations perceived as adverse or changeable occurs through a dynamic process of adaptation, influenced by personal characteristics, family and social resources. Resilience should therefore be understood not only as a personal attribute that can lead to success, but also as a dynamic interaction associated with adaptability and a positive history of functioning after adversities (see Table 4).

Table 4. Dynamic process evolving over time.

Reference Articles	**Definition proposed**	**Citation Source**
Dias [2015]	*Resilience may be defined as a dynamic process involving the interaction between both risk and protective factors, internal and external to the individual, that act to modify the effects of an adverse life event.*	Brandão [2011]; Yunes [2003]
Dias [2015]	*Resilience should be understood not only as a personal attribute that may lead to success, but also as the dynamic interaction between biological and psychosocial processes*	Dias [2015]
Caldeira [17]	*We propose a definition of resilience which is the ability to recover from perceived adverse or changing situations, through a dynamic process of adaptation, influenced by personal characteristics, family and social resources, and manifested by positive coping, control and integration.*	Caldeira [2016]
Kim-Cohen [2012]	*Resilience is theorized to result from a dynamic interplay among multiple factors that threaten adaptive functioning, as well as multilevel factors that protect against adversity and promote positive adjustment.*	Cicchetti [2006]; Luthar [2007]; Masten [2012]; Rutter [2006]
Stephens [2014]	*Resilience is "an ongoing process of struggling with hardship and not giving up".*	Gillespie [2007]
Garcia-Dia [2013]	*Resilience can occur either as a process or as a motivational life force that can be developed in individuals.*	Haase [2013]
Davydov [2010]	*Resilience as a process or force that drives a person to grow through adversity and disruption.*	Jacelon [1997]; Richardson, [2002]; Richardson [2002]
Patel [2017]	*Resilience is "a process or the attainment of positive outcomes at the individual, family, and community levels despite adversity (e.g., natural disaster, terrorist attack).*	Lemyre [2005]
Kim-Cohen [2012]	*Resilience is conceptualized as dynamic with the understanding that adjustment can fluctuate over time in response to a Stressor.*	Masten [2011]; Masten Narayan [2012]
Davydov [2010]	*Emotional resilience has been used as the process linking resources (adaptive capacities) to outcomes (adaptation).*	Norris [2008]
Levine [2009]	*Patterson's perspective that family resilience is an "ongoing, emergent process". Resilience was manifest in the process of moving from the position of "knowing" through listening to others to "knowing" developed in the context of listening to self.*	Patterson [2002]
Kim-Cohen [2012]	*Resilience is dynamic and interactive in that it is a process stimulated by the presence of adversity rather than simply the balance of risk versus protective factors.*	Rutter [2012]
Brush [2011]	*Resilience is the process as "the capability to adapt better than expected in the face of significant adversity or risk".*	Tusaie [2007]
Brush [2011]	*Resilience implies a process of hurdling resistance and, in doing so, gaining strength against future stressors, challenges, crises, or trauma,*	Hernandez [2007]

	much like a microbe develops resilience over time to an antibiotic and ultimately adapts to and survives its environmental conditions. Adaptation and survival are thus consequences of resiliency while resiliency is an important individual characteristic in the process of overcoming.	
Lee [2004]	*Resilience as an active process that develops internal resources for coping with stress.*	Woodgate [1999]
Cuhadar [2016]	*Resilience is a dynamic process related to an individual's capacity to cope with difficult or stressful experiences and the ability to psychologically overcome adversity.*	Luthar [2003]; Masten [2007]; Basim [2011]; Wright [2013]; Sharpley [2014]
Karoly [2006]	*Resilience is considered both functional and dynamic, in that it implies the effective performance of life tasks by virtue of a complex interaction between varied risk and protective factors.*	Luthar [1988]; Olson [2003]
Takahashi [2015]	*Resilience is defined as "a dynamic process encompassing positive adaptation within the context of significant adversity.*	Luthar [2000]
Whitson [2015]	*Resilience is a process associated with adaptive capacities and a positive history of functioning and adaptation after adversities.*	De Alfieri [2011]
Paletti [2007]	*Resilience as ''a set of qualities that foster a process of successful adaptation and transformation'' in the face of adversity. resilience may be seen as prerequisite to recovery; by engaging in resilient behaviors, bereaved individuals may work toward the self-transformation inherent in successful adaptation to loss.*	Benard [1995]
Earvolino- Ramirez [2007]	*Resilience is a dynamic developmental process.*	Luthar [1996]
Pangallo [2014]	*Resilience is best defined as process characterized by a complex interaction of internal and external resources moderated by developmental influences.*	Masten [1999]; Rutter [1993]; Werner [2011]; Windle [2013]
Ungar [2013]	*I defined resilience as the capacity of both individuals and their environments to interact in ways that optimize developmental processes. Specifically, research shows that in situations of adversity, resilience is observed when individuals engage in behaviors that help them to navigate their way to the resources they need to flourish.*	Ungar [2017]
Dias [2015]	*Resilience is a process associated with adaptive capacities and a positive history of functioning and adaptation after adversities. This dynamic process involves the interaction between biological and psychosocial factors, which makes its investigation more complex.*	Dias [2015]
Tan [2019]	*Resilience refers to a dynamic process of positive adaptation within the context of adversity*	Luthar [2000]
Eshel [2018]	*Resilience is a dynamic state of mind that may change due to changing circumstances which will modify the existing balance of individual protective factors and risk factors.*	Ungar [2011]
Stainton [2018]	*"Resilience is the process of effectively negotiating, adapting to, or managing significant sources of stress or trauma."*	Windle [2011]
Graber [2016]	*Psychological resilience is a psychosocial developmental process through which people exposed to sustained adversity experience positive psychological adaptation.*	Luthar [2006]; Rutter, [2006]
Dulin [2018]	*Resilience resources are also viewed here as processes that buffer against and are potentially more malleable to intervention than some of the aforementioned adversities at the individual, interpersonal, and neighborhood levels.*	Dale [2013]; De Santis [2011]; Kent [2008]; Steinhardt [2013]

3.5 POSITIVE ADAPTATION TO LIFE CONDITIONS

Resilience is also referred to as the ability to deal with stress conditions. The processes of psychological resilience have to do with the cognitive evaluation carried out by the subject, which regulates the possibility of finding effective forms of adaptation. The thought processes, the emotional and behavioral responses through which resilient subjects build their personal vision of reality, give rise to decisions and behaviors that allow them to adapt to stressful or adverse conditions (see Table 5).

