Mental Health and Wellness Screener
Software Requirements Specification

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1. SRS Revision History

Date	Author	Description
2-14-2022	lv	Created the initial document.
2-14-2022	lv	Sections 2.1, 2.2, 4, and half of 5
2-15-2022	lv	Sections 5, 2.3, 2.4, 2.5, some of the table of contents
2-15-2022	lv	Section 2.6
2-15-2022	lv	Section 3.1, 3.2, 3.3, format changes
2-15-2022	no	Peer review/check for errors
2-15-2022	lv	Sections 3.4, 3.5, table of contents, small checks and revisions
3-06-2022	qf	Updated SRS for final submission

2. The Concept of Operations (ConOps)

2.1. Current System or Situation

Dubbed by some as the “epidemic of the 21st century”, mental health disorders are shockingly common with 1 in 5 Americans experiencing mental illness in a given year (SAMHSA 2015) and 1 in 5 children having experienced or currently are experiencing a mental illness (Merikangas et al. 2010). With numbers that are far from trivial, it is a wonder that there is not greater demand to reduce mental illnesses: especially for children. Literature in the field of psychology, specifically pertaining to child mental health and wellness, has been slowly culminating over the last several decades providing methods by which to diagnose mental illness and recognize risk in childhood to help improve intervention for lifelong mental health. Although these methods have a proven effectiveness, they require application in order to make a meaningful contribution to mental health and wellness.

2.2. Justification for a New System

Universal mental health screening is one of the best methods that has been identified to aid in improving overall mental health by addressing risk and potential diagnoses (Dowdy et al. 2010) (Kamphaus et al. 2010). However, this screening must be universal for it to be effective, which can be an expensive process with current application (Verlenden et al. 2020). Furthermore, mental health screening has been shown to improve the overall mental wellness in a population by taking a screener and being informed of the results (Choi et al. 2018). By taking a screener, participants become more aware of their own mental health and in turn automatically begin taking personal steps to improve their own mental well-being. As such, it is imperative that the necessary tools are developed in order to assist these functions of mental health screening.

The SDQ (Strength and Difficulties Questionnaire) is a short 25 question screener for ages 3-16 with separate parent, teacher, and self-report versions (Goodman 1997) that are available in over 60 languages (Kovacs & Sharpe 2014). Furthermore, all these versions are available at the official SDQ website (SDQ 2022) which is maintained by creators of the screeners along with data samples of various norms and how to score the screeners themselves. With this information anyone can pick up the SDQ and take the self-report version.

However, manually scoring a test as well as comparing and computing data samples in order to establish risk after taking the screener is far from trivial and requires numerous math intensive steps to reach a decisive outcome. As it currently stands there is no software available for anyone and everyone to use the SDQ to see these results despite the proven benefits of self-screening as shown through research by (Choi et al 2018). Furthermore, because this software is not available, if a school district wished to use the SDQ for universal mental health screening, they would be required to either create the software themselves or implement a paper and pencil method as well as manually compare the results against norms to analyze risk; both of which are completely impractical options that only increase the cost associated with universal mental health screening.

2.3. Operational Features of the Proposed System

This new system will provide downloadable software by which any individual can take the SDQ as well as view scores and overall risk for the 5 different scales of the SDQ (SDQ 2022). This software will provide a GUI screen with instructions for taking the screener, a list of references concerning modern literature and research on the SDQ, and finally a method to begin taking the screener itself which consists of a series of 25 multiple choice questions. Since this software is intended for individual use, the screener offered will be the self-rated SDQ for ages 11-17, since this is the only age range at which the SDQ is deemed appropriate for self-report. Furthermore, although there are many languages available, our software will only provide the English (USA) version of the SDQ. There are two main reasons for this choice: first, our group is composed of members of which English is their primary language and second, there is some conflicting literature about bias and validity with non-English versions of the SDQ due to insufficient research (Zwirs et al. 2011) (Hoosen et al. 2018).

With the system proposed above we would be able to provide a method by which individuals can take the SDQ and view the results to evaluate their own risk and see a synopsis of potential areas of improvement in their mental health. This would be a direct response to the research by (Choi et al 2018) by making the user aware of their own mental health risk which in turn can lead to positive outcomes as proved in the research. Additionally, the proposed system would provide free open-source software for taking and scoring the SDQ which eliminates the time (and ultimately monetary) constraints of manually scoring and calculating risk from the results. Although the software would need additional improvements in order to scale accordingly, it would provide a prototype piece of software that is a cheaper method by which to administer the

SDQ to school districts and classrooms as observed in the case studies by (Verlenden et al. 2020). In this regard, our software would solve two problems of universal mental health screening using the SDQ.

2.4. User Classes

For this piece of software there is one user: children aged 11-17. This age range is what the SDQ has been tested for and is the only recommended age range. Other than the age requirement there are no other restrictions since mental health screening is intended to be conducted universally regardless of an individual's current mental health. However, we suspect, more often than not, that this screener will be used by individuals who are worried about their current mental health, are experiencing unexplainable somatic symptoms, or perhaps are just curious about their overall risk.

