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ABSTRACT

The authors, in view of the "environment-mind-body-food connection", propose "im/mediate nutrition" to stimulate the global health of individuals thanks to the use of two tools: food and emotional awareness mediated by the practice of mindfulness and support for a correct eating style and lifestyle to always carry with you via the customizable PROTEIN App. The objective, from an educational perspective, concerns the promotion of psychophysical well-being in the medium-long term.

Le autrici, alla luce della "connessione ambiente-mente-corpo-cibo", per stimolare la salute globale degli individui propongono "l'alimentazione im/mediata" grazie all'uso di due strumenti: la consapevolezza alimentare ed emotiva mediata dalla pratica della mindfulness e il supporto per un corretto stile alimentare e di vita da portare sempre con sé tramite l'App personalizzabile PROTEIN. L'obiettivo, in chiave educativa, riguarda la promozione del benessere psicofisico nel medio-lungo termine.

KEYWORDS

Health, nutrition, mindfulness, education

Salute, nutrizione, mindfulness, educazione.

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Introduction

The 20th century marked a "bit-bang" of human civilization by historically developing multifaceted, complex and contradictory interconnections between the anthropomorphic Emotional Intelligence and the technomorphic Artificial Intelligence.

Therefore, in the political perspective of the SDG 2030, continuous and multidisciplinary research on the education and educability of man emerges and is urgently needed to guarantee his "evolutionary well-being" and ecosystem sustainability. Furthermore, the recent health emergency due to the COVID-19 pandemic has amplified the complex debates between neuroscience and education towards theoretical-practical research of the "care process" which, in addition to specialist knowledge and practices, is made up of psychobiological, ethical and relational ones strongly intersected with each other in a systemic and procedural vision of the concept of health.

From these scenarios, some theoretical research, training practices and territorial partnerships of the authors are oriented towards the scientific analysis and training competence of the "environment-mind-body-food connection".

In particular, the contribution of this work highlights some paths of "immediate nutrition" between the practice of "emotional awareness" of "Mindfulness", based on the M.B.S.R. clinical protocol by Jon Kabat-Zinn, and the technological innovation of Artificial Intelligence in personalized nutrition through the "PROTEIN A.I." project. Advisor", recently developed by the European Union.

1. Mindfulness practice and "food awareness"

Mindfulness represents an area of clinical research based on scientific evidence and subjective benefits generated by the practice of "paying intentional attention to the present moment", lived in a "kind" and "non-judgmental" way. The concept of "Mindfulness" has its roots mainly in Buddhist contemplative traditions. The English name "mindfulness" derives, in fact, from the word "Sati", a term in the Pali Indian language which can be translated as meaning "present and active attention" or "awareness".

The practice of Mindfulness is aimed at reducing and eliminating physical suffering linked to an incorrect understanding of reality inspired by the Buddhist meditation of Thich Nhat Hanh.

In the medical field, the studies of the American biologist Jon Kabat-Zinn aimed at describing the connections between physical suffering and mental states date back to 1979. From these observations emerged the M.B.S.R., a protocol for stress reduction based on Mindfulness. The implementation of the protocol allows you to develop emotional-relational skills capable of self-regulating mental states to generate empathy, resilience and psychophysical well-being. Above all, through biochemical connections between the brainstem, the limbic system, the cerebral and subcortical cortex, the main neurophysiological effects evident from the practice of Mindfulness concern:

- 1) Improvements in attentional functioning (e.g. Chambers, et al. 2008);
- 2) Increased cognitive flexibility (e.g. Lutz, et. al., 2006);
- 3) Increased thickness of brain regions associated with sensory processing and internal sensations (interoception) and areas involved with attentional circuits (Lazar, et al., 2005)
- 4) Greater gray matter density and greater activation of areas that process emotions and distracting events (Holzel, et al. 2011);
- 5) Reduction of depression, anxiety and stress (N. A. S. Farb, et al. 2010);
- 6) Less emotional reactivity and ability to reduce the interference of emotions on cognitive activities (Ortner, Kilner & Zelazo, 2007);
- 7) Greater satisfaction in emotional relationships, ability to respond to relational stress and ability to communicate one's emotions (Carson et al. 2007);
- 8) Reduction of ruminative processes and mind wandering (Chambers, et al. 2008);
- 9) Better functioning of the immune system (Carlson, et al., 2004);
- 10) Improvements in the cardiovascular system and reduction of arterial hypertension (Carlson, et al. 2008);
- 11) Improvements in the immune system and fewer stress symptoms in patients suffering from fibromalgia, asthma, chronic pain syndromes (Carlson, et al. 2001);
- 12) Benefit in the treatments of psoriasis, prostate cancer and atherosclerosis (Kabat-Zinn et al. 1998);
- 13) Effects on the treatment of psychopathologies (Abba, Chadwick&Stevenson, et al. 2008);
- 14) Prevention and risk of depressive relapses (Tang et al. 2007, Segal 2000).

