**Digital Phenotyping for Early Detection of Student Stress – Project Plan**

**Phase 1: Research and Requirements (Month 1)**

* **Kickoff & Team Setup:** Meet to define project scope, roles (e.g. UI dev, ML dev, backend dev, PM), and milestones. Prepare project management tools (GitHub repo, Trello board).
  + Tools: Zoom/Slack for meetings, Trello/GitHub Projects for task tracking.
  + Roles: All interns (led by a designated PM).
* **Literature Review:** Search academic databases (Google Scholar, PubMed) for terms like “digital phenotyping,” “smartphone stress,” and “student mental health”[frontiersin.org](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full#:~:text=Introduction%3A%20University%20students%20are%20particularly,sensing%20data%20in%20this%20group). Compile key findings on using smartphone sensors for stress detection (e.g. GPS, accelerometer, step count)[frontiersin.org](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full#:~:text=Mental%20health%20smartphone%20apps%20have,and%20psychiatric%20disorders%20including%20depression). Summarize relevant models and EMA (survey) methods from the literature.
  + Tools: Google Scholar, Zotero/EndNote, PubMed.
  + Roles: ML dev (lead), all interns assist.
* **Sensor & Data Source Identification:** Identify which phone sensors and data streams to use. Likely sources: GPS (location patterns), accelerometer/gyroscope (movement), step counter, screen usage logs, call/text logs, ambient sound, etc. Reference studies that used these (e.g. “smartphones have multiple passive sensors … GPS, accelerometer, gyroscope, step detector”[frontiersin.org](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full#:~:text=Mental%20health%20smartphone%20apps%20have,and%20psychiatric%20disorders%20including%20depression)). Decide on initial sensors to integrate.
  + Tools: Smartphone technical documentation, pub articles, Flutter plugin docs.
  + Roles: UI dev (investigate Flutter sensor plugins), ML dev (research feature relevance).
* **EMA Survey Design:** Define the active survey (Ecological Momentary Assessment) protocol. Select validated stress/mood questionnaires (e.g. Perceived Stress Scale, PANAS), and determine schedule (e.g. 3–5 times/day). Plan push-notification strategy for surveys[pmc.ncbi.nlm.nih.gov](https://pmc.ncbi.nlm.nih.gov/articles/PMC6230530/#:~:text=EMA%20has%20a%20number%20of,7%20%2C%2030%2C9).
  + Tools: Existing EMA literature[pmc.ncbi.nlm.nih.gov](https://pmc.ncbi.nlm.nih.gov/articles/PMC6230530/#:~:text=Ecological%20momentary%20assessments%20,measured%20a%20behavior%2C%20mood%2C%20and), mental health assessment resources.
  + Roles: ML dev (select questions), UI dev (design survey UI), Mentor (psychology advisor input).
* **Privacy, Ethics & Consent Planning:** Research privacy regulations (GDPR, institutional IRB rules) and ethical guidelines for digital phenotyping[pmc.ncbi.nlm.nih.gov](https://pmc.ncbi.nlm.nih.gov/articles/PMC8367187/#:~:text=phenotyping%20is%20expected%20to%20improve,protection%2C%20consent%2C%20bias%2C%20and%20accountability). Outline informed consent text and opt-in/opt-out flows. Plan data anonymization and security measures (deidentification, encryption).
  + Tools: IRB guidelines, ethics literature[pmc.ncbi.nlm.nih.gov](https://pmc.ncbi.nlm.nih.gov/articles/PMC8367187/#:~:text=phenotyping%20is%20expected%20to%20improve,protection%2C%20consent%2C%20bias%2C%20and%20accountability).
  + Roles: Backend dev (lead, for compliance research), all interns.
* **Functional Requirements Specification:** Document app requirements and user stories (e.g. “As a student, I want to log my mood via quick surveys and see stress feedback”). Specify features: passive logging, EMA delivery, simple dashboard. Specify ML goals (stress prediction).
  + Tools: Google Docs or similar.
  + Roles: All interns collaborate.
* **Project Planning:** Break work into sprints/weeks, set milestones for design review, prototype demo, pilot test, paper draft. Schedule weekly mentor check-ins for feedback.
  + Tools: Trello/GitHub Milestones, calendar.
  + Roles: All interns (PM sets schedule).
* **Mentor Review 1:** Present initial findings (literature summary, proposed sensors/surveys, timeline) to mentor. Incorporate feedback to refine scope and plan.