Table 5. Positive adaptation to life conditions

Reference Articles	Definition proposed	Citation Source
Dias [2015]	*Resilience was defined as positive adjustment in case of adversity.*	Bekhet [2012]; Fernández-Lansac [2010]; O'Rourke [2014]; Bull [2012]; Fitzpatrick [2012]; Garces [2008]; Wilks [2012]
Hilliard [2015]	*Resilience: achieving one or more positive outcomes despite exposure to significant risk or adversity.*	Hilliard [2006]

Davydov [2010]	*Resilience' can be seen as synonymous with reduced 'vulnerability'; with ability to adapt to adversity.*	Hofer [2005]; Schneiderman, [20012]
Brodsky [2013]	*Resilience* is successful adaptation despite risk and adversity.	Masten, [2001]
Lee [1990]	*Defining resilience as the process of, capacity for, or outcome of successful adaptation despite challenging or threatening circumstances.*	Masten [2016]
Thomas [2009]	*Resilience is defined as the ability to overcome adversity and includes how one learns to grow stronger from the experience.*	McAllister [2018]
Thompson [2012]	*Psychological resilience is characterized by the ability to successfully adapt to stressful events in the face of adverse conditions.*	Norman [1993]
Pangallo [2014]	*Resilience is a temporal phenomenon, and as such, positive adaptation is likely to fluctuate according to circumstances and life stage.*	Pangallo [2014]
Garcia-Dia [2013]	*Resilience as adaptation and adjustment that occurs despite multiple personal and social losses.*	Rabkin [2014]
Brush [2011]	*Resilience is the capability to adapt better than expected in the face of significant adversity or risk.*	Tusaie [2007]
Davydov [2010]	*Resilience can be viewed as an epiphenomenon of adaptive temperament.*	Wachs [2006]
Li [2018]	*Resilient people have the ability to adjust and cope successfully in the face of adversity, exhibiting a stable trajectory of healthy functioning across time and the capacity for positive emotions after having experienced stressful life events.*	Bonanno [2001]
Chen [2016]	*Resilience the capacity to adapt to and bounce back from adversity and stressful events.*	Davidson [2005]; Prince-Embury [2013]
Caldeira [2016]	*Resilience is considered both as a psychological and physical aspect of coping with stress.*	Hart [2014]
Garcia-Dia [2013]	*Resilience was in fact quite common rather than uncommon as had been proposed by earlier researchers, and a fundamental feature of normal coping skills as manifested by seeking social support from others, moving forward with life and accepting your circumstances with hope.*	Masten, [2001]
Eisenach [2007]	*Resilience is a measure of coping ability, hardiness, and the ability to thrive in the face of adversity.*	Vaishnavi [2004]
Lee [2004]	*Resilience as an active process that develops internal resources for coping with stress.*	Woodgate [1999]
Lee [1990]	*Resilience as a capacity refers to an individual's capacity for adapting to changes and stressful events in a healthy way.*	Catalano [2009]
Chen [2016]	*Resilience as essentially a capacity of positive adaptation after exposure to social and psychological adversity.*	Prince-Embury [2013]
Whitson [2015]	*Resilience as a psychological construct, referring to adaptive attitudes and behaviors that allow one to remain psychologically sound, or even thrive, after being exposed to stressful life events.*	Luthar [2000]; Wagnild [2010]
Li [2015]	*Resilience can be used to represent an individual's successful adaptation to trauma.*	Wang [2002]
Miller [1993]	*Resilience as a personality characteristic that minimizes the negative effects of stress and promotes adaptation.*	Wagnild [2010]
Patel [2017]	*Resilience is not a process, it is not a management system standard, nor is it a consulting product. Resilience is a demonstrable outcome of an organization's capability to cope with uncertainty and change in an often volatile environment. Resilience is thus a product of an organization's capabilities interacting with its environment.*	Gibson [2016]
Horn [2017]	*Resilience is broadly defined as the dynamic ability to adapt successfully in the face of adversity, trauma, or significant threat. Resilience is complex and might be best conceptualized on a continuum, with the potential for it to change across an individual's lifespan.*	Southwick [2014]
Cosco [1993]	*Resilience involves positively adapting to adverse events.*	Luthar [1998]; Rutter [1993]
Harvey [2004]	*Resilience as ''manifested competence in the context of significant challenges to adaptation or development''.*	Masten [2008]
Davydov [2010]	*Emotional resilience has been used as a concept to imply the flexible use of emotional resources for adapting to adversity or as the process linking resources (adaptive capacities) to outcomes (adaptation).*	Waugh [2015]; Norris [2008]
Johnston [2015]	*Resilience can be conceptualized as the process of achieving unexpected positive outcomes in adverse conditions, as opposed to an individual trait.*	Taylor [2011]
Dias [2015]	*Resilience is a process related to adaptive capacities or to a positive trajectory of functioning and adaptation after a traumatic situation.*	Fitzpatrick [2012]; Garces [2012]; Norris [2008]; Wilks [2012]
Eshel [2018]	*Resilience has thus been defined as "the potential of manifested capacity of a dynamic system to adapt successfully to disturbances that threaten the function, survival, or development of the system.*	Masten [2015]
Stainton [2018]	*Resilience appears to be a common phenomenon that results in most cases from the operation of basic human adaptational systems. If those systems are protected and in good working order, development is robust even in the face of severe adversity.*	Masten [2001]
Dulin [2018]	*Resilience resources as positive psychological, behavioral, and/or social adaptation in the face of stressors and adversities that draws upon "an individual's capacity, combined with families' and communities' resources to overcome serious threats to development and health".*	Fletcher [2013]; Earnshaw [2013]; Unger [2008]

4. DISCUSSION

Our literature review shows that psychological resilience is described in different ways. This discrepancy in terminology can hinder a shared definition of the construct that limits comparisons among the research results and makes objective measurement difficult. Based on our analysis of the literature, we identified five macro-categories which, on the one hand, summarize the recurring elements in the definition of resilience across the works examined; on the other, they highlight the multidimensionality of the construct.

Over the years, several authors described resilience as 'ability to recover'. However, this expression has been understood in various ways. Specifically, some authors define resilience in terms of ability to recover from trauma, stress or deprivation; others understand it as the ability to remain well despite the difficulties or to recover completely and quickly. The recovery is also intended as a return to a state of balance or as a posttraumatic growth ability or as learning of useful skills for overcoming future risks. Additional authors describe resilience in terms of recovery by using protective barriers to stress. Summarizing, the ability of recovery represents the tendency of the individual to maintain their own internal balance despite the experience of traumatic events or stressful conditions. Moreover, the capacity for resilience indicates the ability to deal positively with traumatic events and to re-organize in the face of difficulties.

We found that resilience was also described in literature as a '*Type of functioning that characterizes the individual'.* The resilience functioning was intended as an ability both to maintain good levels of psychological and physical health and to return to a state of balance despite adversities. In this context, a reference to resilient qualities emerges in terms of individual features or personality traits, such as robustness and resourcefulness, with some authors affirming that these qualities are innate and influenced from the external environmental only in a limited way. The functional adaptation to adverse conditions can be facilitated or hindered by the interaction between protective and risk internal factors. As regards, literature has recently turned towards a concept of resilience understood as a complex phenomenon that comes into play several factors including innate personality traits,

personal purposes, the external and the psychosocial context. Exploring the protective factors that enable the implementation of resilient behaviors, we can identify the following categories: cognitive flexibility, positive affect and optimism, humor, acceptance, active coping and religion or spirituality, altruism, social support, role models, exercise, capacity to recover from negative events, and stress inoculation. In summary, what determines resilience are the personal qualities identified as protective factors despite stressful or traumatic events.

A third group of definitions, albeit small, refers to resilience as '*capacity to bounce back'*. Although this description of resilience seems to be like that of the ability of adaptation, we believe that it deserves to be included in another category as it emphasizes a particular response mode, namely referring to some specific characteristics. Thus, resilience as *capacity to bounce back* outlines the ability to persist and grow when faced with stressors, to cope despite adversity and to bounce from negative experience. Resilience refers to having good outcomes despite adversity and risk and could be described in terms of preserving the same level of outcome or rebounding back to that level after an initial set back. More specifically, resilience as 'bouncing back', could involve either rebounding after adversity or affectively adapting to adversity.