As an important notice: this software is **NOT** intended to be used by a teacher or parent to evaluate their own child. Mental health is extremely personal and results should only be made available to a practicing psychologist or the individual themselves.

2.5. Modes of Operation

There is one mode of operation for this software. Since we only have one user, kids aged 11-17, our only mode of operation is when a user wishes to take the SDQ to check in on their current mental health. The user would simply open the piece of software and begin the screener. After finishing (with a completion time anywhere between 5 and 10 minutes) the user will have different ways to view their results. This will include a review of the questions and their answers, the scores for each question, a comparison of the overall score compared to norms and data samples and a comparison of the 5 major factors to norms and data samples.

2.6. Operational Scenarios (Also Known as "Use Cases")

Use Case 1: Taking the Screener

Brief description: This use case describes how to get started taking the SDQ screener using our open-source software.

Actors: A student aged 11-17

Preconditions:

1. The student has downloaded the software following the Installation Guide and has met all the conditions for running the software also mentioned in the Installation Guide (example: installing Python 3.7+)
2. The student has uninterrupted access to the computer containing the software for up to 15 minutes.

3. The screener should be completed voluntarily with a potential suggestion from a parent, teacher or friend. It should not be completed through forceful measures or under supervision by anyone other than a licensed psychologist.

Steps to Complete the Task:

1. Open the software by double clicking on the application via the taskbar
2. Once the application has opened, read the instructions on the main page
3. Follow the instructions to begin taking the screener
    a. Answer the questions given on the next page. There will be 25 multiple choice questions.
    b. Answer the questions according to the instructions given on the previous page. The instructions for answering questions will also be given at the top of the new page.
    c. After finishing the screener, follow the instructions to exit the screener
4. You have finished taking the screener. You can either close the application or move onto other use cases.

Postconditions:

The student has now finished the screener and will be shown the final page of the application. This page will present the student with several options that are presented in the other user cases. At this point the student can also close the application entirely if they wish.

Use Case 2: Viewing Results

Brief description: This use case describes how to view your results after completing the screener (or after completing use case 1).

Actors: A student aged 11-17

Preconditions:

1. The student has finished taking the SDQ screener as described by the specifications in Use Case 1.
2. The student has access to a method of viewing a text file.
3. The student can download and email a text to themselves for later viewing or use on another computer.

Steps to Complete the Task:

1. Click the “Submit” button to generate a text file. This file will contain the results of the screener selected in the previous step and will be automatically downloaded onto your computer.
2. Open the text file by navigating to the folder containing the application on your local machine. You can either:
    a. Open and view the text file to view your results
    b. Email the text file for later viewing

3. You have finished viewing your results for the SDQ screener. You can now exit the application or move onto Use Case 3.

Postconditions:

The student has finished taking the screener and viewed their results. They can continue analyzing their results or move onto Use Case 3.

Use Case 3: Retaking the Screener/Restarting the Screener for another Student

Brief description: The student wishes to retake the test or get the application ready for another student.

Actors: A student aged 11-17

Preconditions:

1. The student has finished taking the screener according to the steps outlined in Use Case 1 or has viewed their results according to the steps in Use Case 2.
2. The student has access to the computer containing the software for an additional 15+ minutes.

Steps to Complete the Task:

1. For those who have finished taking the screener and do not wish to view their results:
    a. Simply follow the instructions on the ending page to navigate back to the starting screen.
    b. Once there you can simply return to Use Case 1 to begin taking the screener again either for yourself or to get ready for another student
2. For those who have finished viewing their results:
    a. The application will automatically prompt you to return back to the main menu to take the screener again.
    b. Once there you can again return to Use Case 1 to take the screener again

Postconditions:

This use case leads directly back to Use Case 1. The student can choose to again take the screener or simply close the application.

3. Specific Requirements

For all the requirements in this section there will be a priority designated to the requirement. The priorities are as follows:

1. Priority 1 items will be followed by a (1). They are the requirements that have been implemented.
2. Priority 2 items will be followed by a (2). They are the requirements that we hope to include in our system in the future.

3.1. External Interfaces (Inputs and Outputs)

1. Instruction Interface (Input) (1)
    a. This interface will provide the user with instructions about how to take the survey, and prompt the user to begin the screener.
    b. The input will come via the user through a button titled “Begin Screener”
    c. Once the button is pressed, the Screener Interface is loaded.
2. Screener Interface (Input) (1)
    a. This will track the user’s answers to the various questions in the SDQ. The user will have the option to select their answer for the 25 questions and their responses need to be saved by the system.
    b. The input will come via the user and will be saved in an instance of a class object.
    c. Each question will be multiple choice with three options for each question. The user can only select one of the three available options.
    d. Each question will have the same three options available as an answer with each answer being weighted differently as outlined by the scoring system for the SDQ (Goodman 1997).:
        i. Not True
        ii. Somewhat True
        iii. Certainly True
    e. The data will be saved simply in an instance of a class object with a variable for the score for each question.

