BIOMEDICAL TECHNOLOGIES TO OVERCOME LIMITS IN CHARACTERIZATION OF MENTAL DISORDER

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Abstract

The characterization of the concept of mental disorder is closely connected with the problem of distinguish between normality and pathology for all specific mental disturbs. The risolution of this problem is of primary importance both from a political and social point of view, and from that of research and therapy. Our research showed that it is possible to characterize a mental disorder through a dynamic representation based data collected progressively through biomedical technologies.

INTRODUCTION

Mental health is an integral part of people's general well-being and it is the basis of healthy relationships and work productivity, that is, it promotes the social and economic development of a country.

With this essay we focused on the limits found in the characterization of the concept of mental disorder as a disease, using the conceptual tools of naturalism, normativism and their hybrid application. In particular, the essay highlighted how the current conceptions of mental disorder don't lend themselves to representing all the various types of specific disorders and don't allow a clear distinction between illness and what is not. The path followed with the study started from some useful questions to develop a reasoning aimed at characterizing the concept of mental disorder.

- What is meant by mental disorder in medicine?
- What are the causes and risk condition?
- How common are mental disorders?
- Are mental disorders characterizable as diseases?
    - What are the limits for identifying what is a mental disorder or not?
    - Mental disorders affect the body, mind, person, or society?
    - What does it mean well-being or discomfort of someone with a mental disorder?
    - Is a mental disorder compatible with the concept of well-being of the person or does it manifest itself only as discomfort for the person?
- What technologies can help diagnose, treatment, cure and monitoring of the mental disorder?

DISCUSSION

The discussion, driven by the previous questions, starts with the identification of a claim that clarifies the subject of the discussion and what we want to prove:

CLAIM: The current definitions of the concept of mental disorder have limits in the characterization of all types of disorder and don't guarantee the identification of a "precise" dividing line between what is possibly a disease and what is not

We will see in the discussion that our attempt to give answers to the previous questions using the conceptual tools of naturalism and normativism, but also a hybrid solution between the two, will confirm our claim.

What is meant by mental disorder in medicine?

Mental disorder, from a medical point of view, appears as an alteration of the mental health of an individual that can be divided into broad categories

- Anxiety
- Mood disorders, such as excessive sadness (depression) or excessive excitement (mania)
- Schizophrenia
- Personality disorders
- Obsessive Compulsive Disorder

Other mental disorders include stress disorders, such as post traumatic stress disorder (PTSD), and suicidal behavior.

Because of extensive list of mental disorders would be useful a general characterization of the concept of mental disorder able to include all specific disturbs. It's is not simple to obtain because we immediately notice that mental disorders show a great variety of symptoms and causes among themselves.

The variety in the type of symptoms can include emotional disorders (depression, anxiety), will (obsessive-compulsive disorders, schizophrenia), cognition and perception (delusions and hallucinations), empathy (autism), appetite (anorexia, bulimia), desire (addictions, sexual disorders).

Todate **causes** of specific mental disorders are still largely unknown and for this reason still without valid cures and treatments. Therefore, on the causes of mental pathology, there are no simple explanations, even if there is a common consensus on the fact that multiple biological, psychological and social **factors** are involved.

In particular from the results of medical research globally (BHANDARI Smitha, 2020), a variety of possible causes have been identified. Synthesis is listed below:

- Hereditary factors, mental illnesses have a family character
- Stress of life
- The environment and culture of belonging
- Health problems affecting the brain

Many stresses, such as the loss of a job, divorce or taking too many drugs, increase the risk of mental illness. Some health problems affecting the brain of newborns, such as complications during birth or a brain virus infection (encephalitis), increase the risk of mental illness later in life.

A mental illness does not manifest itself because people are lazy or irresponsible, and it is not a state that is achieved on purpose.

