FREEMASONS FOUNDATION CENTRE FOR MEN'S HEALTH



Adherence to an e-health ecological momentary assessment protocol in distressed young people: a mixed methods study

e-health technologies generate unique data and bring unique challenges; raising questions about "who is appropriate for this type of data gathering?" and "how to ensure that data is regularly and accurately reported?".

This mixed-methods study examined practically relevant individual differences, including self-determination, that reveal who adhered to a 14-day e-health Ecological Momentary Assessment (EMA) protocol and possible reasons why. Participants were drawn from visitors to the popular ReachOut website (www.reachout.com) resulting in a purposefully recruited sample of young people considered 'at-risk' of mental-health disorders.

To help realise the potential of EMA in managing young people's mental-health, this study informs e-health design strategies that might improve overall adherence to EMA by bringing attention to practical aspects of well-established motivational theory.

Introduction

Since most adult mental-health problems emerge before 24 years of age (Kessler et al., 2005), continuously monitoring and detecting symptoms early in the course of these pervasive disorders may predict declining emotional states and inform 'just-in-time' early interventions that prevent them from becoming established and promote positive long-term mental health outcomes.

One promising e-health methodology that enables self-monitoring is Ecological Momentary Assessment (EMA; Stone & Shiffman, 1994), which captures everyday fluctuations in self-reported mood and other mental-health symptoms in natural setting. Given that smartphones have become ubiquitous and routine in the lives of young people (Rideout, 2016), EMA delivered electronically seems inevitable and likely to appeal to young people.

Although EMA provides valuable insight into behaviours and subjective states, for all its promise, the consensus is that EMA imposes an inherent burden that reduces overall adherence and threatens its efficacy (Bolger, Davis, & Rafaeli, 2003). Subsequently, Wen et al. (2017) called for a need to identify factors that may impact young people's adherence to EMA.

Aims

- 1. To determine who *did* and *did not* adhere to the EMA protocol.
- 2. To examine *why* participants adhere to EMA by understanding underlying motivational orientation within the framework of Self-Determination Theory (SDT; Deci & Ryan, 1985).
- 3. To qualitatively explore why participants did and did not adhere to an EMA protocol by identifying barriers, facilitators and experiences using open-ended questions.



SDT proposes that motivation varies in the degree to which it is autonomous or controlled. The theory suggests that both the degree of motivation and also motivational orientation affects engagement and maintenance of behaviour.

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Methods

130 young people (16-27 years) were recruited from the ReachOut mental-health support website (www.reachout.com) that targets young people experiencing mental-health issues.

• At baseline (time **T1**), participants completed baseline measures of *personality* (Big Five Personality Index; BFI10) and emotional or psychological distress state (Depression, Anxiety, Stress Scale; DASS21) - with results indicative of moderate to severe mental-health problems compared to normative Australian data (Crawford et al., 2011).

During the **14-day EMA protocol**, 'Adherence' scores (in days) were calculated based on the number of completed EMA entries recorded by the online EMA tool (goAct) per participant. • At the 6-month follow-up (time **T2**), individual differences, including *motivational* orientation (Intrinsic Motivation Index; IMI) as predictors of adherence were examined using mixed methods. Specifically, regressions were calculated to predict adherence, and a thematic analysis of participant's experiences with and use of the EMA tool was undertaken.



Results

- Participants who took part in the EMA protocol (EMA group, *n*=65) were **younger** and reported *lower stress* and *anxiety* than those who did not (non-adherence group, *n*=65), *t*(128)=2.78, *p*=.006 and *t*(128)=2.99, *p*=.003 respectively.
- Adherence within the EMA group was considered moderate (*n*=65, *M*=11.85 days, *SD*=8.75), with 30 of the 65 (46.2%) participants completing the required 14-day protocol.

Aim 1: who adhered (zero-inflated negative binomial regression).

Adherence increased amongst participants who were *more stressed* (Incident Rate Ratio, IRR=1.08, 95% CI[1.00, 1.17]). Conversely, adherence decreased amongst participants who scored higher on the *neuroticism* BFI10 personality factor (IRR=0.85, 95% CI[0.72, 0.99]).

Aim 2: why participants adhered (quantitative - linear hierarchical multiple regression). The model (F(9, 36)=2.93, p=.01) explained 42.3% of the variance in adherence to EMA. Most interestingly, participant motivational orientation tended towards the Value-Usefulness integrated extrinsic motivation factor of the IMI, which predicted significantly higher adherence (B=3.01, p=.009). Also, an *agreeable* personality significantly predicted adherence to the EMA (B=1.28, p=.029). Surprisingly, the **Interest-Enjoyment** motivational orientations showed a negative association with adherence despite non-significance.

Aim 3: why participants adhered (qualitative - thematic analysis).

The most prevalent themes raised indicated that participants were interested in the 14-day EMA protocol and that they valued its importance and benefits, however the repetitiveness of EMA items and forgetfulness contributed to lower adherence.

Discussion

Two of the more striking observations within the first aim of this study are: (1) the influence of age, with younger participants more likely to commence the EMA; and, (2) the revelation that participants with higher stress exhibit higher adherence. The second finding is particularly interesting given that overall stress in the adherence group was significantly lower than in the non-adherence group. This suggests that once individuals engaged with the EMA, those with higher stress levels were more likely to persist.

There was no quantitative evidence that the most autonomous form of motivational orientation - intrinsic motivation, as indicated by Interest-Enjoyment on the Intrinsic Motivation Index (IMI) - contributes to adherence. Conversely, the autonomous form of extrinsic motivation - Value-Usefulness - is strongly positively associated with adherence to EMA. Other IMI subscales more closely related to controlled forms of extrinsic motivation were not associated with adherence, as anticipated by SDT (Ryan & Deci, 2006).

In general, the themes identified as part of the qualitative analysis validate the quantitative data that emphasised Value-Usefulness as a predictor of adherence. For instance, respondents indicated that their motivation for participating in the EMA was driven by insights, self-awareness, personal health outcomes and interest. Furthermore, participants reported that they "liked the ease of use" of the EMA and that "it was easy and visually appealing". Therefore, the use of a face emoticon scale in this study may have acted to reduce the burden of EMA and increase its feasibility among the young sample.

The results support the notion that individuals who identify with and integrate the value of EMA with their personal goals are more likely to adhere. Since SDT recognises motivation as pliable in relation to specific behaviours (Friederichs et al., 2015), an important practical implication for the design of EMA protocols to address adherence is that it may be feasible to influence motivational orientation with a view to initiating and sustaining adherence. This might be achieved by re-orienting individuals towards Value-Usefulness autonomous forms of extrinsic motivation, rather than focussing on the Interest-Enjoyment intrinsic motivational aspects of EMA design, such as aesthetics, which were shown not to influence adherence.

Conclusions

Although additional research is required to characterise non-adherence, this study uniquely investigated motivation within the well-established theoretical framework of SDT. The results distinguish who might adhere to and benefit from EMA. Perhaps the most important discovery resulting from this study is the differentiation between intrinsic and autonomous extrinsic motivation – with the later a predictor of adherence. By bringing attention to motivational aspects of self-determination theory, one promising avenue offered by this study is to enhance the sense of value and usefulness of EMA.

Overall, this study represents a valuable contribution in identifying which personality and motivational orientation correlates influence adherence to EMA in distressed young people. The next logical step is to use the theoretical knowledge of these mechanisms to design EMA protocols and associated interventions that attend to what motivates individuals and who is most likely to adhere to and subsequently benefit from them.

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