Today, full awareness has officially become part of Western standards in many clinical, training, professional fields. In particular, it can be useful in managing:

- difficult life transitions (personal, family, parental crises, illnesses, taking care of sick family members or those with chronic disabilities);
- emotional distress (generalized anxiety, dysfunctional habits, sleep difficulties, irritability, tiredness, emotional hunger, etc.);
- chronic disease disorders (chronic pain, hypertension, diabetes, asthma, gastrointestinal symptoms);
- workplace burnout (hospital facilities, emergency departments, companies).

A specific area of Mindfulness is "Mindful Eating" 8 with which "food awareness" is practiced. In fact, it is estimated that 50-60% of the world's population exhibits some dysfunctional eating behavior, falling into the category of what is commonly defined as "nervous hunger" or "emotional hunger". Research shows that four and a half years after completing a diet, on average, people maintain a loss of only 3 kg, or 3.2% of the initial weight reduction. The percentage of people who have maintained their weight loss varies from less than 3%, if we consider maintaining 100% of the weight loss, to 28%, if we consider maintaining less than 10% of the initial weight loss, after 4 years (Priya Sumithran P., Proietto J., 2013).

Those who suffer from nervous hunger suffer from emotional dysregulation: they do not recognize emotions, confuse them with hunger and, consequently, eat in a dysfunctional way, not tolerating negative emotions. Another characteristic of this population is the presence of rigid beliefs (e.g., so-called "all or nothing" thoughts), accompanied by rumination or thought suppression (e.g. "I shouldn't think about chocolate"). Consequently, a typical vicious circle is observed, characterized by cognitive and behavioral restriction with respect to food with consequent over-eating and new restriction (defined as the "paradox effect of food restriction"). Finally, "fatphobia" culturally fueled by the focus on the need to lose weight and by seasonal "swimsuit tests", leads people to obsess over weight and body fat, falling into a cycle of body dissatisfaction, food restriction, obsession with "forbidden" foods and dysregulated eating. Instead, the practice of Mindful Eating emotionally orients people to:

- 1) observe thoughts as mental events;
- 2) distinguish between the psychological aspects of emotional experience and the stimuli of hunger and satiety;

- 3) accept emotions as part of the human experience, with less reactivity to them;
- 4) become aware of internal cognitive states, increasing meta-cognitive monitoring;
- 5) use new functional ways of interacting with food;
- 6) value themselves.

Nutritional rehabilitation based on an educational and experiential approach is therefore able to interrupt the cycle of dysfunctional habits and help people achieve psychophysical well-being results in the medium-long term.

Furthermore, attention to nutritional intake in critically ill patients has been recognized in recent years as being of fundamental importance both from a therapeutic point of view and from the point of view of life support in intensive care.

2. I.A. ADVISOR: PROTEIN (PeRsOnalized nutriTion for hEalthy livINg)

Food is of utmost importance for human physical and mental health as it not only provides the energy necessary for the functioning of the human body but is also a factor that promotes psychophysical and social well-being. However, not all types of food are equally beneficial for overall health, as the nutrients that comprise them are processed differently by the human body.

In fact, according to the World Health Organization (WHO) cardiovascular diseases and diabetes are responsible for 71% of deaths worldwide, but these are preventable through effective preventive interventions that address risk factors. In fact, food globalization, lifestyle changes, economic and socio-cultural factors can significantly compromise people's ability to adhere to healthy diets. Therefore, maintaining a balanced and nutritious diet is essential for human health. Given the significant impact of nutrition on non-communicable diseases, there is a great need for food recommendation systems that can guide users towards health and sustainable diets.

Very often, to guide people towards healthy eating behavior and obtain optimal results and benefits, complex and personalized support may be necessary. To this end, AI systems Food intake monitoring can provide substantial benefits to users by suggesting ways of nutritional education and maintaining a healthy diet. AI-

based software applications for personalized nutrition have recently gained traction and attention to help users follow a healthy lifestyle.

“Personalised nutrition” provides advice tailored to suit an individual based on their personal health status, lifestyle, nutrient intake or alternatively on genetic and phenotypic data. Therefore, several authors have highlighted the need to design and develop technological systems for monitoring individual food intake validated by expert nutritionists to provide personalized and optimized food plans, healthy diets adapted to the user's specific parameters. Such metrics could include physical characteristics, dietary choices, health conditions and preferences, as well as particular behaviors (e.g., considering potential deviations from the prescribed diet) and real-time measurements (e.g., glucose levels from IoT devices).

Food recommendation systems are often classified based on the method used to recommend healthy diets, namely content-based (CB), collaborative filtering-based (CF), and hybrid approaches. Furthermore, the recommendations can be personalized based on foods, meals, but also with more complex elements such as recipes, or types of daily meals (breakfast, lunch, dinner, snack, etc.). In fact, "healthy food" and "tasty food" are not necessarily mutually exclusive. Indeed, there is an optimization trade-off between nutrient intake and user preferences.