The resilience construct over the years has also been identified as '*dynamic process evolving over time*'. Specifically, dynamic process here means firstly the interaction between internal and external protective factors that act to modify the personal effects of an adverse event. Secondly, it refers to the interaction between personal characteristics, biological processes, family and social resources that can promote or hinder resilient processes. Within this macro-category, it is possible to identify several shades of meaning of the term resilience. Some authors define it as a vital motivational force of the individual that foresees an attitude of continuous struggle and an inclination not to surrender before difficulties; or as a force that can fluctuate over time and push the person to grow through the adversities or interruptions of their life trajectory. Others emphasizes the ability to promote developmental processes and identify resilience with a dynamic mental state that can adapt to changing circumstances. Resilience is also defined as a process through which individuals survive or

even grow in front of adversity. It involves both a set of qualities or internal traits, such hardiness or high self-efficacy, and external factors, such as social support, that promote coping skills.

Given the great attention paid by the literature on the meaning of resilience as a capacity for adaptation, we decided to include this definition in a specific category, namely '*positive adaptation to life condition'.* In describing resilience in these terms, authors emphasize different aspects of the phenomenon. Some describe it as the ability to promote positive adaptation despite exposure to adverse, stressful or traumatic conditions. Others define it as an adaptive attitude and behavior that allows one to remain psychologically healthy, or even to thrive until a post-traumatic growth, after being exposed to stressful events. Thus conceived, resilience implies that emotional resources are used to adapt to adversity and therefore it can also be described as the process that links resources (adaptive capacities) to results (adaptation).

Other authors focus attention on the duration of the phenomenon. In particular, some describe resilience as a temporary phenomenon, subject to fluctuations based on life circumstances and the stage of development; for others it represents a stable trajectory of operation over time.

The analysis of the literature shows that the term resilience does not have a single meaning and takes on different nuances depending on the perspective from which it is analyzed. In the field of resilience studies there is an heated debate among scholars, in particular between those who consider resilience as a trait of personality fixed and stable over time and therefore measurable ('Type of functioning that characterizes the individual') and those who do not consider it as a personality trait but rather as 'dynamic process evolving over time', that refers to the interaction between protective factors and risk factors. Specifically, the effects of protective factors such as 'Type of functioning' are detectable only in presence of the stressful events and their role is to modify the response despite adversity. The 'dynamic process' is instead described as the interaction of a constellation of variables that allow the reduction of the impact with the risk conditions and thus the effectively dealing with the adverse condition. In the 'recovery category' it is also possible to identify the attitude toward a gradual return to an initial state, staying well and maintaining an effective functioning, despite the destabilization

caused by an adverse event that has a significant impact on the person. Therefore, it is understood as a return to an initial state of balance. The 'Capacity to bounce back' instead emphasizes the possibility of a personal growth despite difficulties, changes, traumatic events rather than a return to an initial state of mind. Literally, 'bounce back' means rebound and change of direction. It refers to the tendency to be persevering and not to give up, assuming an attitude of openness to change.

We consider the fifth category, that is 'Positive adaptation to life conditions', as transversal to the other four we have identified, because the concept of effective adaptation to life events is implicit in each of them. Nevertheless, we have established it as a different category than the others since many definitions in the literature focus on the concept of positive adaptation to define resilience. As can be seen by comparing the tables, the category that identifies resilience as 'positive adaptation' includes many definitions.

Summarizing all the categories, the processes of psychological resilience make it possible to face events by maintaining and enhancing one's resources, to the point of producing personal strengthening and a positive reorganization of one's biographical history. Therefore, the use of resilient attitudes makes it possible to construct and rebuild one's life path, to re-establish a new balance by producing change in oneself and reacting positively in the face of difficulties, transforming them into opportunities for growth.

From the study we conducted, it was interesting to observe the multidimensionality of the resilience construct, that has been described in the literature from different points of view, in some cases with common characteristics. The revision of the definitions of resilience has allowed us to better clarify this term and to propose a broader definition characterized by the elements that we have supposed as being more indicative of the resilient attitude.

According to the results of our study, resilience should be considered as a "competence", present in each individual or organization, thank to which it is possible not to succumb to adverse events, but to react and to reach, or to return, to a state of equilibrium.

The importance of the work we carried out thus lies in having observed that resilience resources are considered as 'skills' that should be present and functional both on an individual level, for example in professional practice or in social relations, and in the organizations.

Moreover, being a dynamic process resilience can be implemented in order to promote a continuous growth of the person and the environment.

Getting to know more about the resilience construct also makes it feasible to structure training pathways focused on resilient human qualities, as tools aimed at fostering an attitude of openness to change.

Regarding the clinical setting, the analysis of the resilience construct we carried out through the review is a useful starting point also with reference to the identification of models of psychological intervention aimed at enhancing individual resources and abilities, in view to support the attitude to face adverse situations while maintaining an adaptive functioning.

However, it is necessary to underline that this study has some limitations that we hope to fill in a future research. More specifically, a limitation refers to the methodology of selection of the articles to be analyzed. The use of the keyword 'definition' inserted in both the accessed search engines has excluded some studies which could be useful to further widen the analysis of the resilience construct. Moreover, extending the study to other databased and considering also scientific articles written before 2002 would allow us to obtain a greater number of works and to identify probable further definitions of the term resilience.

5. CONCLUSIONS

The analysis of the literature has made possible to identify multiple definitions of psychological resilience. As proposed in our discussion of the results, the concept of resilience can be defined by focusing attention on different contents that describe it in a different way. Based on the previously discussed results, we propose our own definition of psychological resilience that takes into account

the transversal elements found in the definitions we analyzed, in order to proceed towards 'a conceptual unification' of the term.

According to the literature search we carried out, it can be affirmed that psychological resilience is the *ability to adapt positively to life conditions*. It is a *dynamic process* evolving over time that implies a *type of adaptive functioning* that specifically allowing us to face difficulties by *recovering* an initial balance or *bouncing back* as an opportunity for growth.

We believe that resilience is the ability to maintain one's orientation towards existential purposes, despite enduring adversities and stressful events. It foresees an attitude of persistence before the obstacle and openness to change. This concept can be understood as the ability to deal with the difficulties experienced in the different areas of one's life with perseverance, maintaining a good awareness of oneself and one's own internal and parallel coherence by activating a personal growth project. This persevering attitude makes it possible to activate one's own resources to recover after having experienced adverse conditions, reestablishing the state of personal balance. In our definition, the term "purpose" refers to the long-term objectives and the overall objective regarding existence in its complexity. This latter varies from individual to individual, according to their life commitments (vocational, affective, social, professional, etc.). Broadly speaking, through the acts of resilience related to partial ends, the individual becomes more and more persistent in the orientation to their personal fulfillment. Our attempt at conceptual clarification of the term resilience, in highlighting also that specific skills and individual characteristics are necessary for a good maintaining one's own orientation towards the existential purposes, will be a useful starting point for further research aimed at deeply exploring resilience resources, and at identifying effective training strategies to support them.

Chapter 3

THE ROLE OF RESILIENCE AND DISTRESS SYMPTOMS IN PATIENTS CANDIDATE TO BARIATRIC SURGERY: BIOETHICS AND PSYCHOLOGICAL ASPECTS

1. INTRODUCTION

According to the literature, patients requesting bariatric surgery have a higher prevalence of psychiatric co-morbidities compared to severely obese patients who do not seek the surgical procedure for their desired weight loss. These patients exhibit a high prevalence of psychiatric disorders, among which mood disorders, eating disorders, anxiety disorders, personality disorders, alcohol use, and low self-esteem (Kalarchian, Marcus & Levine, 2007). Studies conducted on severely obese patients typically focused on specific psychological and behavioral components, which can play a fundamental role in determining the efficacy of the bariatric intervention and the physical and mental well-being of the patient, regardless of their weight loss. Previous studies have demonstrated that among obese patients, there is a high presence of dysfunctional cognitive, emotional, and behavioral patterns characterized by impulsive traits, dysfunctional eating behaviors, and difficulties in self-regulating emotional states (Sarwer et al., 2019). Moreover, between 10% to 25% of bariatric surgery candidates are affected by binge eating disorder and a smaller proportion suffers from night eating disorder (Herpertz et Al., 2004).

