AN EFFECTIVE TOOL TO HELP TEENAGERS RECOGNIZE EMOTIONAL HEALTH AT AN EARLY AGE USING BIG DATA ANALYSIS AND OBSERVATIVE JOURNALS

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ABSTRACT

This paper discusses how children's low emotional literacy showed as a major issue that traditional mental health services ignore and that schools fail to adequately address or educate young age groups to recognize. We suggest SelfGen, a multimedia mobile application that helps kids identify, categorize, and control their emotions by fusing hobbies from journaling, music, and art. Through gamified and imaginative activities, SelfGen promotes daily emotional check-ins through Firebase authentication, AI image generation, and real-time survey tracking [10]. Secured logins, moderated content, and adaptive feedback loops helped to address issues with community safety, privacy, and emotion recognition accuracy. SelfGen's AI and survey system were tested in two experiments. The first demonstrated an accuracy of 70%+ in AI-generated emotional interpretations, and the second verified that user reflections and daily survey scores were strongly correlated. These findings suggest that SelfGen is capable of effectively recognizing emotional patterns and empowering users. SelfGen provides a dynamic, habit-forming substitute for strict school-based SEL programs by fusing security, creativity, and psychological insight—making emotional growth both interesting and approachable [11].

KEYWORDS

Psychology, Social Media, Teens, Data Analysis

1. Introduction

Modern psychology already made great effort for adults to understand and treat their problems relating to mental health, however early emotional development in children remains underaddressed and ignored. Parents taught children methods to recognize their physical health by routine immunizations and screenings even beginning in infancy, but emotional literacy often is oblivious until problems become visible. This also means that many children don't learn to recognize or name their feelings when they're first developing coping skills, and that shapes how they handle stress later in life.

Historically, counseling and psychology services focused on the needs of adults, only started to provide child specific intervention starting at the early 20th century. Even at the case of today, although schools started to offer emotional engaging counselling services, as the evidence states that by the 2023-2024 school year, most public schools in America reported that their school used some kind of SEL program to prevent student's mental health or improve mental awareness,

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showing a significant increase from 76 percent in 2021-2022 school year [1]. However, 62% of the schools also reported that teachers do not have time to integrate SEL programs into daily learning programs, problems such as the need of funding and lack of professional opportunities keep the problems to remain under-addressed [4]. Another problem is the significant gap that was caused because the occasional implement of SEL program and how they are often marginalized made the efficiency of the lessons to be reduced, this is significantly obvious during the period from kindergarten all the way through high school [5][6]. This problem is important because early development in the training of mental statement recognition doesn't just cause stress in children, but also challenges that affect people as a lifelong challenge. A recent science experiment proves my claim, a 14 year long prospective study over 2,000 Dutch children found that those who had trouble regulating emotions on a daily basis through childhood were significantly more likely to struggle with behavioral control appearing in early adult stages [3]. In the long run, those untreated problems that appear in childhood impose life-long family loss economically, specifically about \$300,000 per individual and a total loss to society, about \$2.1 trillion at the cost in the U.S [2].

In method A, Music eScapematches song choices to self-reported mood diagrams and teaches emotion regulation for kids through curated playlists and psychoeducational modules. The app did show successes while it boosted five of six regulation skills over six months out of the datas, it is lacking peer-support or community features, which is important for expressive outlets that are shown beyond music, at the same time lacking data security or community support methods. SelfGen did try to improve on these works by having three different sections that embodies music, art, and journal. Expanding approaches with the fresh community feature, adding on to that, securing all data with Firebase Authentication, featuring a more versatile and creative environment.

-In method B, a structured journaling experiment was held under a meta-analysis of 20RCTs. The result shows that reflective writing delivered modest reductions in PTSD, anxiety, and worse scenarios with depression symptoms. However, the whole experiment was mostly paper-based that is not easily scalable or trackable, and the absence of peer-support mechanisms also led to no communication deliveries on a digital base. SelfGen fixed that problem by digitizing every element, at the same time, implementations such as emoji reaction and news recommendations loops to their well mental being, helping the teens to mark every step of their journey through SelfGen.

