

Feasibility and Acceptability of using Ecological Momentary Assessment Among Youth with recent Suicidal attempt in Lusaka, Zambia

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Abstract

Background

Suicide among adolescents and young adults constitutes a significant global public health concern, with a disproportionate burden in low- and middle-income countries (LMICs) where mental health care infrastructure remains critically under-resourced. Ecological momentary assessment (EMA) has emerged as a methodologically rigorous approach for capturing real-time fluctuations in suicidal ideation and affective states; however, evidence regarding its feasibility and acceptability in resource-constrained settings is still lacking. This study evaluated the feasibility and acceptability of smartphone-based EMA among adolescents and young adults after receiving post-attempt care in Lusaka, Zambia.

Methods

Participants aged 17–25 years were recruited from emergency care settings following a suicide attempt and completed twice-daily EMA surveys via the m-Path smartphone application across a 14-day monitoring period. Feasibility was operationalized through recruitment and enrollment rates, retention, prompt compliance, and technical or logistical barriers encountered. Acceptability, defined as the extent to which participants perceived the protocol as appropriate, manageable, and satisfactory, was assessed through self-reported usability, perceived burden, participant satisfaction, and qualitative feedback on barriers and benefits. Data were described using quantitative methods, and complemented by qualitative evaluation of participant experiences.

Results

The EMA protocol demonstrated high retention and moderate compliance, with the majority of participants completing at least 50% of prompted assessments. Participants broadly characterized the protocol as acceptable, easy to use, and minimally burdensome. The most commonly reported barriers were intermittent internet connectivity, difficulties with phone charging, and periods of acute emotional distress; notably, these did not substantially impede study engagement. A subset of participants additionally reported that the EMA process felt supportive and facilitated self-reflection, indicating potential therapeutic functions of the assessment tool beyond surveillance.

Conclusions Smartphone-based EMA is both feasible and acceptable for monitoring suicidal ideation and associated experiences among at-risk youth in a low-resource sub-Saharan African context. EMA shows promise as a real-time suicide risk monitoring tool in LMIC contexts, with important ethical and clinical implications for its use among vulnerable adolescent populations.

Introduction

Suicide is the third leading cause of death among people aged 15–29 years, with approximately 73% of suicides occurring in low- and middle-income countries (LMICs) (1, 2). Despite this burden, empirical data on suicidal ideation (SI) and suicidal behavior (SB) among youth in LMICs, especially in sub-Saharan

Africa, remain limited (1, 3, 4). This evidence gap constrains the development of effective, context-appropriate prevention strategies and policy responses for young people.

Assessing youth suicidality is methodologically challenging because risk fluctuates over short timescales. Retrospective and cross-sectional measures are vulnerable to recall bias and fail to capture within-person variability and proximal triggers that unfold over hours or days (3). Methods capable of real-time or intensive longitudinal assessment are needed to showcase fluctuating short-term mood states and potential risk windows.

Ecological momentary assessment (EMA) repeatedly samples thoughts, affect, context, and behavior in participants' natural environments, reducing recall bias and improving ecological validity (5). For suicidality research, EMA can map temporal coupling of SI with mood, interpersonal stressors, substance use, and other proximal factors, and can track rapid changes in suicide risk (6). Evidence from high-income countries (HICs) suggests that EMA is a feasible and acceptable tool for studying SI and SB among adolescents and young adults, with adequate compliance and, in some studies, greater disclosure of sensitive experiences compared to retrospective methods (6, 7). Systematic reviews and meta-analyses have shown encouraging feasibility and acceptability of EMA in suicide research, with participation rates of approximately 77% and compliance rates near 70% (10).

However, feasibility demonstrated in HICs cannot be assumed in LMIC settings. Structural constraints, including variable smartphone ownership, shared device use, limited data plans, intermittent electricity, and connectivity, may hinder participation and data quality (8–10). While mobile phone ownership has increased substantially across the region, there are still disparities in accessibility, digital literacy, and technological reliability (5). Privacy risks within crowded households, stigma, and norms around device sharing raise ethical and safety considerations for real-time monitoring. Moreover, LMIC health systems are often centralized and under-resourced, complicating risk monitoring, triage, and continuity of care (11). Existing LMIC EMA studies remain few and heterogeneous, offering limited guidance for research focusing on high-risk youth populations (12–18).