Surgery candidates also appear to experience an impaired quality of life in several areas, including physical health, body image and social and occupational functioning. It is evident that these long-term difficulties can contribute to increasing the risk of developing a mood disorder (Fabricatore et Al., 2005). So, if sufficiently serious, these difficulties can complicate postoperative outcomes, including the patient's ability to adhere to postoperative dietary needs. In addition, they can play a part increasing the frequency of unwanted events such as nausea, vomiting and gastric dumping.

Preoperative behavioral complications can also compromise postoperative weight loss and long-term weight maintenance (Sarwer, Wadden & Fabricatore 2005). For example, in the study conducted by Kalarchian and colleagues (2008) it emerges that patients diagnosed with mood disorder undergoing bariatric surgery reported weight loss of 25.1% 6 months after surgery, which was significantly less than the 29.5% weight loss that had been experienced by patients who did not have a history of psychiatric disorders. Poor weight loss results have also been observed in patients with psychiatric disorders.

Finally, it is essential to focus attention on individual resources which, if properly enhanced, can support the patient in the process of change to which he is called along the treatment path. These resilience resources can, infact, promote a life project capable of integrating vulnerability with personal resources and expanding them by promoting the persistence of one's orientation towards the objective of improving the state of physical and mental health. In the literature it emerges specifically that low levels of resilience are closely associated with higher incidences of depressive symptoms (Sharpley et Al. 2016) and a high Body Mass Index (BMI) (Stewart-Knox 2012). This data allows to hypothesize that high levels of resilience can be identified as protective factors in relation to the condition of psychological distress and dysfunctional eating style.

In conclusion, the evaluation of patients in the phase prior to bariatric surgery, considering the elements of vulnerability and internal resources, appears to be necessary, not only to identify potential contraindications to surgery, but also to plan specific psychological interventions, in order to optimize results short and long term operators (Block 2013).

2. AIMS OF THE STUDY

The monocentric and retrospective study aims include the acquisition of useful elements for a psychological assessment designed to assess the suitability of candidates for bariatric surgery, focusing in particular on the construct of resilience. Therefore, it is optimal to identify both the

elements of psychological frailty of the patient and the cognitive resources of resilience in the obese patient, to understand how the latter can represent a reference parameter for the patients' eligibility for surgery. In addition, the current study was designed with the aim of analyzing the relationship between the components of psychological distress that occur most frequently in the obese patient and the presence of functional and adaptive resources of resilience that allow the patient to maintain a motivation and orientation toward the goal of long-term change. In addition, another, purely clinical, purpose of this study is to be able to correlate resilience with the eligibility for bariatric procedure.

3. MATERIALS AND METHODS

A sample of candidates for bariatric surgery was enrolled in the study according to a criterion of consecutive eligibility. All patients were selected who, from September 2019 to January 2020, carried out a clinical psychological assessment aimed at identifying any psychological and/or psychiatric contraindications to candidates to bariatric surgery in the department of Psychology of the Campus Bio-Medico University Hospital.

Inclusion criteria (table 1): patients over 18 years old who, following a bariatric surgery consultation, are candidates for bariatric surgery procedure according to the eligibility criteria established by the Italian Society of Bariatric and Obesity Surgery (SICOB) guidelines (2016).

The Ethic committee of the Campus Bio-Medico University Hospital approved this study and its development. All procedures performed in the study were in accordance with the ethical standards of the institutional and/or national research committee and the 1964 Declaration of Helsinki and its subsequent amendments or comparable ethical standards. The study involves the administration of questionnaires about the assessment of resilience resources, psychic functioning and mechanisms of emotional and behavioral self-regulation. Data are presented as numbers and percentages for categorical data and means and standard deviation for quantitative data.

Table1: PICOS Criteria

Parameters	**Inclusion criteria**	**Exclusion criteria**
Patient, population or problem	Patients candidate to bariatric surgery	Non italian Patients without a bariatric surgery first visit
Intervention, prognostic factor, or exposure	Patients over 18 years old, following a bariatric surgery visit, candidates for a bariatric surgery procedures according to the eligibility criteria established by the SICOB	
Comparison or intervention	The study involves the administration of questionnaires about the assessment of resilience resources, psychic functioning and mechanisms of emotional and behavioral self-regulation.	
Outcome you would like to measure or achieve	Role of Resilience and distress function in patients candidate to bariatric surgery	
Study design	Monocentric, monophase and retrospective study	

3.1 Sample size Calculation

The calculation of an adequate sample size thus becomes crucial in any clinical study and is the process by which we calculate the optimum number of participants required to achieve ethically and scientifically valid results. Generally, the sample size for any study depends on the acceptable level of significance; Power of the study; Expected effect size; Underlying event rate in the population; Standard deviation in the population. Some more factors that can be considered while calculating the

final sample size include the expected drop-out rate, an unequal allocation ratio, and the objective and design of the study.

There are several methods to calculate the sample size, depending on the type of data or study design.

The sample size is calculated using the following formula:

$$n = \frac{2\left(Z_a + Z_{1-\beta}\right)^{2\sigma 2,}}{\Delta^2}$$

where n is the required sample size. For Zα, Z is a constant (set by convention according to the accepted α error and whether it is a one-sided or two-sided effect) as shown below:

α-error	5%	1%	0.1%
2-sided	1.96	2.5758	3.2905
1-sided	1.65	2.33	

For Z1-,β,Z is a constant set by convention according to power of the study as shown below:

Power	80%	85%	90%	95%
Value	0.8416	1.0364	1.2816	1.6449

In the above-mentioned formula σ is the standard deviation (estimated) and Δ the difference in effect of two interventions which is required (estimated effect size).

In our study we calculate this parameters (Power calculation for One-way independent ANOVA): Power 0.950, Effect size 0.5, Significance level 0.05, Number of groups 5, Sample size 43,38. these data mean that you should have a stratification by 5 groups maximum divided by level of education, age, BMI. Each group should have around 43 people minimum.

3.2 Statistical analysis

SAS v. 11.2 was used to perform the statistical analyses on the following statistical methodologies: analyses on the primary components, Pearson and Spearman correlations, Student's t-test, principal component analysis, canonical discriminant analysis, clustering of variables with oblique principal components (using the 'varclus' procedure in SAS). The use of parametric approaches was justified by the high number of subjects far exceeding the threshold for considering as gaussian the error distribution.

3.3 Questionnaires

The current study involves the administration of the questionnaires listed below for the evaluation of psychiatric functioning, emotional and behavioral self-regulation mechanisms, and resilience qualities.

Symptom Checklist-90 Revised (SCL-90-R; Derogatis, 1983): a self-assessment questionnaire consisting of 90 items evaluating the presence and severity of symptoms of mental distress in various symptomatological domains. In particular, Somatization, Obsession-Compulsion, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, Psychoticism are assessed.

Barratt Impulsiveness Scale (BIS-11; Patton, Stanford & Barratt 1995): a self-assessment questionnaire of 30 items. The total score offers a quantitative estimate of impulsiveness that is derived from the sum of three factors: motor impulsiveness, defined as the tendency to act without thinking (motor activation); cognitive impulsiveness, which is understood as the tendency to make quick decisions and assesses the lack of concentration with respect to the task (attention); and non-planning impulsiveness, which is described as a mode of behavior characterized by poor assessment of the consequences and a lack of planning.