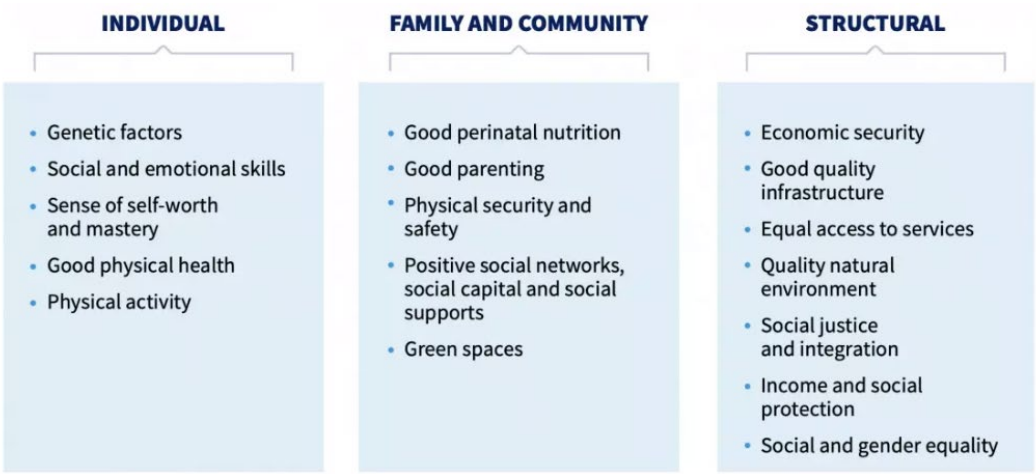
This means that on the basis of more or less known and significant **biological and genetic predispositions** (depending on the disorder), the encounter with a certain type of **environment and experiences** can lead to the onset of a pathological picture.

In general, research shows the importance of some **risk factors** and **protective factors** with respect to the development or trigger of a mental disorder. We must also consider that painful and traumatic events, which are considered **factors of precipitating** disturbances, can affect differently depending on the **vulnerability** or predisposition of the individual, but also on the environmental support.

I refer to conflicting relationships in the family or at work, separations, bereavement, accidents, serious trauma the loss of an attachment figure, a major social defeat, impotence in high-risk situations, or those cases in which efforts produce very modest results (GILBERT, 2015). The same applies to anxiety, an anticipated fear that is activated when threatening elements in the environment portend a possible danger (HORWITZ, WAKEFIELD, 2012).

The classification of **protective factors** and **risk factors** for mental disorders according to the international medical community (WHO, 2012, ARANGO ET AL. 2021) is shown below:

Protective factors



Risk factors

Source: WHO 2012, ARANGO ET AL. 2021

Among the structural or global threats to mental health, it is also necessary to point out the growing climate crisis, whose impact on psychophysical health and on other risk factors is increasingly supported by evidence. It is recommended also in “Mental health and climate change. Policy brief "(WHO 2022). So in the coming years we could have e sensisitve increase of mental disorders.

How common are mental disorders?

According to what emerges from the **“World mental health report. Transforming mental health for all "**(WHO, 2022), mental disorders, which globally represent the main cause of years lived with disabilities, in 2019 affected 970 million people, of which 82% in income countries medium low. The most common disorders in the same year were anxiety (31%) and depressive disorders (28.9%), which following the Covid-19 pandemic recorded an increase of 26% and 28% respectively.

Are mental disorders classifiable as diseases?

This question arises from the atypical nature of the mental disorder compared to other medical disturbs that are simpler to diagnose, treat and cure. We can start from definition of health from the World Health Organisation (WHO)

“Health is a state of complete physical,
mental and social well-being and not
merely the absence of disease or infirmity”
(1946)

From the conceptual point of view, in the philosophy of medicine today there is sufficient consensus in accepting the distinction, drawn from sociology, between *disease* (physiological malfunction or injury diagnosed by the expert), *illness* (state of malaise perceived as undesirable by the individual) and *sickness* (state of disability recognized by society as a whole) (TWADDLE 1994).

For some forms of mental disorder such as schizophrenia, bipolar disorder, the condition is typically recognized both by the doctor as a disease, both by the subject as a debilitating or suffering state, and by society, which recognizes certain rights (i.e. treatment, abstention from work) as well as certain limitations to action (for example driving planes, trains, weapons license).

But the three dimensions of the concept of disease allow us to describe more complex cases: for example, anxiety disorders can be experienced as an *illness* by the person, and as a pathological state (*disease*) but not as *sickness* by the society which consequently doesnt recognizes certain rights.

Finally there are personal states whose categorization as a disease depends on the attribution of a threshold or parameter by the scientific community, as in the case of autism, mood disorders, obsessive compulsive disorders; for instance a person with autism can find himself perfectly well in his condition, despite the diagnosis of the problem.

Apart from this convergence on the distinction between *disease, illness* and *sickness,* the debate on disease in th philosophy of medicine is divided between naturalist (BOORSE 1975; SCHRAMME 2007), and normativist (or constructivist) positions (NORDENFELT 2001, 2007, FULFORD 1989, 2001; REZNECK 1991).

