**Q1. What global challenge will your team address?**

We will address the good health and well-being goal through early detection of depressive disorders in children and young adults aged 5 to 22. This follows the United Nations Article 29 from the "Convention on the Rights of the child” which stresses that the education of the child should ensure "The development of the child's personality, talents and mental and physical abilities to their fullest potential” a. We intend to do so by integrating online psychometric games tailored to each age group into the school experience. The results of these games will be analyzed by a machine learning algorithm to identify students who might need help.

**Q2. In approximately 300 words, describe the global challenge and explain why your team is interested in it and why it is important to resolve**

Every individual is the product of their habits and behavior developed during childhood. Depression can negatively impact this behavior and inhibit their overall growth and development. It is an issue that goes beyond religion, culture, age and economic status. Globally, it is estimated that more than 300 million people suffer from depression b. In addition, research has shown that 70% of mental health problems start during childhood or adolescence c. Depression is one of the main causes of disability in the world d and has personal, social and economic costs. People suffering from depression function poorly at school, at work and in their family. Globally, the productivity loss, absences from work and medical expenses due to depression cost $210.5 billion per year e. Depression is also the major cause of the 800 000 suicide deaths that occur annually b. It is known to be an important risk factor for the development of alcohol and illicit drug use disorders and gun violence f. Usually the mental illness goes unnoticed because there are many students in the class and the symptoms are misinterpreted as bad behavior. One of the most challenging problems a depressed person faces is fear of approaching teachers or friends for help. Barriers to effective care include identification of the illness at the early stage to provide the necessary help.

Despite all the consequences listed above, there’s lot of effort invested into recovery from depression but not much is done to prevent it from happening in the first place. Hence, our interest in detecting depression symptoms early enough in order to provide necessary support to children before it’s too late.

**References**

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3. Centre for Addiction and Mental Health (CAMH). Mental Illness and Addiction: Facts and Statistics. Accessed on 2018-12-08. <https://www.camh.ca/en/driving-change/the-crisis-is-real/mental-health-statistics>
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5. Amy Morin. 2018-08-12. “Depression Statistics Everyone Should Know” <https://www.verywellmind.com/depression-statistics-everyone-should-know-4159056>
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**Q3. In approximately 400 to 800 words, provide a brief outline of your team’s unique solution to address the chosen global challenge**

There are several online questionnaires that allow to identify depressive symptoms. However, a mentally unhealthy person is unlikely to go online and make use of such resources. Our solution is to integrate online psychometric situation-based games into the school experience, thus bringing the diagnosis process within students' daily routine. We chose games over questionnaires because we believe they will make the experience more enjoyable and thus keep students engaged.

For instance, one of the simulated situations could be a character in a virtual world who is a student like the player. In the game, the character's classes have been cancelled on a beautiful sunny day. Looking outside the window the virtual character is asked to choose between:

1. Playing outside with friends

2. Taking an extra nap

The player must choose one of the above options. There can be several such situational questions and the pattern of responses over a long run can be analyzed to identify students' state of mind.

Students will create an account and sign in before each game so that changes can be monitored, and results saved for analysis. Required sign in information will include last and first name, school name and grade level. Teachers will help participants that are too young to do so. To conduct the analysis at a school level, each participating school will have its own platform where their students' results will be saved.

The games will be designed by psychologists/ psychiatrists and will be tailored to each age group. The proper participation frequency will be identified by professionals. Their contents will help identify common signs and symptoms of depression and anxiety such as sadness, anger, withdrawal, loss of interest, guilt, difficulty concentrating and recurrent thoughts of death.

These responses will be analyzed by a computer software which will predict students' state of mind using a machine learning algorithm trained to identify signs of depression and anxiety. There will be two possible outputs: need attention and doing good. For instance, a student whose responses often portray withdrawal or aggression will be in the " need attention" category.

Teachers will then receive their class’ results containing every student's mental health diagnosis as well as the most informative responses that triggered the red flag. They will be trained to fully understand and interpret the results. If a student’s responses repeatedly raise a red flag, teachers will inform the parents and appropriate measures will be taken.

The algorithm will ensure fast analysis and will not require any additional time and financial costs from the schools. It will be capable of identifying the necessary symptoms across cultures regardless of what triggered the illness. Furthermore, it will provide extra support to teachers for the proactive detection of anxiety and depression symptoms, irrespective of class sizes. Moreover, this approach is highly scalable to the corporate world and will allow to build a data lake for further research.

We hope that our solution will ensure healthy lives and promote well-being for all in a digital era where adoption of technology and computer aided instructions in schools are being encouraged.