Difficulties in Emotion Regulation Scale (DERS; Sighinolfi et al. 2010): a self-assessment questionnaire that investigates, through 36 items, the presence of specific difficulties in the regulation of emotions. The six scales are: non-acceptance of negative emotions (Nonacceptance); inability to engage in targeted behaviors when experiencing negative emotions (Goals); difficulty controlling impulsive behaviors when experiencing negative emotions (Impulse); limited access to emotion regulation strategies that are considered effective (Strategies); lack of awareness of one's emotions (Awareness); and lack of understanding of the nature of one's emotional responses (Clarity).

Binge Eating Scale (Gormally at al. 1982): evaluates behaviors, sensations, and cognitive aspects associated with bulimic episodes in obese subjects.

The Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson 2003): investigates the following five factors of resilience: personal competence and tenacity; self-confidence and management of negative emotions; positive acceptance of change and secure relationships; the ability to maintain self-control; and spiritual influences.

The Body Uneasiness Test (BUT; Cuzzolaro et al. 1999): investigates the following factors: body shape and/or weight dissatisfaction; avoidance; compulsive control behaviors; detachment and estrangement feelings towards one's own body; specific worries about particular body parts; and shapes or functions.

4. RESULTS

In table 2 it is reported the population data and the simple statistical analysis of our study sample. Most of the sample were female (74%) and the mean age is 43. The mean BMI of the sample was 42.2 kg/ m2. In relation to the emerging clinical data, it is clear that 26% of the examined sample had depressive symptoms and 23% had clinically significant symptoms of anxiety. There is also a difficulty in self-regulation of the emotional states experienced in 46% and with impulsive traits in 10% of the study participants. In relation to the problems related to the food style, given the specificity

of the examined sample, it is possible to identify the presence of binge eating disorder in 38% of the patients.

Table 2: Population data (220 patients)

Variable	Mean	Std.Dev	Miniimum	Maximum
ANAG1	0.7454545	0.4365988	0	1.0000000
ANAG2	1.7075472	0.7474060	0	3.0000000
ANAG3	43.5727273	11.7126627	18.0000000	66.0000000
IDON	0.5227273	0.6298741	0	2.0000000
BMI	42.2590909	5.9103778	31.0000000	80.0000000
IMP1	14.4772727	3.0286956	8.0000000	24.0000000
IMP2	18.7045455	4.0588116	11.0000000	35.0000000
IMP3	24.2090909	4.6662011	12.0000000	38.0000000
IMPTOT	57.1363636	9.7042826	19.0000000	95.0000000
IMP01	0.1000000	0.3006842	0	1.0000000
BES	12.8000000	8.6185528	0	39.0000000
DCA01	0.3818182	0.6548982	0	2.0000000
SOM	1.0462727	0.7247646	0	3.5000000
OSSCOMP	0.7227273	0.6222891	0	3.6000000
SI	0.7200909	0.7962079	0	3.6700000
SI01	0.3000000	0.4593026	0	1.0000000
D	0.7592273	0.6953373	0	3.4600000
D01	0.2627273	0.4402903	0	1.0000000
A	0.6198636	0.5996121	0	3.4000000
A01	0.2315000	0.4202554	0	1.0000000
OST	0.4718182	0.5634705	0	3.3300000
AFOB	0.3009091	0.4902717	0	2.8600000
PAR	0.7425000	0.6874157	0	3.3300000
PSIC	0.3795455	0.4990308	0	2.3000000
DISTOT	0.6862273	0.5461454	0	3.1890000
DIS01	0.2363636	0.4258169	0	1.0000000
REGEM1	11.6909091	5.6418939	6.0000000	30.0000000
REGEM2	10.0136364	4.2945006	4.0000000	24.0000000
REGEM3	10.2000000	4.5876547	6.0000000	30.0000000
REGEM4	9.7909091	4.0286541	5.0000000	28.0000000
REGEM5	15.0681818	5.5796341	4.0000000	33.0000000
REGEM6	6.4500000	3.0702952	3.0000000	18.0000000
REGEMTOT	63.0545455	21.4577577	6.0000000	137.0000000
REGEM01	0.4681818	3.5825409	0	53.0000000
IMM	1.8757169	1.1281635	0.0500000	4.8200000
IMM01	0.6940639	0.4618584	0	1.0000000
RES1	22.4429224	6.9295394	1.0000000	32.0000000
RES2	17.8310502	5.5084376	0	28.0000000
RES3	14.2465753	4.1334865	0	20.0000000
RES4	8.4109589	3.0387510	0	20.0000000
RES5	3.5890411	1.9664779	0	8.0000000
RESTOT	66.4840183	18.0354765	3.0000000	99.0000000

ANAG1: Gender; ANAG2: Schooling ANAG3:Age; Anxiety; A01: Anxiety NO\YES; AFOB: Phobic anxiety; BES: Binge Eating Disorder; D: Depression ; D01: Depression NO\YES; DIS01: Psychological distress NO\YES; DISTOT: Total Psychological distress; IDON 0= Suitable; IDON 1= Riserve; IDON2 = Unsuitable; IMM: Body image distress; IMM01: Body image distress NO\YES; IMP01: Impulsivity NO\YES; IMP1: Motor impulsivity; IMP2: Cognitive impulsivity; IMP3: Unplanned impulsivity; IMPTOT: Total impulsivity; OSSCOMP: Obsession-Compulsion; OST: Hostility NO\YES; PAR: Paranoid Ideation; PSIC: Psychoticism; REGEM01: Total Emotional regulation NO\YES; REGEM1: Emotional regulation. Nonacceptance; REGEM2: Emotional regulation. Goals; REGEM3: Emotional regulation. Impulse; REGEM4: Emotional regulation. Strategies; REGEM5: Emotional regulation. Awareness; REGEM6: Emotional regulation. Clarity; REGEMTOT: Total Emotional regulation; RES1: Resilience. Personal competence and tenacity; RES2: Resilience. Management of negative emotions, RES3: Resilience. Positive acceptance of change; RES4: Resilience. Ability to self-control; RES5: Resilience. Spiritual influences; RESTOT: Total Resilience; SI: Social introversion; SI01: Social introversion NO\YES; SOM: Somatization.

Table 3 reports the Spearman correlations between different psychological dimensions. Resilience is only mildly correlated with other psychological aspects thus confirming the existence of a well separated and autonomous 'resiliency' construct. It is worth noting BES is the variable most correlated with resiliency giving a proof of concept of the relevance of resiliency in eating disorders.

Table 3: Spearman's correlation coefficients between variables and resilience (220 patients)

	RESTOT	IMPTOT	BES	D	A	REGEMTOT
RESTOT	1.00000	-0.31592 <.0001	-0.46048 <.0001	-0.34544 <.0001	-0.27606 <.0001	-0.49224 <.0001
IMPTOT	-0.31592 <.0001	1.00000	0.37126 <.0001	0.33917 <.0001	0.32653 <.0001	0.49818 <.0001
BES	-0.46048 <.0001	0.37126 <.0001	1.00000	0.49588 <.0001	0.38649 <.0001	0.57981 <.0001
D	-0.34544 <.0001	0.33917 <.0001	0.49588 <.0001	1.00000	0.75544 <.0001	0.67739 <.0001
A	-0.27606 <.0001	0.32653 <.0001	0.38649 <.0001	0.75544 <.0001	1.00000	0.55287 <.0001
REGEMTOT	-0.49224 <.0001	0.49818 <.0001	0.57981 <.0001	0.67739 <.0001	0.55287 <.0001	1.00000

A: Anxiety; BES: Binge Eating Disorder; D: Depression; IMPTOT: Total impulsivity; REGEMTOT: Total Emotional regulation; RESTOT: Total Resilience.