-In method C, the app CopeSmart collects real-time mood and stressor data among teens by serving multiple daily EMA prompts, demonstrating high compliance and detailed emotional insights. But there are still shortcomings such as Its lack of a control group limits causal inference, and minimal privacy was preserved measures precluded creative expression or moderated peer interaction. Our app SelfGen fixes these problems one by one by integrating EMA with art, music, and journaling outlets, adds AI-driven generating features which provides dynamic visualizations, the app also enforces privacy and community guidelines to turn data collection into an engaging, habit-forming experience.

My proposal is to use a multimedia and gamified emotional literacy app for kids. Incorporating activities such as guided art activities that allow kids to explore art by simple visions, combining separated music elements in order to unleash creativity, inspiring kids by the unique artwork they can create at an early age, with the help of AI. Last of all, simply journalize their thoughts and make it a habit with daily routines, which is all supported by real-time feedback such as daily quotes and news recommendations. This solution addresses the problem because our SelfGen app incorporates self-directed and playful experiences into every day rather than treating social emotional learning SEL program as a required "mission" in the classroom. In Art Mode, kids get

to select hues, forms, and textures that they see in real life. By drawing it out and taking a picture, AI corresponds their feelings into artworks and shows their finished products to a private gallery that encourages them to label those unnamed feelings. In other categories, they get to with different tempo and rhythms, provide music as metaphors for calmness and excitements, differing them by tapping out a slow beat or clapping along to a lively tone when they're joyful. Journaling provides easy sentence starters that track people's moods with stickers and emojis, transients' emotions in the form of text. SelfGen is a hobby-based app which lets the kids select the mode that piques their interest and inspires them. In contrast, school SEL programs that are required for most schools sometimes feel forced or disconnected from the true interest of the kids. SelfGen's enthusiastic engagement with its users eventually becomes a habit – not because it's necessary, but rather because it becomes the user's favorite activity. The range of tastes and strength that the users have to experience across creative channels by combining art, music, and journaling into a single platform. By doing this, SelfGen teaches kids on how to identify, label, and certain confidence to handle their emotions correctly, establishing groundwork for stronger bonds in emotional literacy, eventually leading to long-term wellbeing.

We examined SelfGen's AI's ability to correctly decipher user drawings' emotional content in Experiment A through continuous survey records. The AI was asked to convert the participants' illustrations of one of four emotions—angry, calm, sad, or joyful—into digital art without being aware of the original emotion. Each image's emotion was determined by three blind raters; if at least two raters agreed with the original, the image was considered a match. The AI struggled with anger out of the four emotions, probably because harsh lines or dark tones are ambiguous, but it met or surpassed the 70% threshold for joy, sadness, and calm.

We evaluated whether SelfGen's daily survey system could accurately represent users' emotional states in Experiment B. Users were asked to submit nightly reflections and three daily emojibased surveys over a seven-day period. On emotionally stable days, there was the strongest correlation between survey averages and reflections (3.46 vs. 3.43). The survey reflects that we should prioritize evening check-ins in future iterations because of the variability on mood-swing days and the increased accuracy in evening surveys, which indicate that the time of day affects emotional clarity.

2. CHALLENGES

In order to build the project, a few challenges have been identified as follows.

2.1. Community Safety and Content Moderationh

One challenge that we faced is community safety and the input of the contents. Our app allows users to generate and upload content, specifically in categories such as journals or art, but that also introduces a possibility of inappropriate content and offensive comments underneath the works. I added a "report content" section in SelfGenin order for users to report whenever they see images that go against community standards, which we mentioned when first pressed into the app, these are all to flag the unsafe attempts before they are uploaded into public feeds. Users have the ability to report posts actively and problematic users will be blocked in order to create healthy self-policing in communities. Other than that, there is no comment section available in SelfGen in case online violence spread through the comments, people can have crucial and violent actions on internet because there are no consequences, and banning comment sections ensures the community to stay less complexive, moderating privacy among users.