In summary,

- for a naturalist, the disease indicates a class of objective facts about the human body, and therefore the concept has a definition in scientific and descriptive terms;
- for a normativist, however, classifying a condition as a disease essentially consists in attributing undesirability, harm or discomfort to it; these notions are not descriptive and objective, but dependent on the judgment of a human community in a certain historical epoch, whose values they reflect.

To clarify, even for the naturalist disease, as described by medical science, can be also evaluated negatively, and therefore has to do with norms, preferences and values, but the naturalist believes that description and evaluation are independent.

We therefore use these conceptual tools (naturalism and normativism) to characterize the mental disorder.

Limits of the application of **naturalism** to the characterization of mental disorders

Naturalism considers the physiological aspect of the disease to be primary with respect to the personal and social aspect, and therefore the concept of disease with respect to illness and sickness. The disease is mainly characterized as a dysfunction with respect to the normality of the various parts of the body.

The best known and most discussed definition in the naturalistic field is that of the philosopher Christopher Boorse. He presents a "biostatistic theory of health": *given a reference class (typically, sex-age) an individual is in complete health when all his organs function normally, that is, given a statistically normal environment, they provide at least their contribution statistically normal to the survival of the individual or its species*. *Conversely, the disease is the non-functioning, or functioning below the threshold, of one or more parts of the organism* (BOORSE 1977).

The human organism can be considered as a complex system with a hierarchy of purposes, in which reproduction and survival are at the highest level; every part (apparatus, organ, cell, gene, etc.) provides a contribution to the purpose of one subsystem or of the global system. Medical physiology and biology explain and describe the subsystems of the human organism and their normal functions.

Effectively, following Boorse's definition to the letter, we are all carriers of disease because anyone of us, undergoing continuous and in-depth laboratory tests, will almost always find some dysfunction taking place, even if only "the death of a cell" (NORDENFELT 1987: 28). This is particulary true for mental dysfunctions that could derive from particular emotional states (for example a problem of work, study, a family quarrel, betrayal, the state of alteration due to alcohol consumption). In these terms and in particular situations we could all show behaviors attributable to a mental disorder. It is therefore the threshold of behavioral anomalies and that of their duration over time to determine a pathology or not.

Certainly the biostatistic conception "hyperpathologizes" human life, but it does not exclude that there have been pathological (diseases) clinically and existentially irrelevant for the individual, that is, diseases without illness. Infact, pathologizing is not yet "medicalising", in the worst sense of the term (SCHRAMME 2007). This is the case of autism perceived as desease (and sickness) but not as illness.

It should also be noted that even in the most severe forms (schizophrenia, bipolar disorders, depression) the psychic alteration doesn't limit necessarily the contribution that the "mind" subsystem makes to the physiological functions of the overall system (including reproduction and survival), except for suicidal forms of mental disorder. Moreover, some of these diseases manifest themselves in an not constant way. A person suffering from schizophrenia may show some normality for long periods before doing something abnormal, ie before showing that the "mind" subsystem works below a certain threshold for a limited time. In the case of anxiety, it is very difficult to establish that the "mind" subsystem works below the threshold, because the disease creates a generalized state of psychosomatic discomfort (fear of going out, feeling of lack of air, feeling of throbbing accelerated, feeling dizzy, etc.), without real clinical evidence (clinically the person is healthy and all his organs are functioning properly). Some philosophers believe that no objective characterization of the concept of disease with the naturalistic approach can ever be sufficient (SEDGWICK 1973: 30-31)

Therefore, it emerges that a naturalist approach to the concept of mental disorder is insufficient to characterize all specific mental disorders as illness and to determine a limit between health and illness as it is very complex to determine a threshold between the two states, a threshold that in any case would be subjective and dynamic for the inherent variability of the disease from individual to individual.

Limits of the application of **normativism** to the characterization of mental disorders

Let us now try to carry out a characterization of the mental disorder following an approach based on normativist theory.

A normativist proposition is that of Bill Fulford, English psychiatrist and philosopher (FULFORD 2001; FULFORD 1989): health is ultimately the full possibility of intentional action - a concept drawn from the philosophy of action, which encompasses a range from simpler act, like lifting a leg or eating fruit, up to more complicated, like doing a job. Illness or subjective illness is therefore defined as a state of impediment to action or sensation, in which the human person as a whole is limited in the realization of his will.

Here the concept of illness, which is evaluative, refers to the person's sense of discomfort; it is primary with respect to disease; in this perspective, to say of someone who, for example, has mental disorders means to attribute an evaluation to him rather than to describe him objectively.