A pilot randomized controlled trial conducted in Uganda to capture real-time behavioral data and deliver remote health interventions, demonstrated promising feasibility and acceptability of mobile phone-based EMA for collecting sensitive behavioral and mental health data (19). Baseline risk profiles in the Uganda study were established at enrollment by measuring self-reported behavioral metrics, including alcohol consumption frequency, dietary habits, and sexual health behaviors like condom use and partner status (19). Participants were generally willing to respond to frequent prompts, and sensitive questions were well tolerated. However, to the best of our knowledge, there has been no reports on feasibility and acceptability of EMA around topics of suicidality in at-risk samples of youth in LMIC.

The current study addresses this gap with data from Lusaka, Zambia. In Lusaka, youth mental health services are scarce despite growing concern about suicidality (11). Emergency departments (EDs) frequently serve as the first, and sometimes only, clinical contact after suicide attempts, yet standardized mental health assessment, follow-up, and surveillance are limited (20). Common attempt

methods include pesticide (organophosphate) poisoning, for which treatment is often reactive and constrained (11). While the EMA pilot study in Uganda indicated that mobile-based monitoring may be promising in sub-Saharan African contexts, to our knowledge no studies have evaluated EMA feasibility among Zambian adolescents and young adults following an ED-treated suicide attempt (19). Given cultural variation in expressions of distress, help-seeking, and health-system touchpoints, setting-specific evidence is essential. Zambia presents a distinct sociocultural and healthcare context, particularly with respect to stigma surrounding suicidality and the organization of emergency mental health services (2, 5). To date, no studies have specifically examined the feasibility of EMA for assessing proximal risk factors for suicidality among youth treated for suicide attempts in Zambian emergency departments. Context-specific feasibility studies are therefore essential before EMA can be scaled or integrated into clinical or public health research and practice.

This study evaluates the feasibility, acceptability, and safety of smartphone-based EMA to monitor suicidal ideation among adolescents and young adults in Lusaka following an ED-treated suicide attempt. Specifically, we aimed to assess feasibility, understood as the extent to which the protocol could be successfully implemented in this population, through recruitment and enrollment rates, retention across the 14-day study period, prompt completion rates, and technical or logistical barriers encountered. Acceptability, defined as the extent to which participants perceived the protocol as appropriate, manageable, and satisfactory within their daily lives, was evaluated through self-reported usability, perceived burden, ease of smartphone use, satisfaction, and qualitative feedback. We hypothesized that smartphone-based EMA would be both feasible and acceptable in this urban Sub-Saharan African setting, given increasing smartphone access among youth in Lusaka and growing evidence supporting digital mental health tools in low- and middle-income countries.

Methods

Study Design

A mixed-methods, short-term longitudinal EMA design was employed, integrating quantitative momentary data with qualitative feedback.

Participants

Participants were youth aged 17–25 years who were treated for a suicide attempt in seven public hospitals in Lusaka, Zambia. Inclusion criteria included possession of a web-enabled smartphone. Individuals were excluded if they were experiencing acute psychological distress requiring immediate clinical intervention or had a severe mental health condition that impaired their capacity to provide informed consent or participate meaningfully in the study.

Study Procedure

After a suicide attempt took place, a member of the Champions team in the hospital reported to the SBIL project manager (ChM), if the patient met the eligible age range. The Champions team comprised healthcare professionals (i.e. doctors, nurses, clinical officers and registry staff) from each participating hospital who served as on-site research representatives. Once the participant was deemed eligible, a research assistant (ChM, CM or EK) met with the participant in the hospital once they had recovered from the suicide attempt and before discharge. The research assistant explained the project procedures and then sought to obtain the participant's signed informed consent, or assent in the case of a minor, to proceed. For participants aged 17 years, written informed consent was obtained from a parent or legal guardian prior to enrolment, alongside the participant's own assent. The research assistant then administered a baseline survey and helped the participant install the EMA application m-path (21) on the participant's smartphone.