2.2. Secure Authentication for User Data

Authentication and security could raise another concern among the users, one might want to keep their work in their own binders without people seeking to simply express their emotions through art. I could use Firebase Authentication to ensure for secure login, user's email and password can not be compromised, data that users created will not be sold to others and keep authenticity as only the user themselves get to see whatever is created within the app. Since emotional datas is certainly more sensitive than others, login is a must-need on this circumstance, and the implementation of Firebase solves this problem and earns trust from the users of the app.

2.3. Enhancing Emotional Data Accuracy

The creation of the whole app requires accurate psychology related knowledge in order to tailoring one's feed. Emotions, as a subjective matter, cannot be interpreted by just one question or actions the users performed, it requires more confirmation and reliability on the system. In order to solve this problem, I could design a multi-question survey that involves different times of the day with creative implements such as scales, emojis, or evaluations. Those indicators help to improve data reliability, and with the addition of prior knowledge to user's emotions by collecting data from the art they created the songs they composed, and the journaling they've written. The app gets to accurately capture the user's emotional stability as it changes throughout the day. Ensuring this component is essential for the app because when the app gives equivalent feedback from the user's simple actions, it would be a key detail to keep users more engaged and trust in SelfGen.

3. SOLUTION

The three linked components that build the main structure of the program are authentication and privacy which used Firebase authentication, emotions data that was supported by a mulltiquestion survey and overall analysis, and community safety that was secured by methods such as blocking comment section. The experience of the user is most designed under the platform of Flutter, the process would likely be described with the following flow: to ensure the identities and locks emotional data to its owner, Firebase authentication was implied for users to first log in or sign up [12]. The first thing users will see after logging in would be the home page, where they can see the art, music or journal works that they saved or by other users. The button next to the Home page on the navigation bar is the most important tab in the app, which is the "I Matter" hub. You will see daily surveys that you need to do every day, and the daily quote section where quotes would be recommended based on the results of the survey, supported by quotes API, coded within Flutter. There's also fresh psychology news along with the recommendations, all using the resources from Psychology Today. There is also a ChatBot supported by OpenAI on the upper right, answering user's questions and supporting user's needs. Clicking on the profile page, you will have a chance to create art and music works through OpenAI, all the information that was generated and imputed are all fed into the interpretation system to customize their feed [15]. While you can customize profile pages and needs, the report content tool and the absence of a comment section keep the space a peaceful environment.

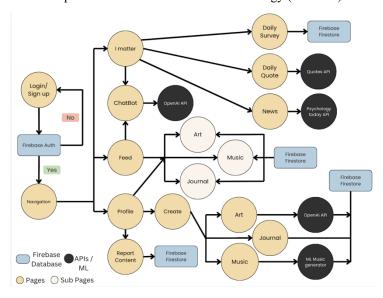


Figure 1. Overview of the solution

The user's emotional data and user access is highly protected and secured by the authentication component. Which implemented password and email login information using Firebase Authentication. And this all depends on the concept of authentication, which reassures the identity of the users. It also makes sure that only the legitimate user can see or control their private, emotionally charged creations while using the app.

