Original Paper

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Which behaviors predict early morning mood? Observations from an ecological momentary assessment of permanent supportive housing residents

Abstract

Background: Behavior and mood are closely intertwined. The relationship between behavior and mood might be particularly important in populations of underserved people, such as people with physical or mental health issues. We used ecological momentary assessment (EMA) to examine the relationship between mood state and other characteristics among people with a history of chronic homelessness who were participating in a health coaching program.

Objective: This study explores predictors of preferences and intentions to access e-mental health services relative to face-to-face services. Five domains were investigated (demographics, technology factors, personality, psychopathology, and beliefs), identified from previous studies and informed by the Internet interventions model. We expected that more participants would report intentions to use e-mental health services relative to reported preferences for this type of support and that these 5 domains would be significantly associated with both intentions and preferences toward online services.

Methods: Participants in m.chat, a technology-assisted health coaching program, were recruited from housing agencies in Fort Worth, Texas. All participants had a history of chronic homelessness and reported at least one mental health condition. A subset of participants was asked to complete daily EMAs of mood and other behaviors. From the circumplex model of affect, the EMA included nine questions related to the current emotional state of the participant (happy, frustrated, sad,
worried, restless, excited, calm, bored and sluggish). The responses were used to calculate two composite scores for valence and arousal.

**Results:** Non-whites reported higher scores for both valence and arousal, but not at a statistically significant level after correcting for multiple testing. Among momentary predictors, greater time spent in one-on-one interactions, greater time spent in physical activities, greater number of servings of fruits and vegetables, greater time spent interacting in a one-on-one setting, as well as adherence to prescribed medication the previous day generally were associated higher scores for both valence and arousal, and statistical significance was achieved in most cases. Number of cigarettes smoked the previous day was generally associated with lower scores on both valence and arousal, though statistical significance was achieved for valence only when correcting for multiple testing.

**Conclusions:** This study provides an important glimpse into factors that predict morning mood among people with mental health issues and a history of chronic homelessness. Behaviors considered to be positive (e.g., physical activity, consumption of fruits and vegetables) generally enhanced positive affect and restrained negative affect. The opposite was true for behaviors such as smoking that are considered to be negative.

**Keywords:** permanent supportive housing; circumplex model of affect; ecological momentary assessment; emotion; mood; valence; arousal; hierarchical mixed effects model.

**Introduction**

More than half a million individuals are homeless at any given time in the United States [CITATION Nat16 \l 1033]. Homelessness is associated with a higher prevalence of mental illness, higher rates of morbidity and mortality, and increased rates of drug abuse, criminality, and victimization [CITATION Faz08 \l 1033]. One approach to reducing chronic homelessness is permanent supportive housing (PSH), which provides low-cost community-based housing alongside supportive services. PSH has been demonstrated to reduce homelessness, increase housing tenure, and decrease emergency room visits and hospitalization [CITATION Rog14 \l 1033]. Although PSH can result in lower overall costs to society, people who reside in PSH face numerous challenges in their ability to live independently, including, in many cases, physical and mental health conditions requiring treatment. For example, 73% of PSH residents in Ft. Worth, Texas reported at least one chronic health condition, 55% reported having received treatment for a mental health condition, 67% reported having a history of substance abuse, and 44% reported both co-occurring substance abuse and mental health concerns [CITATION ESp13 \l 1033].

Mood and emotional reactivity have been shown to play an important role in both mental and physical health. For example, Gallo and Matthews [CITATION Gal03 \l
found that negative emotions and cognitions were related to cardiovascular disease and all-cause mortality, and contributed to the relationship between socioeconomic status and health [CITATION Gal99 \l 1033]. A study of well-being among adults in England found that positive affect was associated with survival, even after controlling for demographic factors and baseline health [CITATION Ste11 \l 1033]. In addition, multiple studies have shown that anxiety, stress, and negative affect are associated with health behaviors such as smoking, alcohol and drug use [CITATION Shi07 \l 1033], [CITATION Hed \l 1033], [CITATION Shi09 \l 1033], [CITATION Bus10 \l 1033], [CITATION Jah11 \l 1033]. Additional research is needed to examine how health behaviors affect affect and stress in disadvantaged and understudied adults.