One week after recruitment and completion of the baseline survey, participants received EMA prompts twice-daily (morning and evening) for 14 consecutive days via the m-path application. Each assessment required approximately three minutes to complete. Participants received the morning prompt at 06:00, with a reminder sent at 10:00 if the survey had not yet been completed. The morning prompt remained accessible until 12:00. The afternoon prompt was delivered at 16:00, followed by a reminder at 20:00 for nonresponses, and remained open until 23:00. Participants received mobile data support and compensation was provided depending on the number of prompts responded to (14 Kwacha/0.54 EUR per prompt). This amount was sent through phone-data money that allows youth to use their phones with internet data. After the study period, participants were instructed on how to remove the application from their smartphones.

Following completion of the 14-day EMA period, participants were contacted by phone and asked to provide feedback on their experiences with the EMA protocol, including perceived burden, acceptability of sensitive questions, usability of the app, and barriers to participation (e.g., charging difficulties, connectivity issues). These phone calls were documented in structured notes by research staff.

Measures

The baseline survey comprised measures across six domains. Demographic information (age, gender, education level, and marital status) was recorded alongside mental health history, including any prior psychiatric illness or treatment. Suicidal thoughts, suicide attempts, and non-suicidal self-injurious behaviors were assessed using the Self-Injurious Thoughts and Behaviors Interview (SITBI) (22). Anxiety symptoms were screened using the Generalized Anxiety Disorder 7-item scale (GAD-7), and depression was assessed with the Patient Health Questionnaire 9-item scale (PHQ-9) (23, 24). Post-traumatic stress was evaluated using the 20-item PTSD Checklist for DSM-5 (PCL-5), and social support was measured using the seven-item Duke-UNC Functional Social Support Questionnaire (25, 26). EMA assessments were self-administered by participants via the m-Path application in response to twice-daily prompts (21).

Main Outcomes

Feasibility was measured through recruitment and enrollment rates, retention across the 14-day study period, prompt compliance, and technical or logistical barriers encountered (Table 1). Acceptability was defined as the extent to which participants perceived the protocol as appropriate, manageable, and satisfactory within their daily lives, assessed through self-reported usability, perceived burden, participant satisfaction, and qualitative feedback regarding barriers, benefits, and recommendations for protocol improvement (questions shown in Additional File section B).

Table 1
Definitions of feasibility and acceptability

Outcome	Operational Definition	Indicators / Measures
Feasibility	The extent to which the smartphone-based EMA protocol could be successfully implemented among youth treated for suicidal behavior in Lusaka, Zambia.	Study recruitment and enrollment rates; retention across the 14-day study period; proportion of participants completing at least one EMA prompt; proportion completing $\geq 50\%$ of prompts; total number of prompts completed; average prompts completed per participant; compliance to twice-daily assessments; technical or logistical barriers (e.g., internet access, charging difficulties, app functionality).
Acceptability	The extent to which participants perceived the EMA protocol as appropriate, manageable, and satisfactory within their daily lives.	Self-reported usability; perceived burden of prompt frequency and duration; ease or difficulty of responding via smartphone; emotional responses to EMA participation; participant satisfaction; willingness to continue participation; perceived helpfulness; qualitative feedback regarding barriers, benefits, and recommendations for protocol improvement.

Even not presented in this particular study, EMA items explored sleep quality, location, social context, momentary affect, self-esteem, sense of belonging, interpersonal conflict, risk behaviors, and suicidality. Suicidality items were adapted for EMA from Paykel’s suicide scale. High-risk responses triggered follow-up safety prompts informing participants that a trained team member would contact them.

Analyses

Quantitative Analysis

Descriptive statistics were used to characterize the sample at baseline. Continuous variables are reported using ranges, means, and medians, while categorical variables are presented as frequencies and percentages. Compliance was operationalized as the number of completed prompts per participant, whereby a prompt was considered completed if at least one EMA item had been answered. Descriptive statistics (mean, standard deviation, median, minimum, and maximum) were calculated for the number of completed prompts per participant as well as for the number of study days with at least one

completed prompt. Overall compliance rates were calculated by dividing the total number of completed prompts by the total number of planned prompts.

To evaluate study feasibility and participant retention, enrollment, and compliance rates were calculated based on the number of invited, enrolled, and retained participants as well as the number of planned and completed EMA assessments.