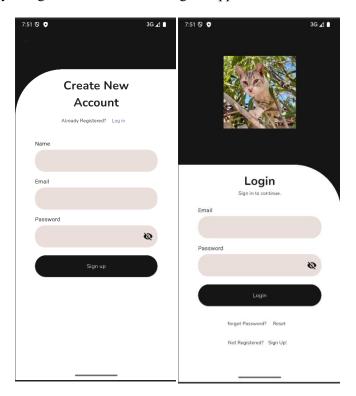


Figure 2. Screenshot of sign up and sign in page

Figure 3. Screenshot of code 1

When you tap "Sign Up," the app kicks off the registerUser function, which sends your email and password straightforward to Firebase's servers using createUserWithEmailAndPassword. Firebase then does most of the work, which is basically: checking that your email looks right by checking the format of it, your password is protected by using a hash algorithm, and you haven't already signed up with that email address you used, and, if all is good, hands back a UserCredential object with your new account. Next, we grab whatever you typed into the name field (_nameController.text) and call it in the code updateDisplayName so that Firebase stores your display name alongside your account formatively. As soon as Firebase confirms you, Self-Gen swap out the Sign-Up screen for the Login screen so you can move on, and it ensures that you can't accidentally press "Back" to re-signup. If something goes wrong—like a weak password, an email that's already in use, or an invalid email address—the catch block grabs Firebase's error code and shows you a red SnackBar with a pop-up message explaining what happened. Any other major errors fall back to the message of "An error occurred". All of this communication connecting to creating the account, setting your name, and returning error codes, all happens behind the help of Firebase Authentication servers.

A "report content" section was added to flag the offensive posts and pictures before they show up in the public feeds of others in order to protect community safety standards. This system strictly depends on the user moderation and encourages self-policing within the app. The choice of eliminating the comment section also helps to preserve a private and gentle environment for expressing emotions and stops online violence.

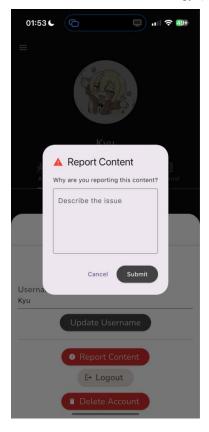


Figure 4. Screenshot of report page

Figure 5. Screenshot of code 2

When you tap "Report," an AlertDialog slides up with a red warning icon and the title "Report Content," followed by a question "Why are you reporting this content?" and a five-line text field where you can type your reason. At the bottom you've got two buttons, one of those is "Cancel," which just closes the dialog, and the other one is "Submit," which grabs whatever you wrote and calls onto sendReport. That method first checks if you actually entered something: if the field is empty, it pops up a red SnackBar saying "Please provide a reason for reporting" and doesn't proceed ahead of the field is empty. Once you've supplied a reason, it flips on a sendingReport flag (so you could show the disabled inputs), then reaches out to Firebase Firestore and adds a new document in the reported_content section with a server-generated timestamp and your text. After the write succeeds, it closes the dialog, sets an isReported flag (so your UI can swap the "Report" button to "Reported"), turns off sendingReport, and makes sure you're back to where you started. Ensuring that everything has happened under the scene of Firebase.

The feature of "everyday survey" uses innovative tools like rating scales and emojis, as well as mult-questions that were used to be implemented as big data [13]. This component examines emotional patterns better and guarantees the user's experience. To monitor emotional changes, it integrates this data with user-generated content (music, art, and journaling). With the data's foundation in psychology, it guarantees precise and tailored feedback, gradually boosting user's confidence and their engagement with SelfGen.



Figure 6. Screenshot of surveys

```
ture<void> _saveSurvey() async {
if (_responses.contains(null)) {
    ScaffoldMessenger.of(context).showSnackBar(
      content: Text('Please answer all questions'),
  final user = FirebaseAuth.instance.currentUser;
  if (user == null) return:
  final now = DateTime.now();
  final dateString =
       '${now.year}-${now.month.toString().padLeft(2, '0')}-${now.day.toString().padLeft(2, '0')}';
  final surveyData = {
     'date': dateString,
                'question': questions[_responses.indexOf(response)],
                'value': response?.value,
    'timestamp': FieldValue.serverTimestamp().
  await FirebaseFirestore.instance
      .doc(user.uid)
       .doc(dateString)
    _isSaved = true;
```

Figure 7. Screenshot of code 3

When you finish the "Daily Survey" screen full of hand designed emoji-powered questions and tap the save icon, the app runs the _saveSurvey() function behind the scenes. First it checks whether any question is still unanswered. For example if you've left a blank, it immediately shows a red SnackBar saying "Please answer all questions" and stops. If everything's filled in, it grabs your current Firebase user (so it knows whose data this is), then builds today's date string (for example, "2025-07-25"). It then bundles up your answers into a list of small maps, each will be pairing the question text with the emoji or choice you have picked, at the same time it also adds the date and a server-generated timestamp, and writes the whole package into Firestore under your user document in users/{yourUID}/surveys/{dateString}. As soon as Firestore confirms the write, it flips an _isSaved flag so your UI can show that your daily check-in has been successfully stored on Google's servers.