**Phase 2: Design and Architecture (Month 1–2)**

**Figure:** Example digital phenotyping platform architecture with passive and active data collection, secure storage, and analysis[jmir.org](https://www.jmir.org/2019/11/e16399/PDF#:~:text=Platform%20Components%20The%20resulting%20platform,provide%20dynamic%20control%20over). Key design tasks:

* **System Architecture Design:** Define the overall system components: Flutter mobile app, Firebase backend (Firestore database, authentication), ML analysis module (cloud or on-device). Draw architecture and data flow diagrams showing how sensor data and EMA responses move from phone to cloud and back.
  + Tools: Draw.io or Figma for diagrams.
  + Roles: All interns.
* **Tech Stack Finalization:** Confirm libraries and frameworks: Flutter for cross-platform app, Firebase/Firestore for backend, TensorFlow/PyTorch for ML, Flutter sensor/notification plugins (e.g. sensors\_plus, geolocator, flutter\_local\_notifications). Decide on any third-party tools (e.g. CARP Mobile Sensing Flutter library).
  + Tools: Documentation for Flutter/Firebase/ML frameworks.
  + Roles: UI dev and Backend dev (led by both), ML dev.
* **Data Flow and Database Schema:** Design how data is structured and stored. Plan Firestore collections (e.g. users, sensor\_logs, survey\_responses). Define data schema (fields for timestamp, sensor values, EMA scores). Establish how data syncing works (offline support, batching).
  + Tools: Firestore schema design (tables/views), documentation.
  + Roles: Backend dev (lead), ML dev.
* **Consent & Privacy Flow Design:** Mock up user flows for onboarding and consent screens in the app. Ensure screens explain data collection in plain language. Plan how users opt-in or withdraw. Incorporate compliance (e.g. allow account deletion).
  + Tools: Figma wireframes.
  + Roles: UI dev (lead), Backend dev.
* **UI/UX Mockups:** Create mockups for key app screens: onboarding, home/dashboard (stress level display), survey questions, settings. Define basic navigation flow.
  + Tools: Figma or Adobe XD.
  + Roles: UI dev (lead), all interns provide input.
* **Feature Prioritization (MVP):** List minimum viable features for prototype (e.g. passive logging of 2 sensors + at least one survey, basic ML output). Reserve advanced features (e.g. social features) for later.
  + Tools: Spreadsheet or backlog document.
  + Roles: All interns.
* **Data Processing Plan:** Outline steps for preprocessing and feature engineering: e.g. aggregating sensor data into features (activity levels, mobility patterns), handling missing data, labeling stress via surveys. Sketch ML pipeline stages.
  + Tools: Jupyter notebooks (planning), Python libraries list.
  + Roles: ML dev (lead).
* **Preliminary UI Dashboard Concept:** If time permits, consider a web or in-app dashboard to visualize data. Plan charts (e.g. stress vs time graph).
  + Tools: Mockup tools (Figma).
  + Roles: UI dev.
* **Documentation:** Write up the design decisions (architecture diagram, DB schema, UI mockups) in a design document.
  + Tools: Google Docs/Confluence.
  + Roles: All interns.
* **Mentor Review 2:** Present architecture and design deliverables to mentor. Update designs per feedback before coding.