Analysis of Qualitative Data

Qualitative data from EMA feedback phone calls were analyzed using a thematic analysis approach. A preliminary deductive codebook was developed based on the study objectives and feasibility framework (e.g., acceptability, usability, burden, barriers, perceived benefits, and safety perceptions) (27, 28). Additional inductive codes were added if new themes emerged during coding. Two independent researchers (CaM, ChM) coded the qualitative feedback using the predefined codebook. Discrepancies were resolved through discussion and consensus, with updates to code definitions documented iteratively and triangulation of the data with a coding supervisor (IFB). The final codebook was used to summarize key themes related to feasibility and acceptability of EMA.

Safety Protocol

An emergency response protocol was activated when participants endorsed high-risk suicidality items. When a participant answered “yes” to questions 4 or 5 of Paykel’s suicide scale, which inquired about serious plans of ending their life or attempting to in the last 12 hours, the emergency response protocol was activated. Trained clinical staff contacted participants by phone to provide immediate support, counseling, and referral as needed. Participants were informed of this protocol during the consent process.

Results

Sample Description

The sample included 21 adolescents and young adults aged 17 to 25 years ($M = 21.5$, Median = 22). Participants were primarily female, with 66.7% identifying as female and 33.3% as male. The majority of participants (76.2%) scored above the clinical cutoff for moderate to severe symptoms of depression ($PHQ-9 \geq 10$) with scores ranging from 4 to 22 ($M = 14.0$, Median = 15), indicating an overall moderate level of depressive symptoms at baseline. Participants reported considerable histories of suicidal behavior, reporting between 1 and 6 lifetime suicide attempts ($M = 1.9$, Median = 2). Nearly half of the sample had made one prior suicide attempt, while over half reported multiple attempts, underscoring the high-risk clinical profile of the cohort. Educational attainment was varied across participants. Most participants had completed at least secondary education, with 33.3% reporting completion of high school or equivalent. See Table 2 for participant baseline data.

Table 2
Participant characteristics

Variable	N (% or range)
Sex	
Female	14 (66.7%)
Male	7 (33.3%)
Age (years)	21.5 (17–25)
PHQ-9 Depression Severity	14.0 (4–22)
Lifetime Suicide Attempts	1.9 (1–6)
1 attempt	10 (47.6%)
2 attempts	8 (38.1%)
3 attempts	2 (9.5%)
6 attempts	1 (4.8%)
Education Level	
7th–9th grade	2 (9.5%)
10th–12th grade, no diploma	7 (33.3%)
High school diploma/GED	7 (33.3%)
Skills training	1 (4.8%)
Some college, no degree	3 (14.3%)
Bachelor's degree	1 (4.8%)

Emergency Activation Protocol

Over the 14-day monitoring period, emergency protocols were activated 42 times among 18 participants (**Additional File 1: Table S3**). All 42 activations received a follow-up call from the research team. Of these calls, 11 (26.2%) went unanswered, and a voicemail was left or a closed line was reached; these calls involved 7 participants, one of whom accounted for 5 of the unanswered calls. Eight calls (19.0%) were classified as false activations, in which participants had responded retrospectively about a past event rather than in real time; one participant triggered this outcome twice and required clarification of the reporting instructions. Fourteen calls (33.3%) resulted in referral to the mental health unit, involving 9 participants, of whom 1 was referred three times and 3 were referred twice. The remaining 9 calls (21.4%) resulted in brief counseling or phone support, involving 8 participants, 1 of whom received this support on two occasions.

EMA Feasibility

Recruitment and Enrollment

Of the 28 individuals who fully met the eligibility criteria, 21 participants were enrolled (75.0%). 3 participants (42.9%) could not participate because they did not own a smartphone. Two participants (28.6%) declined to take part, one participant's phone could not support the m-path application (14.3%), and one participant was unable to travel to the facility (14.3%).

Participant Retention

Of the 21 enrolled participants, 20 responded to at least one prompt the study (95.24%).

Prompt Completion and Compliance

Over the 14 EMA days (2 prompts per day), a total of 560 prompts were scheduled to be delivered. Compliance was moderate, with 308 out of 560 prompts answered (55%). On average, participants completed 14.4 prompts (SD = 9.5, median = 14, range 0–28). The number of days on which at least one prompt was completed averaged 8.8 days (SD = 5, median = 9, range 0–14). Within completed prompts, all items were answered, as the EMA app required participants to respond to every question before submission. Consequently, no item-level missing data occurred, and analyses at the item level were not applicable.