As evident in tables 4-5 from the loading pattern, the system highlights a "general impulsivity factor" scaling with "total impulsivity" (first component, IMPgen, loading=0.97 with imptot) and a minor

but meaningful second component. This second component differentiates between motor (IMP1) and non-planned (IMP3) impulsivity that have opposite loading on cognitive component (IMP2). Patients with high scores of cognitive component have comparatively higher cognitive impulsivity than non-planned (lower values point to the opposite direction).

Binary impulsivity score registers (see below) general impulsivity (correlation = 0.67) but does not register the 'quality' (second component: imp cognitive) (IMPcog) of impulsivity that is an emergent property we discovered in this study (see below).

Table 4. Impulsivity: correlation between components and original variables

	IMPgen	**IMPcog**
IMP1	**0.73611**	**0.61817**
IMP2	**0.82120**	0.01321
IMP3	**0.80097**	**-0.49022**
IMPTOT	**0.96908**	-0.07557

IMP1: Motor impulsivity; IMP2: Cognitive impulsivity; IMP3: Unplanned impulsivity; IMPTOT: Total impulsivity: IMPgen: general impulsivity factor; IMPcog: second component of impulsivity cognitive

Table 5. Impulsivity. Pearson correlation coefficients

	IMP01	**IMPgen**	**IMPcog**
IMP01	1.00000	0.67340 <.0001	-0.05158 0.4466
IMPgen	0.67340 <.0001	1.00000	0.00000 1.0000
IMPcog	-0.05158 0.4466	0.00000 1.0000	1.00000

IMP01: Impulsivity NO\YES; IMPgen: general impulsivity factor; IMPcog: second component of impulsivity cognitive

Tables 6-7 display the results from the discomfort analyses. DIS1 (first component of Psychological Distress) is equivalent to DISTOT (Total Psychological distress) (r = 0.99), confirming the consistency of the data set with the expected questionnaire structure. The same holds for binary outcome (Psychological distress NO\YES) (DIS01).

Table 6. Distress: correlation between components and original variables

	DIS1	Factor2	Factor3
SOM	**0.73296**	0.60541	0.18906
OSSCOMP	**0.88034**	0.02247	-0.12734
SI	**0.87521**	-0.32386	0.17376
D	**0.92409**	-0.00515	0.16934
A	**0.91863**	0.15298	-0.04472
OST	**0.85013**	-0.02765	-0.40536
AFOB	**0.86918**	0.14428	-0.00206
PAR	**0.85323**	-0.35536	0.22288
PSIC	**0.87333**	-0.13114	-0.15768

A: Anxiety; AFOB: Phobic anxiety; D: Depression; DIS1: First component of Psychological Distress; OSSCOMP: Obsession-Compulsion; OST: Hostility; PAR: Paranoid Ideation; PSIC: Psychoticism; SI: Social introversion; SOM: Somatization.

Table 7. Distress: Pearson correlation coefficients

	dis1	DISTOT	DIS01
dis1	1.00000	**0.99440** <.0001	**0.81858** <.0001
DISTOT	0.99440 <.0001	1.00000	**0.82419** <.0001
DIS01	0.81858 <.0001	0.82419 <.0001	1.00000

DIS1: First component of Psychological Distress; DIS01: Psychological distress NO\YES; DISTOT: Total Psychological distress

Table 8-9 shows a 'synthetic score' correlated with Total Emotional regulation (REGEMTOT) as first (most relevant in term of variance explained), and, similar to impulsivity, an independent dimension (components are orthogonal by construction to one another) isolating the issue of 'clarity' (regclarity, second component) was demonstrated.

As expected, Total Emotional regulation (REGEMTOT) (total score) scales correlated nearly perfectly with the first component (r = 0.98, see below), while emotional regulation emerged as a unique dimension (quality of emotional regulation). Interestingly, there is a lack of correlation with the binary outcome, potentially due to a high standard deviation that is not related to that of the quantitative one (no clear clustering into two classes of 'positive/negative' that instead lay in a continuous space). This posits some questions on the usability of the binary index in this particular case.

Table 8. Emotion regulation: correlation between components and original variables

	REGener	**REGclar**	**Factor3**
REGEM1	**0.80505**	-0.24314	-0.40613
REGEM2	**0.83630**	-0.27519	-0.08616
REGEM3	**0.78952**	-0.37378	0.24496
REGEM4	**0.78609**	0.37343	-0.19872
REGEM5	**0.83018**	0.03020	0.41193
REGEM6	0.50851	**0.79127**	0.03902

REGEM1: Emotional regulation. Nonacceptance; REGEM2: Emotional regulation. Goals; REGEM3: Emotional regulation. Impulse; REGEM4: Emotional regulation. Strategies; REGEM5: Emotional regulation. Awareness; REGEM6: Emotional regulation. Clarity; REGEMTOT: Total Emotional regulation; REGenerl: first component of total Emotional regulation; REGclarity: second component of emotional regulation Clarity

Table 9. Emotion Regulation: Pearson correlation coefficients

	REGener	**REGclar**	**REGEMTOT**	**REGEM01**
REGener	1.00000	0.00000 1.0000	**0.98333** <.0001	0.08332 0.2184
REGclar	0.00000	1.00000	-0.02526	0.08905

	1.0000		0.7094	0.1882
REGEMTOT	0.98333 <.0001	-0.02526 0.7094	1.00000	-0.08486 0.2099
REGEM01	0.08332 0.2184	0.08905 0.1882	-0.08486 0.2099	1.00000

REGEMTOT: Total Emotional regulation; REGenerl: first component of total Emotional regulation; REGclarity: second component of emotional regulation Clarity; REGEM01: Total Emotional regulation NO\YES

In tables 10 and Image 1 the Spiritual resiliency (RES5) is heterogeneous with respect to the other resiliency scores and generates a dimension of its own (second component spiritual influences = respirit). The other resiliency variables are instead correlated and generate a global dimension (first component of resiliency = resgeneral). As expected, the first resiliency component coincides with resiliency total score confirming once again the stability and representativity of our data set (Table11). This global component of resiliency is differentially distributed in extreme idoneity classes (Suitable/Unsuitable, see below), but it was not inserted in the prediction model, as its heterogeneity (see variable clustering step) with other variables disturb the prediction efficiency. Regardless, this analysis demonstrated a significant effect of resilience on the idoneity score. As expected, the first resiliency component correlates with the resiliency total score, confirming again the stability and representativeness of the data. Focusing on the two extremes eligibility classes, suitable and unsuitable (IDON=0, IDON=2), we show the statistical significant effect ($p<0.0001$) of Resiliency (let's keeep in mind this decriptor was not taken explicitly into account by the clinician giving the idoneity response) (Table 12), The great unbalance between the two classes (120 eligible vs. 16 discarded) prompted us to use Satterwaithe approximation for t-test computing that takes into account the different variances of the two classes).