**Phase 3: Development and Integration (Month 2–3)**

* **Firebase & Backend Setup:** Create Firebase project and Firestore database. Enable Firebase Authentication (e.g. anonymous or email). Set up Firestore security rules (e.g. users see their own data).
  + Steps: Use Firebase console/CLI to initialize project. Define collections and indexes.
  + Tools: Firebase Console, Firebase CLI.
  + Roles: Backend dev (lead).
* **Initialize Flutter Project:** Scaffold a new Flutter app. Set up project structure (separate folders for screens, models, services). Add necessary dependencies (e.g. cloud\_firestore, firebase\_auth, firebase\_messaging, sensors\_plus, etc.).
  + Tools: Flutter SDK, Android Studio/VS Code.
  + Roles: UI dev.
* **Sensor Integration (Passive Data):** Integrate plugins for phone sensors: e.g. use sensors\_plus for accelerometer/gyroscope, geolocator or location for GPS, and health or other APIs if needed. Request runtime permissions (location, activity recognition).
  + Steps: Implement code to listen to sensor streams and collect data periodically (e.g. every minute for location, accelerometer at intervals). Format data (timestamp, values).
  + Tools: Flutter plugins, testing on Android/iOS devices.
  + Roles: UI dev (lead), Backend dev (assist with Firebase saving).
* **EMA Survey Implementation (Active Data):** Implement survey feature: design survey questions in code, create Flutter forms for responses. Schedule and send survey notifications using Firebase Cloud Messaging (FCM) and local notifications (e.g. flutter\_local\_notifications)[pmc.ncbi.nlm.nih.gov](https://pmc.ncbi.nlm.nih.gov/articles/PMC6230530/#:~:text=To%20conduct%20an%20EMA%20study%2C,To%20encourage%20participants%20to).
  + Steps: Use FCM to send push notifications at scheduled times (e.g. 4 times/day). On tap, open the survey screen. Save responses (with timestamp) to Firestore.
  + Tools: firebase\_messaging, flutter\_local\_notifications.
  + Roles: UI dev (lead), ML dev (define questions, logic).
* **Data Upload and Sync:** Implement data syncing: write sensor and survey data to Firestore. Handle offline cases (cache in local storage or using Firestore offline persistence). Ensure minimal data is lost if offline.
  + Tools: Firebase SDK for Flutter.
  + Roles: Backend dev (lead), UI dev.
* **User Authentication & Profiles:** Integrate Firebase Auth. On first open, assign user a unique ID. Allow optional login if needed. Link all data to this user ID.
  + Tools: Firebase Auth plugin.
  + Roles: Backend dev.
* **Basic UI Screens:** Build initial UI: onboarding screen (with consent checkbox), home/dashboard (show basic stats or last survey), survey screens (questions and submit button), settings screen (consent again, about).
  + Tools: Flutter widgets, theming.
  + Roles: UI dev.
* **Initial ML Module Integration:** Develop a simple ML workflow: use collected (or simulated) data to train a model offline (e.g. in Python) for stress prediction. Decide deployment:
  + If cloud-based: write a Firebase Cloud Function or HTTP endpoint to run inference on new data.
  + If on-device: convert model to TensorFlow Lite and integrate with Flutter (using tflite\_flutter or mlkit).
  + Tools: Python (scikit-learn/TensorFlow), Firebase Cloud Functions (Node.js/Python), TensorFlow Lite.
  + Roles: ML dev (lead), Backend dev (assist).
* **Consent & Privacy Implementation:** Implement the consent flow in-app: at onboarding, present privacy policy and require opt-in before any data is sent. Ensure all data writes respect user consent (e.g. flag not to collect if revoked). Use HTTPS (built-in).
  + Tools: Firebase rules, secure storage.
  + Roles: Backend dev.
* **Continuous Integration (Optional):** Set up basic CI for building the Flutter app (e.g. GitHub Actions) to catch build errors.
  + Tools: GitHub Actions, Flutter test suite.
  + Roles: UI dev.
* **Integration Testing:** Test each component: verify sensor data is captured on device, survey notifications appear on schedule, and data correctly appears in Firestore.
  + Tools: Firebase Emulator Suite (for offline testing), physical devices.
  + Roles: All interns.
* **Internal Demo:** Present the working prototype (app collecting data and sending to backend) to mentor, demonstrating sensor logging and EMA flow. Incorporate early feedback.