Technical and Logistical Barriers (*internet access, charging difficulties, app functionality*)

Some barriers to EMA participation were identified. Internet connectivity issues occasionally prevented participants from responding to prompts. Participant 2 stated, “[...] the time I missed the questions was during the network breakdown... due to the bad network we had sometime back.” A small number of participants also reported difficulties with prompt timing.

EMA Acceptability

Usability and Perceived Burden (*self-reported usability, perceived burden of prompt frequency and duration, ease of responding via smartphone*)

Participants generally found EMA convenient and easy to complete. Most reported that the timing and frequency of prompts were appropriate, with only two participants expressing dissatisfaction with prompt timing. The application was widely described as simple and intuitive, which helped with engagement.

Several participants also expressed interest in features such as an open forum space to express thoughts at any time, indicating a desire for greater flexibility in expression. Participant 1 stated, “I feel like there was a need for me to type an option, at least, for me to tell exactly how I'm feeling.”

Emotional Responses and Satisfaction (*emotional responses to EMA participation, participant satisfaction, willingness to continue, perceived helpfulness*)

Participants generally described EMA as a positive experience. Many noted that the app felt like talking to someone, which contributed to comfort during participation. Participant 4 stated, “The questions were very helpful, like the way they were phrased, it’s like you have someone talking to you, which I found helpful and makes me feel better.” Completing EMA prompts was frequently reported to promote self-reflection and increased awareness of emotional states. Participant 13 shared, “it gave me a chance to analyze myself.”

External support also appeared to enhance participation. Participants who received encouragement or reminders from family members tended to have higher response rates. Participant 8 said, “Because my sister was helping me out... She was helping me when I missed, because I was using her phone, so whenever the message came, she would wake me up in the morning so that I’d answer.” In addition, follow-up phone calls from the research assistant, particularly following emergency protocol activation, were frequently described as meaningful and supportive. These contacts contributed to participants feeling checked on and encouraged continued participation. Nearly all participants indicated willingness to participate in EMA research again in the future.

Barriers, benefits, and recommendations for protocol improvement

Several participants reported being confused by study protocol instructions, specifically the expectation to report their feelings at the moment of the prompt. In one case, a participant reported responding based on general emotional experiences rather than momentary states. Participant 1 accidentally activated the emergency protocol and stated, “Then someone (project manager) called me. They were like, no, you’re supposed to... They first asked like, are you okay? Is everything fine? I was like, yes, everything’s fine. Then they asked me why I answered like that. And then he went on to tell me that, no, you’re supposed to answer like in the present.”

Participants reported that acknowledging and recording difficult emotions provided validation and emotional relief. Contact with the research team further enhanced acceptability, with several participants expressing gratitude for the study and the support provided. Participant 4 stated, “The questions were very helpful, like the way they were phrased, it’s like you have someone talking to you, which I found helpful and makes me feel better.”

A small number of participants suggested improvements to the EMA protocol. Some recommended including additional questions related to interpersonal relationships, while others suggested more opportunities to respond, although most participants felt the current prompt frequency was appropriate.

EMA Perceived as a Clinical Tool

Although designed as an assessment method, many participants described EMA as having therapeutic value. Responding to prompts helped participants reflect on and analyze their emotions, and the process of acknowledging negative feelings was often described as validating and relieving.

One participant reported that engaging with the prompts encouraged them to persevere during difficult moments. Participant 12 shared, “I am very grateful because this was very helpful to me and a lot of people helped me and all this has really encouraged me to never attempt again.” Several participants used the EMA prompts as an outlet to validate their emotional experiences, highlighting its perceived role as a space to freely express their feelings.

Discussion

This study assessed the feasibility and acceptability of smartphone-based EMA among adolescents and young adults treated for suicide attempts in Lusaka, Zambia. Findings suggest that EMA can be successfully implemented in this high-risk population within a setting that lacks mental health resources.