3. Result Formatting Selection (Input) (2)
    a. This will allow the user to select what parts they want generated for their report such as the norms or a general summary of their answers.
    b. The input will come via the user selecting some or all of the available options for their report.
    c. The user will be able to select as many of the following as they wish:
        i. Overview of questions and answers
        ii. Scoring for questions and the test
        iii. Diagrams of risk for various factors in the SDQ
    d. The units of measure will simply be True/False whether or not to use the selected option for their mental health report.
    e. The data will be formatted into an instance of a class object with booleans for each of the selections made.

4. Final Screen (Input) (1)
    a. This will provide the user with instructions about accessing their results, and allow the user to either complete the survey again, or exit the program.

   b. The input will come via two buttons entitled “Take Again” and “Finished”
      i. Take Again - Loads the Instruction Interface.
      ii. Finished - Exits the program
5. Report Text File (Output) (1)
   a. This will be the final report generated with the results from the screener.
   b. The file will be output to the same directory as the location of the application.
   c. The file will be in .txt form for ease of use, and will be longer or shorter depending upon the options selected for the final report.
   d. It will be a simple text file with characters and descriptions.
   e. The data will be formatted as a text file with descriptions of the various attributes of the results of the screener along with the numerical data as proof.

3.2. Functions

Screener Interface (Input) - Taking the Screener (1)

1. There are no validity checks needed for the input since the user will only have 3 preset multiple choice options to choose from. However, since each question is scored differently we will need a way to convert the option that was selected from that specific question to its correct numerical value.
2. To process inputs:
   a. Save the selection that was made for the question
   b. Find the numerical value associated with that question based on the answer provided
   c. Save the numerical value with the question and the answer
3. The only abnormal situation is if the user skipped a question. Since the screener is incomplete without every single question answered, the interface will not move on to the results until every question is answered.
4. To generate the output for the text file there are several steps that will need to occur:
   a. First is to save the answer and numerical value for each question.
   b. Second, tally up total scores for the entire test and for each individual factor of the SDQ.
   c. Compare these numbers to the norms for self-reported data to determine where risk lies for the entire test and individual factors.
   d. Calculate T-Scores for the entire test and individual factors.
   e. After each one of these steps we store the string that will eventually be put into the output file.

Result Formatting Selection (Input) - Picking Options for Result File (2)

1. There are no validity checks required on the input since there is a set of specified options available to the user. They cannot put anything of their own into the system.
2. To process the input the system will
    a. Check which options were selected for the output file
    b. Store these options as booleans for later use.
3. Error handling will be present only if the user attempts to select a result file without selecting any of the options since the result file would be completely empty. Other than that the user can select as many of the available options as they want.
4. This input has direct correlation with the output result file.
    a. First we will check which options were selected for the output file
        i. if none, then there is an error
    b. Store the selections as booleans.
    c. Once the user indicates they wish to generate the result file, the system will determine which of the strings generated during the screening process will be desired for the result file based on the stored boolean values.

3.3. Usability Requirements

The main goal of our system will be ease of use for a quick process. In turn some of our goals for usability will be:

1. Elimination of some of the more tedious details of mental health screening such as (1)
    a. Filling in personal information
    b. Creating an account
    c. Connecting to the internet which can increase waiting times
2. A website version of taking the screener when you cannot download the software (2)
3. Simple user interface that includes just the instructions and the questions/answers (1)
4. An easy to read report for those without background in psychology or stats (1)
5. A customizable report (2)
6. Software that can be easily run by double clicking on the application and has very little prerequisites or prior programming knowledge to download and setup (2)
7. A pdf version of the final report for inclusion of graphs and tables for a more immersive result file (2)

3.4. Performance Requirements

Static

1. Application will load within 1 second of being clicked on (1)
2. Generating statistics for a screening and generating a report file will finish in less than 1 second (1)

3. Selecting answers for multiple choice questions will be immediately responsive (roughly a millisecond) and will not require a re-loading of the page.

Dynamic

1. For multiple uses the system's static performance requirements will run at the same speed with each consecutive run as in previous iterations (1)
2. The system will be able to process infinitely many runs as long as the computer is operational. (1)

3.5. Software System Attributes

1. This software will be tested primarily on Unix based operating systems such as Linux distributions and MacOS with a majority of the development occurring on MacOS. (1)
2. However, it is expected to be 100% portable to all Operating Systems (2)
3. This system will ensure user privacy by removing result files from the systems when the program is exited or returned to the main menu after a screening is completed. (1)
4. The modules in this program will be designed in such a fashion that key components such as the screener interface, and the logic for calculating statistics will be portable no matter the configuration. This means future upgrades such as a website, improvements for a teacher to screen their entire class, or additional features to create user accounts for a school district can be added while core functionality like the screener and calculation of statistics remain unchanged. (1)
5. Security and privacy are also ensured since all information used in this software is readily available at (SDQ 2022). (1)

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