Another normativist analysis is that of Lennar Nordenfelt (NORDENFELT 2006, 2001), who defined health as the ability of an individual to achieve their vital goals, which concern not only survival and reproduction, but also relational well-being and social, and the ability to do a job corresponding to their abilities. A note by

Nordenfelt himself captures the difference between his definition and that of Boorse's naturalist: for Boorse a mental disorder is a disease because it compromises the functioning of an organ, for Nordenfelt (as for Fulford) because it compromises the overall well-being of an individual.

Both the previous definitions are very similar to the definition provided by the World Health Organization with which we began the discussion: they adopt a holistic point of view, that is, aimed at the whole of the person and his actions rather than just his internal (physiological) parts. In general if it is believed that the disease is not an individual property, but a relational property of the individual inserted in a social, political and environmental context, it is easier to argue that society, institutional subjects and the environment are responsible for the health or disease of the individual, with obvious social and political consequences.

However, both these definitions, as well as the WHO definition, when applied to mental disorders also have limitations in characterizing them as a disease.

There are in fact mental disorders that according to this theory can be classified as diseases in that they compromise a person's freedom of action and vital and social objectives. This is the case with schizophrenia, obsessive-compulsive disorders, mood disorders, suicidal behavior and some cases of severe anxiety.

Instead other forms of mental disorder such as bulimia, anorexia, PTSD and mood disorders, but also mild cases of anxiety, in most cases allow high degrees of freedom of action for the person. that it can independently pursue its vital and social objectives (for example work).

In conclusion, if on the one hand the naturalism of Boorse's biostatistic theory has the "threshold problem", deciding which dysfunctions are relevant as mental illnesses, among all existing dysfunctions, and what counts as dysfunction, normativism loses universality, and runs the risk to include in category of mentally ill a big number of "false positive"; i.e. human conditions such as fear, sadness, poverty or, in some cases, ethnicity, religion or gender that satisfy normativistic definitions.

Given these considerations, the intuition suggests of resorting to a hybrid version of naturalism, a sort of"normativist naturalism", which is based on the integration of the naturalistic approach with the normativistic one.

Limits of the **hybrid** approach to the characterization of mental disorders

The hybrid naturalist definition is the proposal of Jerome Wakefield, American philosopher and psychologist: “a disease or, more generally, a disorder is a harmful dysfunction” (WAKEFIELD 1992, 1999, 2007). This intermediate position proposed by Wakefield has been considered by the scientific community as particularly suitable for the case of mental illness or "disorder", and developed by Wakefield for this very purpose, applying it to various cases of mental disorders.

In DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, V versione), we find a special paragraph entitled “Definition of mental disorder”:

“A mental disorder is a syndrome characterized by clinically significant disturbance in an individual’s cognition, emotion regulation, or behavior that reflects a dysfunction in the psychological, biological, or developmental processes underlying mental functioning. Mental disorders are usually associated with significant distress or disability in social, occupational, or other important activities. A predictable or culturally approved reaction to a common stressor or loss, such as the death of a loved one, is not a mental disorder. Socially deviant behaviors (e.g. political, religious or sexual) and conflicts that arise primarily between the

individual and society are not mental disorders, unless the deviance or conflict is the result of an individual's dysfunction, as previously described" (APA 2013).

It is a hybrid characterization based on two components, **dysfunction** and **damage** (here expressed by the term "distress").

In Wakefield's version: *"...a [mental] disorder is: a harmful dysfunction*, where: "harmful" is an evaluative term, which refers to conditions that are judged negatively according to socio-cultural standards, and "dysfunction" is a factual scientific term, which refers to a failure in biological functioning. In modern science the notion of "dysfunction" is ultimately based on evolutionary biology and indicates in a mechanism the failure of one of its selected natural functions" (WAKEFIELD 2007: 149).

Wakefield's proposal, differs from the characterization adopted in the DSM-5 for the explicit assumption of an evolutionary conception of functions and therefore obviously of dysfunctions - while the manual doesn't mention it. Furthermore, the DSM-5 version adopts expressions of caution: a mental disorder "reflects" a dysfunction and is "usually associated" with harm, while for Wakefield it "is" a dysfunction and "is" harmful.

These clarifications suggestion we are dealing with a conception of mental disorder as a "harmful dysfunction" (harmful dysfunction view).

First of all, as mentioned above, it is a naturalist definition with a normative component, or "hybrid position" as Wakefield himself describes it.