To our knowledge, this is the first study to use EMA to investigate suicidal ideation in adolescents in Zambia, and even more generally, in sub-Saharan Africa. Evidence on real-time suicide risk monitoring in LMIC emergency care populations is still limited, particularly among youth following suicide attempts. Therefore, this study addresses a critical gap in the literature (29, 30).

Notably, this study demonstrates the feasibility of implementing EMA in a context with certain structural and systematic limitations. These findings highlight the potential of mobile-based approaches to expand mental health assessment beyond hospital settings and support innovation in environments with limited resources, in a vulnerable study sample with significant mental health burden and recurrent suicidal behavior.

Feasibility and Acceptability

Overall, EMA was both feasible and acceptable among participants. Qualitative findings indicated that youth were able to engage with repeated, real-time prompts and generally perceived the application as easy to use and well tolerated. Many participants described the process as intuitive and even supportive, suggesting that EMA is manageable in this population.

Compliance rates were moderate but comparable to those reported in high-income settings, reinforcing the feasibility of EMA in LMIC contexts (31, 32). Despite expected infrastructural challenges, including issues related to connectivity, device access, and charging, these barriers did not prevent meaningful participation (33). Rather, these challenges are easily modifiable and relate to implementation, rather than a reflection of serious limitations of the approach.

These findings are consistent with prior EMA research conducted in sub-Saharan Africa, including an EMA study in Uganda that reported similar levels of engagement and acceptability (19). Together, this growing evidence shows that digital mental health tools can be effectively implemented among adolescents in the region.

These results indicate that EMA is possible to implement in LMIC settings. Even though clinical support and availability is required among the high-risk population of youth treated for suicide attempts, participants demonstrated willingness and ability to engage with frequent, real-time assessments.

Ethical Considerations and Potential Burden of EMA

Despite its advantages, EMA presents potential challenges. Frequent prompts may be perceived as burdensome, particularly in populations facing daily stressors and resource constraints (10, 13). There are also concerns that repeated assessment of negative experiences could exacerbate distress (13). However, empirical evidence indicates that asking individuals about suicidal thoughts does not induce suicidal ideation in asymptomatic individuals nor worsen ideation in those already experiencing symptoms (13) and frequent monitoring may even reduce suicidal ideation by increasing self-awareness and perceived support (13, 14).

Importantly, implementation of EMA in high-risk populations requires strong safety protocols with clinicians in place to respond to individuals in need. Clear procedures must be in place for identifying acute risk and providing timely support. This is particularly important in LMIC settings, where access to mental health services may be limited and emergency response systems may be under-resourced. Ensuring participant safety while minimizing intrusion is a central ethical consideration in EMA-based suicide research.

EMA as a Clinical Tool

Although EMA has traditionally been used as a research assessment tool, findings from this study suggest meaningful clinical applications. EMA may enable acute risk states which may not be observed in routine clinical follow-up, to be detected emphasizing its potential for real-time risk monitoring, especially in LMICs (31, 32).

Emergency protocols were activated on 42 occasions across the monitoring period, reflecting both the vulnerability of the study population and the importance of continuous monitoring following a suicide attempt. These real-time responses demonstrate how EMA can function not only as a data collection method but also as a mechanism for prompt clinical intervention (34).

Participants' qualitative feedback further supports this interpretation, with many describing EMA as reflective, supportive, and at times therapeutic. This aligns with emerging literature suggesting that EMA may enhance self-awareness and emotional processing (29).

Looking at both the quantitative and qualitative aspects of this study, these findings point to several potential clinical applications of EMA, which include post-suicide attempt monitoring, early detection of increasing suicidal ideation, and support for the patient following discharge from emergency services, including ecological momentary interventions (EMI). In settings where structured follow-up care is limited, EMA/EMI may offer a scalable approach to bridging these care gaps (35).

While participants generally found the EMA protocol acceptable, moderate compliance rates suggest that further reducing participant burden remains an important goal. One promising direction is the integration of EMA with principles from computerized adaptive testing for mental health (CAT-MH), which uses item response theory to tailor assessments based on previous responses, selecting only the most informative items needed to estimate symptom severity (36). Applied within an EMA framework, this approach could allow assessment length and content to vary dynamically according to participants' reported distress and suicide risk. Those reporting consistently low suicidal ideation might receive fewer follow-up questions, while those endorsing elevated or worsening symptoms could receive more detailed assessments targeting intent, hopelessness, or perceived social support. Adaptive EMA approaches may thus reduce survey fatigue, improve engagement, and enhance the precision of real-time risk monitoring among vulnerable youth (37).

