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Feasibility and validity of ecological momentary assessment in the investigation of suicide risk

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ABSTRACT

Ecological Momentary Assessment has been used to investigate a wide range of behaviors and psychiatric conditions. Previous investigations have consistently obtained promising results with high acceptance and compliance rates, and with only minor reactive effects for specific variables. Despite the promise of this methodology for the study of severe psychiatric populations, little is known about its feasibility in samples at risk for suicide. In the present study, four samples at varying risk for suicide completed an Ecological Momentary Assessment study by responding to five electronic assessments per day over a one-week period. Samples included healthy controls ($n=13$), affective controls ($n=21$), past suicide attempters ($n=20$), and recent suicide attempters ($n=42$). The results demonstrate satisfactory participation rates and high compliance with daily life repeated assessments across all groups. Importantly, negative thoughts or suicidal ideation were not reactive to the duration of the study, indicating that the repeated assessment of such cognitions in daily life have little or no effect on their frequency. The findings provide support for the use of Ecological Momentary Assessment in the study of suicidal ideation and suggest that mobile technologies represent new opportunities for the assessment of high-risk cognitive states experienced by patients in daily life.

1. Introduction

Over the past three decades, ambulatory monitoring techniques such as the Experience Sampling Method ("ESM"; (Csikszentmihalyi and Larson, 1987) and Ecological Momentary Assessment ("EMA"; (Stone and Shiffman, 1994) have been applied to investigate a number of psychiatric disorders and clinical phenomena. These techniques have also been recognized as a major advance in medical research more generally (National Institute of Health, 2011), with strong potential to complement traditional research designs. The earlier versions of this methodology relied on personal diaries in which participants were prompted by watches or beepers to fill out paper questionnaires at various times throughout the day (Bolger et al., 2003). This method has since been criticized as individuals tended to inaccurately report the actual time at which each questionnaire was filled out (Broderick et al., 2003, Stone et al., 2003). In recent years, technological advances have enhanced ambulatory monitoring techniques, notably through the use of mobile signaling devices (PDAs or smartphones) that also allow for electronic data collection. In this way, computerized Ecological Momentary Assessment permits the completion of electronic questionnaires administered in real-time and in the natural contexts of daily life. In addition to facilitating data entry, computerized EMA provides time-stamped observations eliminating inaccurate reporting of the time elapsed between the prompt and the completion of the questionnaire.

Since its development, Ecological Momentary Assessment has been used to investigate a variety of psychiatric conditions such as major depression and bipolar disorder (Barge-Schaapveld et al., 1999, Husky et al., 2009, Putnam and McSweeney, 2008), psychosis (Myin-Germeys et al., 2003, Swendsen et al., 2011), anxiety (Brown et al., 2007, Kashdan and Steger, 2006), eating disorders (Hilbert and Tuschen-Caffier, 2007, Smyth et al., 2007), substance use (Cooney et al., 2007, Swendsen et al., 2000, Zheng et al., 2013), and borderline personality disorder (Santangelo et al., 2012).

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Despite its application to a range of psychiatric syndromes, very few studies have used this method to investigate suicidal ideation or its risk factors. One investigation used computerized EMA to examine self-injurious thoughts and behaviors in 30 adolescents and young adults with a recent history of self-injury (Nock et al., 2009). Several additional studies have used paper-based methods to explore proximal predictors of self-harm ideation or negative mood in inmates (Humber et al., 2013), hospitalized depressed adults (Ben-Zeev et al., 2012), persons with borderline personality and suicidal behavior (Links et al., 2007, Nisenbaum et al., 2010) as well as individuals at risk of developing psychosis (Palmier-Claus et al., 2012). Despite these encouraging findings, however, previous studies have not systematically reported information regarding participant compliance with the repeated electronic questionnaires, or regarding the potential reactive effects associated with repeated assessments.

The possibility that questioning patients about suicidal ideation may lead to an increase in the frequency of such cognitions has been a long-standing concern for both researchers and clinicians. While investigations of this issue have found no support for iatrogenic effects of assessing suicidal ideation, they have be conducted using single or infrequent assessments (Gould et al., 2005). Little is known about the effect of more intensive repeated assessment protocols such as those used in EMA investigations, and therefore is it unknown to what extent the use of this approach may pose ethical issues. Finally, the application of computerized ambulatory monitoring to suicide research requires careful documentation of the basic feasibility and validity of this approach in this population. This goal would be best achieved by using identical methods in groups at varying risk for suicide, thereby providing an indication of change in compliance or biases as a function of risk. The main objectives of the present study are to determine the feasibility of Ecological Momentary Assessment in the study of suicide risk in populations at varying risk for completed suicide: healthy controls, persons with a history of mood disorder, persons with both a history of suicide attempt and mood disorder, and persons recently discharged from the hospital following a suicide attempt. The specific objectives are to describe for each group: 1) the rate of acceptance to participate; 2) compliance with EMA procedures; 3) reactive effects in the assessment of negative cognitions, and suicidal ideation in particular; and 4) reactive effects in behavioral and environmental variables.