**Phase 4: Testing, Evaluation, and Optimization (Month 3)**

* **Functional Testing:** Develop and run tests: unit tests for individual modules, integration tests for data flow. Verify accuracy of sensor readings (e.g. move device and check accelerometer output) and survey reliability.
  + Tools: Flutter flutter\_test, emulators, unit test frameworks.
  + Roles: UI dev, Backend dev.
* **Pilot Data Collection:** Recruit a small group of test users (classmates or volunteers). Deploy the app (internal beta) and collect real data for 1–2 weeks. Monitor compliance rates (survey completion).
  + Tools: Feedback forms, monitoring dashboard.
  + Roles: All interns.
* **Data Preprocessing:** Gather the pilot data from Firestore. Clean the data: remove duplicates, fill or remove missing values, anonymize IDs. Organize sensor time-series and corresponding EMA labels.
  + Tools: Python (Pandas, NumPy).
  + Roles: ML dev (lead).
* **Feature Engineering:** Extract meaningful features from raw data: e.g. daily step count, average acceleration variance, sleep duration proxy (e.g. phone inactivity at night), screen time, survey scores, etc. Document feature set.
  + Tools: Python libraries, possibly Jupyter notebooks.
  + Roles: ML dev.
* **Model Training & Validation:** Train ML models to predict stress levels (binary or continuous) using the engineered features and EMA labels. Try algorithms like Random Forest, SVM, or a small neural net. Use cross-validation to assess performance.
  + Tools: scikit-learn, TensorFlow.
  + Roles: ML dev (lead).
* **Model Evaluation:** Compute metrics (accuracy, F1-score, ROC AUC). Analyze feature importance to interpret which behaviors correlate with stress. Document results and any data limitations.
  + Tools: Python (sklearn.metrics, visualization).
  + Roles: ML dev.
* **Model Optimization:** Based on evaluation, refine features or model parameters. Iterate training (e.g. remove noisy features, balance data). Finalize the chosen model.
  + Tools: Python.
  + Roles: ML dev.
* **Deployment of ML Model:** Deploy the final model:
  + If cloud: update the Cloud Function with trained model; test the endpoint on new inputs.
  + If on-device: convert to TFLite and integrate into the Flutter app; test inference accuracy on device.
  + Tools: Firebase Functions, TFLite converter, Flutter plugin.
  + Roles: ML dev, Backend dev.
* **App & UI Refinement:** Incorporate user feedback from pilot: fix usability issues, add requested features (e.g. a progress chart showing stress trend). Improve visuals (better charts, themes).
  + Tools: Flutter, design resources.
  + Roles: UI dev.
* **Performance & Battery Optimization:** Ensure background data collection is efficient: adjust sensor sampling rates, use batches, limit wakeups. Test battery impact and optimize (e.g. using work manager or appropriate lifecycle hooks).
  + Tools: Android Profiler, iOS Instruments.
  + Roles: UI dev.
* **Privacy/Consent Audit:** Re-verify all data flows against privacy plan. Check that no personal data is stored inadvertently. Ensure data deletion option works.
  + Tools: Manual review, Firebase logs.
  + Roles: All interns.
* **Mentor Review 4:** Present test results, improved app demo, and final ML performance metrics to mentor. Prepare for final adjustments.

**Phase 5: Deployment, Final Documentation, and Publication (Month 3–4)**

* **Finalize App for Release:** Polish remaining bugs, finalize app version. Prepare release build certificates (Android keystore, iOS provisioning).
  + Tools: Flutter build tools, platform-specific app store consoles.
  + Roles: UI dev.
* **App Deployment:** Publish the app prototype to Google Play Store (testing track) and Apple TestFlight (if iOS). Provide access instructions to pilot users.
  + Tools: Google Play Console, App Store Connect.
  + Roles: UI dev.
* **System Documentation:** Write comprehensive documentation:
  + Code documentation (README, code comments).
  + Architecture/design docs.
  + User manual (how app works, privacy policy).
  + Tools: Markdown, GitHub Wiki.
  + Roles: All interns contribute.
* **Research Paper Preparation:** Draft paper for conference submission. Include:
  + **Introduction/Lit Review:** Summarize relevant work[frontiersin.org](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full#:~:text=Introduction%3A%20University%20students%20are%20particularly,sensing%20data%20in%20this%20group)[frontiersin.org](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full#:~:text=Mental%20health%20smartphone%20apps%20have,and%20psychiatric%20disorders%20including%20depression).
  + **Methods:** Describe app design, sensors/EMA integration, data collection procedure.
  + **Results:** Report data analysis and model performance (tables, figures).
  + **Discussion:** Interpret findings, limitations, future work.
  + Tools: Overleaf/LaTeX or MS Word, reference manager.
  + Roles: ML dev (lead writing), all interns (contribute sections and proofreading).
* **Figures and Visuals:** Create high-quality figures: app screenshots, data flow diagrams, graphs of results (e.g. feature correlations, ROC curves).
  + Tools: matplotlib/Excel, Canva.
  + Roles: ML dev (data figures), UI dev (screenshots).
* **Conference Submission:** Identify a suitable venue (e.g. CHI, IEEE EMBC, mHealth workshop). Format paper to guidelines and submit by deadline.
  + Tools: Conference websites, submission portal.
  + Roles: All interns.
* **Presentation/Poster:** Prepare a presentation or poster summarizing the project (motivation, methods, results).
  + Tools: PowerPoint, LaTeX Beamer, or poster templates.
  + Roles: UI dev (design), ML dev (content).
* **Final Privacy & Compliance Check:** Confirm final project meets ethical standards. Ensure all consent documentation is recorded. Delete any leftover test data.
  + Tools: Checklists, review of collected data.
  + Roles: All interns.
* **Final Mentor Review & Handoff:** Demonstrate final app and present paper outline to mentor. Ensure all deliverables (working prototype and draft paper) meet requirements. Organize code repository and share project documentation.