Table 10. Resilience: correlation between components and original variables

	Resgen	**Respirit**
RES1	**0.89992**	-0.01308
RES2	**0.91387**	0.03186
RES3	**0.88207**	-0.09174
RES4	**0.81324**	-0.24802
RES5	0.27904	**0.95071**

RES1: Resilience. Personal competence and tenacity; RES2: Resilience. Management of negative emotions, RES3: Resilience. Positive acceptance of change; RES4: Resilience. Ability to self-control; RES5: Spiritual influences; Resgen: first component of resiliency; Respirit: second component spiritual influences

Table 11. Resilience: Pearson correlation coefficients

	resgen	**respirit**	**RESTOT**
Resgen	1.00000	0.00000	**0.99016**
		1.0000	<.0001
Respirit	0.00000	1.00000	0.05385
	1.0000		0.4278
RESTOT	0.99016	0.05385	1.00000
	<.0001	0.4278	

RESTOT: Total Resilience; Resgen: first component of resiliency; Respirit: second component of spiritual influence

Table 12: Student's t-test results: Resilience

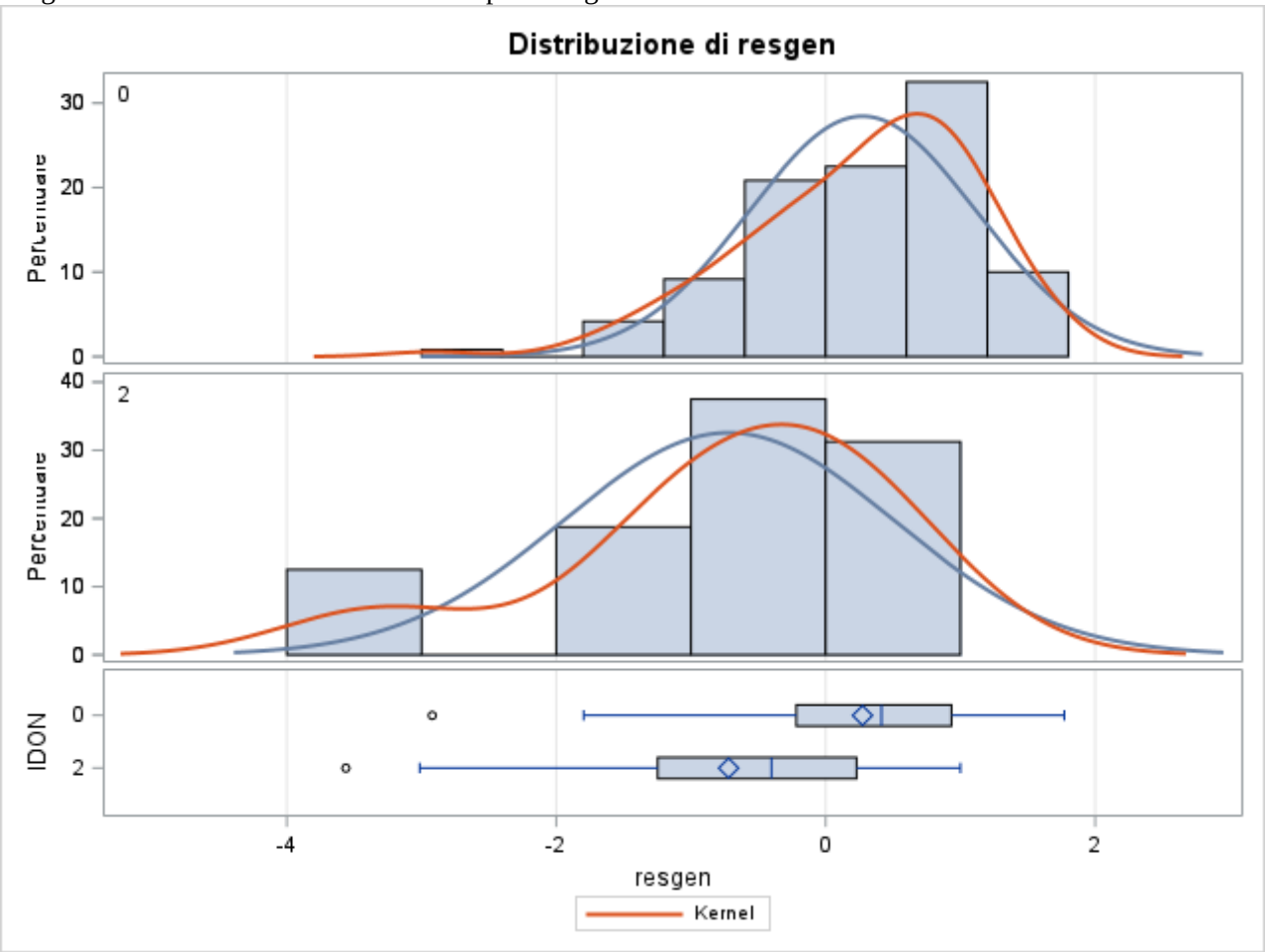
IDON	**N**	**Mean**	**Std.Dev.**	**Std.Err**	**Minimum**	**Maximum**
0	120	-0.2942	0.7991	0.0730	-1.9029	2.2105
2	16	2.2066	1.9664	0.4916	-0.8129	5.8309

T-value (Satterwaithe) = - 5.03, p = 0.0001

	Variances	**DF**	**t-value**	**Pr > |t|**
Aggregation	Equal	134	-9.40	<.0001
Satterthwaite	Different	15.667	-5.03	0.0001

IDON 0= Suitable; IDON2= Unsuitable

Image 1. Total Resilience: Distribution in parcentage



CORR procedure

5. DISCUSSION

The premise of the current study stems from our manuscript (Sisto et al., 2019) in which we conclude with the definition of psychological resilience as the ability to maintain the persistence of one's orientation towards existential purposes. The literature demonstrates that the application of the concept of resilience can be applied to obesity or bariatric surgery. Borinsky et al. (2019) demonstrated that low resilience and perceived overweight/obesity are both independently associated with body size dissatisfaction. This is important as resilience can be improved, thus highlighting an opportunity for future studies to focus on creating interventions to build resilience, therefore

decreasing body size dissatisfaction. Furthermore, Foster and Weinstein (2019) examined the emotional resilience and body size in children, concluding that resilience, specifically emotional resilience, may be a protective factor against obesity in children, regardless of income stratum. Physical activity of the child is often associated with greater emotional resilience and that better maternal health may mediate the association between resilience and weight. Obesity represents a primary public health issue worldwide, as its prevalence continues to increase in developed and developing countries, and represents an important risk factor for a multitude of chronic diseases. Obesity is, in fact, associated with high mortality and comorbidity rates with type 2 diabetes mellitus, hypertension (Song et Al. 2015) and can increase the risk of cancer disease (Gallagher & LeRoith 2015).

There is a growing consensus that bariatric surgery has a proven efficacy in the treatment of severe obesity. Following the surgery there is a significant weight loss among patients who have failed in previous dietary attempts using behavioral and pharmacological interventions (Adams et al. 2012). Studies have also shown that, following surgery, in addition to weight loss, there is an improvement in mental health and quality of life (Courcoulas et Al. 2013; Rydén & Torgerson 2006).

It is important to emphasize that obesity implies an important behavioral component and the current surgical methods to address obesity require a permanent behavioral modification to guarantee a long-term, positive outcome. Following the surgical intervention, the success of the individual depends substantially on the change in their eating habits and on their ability to adapt to the new anatomical and functional situation. In some cases, there can be difficulty in accepting the changes in body image resulting from a significant weight loss. Psychological support aimed at promoting the adaptation to the new condition may therefore be necessary (Adami et al 2005).