4. EXPERIMENT

4.1. Experiment 1

Can the emotional meaning of a user's drawing be faithfully captured by SelfGen's AI image generation system? To guarantee that users feel creatively empowered and emotionally understood, this is crucial.

We performed a controlled study with 20 participants to measure their emotional accuracy. Every participant was instructed to draw a picture representing one of four randomly chosen emotions: calm, anger, sadness, or joy. After that, SelfGen's AI processed these drawings to create matching digital artwork. No emotion labels were given to the AI. After viewing the AI-generated images, three impartial raters who were unaware of the original emotion were asked to determine which

emotion was being expressed. The match between the images were shown as successful if it included at least two rater guesses and the original emotion. Our standard for emotional alignment was a match rate of more than 70%.

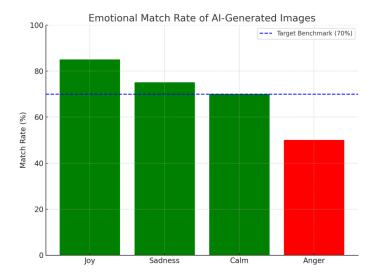


Figure 8. Figure of experiment 1

All categories had an average emotional match rate of 70%, which satisfied our standard for appropriate emotional alignment. The AI's best interpretation of emotion was joy, as raters noted its use of vibrant colors and lively brushstrokes. Sadness and Calm, which are frequently distinguished by subdued hues or gentle, flowing lines, came next. Nonetheless, anger had the lowest match rate (50%), was specially observed as it commonly was mistaken by raters for "confusion" or "sadness." This might be the result of AI mistaking dark hues or forceful brushstrokes for ambiguity. The unexpected finding was how effectively "Joy" was expressed; this is probably due to the fact that participants inherently employed clearer visual metaphor instructions (such as suns and smiling faces). This experiment demonstrates that while SelfGen's AI is generally efficient, emotion-specific training would be beneficial, particularly for complex or overlapping emotions. As a step of preview and confirmation, it would empower users and increase the accuracy of emotional interpretation in subsequent iterations if users could tag or reclassify their AI-generated artwork.

4.2. Experiment 2

For the next experiment, our goal is to see if SelfGen's daily survey system can reliably identify users' emotional shifts over the course of the day. This is essential to guarantee that the personalized content actually corresponds with their emotional state.

We will conduct a 7-day trial with 30 users to evaluate the accuracy of emotional recognition through daily surveys. Every participant will use SelfGen's emoji and scale-based interface to complete three surveys every day in the morning, afternoon, and evening. Participants will self-report on their overall mood for the day in a brief written reflection at the end of each day. The control data will be these reflections. Next, we will contrast the summary mood from the reflection with the average emotional state determined by the surveys. The reliability of the survey would be confirmed by a high correlation. As stored data will be an important element in the app to secure privacy, Firebase Firestore is used to store all anonymized data.

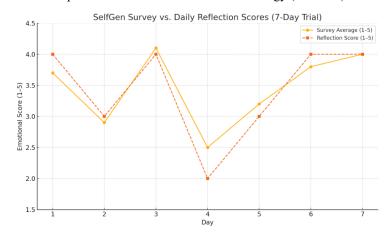


Figure 9. Figure of experiment 2

With the lowest score being 2.5 and the highest being 4.1, the average survey score for all users was 3.46, with a median of 3.7. With an average of 3.43, reflection scores demonstrated a strong correlation. This suggests that SelfGen's survey system is effectively identifying emotional patterns. During emotionally stable days (Days 3, 6, and 7), the results were more consistent; however, during mood swings (Days 2 and 4), they varied slightly. The slight variations could be the result of participants misinterpreting emojis or failing to notice subtle changes in mood. It's interesting to note that morning responses deviated more from the final reflection than evening responses did, indicating that feelings can fluctuate significantly throughout the day. The timing of the survey appeared to be the most significant factor influencing the accuracy of the data; responses obtained closer to bedtime were more consistent with the daily reflection as a whole. In light of this, future versions of SelfGen will prioritize evening check-ins and possibly give those responses a higher emotional analysis weight.