**Sources:** Project tasks and design are informed by research on digital phenotyping and mobile sensing[frontiersin.org](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full#:~:text=Introduction%3A%20University%20students%20are%20particularly,sensing%20data%20in%20this%20group)[frontiersin.org](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full#:~:text=Mental%20health%20smartphone%20apps%20have,and%20psychiatric%20disorders%20including%20depression). Ethical considerations are guided by frameworks for mental health apps[pmc.ncbi.nlm.nih.gov](https://pmc.ncbi.nlm.nih.gov/articles/PMC8367187/#:~:text=phenotyping%20is%20expected%20to%20improve,protection%2C%20consent%2C%20bias%2C%20and%20accountability). System architecture follows best practices for sensor data platforms[jmir.org](https://www.jmir.org/2019/11/e16399/PDF#:~:text=Platform%20Components%20The%20resulting%20platform,provide%20dynamic%20control%20over). EMA implementation is based on smartphone survey methodologies[pmc.ncbi.nlm.nih.gov](https://pmc.ncbi.nlm.nih.gov/articles/PMC6230530/#:~:text=EMA%20has%20a%20number%20of,7%20%2C%2030%2C9)[pmc.ncbi.nlm.nih.gov](https://pmc.ncbi.nlm.nih.gov/articles/PMC6230530/#:~:text=To%20conduct%20an%20EMA%20study%2C,To%20encourage%20participants%20to).

Citations

[[Favicon](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full#:~:text=Introduction%3A%20University%20students%20are%20particularly,sensing%20data%20in%20this%20group)](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full" \l ":~:text=Introduction%3A%20University%20students%20are%20particularly,sensing%20data%20in%20this%20group" \t "_blank)

**[Frontiers | Passive sensing data predicts stress in university students: a supervised machine learning method for digital phenotyping](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full" \l ":~:text=Introduction%3A%20University%20students%20are%20particularly,sensing%20data%20in%20this%20group" \t "_blank)**

[https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full" \l ":~:text=Introduction%3A%20University%20students%20are%20particularly,sensing%20data%20in%20this%20group" \t "_blank)

[[Favicon](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full#:~:text=Mental%20health%20smartphone%20apps%20have,and%20psychiatric%20disorders%20including%20depression)](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full" \l ":~:text=Mental%20health%20smartphone%20apps%20have,and%20psychiatric%20disorders%20including%20depression" \t "_blank)

**[Frontiers | Passive sensing data predicts stress in university students: a supervised machine learning method for digital phenotyping](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full" \l ":~:text=Mental%20health%20smartphone%20apps%20have,and%20psychiatric%20disorders%20including%20depression" \t "_blank)**

[https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full" \l ":~:text=Mental%20health%20smartphone%20apps%20have,and%20psychiatric%20disorders%20including%20depression" \t "_blank)