Since 1991, the National Institutes of Health Consensus Development Panel (NIH) and all of the most recent international and Italian guidelines for the evaluation of candidates for bariatric surgery have underlined the importance of a multidisciplinary team taking on the responsibility of the patients (Inter-disciplinary European guidelines on surgery of severe obesity, 2007; Medical Guidelines for

clinical practice for the preoperative nutritional, metabolic and non-surgical support of the bariatric surgery patient, 2008; Guidance on the prevention, identification, assessment and management of overweight and obesity in adults and children, 2006; Guidelines and state of the art of bariatric and metabolic surgery in Italy, 2016). Guidelines have also stressed the importance that assessment should be conducted by a mental health professional. These indications were given to identify any psychological/psychiatric contraindications for bariatric procedures and address any potential obstacles to a positive postoperative outcome.

The sample examined in the current study included 220 patients with an average age of 43 years, 74% were women, and the remaining 26% were men. All subjects had a BMI greater than 35 kg/m^2. In the current sample, it was possible to identify elements of clinically significant distress. In line with previous research (Kalarchian, Marcus & Levine, 2007), more than a third of patients had symptoms consistent with binge eating disorder. Furthermore, emotional dysregulation and anxiety disorders were found to be the most prevalent classes of disorders at the time of preoperative evaluation. Many subjects reported having a lifetime disorder (29.5%), accounted for primarily by binge eating disorder. The most common class of lifetime disorders was mood disorders (45.5%), whereas the most common class of disorders at the time of preoperative evaluation was anxiety disorders (24.0%). Also consistent with previous research, the current study demonstrated that higher resilience was an independent predictor of lower psychological distress (Sharpley et al, 2016; Fredrickson et al, 2003). The current study has explored not only depression and stress, but also positive traits, mood, and resilience. It is a fundamental human component to be explored. Resilience is the ability to react positively despite the difficulties, turning them into opportunities for growth. It is configured as a change that allows to find a new balance and to evolve positively despite adverse or traumatic living conditions. Hence being resilient means building and rebuilding one's life path, being able to restore a new balance by producing an existential change. In this perspective, resilience is a powerful factor in promoting well-being whose benefit will be verified over the long term.

Although an inherent personality trait, resilience can also be construed as a process (Luthar, Cicchetti & Becker, 2000) and as such, has the potential to be taught and/or encouraged at the individual level or promoted at the group level through the creation of resilience promoting environments.

That lower resilience predicted higher BMI in Portugal as well as higher WC in GB suggests that taking measures to promote resilience at both the individual and public health levels may reduce obesity in both countries. Resilience could be either or both a driver and/or a consequence of health behavior and obesity (Stewart-Knox B, 2012).

Specific literature on bariatric surgery indicates a higher prevalence of psychological comorbidities such as mood disorders, eating behavior disorders, and psychological distress in bariatric surgery candidates along with anxiety, personality disorders, alcohol use, and low self-esteem when compared to controls or obese patients who do not seek the procedure (Kalarchian, Marcus & Levine, 2007; Greenberg I, Sogg S, & Perna FM, 2009; Pull 2010; Jumbe, Hamlet., & Meyrick, 2017)

The limits of the current study are primarily due to the chosen design. This study is retrospective and monocentric, therefore requiring an extension to evaluate patients prospectively and from multiple centers. The statistical analyses conducted, however, highlighted a crucial point of resilience, which had not yet been developed in the literature and which may represent a trend to follow; that having resilience could be a possible addition to the criteria for suitability for bariatric surgery. The uniqueness of this pilot study consists primarily of the aim to introduce a new parameter to the psychological evaluations of candidates for bariatric surgery. From a bioethical perspective, resilience is key to understanding the patient and by using the questionnaires, you can perform a detailed analysis on the motivations that drive him/her to bariatric surgery.

The scientific literature is currently lacking in studies concerning the concept of resilience as it applies to various surgical fields. In the case of bariatric surgery, the literature reports only a few studies and with great limitations. A larger and more prospective study that can carry forward the concept of resilience applied to bariatric surgery, which was introduced with this study, is needed.

6. CONCLUSIONS

The literature review on the meaning of the term resilience has allowed us to investigate the multidimensionality of the construct and some common features. The definition of psychological resilience has, therefore, been elaborated, taking into account the transversal elements of the various definitions that have been formulated, to date, in the literature over the years. In particular, we believe that resilience is *the ability to maintain one's orientation towards existential purposes, despite enduring adversities and stressful events. It anticipates and delivers an attitude of persistence when facing obstacles and preserves an openness to change.* This concept can be understood as the ability to deal with the difficulties experienced in the various areas of one's life with perseverance, maintaining an awareness of oneself and one's own internal and parallel coherence by activating a personal growth project. This persevering attitude allows the activation of one's own resources to recover after having experienced adverse conditions, thus reestablishing the state of personal balance. In our definition, the term *"existential purpose"* refers to the long-term objectives as well as the overall objective regarding existence in its complexity. The latter varies from individual to individual, according to life commitments (vocational, affective, social, professional, etc.). Broadly speaking, through acts of resilience related to fragmented purposes, the individual becomes more and more persistent in the orientation to their personal fulfillment.

The attempt to conceptualize the term resilience is believed to be a starting point for additional research aimed at applying this construct in the context of the different clinical areas that treat patients who have highly complex physical and mental features. The literature review carried out on resilience as a construct was then applied to the clinical area of bariatric surgery.

The current study was carried out on a sample of severely obese patients, paying particular attention to the healthy component of personal functioning, which tends to be disregarded in the literature. In fact, over the years, the literature has primarily focused on examining the elements of psychological vulnerability of severely obese patients, noting, in particular, the high presence of cognitive, emotional, and behavioral dysfunctional patterns that can hinder compliance with treatments. It is

evident that obesity implies an important behavioral component. Therefore, in order to guarantee a positive, long-term outcome, current surgical methods for obesity require a persevering and therefore resilient attitude in order to maintain the desired behavioral modifications and to maintain it, permanently. After the surgical intervention, the therapeutic success depends substantially on the change in the eating habits of the operated person and on his ability to adapt to the new anatomical and functional situation determined by the surgery. In some cases, the change in body image consequent to the significant weight loss can in fact lead to difficulties in accepting and reworking this new image and may require resilience resources to adapt to the new condition.

It is therefore necessary to study severely obese patients, keeping a focus on their specific psychological and behavioral components, which can play a fundamental role in determining the effectiveness of the bariatric intervention and the physical and mental well-being of the operated patient, also regardless of the achieved weight loss.

As previously discussed, all of the most recent national and international guidelines to assess candidates for bariatric surgery emphacize the importance of a multidisciplinary team to take on the responsibility of the patients. The guidelines also state the significance of an assessment conducted by a mental health professional. These suggestions are given with the aim of identifying any psychological contraindications for bariatric procedures as well as any potential obstacles to a successful postoperative outcome.

From the results of the current study for the purposes of this thesis, it emerges that resilience resources represent a substantial reference parameter in assessing patients' suitability for bariatric surgery.

We, therefore, define the parameters of resilience, acquired through the administration of validated tests, as a sort of *psycho-marker* that, for the same as discomfort indices, can orientate the clinician to allow them to properly assess the patient's psychological suitability for the surgery The assessment of resilience is also useful in the post-surgery phase, to plan psychological interventions aimed at its enhancement, in order to optimize short- and long-term results. These resilience virtues can, in fact, promote goals of integrating vulnerability with personal resources and expanding them by promoting

the persistence of one's orientation towards the objective of improving their physical and mental health.

Future studies should look to expand the sample of obese patients and to further consolidate what has been identified through the current study. Furthermore, given the multidimensionality of the detected resilience construct, it may be interesting to apply the concept of resilience to different clinical areas and bioethical constructs with the ultimate purpose of promoting good clinical practices.

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