The PROTEIN10 project was thus born from a research initiative led by a consortium of European public and private sector organizations aimed at promoting health and well-being. PROTEIN has received funding from the European Union's Horizon 2020 research and innovation programme. The Horizon 2020 Protein project, therefore, integrates the collaboration of around 20 important European public and private organizations to create an AI app. functional to the development of validated personalized nutrition and physical activity plans, supporting people to make healthier choices based on their needs and preferences.

The consultant I.A. PROTEIN is developed on a new architecture that includes (a) a qualitative layer to verify the adequacy of ingredients and (b) a quantitative layer to summarize meal plans. The first level is implemented as an expert system for fuzzy inference which is based on an ontology of rules acquired from experts in Nutrition, while the second, as an optimization method for the generation of daily meal plans based on values and intervals of target nutrients. Finally, the effectiveness of the system is evaluated through extensive experiments to establish the adequacy of meals and the meal plan, the variety of meals, as well as the system's ability to recommend meal plans. PROTEIN's technology ecosystem

consists of an Android mobile application for users and a web-based dashboard for nutritionists and other experts.

From the user's point of view, the operation of the PROTEIN system is rather intuitive: all they have to do is download and install the app of the same name, register and provide some information to create their profile. The system is based on this information and on stored and codified industry knowledge to generate and provide the user with programs for carrying out physical activity or appropriate daily and weekly food plans.

Furthermore, the system can integrate physical activity data from the app and connected sensors and then readjust the recommended plan on a daily and weekly basis. In case users are subject to the supervision of nutritionists or other healthcare professionals, the control panel offers an overview of all automated suggestions and the expert in question can intervene if deemed necessary. From a clinical point of view, particular attention was given to the correlation of the intestinal microbiome and genetic profile with dietary patterns and those associated with physical activity.

What's more, the PROTEIN system supports a variety of new devices and algorithms for monitoring and studying behavior during, before and after meals. As part of the project, the role played by educational games in relation to achieving optimal health and well-being was also explored. Therefore, PROTEIN has produced several concrete innovation resources, including a volatile organic compound sensor for non-invasive breath analysis to analyze the effects of food intake and a "smart belt" for the assessment of intestinal functioning. Combining these sensors with the mobile application offers a convenient, rapid, non-invasive screening tool for monitoring users' nutritional status and collecting relevant information related to their diet and lifestyle habits.

Finally, the application of PROTEIN represents progress in terms of innovation compared to the different applications of personalization of drinks and food or health and fitness. In fact, PROTEIN also implements a functionality dedicated to restaurants and an automated shopping list obtained from food plans in seven different languages, thus involving different populations at a European level.

In the MediaEvo11 of the "bit-bang" a nutritional medi@morphosis is now "embodied" which requires new systemic and educational co-evolutions.

3. Food for sustainable well-being

In conclusion, the authors promote the responsibility of instructing, educating, training young generations in health, as an experiential process, mediated by didactic and immediate action by AI, aimed at acquiring the physical, mental and social well-being essential for growth of future citizens. This process is now among the priority areas of educational-didactic intervention in an interdisciplinary and transversal dimension, from the fields of experience in nursery school to the disciplines of primary, secondary and academic schools.

It is necessary to leverage the growing awareness that nutrition plays a role of fundamental importance in the process of growth and health of the individual. Paradoxically, in modern and globalized society we are increasingly witnessing the spread of pathologies linked to nutritional errors and which compromise, in certain circumstances, the overall physical and mental well-being of the individual. The awareness that the child's eating habits take root and consolidate during school age urges the school to take on a decisive role as a primary training agency in this educational field too. Furthermore, it can carry out the delicate and emerging task of educating and guiding not only students but also families and the community.

The main purposes of "immediate nutrition" concern the knowledge of correct eating habits based not only on nutritional plans, but also on the cultural and culinary traditions of the area. This calls for a necessary economic and cultural re-appropriation of the regional and national food heritage, beyond the misleading advertising messages of food massification.

In Italy, unfortunately, the consumption of agri-food products is decreasing, and these are fundamental for maintaining health and preventing numerous diseases. Therefore, the Authors, supported by specialists, are promoters of territorial projects aimed at spreading the culture of nutrition based on sensorial experience, nutritional knowledge, food description, hygiene and safety, food traditions for:

- protect the well-being and health of citizens;
- activate family dynamics of food awareness;
- enhance local agri-food products, respecting their seasonality;
- rediscover regional gastronomic traditions;
- rebalancing the relationship between man and nature (sustainability).

These experiential practices are promoted through a Third Sector Organization¹² located on the Amalfi Coast where Nature still teaches how to live the "Harmony of the Earth and Evolutionary Well-Being".

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