2. Methods

2.1. Subjects

A total of 96 participants were drawn from two ongoing studies conducted in the Psychiatric Emergency and Post Emergency Department, at the University Hospital of Montpellier, France. Both studies were approved by the local research ethics committee (CPP Montpellier Sud-Méditerranée IV, CHU Montpellier) and conducted according to the tenets of the Declaration of Helsinki. All participants provided written informed consent. Eligibility criteria and recruitment procedures for each of the four groups are described below.

2.1.1. Recent suicide attempters (RSA)

The Ecological Momentary Assessment study was offered to adults hospitalized in the Psychiatric Emergency and Post Emergency Department unit due to a suicide attempt between July 2010 and October 2012 when the research staff was on site. Persons in the RSA group were enrolled in a larger study on suicidal behavior that included a genetic component requiring individuals to be Caucasian adults whose parents and grandparents were of Western European descent with the exclusion of Basques and Sardinians. Pregnant or breastfeeding women were also excluded. Of the 48 participants who were offered participation, a total of 42 patients agreed to participate in the present EMA study upon hospital discharge and were included in the analyses.

The remaining participants were recruited from an fMRI study on suicidal behavior in women. This study also included a genetic component with the same ethnicity requirements as described in the first study. Participants in this study were 18 to 50 years old, right-handed, non-menopausal and euthymic women (Hamilton Depression Rating Scale (HAMD) (Hamilton, 1960) score below seven), and did not present any contraindication for fMRI. In addition, participants were excluded if they had a lifetime history of severe head trauma, central nervous system disorder, schizophrenia, or a history of drug or alcohol abuse or dependence in the previous 12 months. Participants were recruited from outpatient consultations with a mental health professional at the hospital and through advertisement in the local newspaper. From this overall study population, the following three groups were defined:

2.1.2. Past suicide attempters (PSA)

Individuals were recruited to this group if they had a lifetime history of both mood disorder and suicide attempt. Patients in this group were also allowed to receive only minimal pharmacological treatment, such as little or no benzodiazepines or sedatives. Of the 30 individuals offered participation, a total of 20 enrolled in the study.

2.1.3. Affective controls (AC)

Individuals were recruited to this group if they had a lifetime history of mood disorder but no history of suicidal behavior at inclusion. Of the 31 individuals offered participations, a total of 21 participants enrolled in the study.

2.1.4. Healthy controls (HC)

Healthy controls were recruited based on the absence of any DSM-IV axis I diagnosis, and no history of suicidal behavior ($n=13$). Among the first consecutive 17 who met inclusion criteria, 13 accepted enrollment in the study.

2.2. Procedure

Identical procedures were used in all four groups. Participants were rated on baseline depression levels with the HAMD and were trained in how to use the mobile assessment device (a Tungsten E2 palm) for the EMA phase of the study. The 15-min training session on computerized EMA included the operation of the device as well as verifying comprehension of each question and response choice as displayed in the electronic interview. After completion of the training, each participant was given an EMA device to carry with them for 7 consecutive days. Each device was programmed to administer five electronic interviews per day. For each individual, the timing of the interviews occurred within a sampling window ranging from 8:00 a.m. and 10:00 p.m. However, to avoid a concentration of electronic interviews within several minutes of each other, this time window was divided into five time periods of 3–4 h. One electronic interview was then administered within each time period, with a minimum spacing of 1 h between any two electronic interviews. For any given individual, the interviews occurred each day at the same time. Furthermore, sampling windows were adjusted to accommodate each participant's typical sleep and wake schedules so as not to modify usual daily life activities. The EMA program permitted responses to be provided only within a 20-min period following the interview signal, and all data entries were time-stamped. All participants were contacted by phone by a member of the research team on the second day of the study to answer any questions and resolve any technical issue, and again on the fifth day to remind them to charge the device. Following the seven-day assessment period, participants returned the device to the research staff.

2.3. Measures

2.3.1. Current level of depression

The HAMD was used to determine participants' current level of depression. With the exception of the recent suicide attempter (RSA) group, participants were required to be euthymic at the time of the study as indicated by an HAMD score below seven.

2.3.2. Ambulatory measures

2.3.2.1. Behavior, environment, and social contexts. At each electronic assessment, participants were asked to describe their current activity, location, and social company (if any) at the moment of the signal. The response options provided to participants were based on those established through previous ambulatory monitoring investigations (Husky et al., 2007, Johnson et al., 2009). For the purpose of examining reactive effects, three representative variables were selected from each category based on their relevance and sufficient frequency (greater than five percent) of occurrence. These variables included being “alone,” “with family” or “with friends” (for social categories); “in person conversation,” “working” or