It is nature that determines what is or is not a dysfunction, not us. So it is largely nature that determines what is or not a mental disorder as a dysfunction: society judges which of the dysfunctions are harmful, therefore relevant to research, clinical and health aspects (normativistic component).

The objective criterion of dysfunction, according to Wakefield, would allow to discriminate pathological mental conditions from those that express "problems of living", to use the expression of Thomas Szasz (SZASZ 1960); think, for example, the antagonistic behavior of an adolescent towards parents. Classifying something as a disease without adequate basis (a "false positive") would produce stigmatization and interfere with the resolution of the problem itself.

Wakefield's definition accepted with slight modifications in the DSM-5 is the target of numerous criticisms. Lalumera (2019) analyzed the concepts of some individual mental disorders such as pyromania and narcissistic personality disorder and showed that they are in tension with the definition of the superordinate concept of mental disorder reported in DSM-5. Amoretti and Lalumera (2019) argue that there are good reasons for not keeping harm as a necessary criterion in the general definition of mental disorder.

In reality, the hybrid definitions of mental disorder in DSM-5 and Wakefield propose components that are not completely measurable and objective and as such, subject to a form of subjectivism, and therefore do not allow a characterization of mental disorder in all its declinations for identify for each of them the demarcation between what is disease and what is not. The objectivity component is weak in comparison to other diseases (for example diabetes, cancer, etc.). If we look at the definition in detail, there is a decidedly evaluative component, that of damage: how is an adequate damage threshold established for each mental disorder to discriminate disease from altered behavior?

Even the concept of dysfunction appears quite abstract if applied to the context of mental disorders where it is the behavior of the individual that highlights the dysfunction, also subject to a form of subjective evaluation by the doctor rather than to the data provided by biomedical tools offered by technology and of proven validity. If I evaluate mental dysfunction in an individual walking on the eaves of a building, then famous acrobats or trapeze artists could also have the same dysfunction.

It seems that also the hybrid approach doesn't allow a clear characterization of the concept of mental disorder that adapts to the various specific disorders. For example the symptomatology of SPCD (Social Pragmatic Communication Disorder, introduced in DMS-5) is notably close to that of (some forms of) Autism Spectrum Disorder (ASD). This opens up the possibility that individuals with very similar symptoms can be diagnosed differently and receive different clinical treatments and social support (Amoretti, Lalumera, Serpico 2021).

On the basis of the current definitions provided for the concept of mental disorder, we have seen with counterexamples and applying the conceptual tools of naturalism and normativism, as well as their hybrid application, that we are not able to obtain an exhaustive characterization of the mental disorder from a conceptual point of view so that it includes the specific mental disorders and define a dividing line or threshold between what is mental disorder and what is not. The hybrid approach improves but doesn't solve the limits identified with the naturalistic and normative approaches.

So rather than trying to obtain a characterization in terms of necessary and sufficient symptoms, it might be more useful to adopt, an open and dynamic characterization in which: given a certain initial characterization of a behavior or mental condition we add dinamically elements attributable to a known or new mental disorder.

From a point of view operative, It is like applying dynamic"lists" for time-varying data structures in software programming rather than using "static data" structures (arrays, matrices, etc..).

Biomedical technologies (APP, Chatboat, dedicated Social, AI and Big Data Analytics) can help in this sense by assuming a mediating role between behavioral events and disturbance. In particular, they allow the collection and classification of information, with or without external sensors, (frequency of occurrence, premonitory phenomena and behaviors similar to mental disorders) which can help to better characterize the various forms of mental disorder and consequently to derive a superordinate characterization valid for all specific disorders. Even the threshold individuation between disease and normality can be better managed, through the use of biomedical technologies with adaptive methods of data interpretation (for example smart agents and machine leraning) able to customize the threshold for each individual (personalized medicine). APPs can also obviously offer support during some crises or help monitor the behavior of people in care and their progress / regressions.

CONCLUSIONS

In summary, the search for a characterization of the concept of mental disorder is closely connected with the problem of distinguish between normality and pathology for all specific mental disturbs. The risolution of this problem is of primary importance both from a political and social point of view, and from that of research and therapy. Rather than trying to obtain a characterization in terms of necessary and sufficient symptoms, we deduced,after analyzing the inadequacy of a normative, naturalistic and hybrid approach to define mental disorder, tha it might be more useful to adopt, an open and dynamic characterization in which: given a certain characterization of a behavior or mental condition we add dinamically elements attributable to a known or new mental disorder.

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