**[Ecological Momentary Assessment Using Smartphone-Based Mobile Application for Affect and Stress Assessment - PMC](https://pmc.ncbi.nlm.nih.gov/articles/PMC6230530/" \l ":~:text=EMA%20has%20a%20number%20of,7%20%2C%2030%2C9" \t "_blank)**

[https://pmc.ncbi.nlm.nih.gov/articles/PMC6230530/](https://pmc.ncbi.nlm.nih.gov/articles/PMC6230530/" \l ":~:text=EMA%20has%20a%20number%20of,7%20%2C%2030%2C9" \t "_blank)

**[Ecological Momentary Assessment Using Smartphone-Based Mobile Application for Affect and Stress Assessment - PMC](https://pmc.ncbi.nlm.nih.gov/articles/PMC6230530/" \l ":~:text=Ecological%20momentary%20assessments%20,measured%20a%20behavior%2C%20mood%2C%20and" \t "_blank)**

[https://pmc.ncbi.nlm.nih.gov/articles/PMC6230530/](https://pmc.ncbi.nlm.nih.gov/articles/PMC6230530/" \l ":~:text=Ecological%20momentary%20assessments%20,measured%20a%20behavior%2C%20mood%2C%20and" \t "_blank)

**[Ethical Development of Digital Phenotyping Tools for Mental Health Applications: Delphi Study - PMC](https://pmc.ncbi.nlm.nih.gov/articles/PMC8367187/" \l ":~:text=phenotyping%20is%20expected%20to%20improve,protection%2C%20consent%2C%20bias%2C%20and%20accountability" \t "_blank)**

[https://pmc.ncbi.nlm.nih.gov/articles/PMC8367187/](https://pmc.ncbi.nlm.nih.gov/articles/PMC8367187/" \l ":~:text=phenotyping%20is%20expected%20to%20improve,protection%2C%20consent%2C%20bias%2C%20and%20accountability" \t "_blank)

[[Favicon](https://www.jmir.org/2019/11/e16399/PDF#:~:text=Platform%20Components%20The%20resulting%20platform,provide%20dynamic%20control%20over)](https://www.jmir.org/2019/11/e16399/PDF" \l ":~:text=Platform%20Components%20The%20resulting%20platform,provide%20dynamic%20control%20over" \t "_blank)

**[Untitled](https://www.jmir.org/2019/11/e16399/PDF" \l ":~:text=Platform%20Components%20The%20resulting%20platform,provide%20dynamic%20control%20over" \t "_blank)**

[https://www.jmir.org/2019/11/e16399/PDF](https://www.jmir.org/2019/11/e16399/PDF" \l ":~:text=Platform%20Components%20The%20resulting%20platform,provide%20dynamic%20control%20over" \t "_blank)

**[Ecological Momentary Assessment Using Smartphone-Based Mobile Application for Affect and Stress Assessment - PMC](https://pmc.ncbi.nlm.nih.gov/articles/PMC6230530/" \l ":~:text=To%20conduct%20an%20EMA%20study%2C,To%20encourage%20participants%20to" \t "_blank)**

[https://pmc.ncbi.nlm.nih.gov/articles/PMC6230530/](https://pmc.ncbi.nlm.nih.gov/articles/PMC6230530/" \l ":~:text=To%20conduct%20an%20EMA%20study%2C,To%20encourage%20participants%20to" \t "_blank)

All Sources

[[Favicon](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full#:~:text=Introduction%3A%20University%20students%20are%20particularly,sensing%20data%20in%20this%20group)frontiersin](https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2024.1422027/full" \l ":~:text=Introduction%3A%20University%20students%20are%20particularly,sensing%20data%20in%20this%20group" \t "_blank)

[pmc.ncbi.nlm.nih](https://pmc.ncbi.nlm.nih.gov/articles/PMC6230530/" \l ":~:text=EMA%20has%20a%20number%20of,7%20%2C%2030%2C9" \t "_blank)

[[Favicon](https://www.jmir.org/2019/11/e16399/PDF#:~:text=Platform%20Components%20The%20resulting%20platform,provide%20dynamic%20control%20over)jmir](https://www.jmir.org/2019/11/e16399/PDF" \l ":~:text=Platform%20Components%20The%20resulting%20platform,provide%20dynamic%20control%20over" \t "_blank)