



## Undernutrition as a Cause of Personality Disorder

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### Abbreviations

MSE: Minnesota Starvation Experiment; AN: Anorexia Nervosa

Considering the increase of malnutrition worldwide [1] and its difficulty to maintain a healthy lifestyle, this article purpose is to emerge the awareness of possible contribution personality comorbidities followed by nutrition status.

Minnesota Starvation Experiment (MSE) was probably a breakthrough protocol which not only studied the effects of malnutrition on human physiology, Keys., *et al.* [2] but also studied the effect on psychology presenting striking results, clinical signs and symptoms that are similar to those of patients with Anorexia Nervosa (AN) [3]. The participants were well-built, healthy male soldiers from the USA army who undertook a period of starvation and nutritional rehabilitation. Minnesota Multiphasic Personality Inventory was used for assessing the personality traits of the participants which included hypochondria, depression and hysteria. A detailed analysis of the responses showed that there were no fundamental differences between the type of responses given by the subjects who were malnourished in relation to patients with a clinical diagnosis of psychoneurosis. The effect of malnutrition was considered as the factor that caused psychoneurosis [4].

At first, men complained feeling "old" and constantly tired. Fatigue then turned into a kind of mental apathy. Before malnutrition, they had strong political views, but as malnutrition continued their views and political debates lost their interest. They as well lost any interest in sex. Food became the main and capital occupation. Some of the men were obsessively reading cookbooks, star-

ing intently at the photos with food, "almost with pornographic obsession" as Keys characteristically outlines. Meal time became the highlight of their day. They became irritable if the food was not served to them on time or there was a delay in serving. The strong desire for food also affected their taste. Although the food was neutral-mild in taste, for the men it was delicious. They consumed the meal slowly, enjoying every bite. They often mixed their meals with water, giving it a form soup and the argument for this behavior was to increase the amount of meal making it look bigger. Between meals, unlimited chewing gum, water and black coffee were allowed. As a result, some consumed up to 40 packets of chewing gum a day and up to 15 cups of coffee a day. Despite the biological and psychological changes, men in their minds did not realize that they were too thin. In fact, they began to think that the others seemed too fat and not that they were too thin.

### Changes during feeding

As the malnutrition phase came to an end, the volunteers imagined the meals they would eat. Although being in the nutritional recovery phase, Keys did not significantly increase their dietary calories. Instead, he divides them into four subgroups that received 400, 800, 1200 or 1600 more calories than they did during the undernutrition period. The purpose of this dietary intervention was because he wanted to explore the optimal amount of calories consumed to regain weight, as soldiers returning from the war either had difficulty regaining their body weight or died of refeeding syndrome. But for the volunteers and especially those who belonged to the group that consumed the lowest calories, their feeling was that they were consuming a little more food than before. They constantly felt the feeling of hunger.

The last meal of the study took place on October 20, 1945. The men had completed the protocol and were free to leave and eat as much as they wished. However, Keys persuaded twelve of them to remain in the laboratory for another eight weeks to be monitored during an "unlimited consumption recovery" phase. During the free feeding phase, Keys observed that these men consumed on average more than 5,000 calories a day. Occasionally, some of them consumed up to 11,500 calories a day. For many months, men reported feeling hungry that they could not satisfy, no matter how much they ate.

**Psychopathological signs and symptoms cause from undernutrition**

During the early weeks of malnutrition phase, 24-year-old Franklin Watkins (FW) showed signs and symptoms associated with reduced food consumption.

Although everyone seemed completely committed to the experiment, hence participation was volunteer, cheating became a major issue as there was an almost uncontrollable urge of food seeking. That's why Keys imposed the "buddy system", where no one was allowed to leave the lab unless accompanied by an attendant. Stress turned out to be overwhelming for 24-year-old FW.

"FW began to have intense, disturbing dreams of cannibalism in which he described eating the flesh of an elderly man. On the way out of the lab to the city (before the Friends system was implemented), FW secretly consumed milk and sundaes (a dessert made up of ice cream and various other ingredients such as fruit, nuts, syrup and whipped cream). Eventually, Keys discovered FW's fraud, bringing him face with the circumstances in which he burst into tears. FW then got angry and threatened to kill Keys and then commit suicide. Keys immediately removed him from the experiment and referred him to the psychiatric clinic of the university hospital for treatment. There, after a few days of renutrition, the psychopathological symptoms induced by food deprivation completely subsided and then he was discharged" [5].

The data given from the above short history describe two time periods. The 1<sup>st</sup> the period of malnutrition, the man exhibits behavior that is not consistent with that of the start of the experiment and the 2<sup>nd</sup> period of hospitalization and discharge. Although the signs and symptoms are deficient in order to conduct a correct differential diagnosis, yet FW presented major symptoms that charac-

terized his behavior (Table below) as changed dramatically since the start of the protocol. Psychopathological analysis displays that FW presented various non-specific symptoms. According to DSM - 5 it would be classified as: Other specified mental disorder due to another medical condition (F06.8) [6] where this is justified by the 2<sup>nd</sup> period of the equator where the symptoms are removed after hospitalization and renutrition which adds value in diagnosis F06.8 as it fully reflects the effect of undernutrition on this current psychopathology.

Mental Status Examination of FW
<p><b>A) Before psychiatric hospitalization the patient presented:</b></p> <p>Affect and mood:</p> <ul style="list-style-type: none"> <li>Stress not specified from the history ("Stress turned out to be overwhelming for 24-year-old FW").</li> </ul>
<p>Attitude and insight:</p> <ul style="list-style-type: none"> <li>Compulsion - aggressiveness ("...then got angry and threatened to kill Keys...")</li> </ul>
<p>Thought and perception:</p> <ul style="list-style-type: none"> <li>Suicidal ideation ("...and then commit suicide...")</li> </ul>
<p>Further information:</p> <ul style="list-style-type: none"> <li>Non adheres with protocol ("Although everyone seemed completely committed to the experiment...")</li> <li>Dreams with malicious content - Nightmares ("FW began to have intense, disturbing dreams of cannibalism in which he described eating the flesh of an elderly man. ")</li> <li>Increased appetite ("FW secretly consumed milk and sundaes...")</li> </ul>
<p><b>B) After hospitalization and renutrition the symptoms completely subsided.</b></p>

**Table**

Until now, this study remains the most comprehensive scientific protocol of the effects of undernutrition-hunger. Key's report highlighted the extent that what we consume can change and modulate both the mind and the body. However, he also learned an optimistic lesson from the experiment. His data revealed that hunger does not appear to have significant, long-term adverse health effects. "The human body was obviously designed by evolution to withstand long periods without food," he said. As for the study volunteers,

many continued their lives pursuing humanitarian efforts as they felt by participating in the MSE experiment. Of these, 18 survivors participated in an interview as part of an oral history program related to the experiment [7]. They admitted that there were delayed consequences of the experiment they encountered later. For many years they were haunted by the fear that food might be eliminated from them again. So far, this protocol is perhaps the only one that has clearly shown that malnutrition-hunger can be independently responsible for the onset of a number of mental disorders such as anxiety, depression and hypochondria. In addition, this study presents a clear relationship between lean mass reduction and associated morbidity with protein-calorie malnutrition [8].

Therefore, in comparison with the references in the literature, it seems that malnutrition could partially cause changes in personality (or may be a risk factor for malnutrition [9] with the main characteristics of neuroticism-borderline, obsessive-compulsive disorder and perfectionism along with the pathological complications where widely known.

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