

Model of psychobiotics: A new use for microorganisms

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Introduction

Psychobiotics are probiotics or prebiotics that stimulate certain populations of microorganisms capable of having an effect on the nervous system and they are of psychiatric interest. The creation of an explanatory model is of **academic and social interest**, since it aims to raise awareness of a current and novel subject that can provide professional guidance to secondary school students and improve society's vision of microorganisms. In order to accomplish these objectives, the model should be exhibited **at schools or scientific institutions** (such as museums). Thus, by raising awareness of the psychobiotics, the microbial world could increase its interest towards them, as well as creating a positive vision towards bacteria.

Methodology



Previous analysis



Elaboration



Further analysis

Academic survey of students between 3rd of ESO (year 10) and 2nd of Batxillerat (year 13).

Opinion survey about microorganisms in non-academic fields.

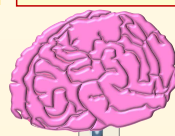
Elaboration of **model, QR code** and **informative cards**.

Presentation of the model in academic fields and subsequent survey.

Dissemination of the QR code in non-academic areas and subsequent survey.

Explanation of **what psychobiotics are** and how they work. Psychobiotics are probiotics or prebiotics that when ingested generate a beneficial effect on the nervous system. To generate this effect, the substances created by the microorganisms must be absorbed in the intestines and transported by the Gut-Brain Axis, which is a bi-directional communication mediated by endocrine mediators, immune mediators and neurotransmitters (1, 2, 3).

Explanation of **where psychobiotics work**. To understand this, the intestine, the villi and the microvilli, where the substances are absorbed, are represented. Some of these substances, through the Gut-Brain Axis, are able to reach the Nervous System where they interact with neurons causing an effect (4).



Comprehensive document on the subject associated with the QR Code. This document expands the topic by explaining, for example, the applications that psychobiotics can have in diseases such as autism, Alzheimer's, anxiety or postpartum depression (5, 6).

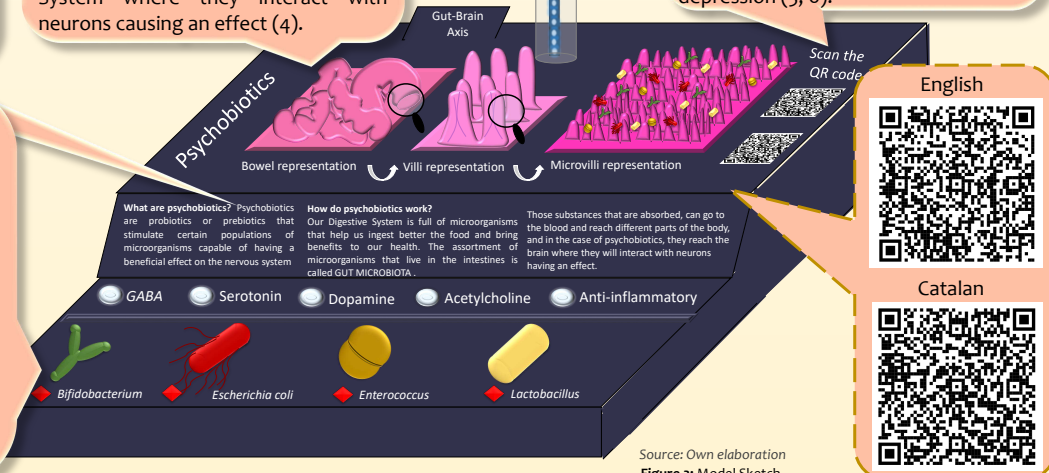
Examples of microorganisms with psychobiotic potential (7, 8, 9):

Bifidobacterium: It is capable of generating anti-inflammatories (stress reduction), GABA (gamma aminobutyric acid; reduces depression and anxiety) and serotonin which generates a feeling of happiness and well-being.

Escherichia coli: It generates serotonin and dopamine, which slightly regulates memory and generates a feeling of well-being.

Enterococcus: Generates serotonin and GABA

Lactobacillus: It is the most interesting species for psychobiotic research. It is capable of generating: GABA, acetylcholine (which improves cognition processes), anti-inflammatory and serotonin.



Source: Own elaboration
Figure 3: Model Sketch.

Results

Assessing the results obtaining in the post-surveys, they have proved that the model has been **useful** to understand the concepts discussed and to **increase the interest** of the students in the Microbiology field (Figure 5). At the end of the presentation, the students had a critical view of the beneficial activities of the microorganisms, which they had previously been unaware of. On the other hand, the effect of the QR code on non-specialized people showed that many people were surprised to learn about the importance of microorganisms and its **new beneficial use** in human health (Figure 6).

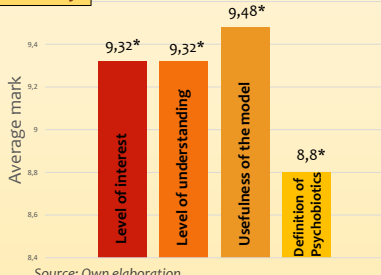
ACADEMIC FIELD

Further survey



Source: Own elaboration

Figure 4: Explanation of the model to the students of the 3rd of ESO (year 10) of the Sant Ermengol School (Andorra la Vella).



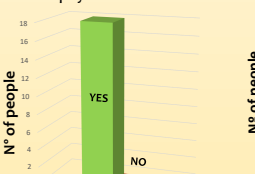
Source: Own elaboration

Figure 5: Results of the survey carried out after the presentation of the model to 27 students from 3rd of ESO (year 10). *Scores out of ten.

NON-ACADEMIC FIELD

Further survey

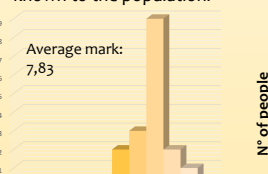
Question 1: Do you have a more positive view of microorganisms after learning about psychobiotics?



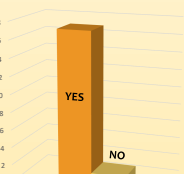
Source: Own elaboration

Figure 6: Results of the three questions asked of 18 non-specialized people to assess the impact of the QR code.

Question 2: Evaluate how interesting it would be to make the issue of psychobiotics known to the population.



Question 3: Do you think today's society has a negative idea of bacteria?



Conclusions

The explanatory model of psychobiotics is designed to clarify and make known a new beneficial use of microorganisms: **psychobiotics**. The scope of application is mainly based on academic fields, although it is a **current and interesting topic** that may be of interest to other people in non-academic fields. Thus, knowledge of psychobiotics can have a **positive impact** and give a positive view of microorganisms to the population. Likewise, the interest that the project has generated in the students will help them have a more concrete vision of the world of Microbiology and guide them slightly in their **professional future**. I hope I can continue to disseminate the model with the aim of reaching a wider public with a current and interesting subject such as the Psychobiotics.

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