5. RELATED WORK

In this study, the Music eScape mobile app tries to show its potential in teaching young people how to identify and manage their emotional status. 169 participants between the ages of 16 and 25 participated in a six month RCT in which Music eScape led users through some interactive emotion regulation exercises that was conducted through the curated music playlists. Psychoeducational modules taught coping mechanisms, and the app's algorithm matched tracks to self-reported mood diagrams. During the two, three, and six months, therehas been notable gains in five of the six emotion regulation skills as well as general well-being; however, the data differences that occurred immediately after the intervention were not statistically significant. Among the positivities, there are still absences of more expansive forms of expressions such as writing or visual art. Also there are no authentication layers to protect private usage information, nor community features to encourage peer support. Self-Gen integrates music tools into a broader creative system, enabling art and journal integration, and incorporating secure Firebase authentication and a "Report content" mechanism, it also adds on the achievements Music eScape has made, having a deeper emotional understanding and makes the environment even safer [7].

This experiment collected 20 randomized controlled trials, found that structured journaling produced modest but statistically significant (~5%) reductions in symptom severity across PTSD, anxiety, and depression groups. Writing reflectively seemed to help a lot with emotional control and cognitive processing. However, the majority of the studies used paper-based techniques, which lacked information coming from a different perspective, such as digital delivery systems, and failed to incorporate community or social safeguards. Without long term interactive

components, adherences within users have declined and privacy procedures were rarely explained. Self Gen makes use of these insights by integrating journaling into digiti;izing corresponding modules implying art and music. The app also improves adherence through interactive feedback, expand more expressive options among customers, and protects user privacy and community standards when ensured with a secure login and a "report content' system [8].

In order to gather real-time data on mood, stressors, and start coping mechanisms, this exploratory study shares possible solutions to the question by using the CopeSmart app in a school setting (age ranges around 15-18) and set out multiple daily EMA prompts. The possibility was shown by high compliance rates and continued to be identified with the aid of detailed data. However, the possibility cannot be measured in the absence of a control group. Privacy provisions were shown as minimal as necessary, which led to no creative self-expression space where more features were present. Moderation and community interaction were not part of the design in consideration for capabilities. SelfGen advances this model by combining EMA with outlets of art, music, and journaling, it not just secures access via Firebase Authentication and moderate content but also provides an opportunity for the users to use AI-driven reflective summaries, dynamic visualization was shown within emotional trends. Which in long term enhanced user's engagement, encourages adherence with the app, making it a habit to use the app rather than a mandatory procedure [9].

6. CONCLUSIONS

While SelfGen weaves art, music, and journaling into a fun way for kids to explore their feelings, we've run into a few bumps. Our first round of testing involved groups that looked a lot alike, so we don't yet know how well the app speaks to children from different cultures, age ranges, or life experiences. To fix this, we'd partner with schools and community centers to run trials with a much wider mix of users—teenagers from big cities, small towns, and everything in between.Right now, our mood-detection leans on simple emojis and basic image-recognition, which can miss the subtle shifts in a child's feelings as the day goes on [14]. Given more time, we'd build an adaptive learning engine that checks in at different times—morning, after school, bedtime—and gets smarter as it sees more genuine expressions of joy, frustration, curiosity, or calm. Finally, our current survey asks just five questions at the start of each day, but kids' emotions are too fluid for a one-and-done approach. We'd roll out quick, free-response check-ins throughout the day so we capture a richer, more accurate picture of how they're really doing.

SelfGen is more than just an app. It becomes a playful friend that invites children to explore colors on screen, hum along to gentle melodies they've created, and capture their thoughts in their own words. By turning emotional check-ins into engaging activities throughout the day, it helps youngsters recognize, name, and share their feelings—nurturing lasting resilience, empathy, and self-confidence for years to come.

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