Limitations and Lessons Learned

Several limitations should be considered when interpreting these findings. First, the small sample size limits generalizability and highlights the need for larger studies. Second, participation was restricted to individuals with access to a smartphone, potentially excluding more vulnerable populations and possibly introducing selection bias. Additionally, the resource-intensive nature of emergency response protocols may pose challenges for scalability in routine care settings.

Practical insights from implementation also emerged. Some participants required additional clarification regarding EMA instructions, particularly the expectation to report momentary experiences rather than past feelings. This showcases the importance of clear participant information, research assistants training and ongoing support. Infrastructure-related barriers, including connectivity issues and device limitations, were present but did not substantially hinder participation, suggesting that these challenges are manageable.

Ethical considerations are central to EMA research in high-risk populations. Real-time data collection requires clear safety monitoring procedures and a defined protocol to respond to heightened suicide risk. The activation of emergency protocols in this study highlights the ethical importance of implementing this system in a complex setting.

Future research should prioritize larger-scale studies to evaluate the scalability and integration of EMA into existing health systems in low-resource settings. Alongside this, efforts to reduce participant burden while maintaining sensitivity to fluctuations in suicide risk will be essential for optimizing EMA protocols in this population.

Conclusions

This study provides evidence that EMA is both feasible and acceptable among adolescents and young adults treated for suicide attempts in Lusaka, Zambia. These findings support the potential of EMA as a tool for real-time monitoring of suicide risk in LMIC settings.

EMA may demonstrate usefulness in potential prevention strategies and improved post-attempt monitoring. By capturing risk fluctuations in real time, EMA offers a new approach to understanding and responding to suicidality in real-world contexts.

Future work should explore the development of adaptive EMA approaches, including integration with tools such as computerized adaptive testing (CAT-MH), which could enable prompt content to be dynamically tailored based on a participant's real-time responses, thereby reducing burden while maintaining assessment precision (36). Future studies should also evaluate the use of EMA and EMI within routine clinical care and suicide prevention frameworks. With appropriate ethical safeguards and contextual adaptation, EMA has the potential to strengthen mental health systems and improve outcomes for high-risk youth in resource-limited settings.

Declarations

Statements

Ethics Statement

This study was conducted in compliance with the protocol and the Declaration of Helsinki. Transboundary research principles were followed in accordance with the Commission for Research Partnerships with Developing Countries (KFPE) guidelines. All applicable national legal and regulatory requirements were met. Ethical approval was obtained from the Ethics Committee of Northwestern and Central Switzerland (EKNZ) and the University of Zambia Biomedical Research Ethics Committee (UNZA BREC). All study documents, protocol amendments, and participant information materials were reviewed and approved by both ethics committees.

Consent for Publication

Not applicable. No identifiable participant information is included in this manuscript.

Conflict of Interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI Statement

No generative artificial intelligence was used in the conceptualization, data collection, analysis, or interpretation of this study. AI-assisted tools were used solely for revision and editing of the manuscript text.

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Author Contribution

CaM (Caroline Muller): Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. VJ: Formal analysis, Methodology, Writing – original draft, Writing – review & editing. PK: Methodology, Writing – original draft. ChM (Chimuka Muleya): Data curation, Formal analysis, Investigation, Writing – original draft, Writing – review & editing. CM (Chungu Musonda): Methodology, data curation EK: Methodology, data curation. RP: Data curation, Project administration, Supervision, Methodology, Writing-revision. IML: Conceptualization, Supervision, Methodology, Validation, Writing – review & editing. IF-B: Conceptualization, Data curation, Investigation, Project administration, Supervision, Validation, Writing – review & editing.

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Data Availability

The datasets generated and analyzed during the current study are not publicly available due to the sensitive nature of the data and ethical restrictions related to participant confidentiality. Participants are identified only by unique participant numbers in all study documents, and data are accessible solely to authorized study personnel. De-identified data may be made available for verification purposes upon reasonable request from the corresponding author and subject to ethical approval.

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