Ecological momentary assessment (EMA) techniques use mobile devices to assess thoughts, feelings, and behaviors in real-time in an individual’s natural settings [CITATION Eco \l 1033]. A review of EMA studies on mood disorders and dysregulation demonstrated that real-time assessment reduces recall bias and allows for the study of dynamic processes and context-specific relationships related to mood [CITATION Ebn09 \l 1033]. For instance, in one 4-day long EMA study of depression among adolescents, higher pretreatment positive affect, lower negative affect, and a higher positive-to-negative affect ratio predicted lower clinician-rated severity of problems following treatment [CITATION For12 \l 1033]. The measures of affect were created using items adapted from the Positive and Negative Affect Scale for Children (PANAS-C) [CITATION Lau99 \l 1033]. Similarly, another EMA study of affect and depressive illness found that response to treatment was predicted by daily increases in positive affect among individuals with clinical depression [CITATION Nja12 \l 1033]. EMAs involving substance use in adolescents indicate that alcohol intake and cigarette intake are predicted by greater negative mood states, including sadness, depression, anger, and stress, as well as greater conduct and behavioral problems [CITATION Hus01 \l 1033], [CITATION Bus13 \l 1033], [CITATION Bus14 \l 1033], [CITATION Bus \l 1033]. Overall, EMAs may be a useful way to monitor and, ultimately, intervene to prevent maladaptive mood experience and mood regulation processes [CITATION Pia07 \l 1033].

Although EMA has been used to evaluate dynamic changes in mood and behavior, no study to date has examined the relationship between emotion and behavior among adults in PSH. The purpose of this study was to explore the prospective associations between mood (i.e., valence and arousal) and health behaviors among adults residing in PSH using EMA. Considering the relatively high costs associated with physical and mental health disorders in this population, it can be beneficial to identify factors affecting daily mood patterns in order to predict and intervene with persons who are at risk.

**Methods**

**Participants/Design and Study Procedures**

Data for this study were drawn from the Mobile Community Health Assistance for Tenants (m.chat) project, a technology-assisted health coaching intervention
designed to improve health indicators among PSH residents in Fort Worth, TX [CITATION Placeholder1 \l 1033 ]. Participants were recruited via convenience sampling from six local housing agencies in Fort Worth. Participants were adult, English speaking, Medicaid-enrolled or eligible, and reported at least one of the following conditions in the past year: prescribed medication for psychological or emotional problems, experienced hallucinations, received a pension for a psychiatric disability, or reported at least moderate levels of depression (≥ 9 on the Patient Health Questionnaire (PHQ-9)). Participants met monthly with a health coach who helped to set goals related to diet, exercise, substance use, medication compliance, social support, and recreation/leisure. A subgroup of participants who scored ≥ 4 on the REALM-SF (indicating > 6th grade English literacy level) were given the opportunity to participate in the EMA portion of the project. This subset of clients completed EMAs each morning with questions about current mood and setting, and health behaviors from the previous day, including diet, exercise, substance use, leisure time activities, medication compliance, and social interactions. The EMA protocol used in this study was based on that of a previous study with homeless smokers [CITATION Bus14 \l 1033 ]. Participants were provided with a smartphone, and granted unlimited voice, text and 2 GB data for their own personal use. While enrolled in the EMA portion of m.chat, participants received up to 15 “Chat Bucks” each month, proportional to the percent of days they completed the assessment (1 Chat Buck = $1 redeemable for health-related supplies; thus, participants could earn up to $15 worth of health-related supplies each month). Provided they were compliant with at least 50% of the EMA prompts, participants could carry the phone for up to 12 months. Project resources allowed for up to 80 participants to participate in the EMA portion at any one time; when participants returned the phone (because they had reached the end of their allotted time, were failing to complete assessments, or decided they did not want to carry the phone any longer) the phone was factory reset and offered to another participant based on the order of enrollment into the parent study. The project was approved by the Institutional Review Board of the University of North Texas Health Science Center, and participants were given assurances of confidentiality. All participants gave informed consent.

The current analysis includes 155 participants who completed a total of 18,357 daily assessments between May 1, 2016 and April 30, 2017. On average, individuals received 139 daily assessments/prompts [range: 14 - 334] and completed 106 assessments [range: 4 - 322]. The sample was split almost evenly between males (77) and females (78) and the average age was 52 years (SD=8 years).

**Instruments (Measures)**

The mobile app alerted participants to complete an assessment 30 minutes after the participant’s self-reported waking time. Participants were asked to complete the assessment within 30 minutes of the initial alert; they had the option to “snooze” an assessment request three times each day before the EMA would be counted as missed. Below are the questions that were presented in the daily EMA (only the questions/response options considered in the current analyses are presented).
Mood
Nine mood items were measured on a Likert type scale from 1 (strongly disagree) to 5 (strongly agree): I feel happy, I feel frustrated, I feel sad, I feel worried, I feel restless, I feel excited, I feel calm, I feel bored, and I feel sluggish.

Physical Activity
Participants were asked how many hours they spent sitting, how many minutes they walked or biked to get somewhere, how many minutes they were physically active for fitness (e.g., running, sports), and how many minutes they were physically active at work or home (e.g., cleaning, lifting or carrying things) the previous day.

Diet
Participants were asked how many servings of fruit and vegetables they ate, how many sugar-sweetened beverages they drank, and how many desserts and other sweets they ate the previous day.

Social Support
Participants were asked how many total minutes they spent in meaningful one-on-one conversations with other people, and how many total minutes they spent in meaningful group interactions (for example, going to church, participating in an exercise class, or other social occasions) the previous day.

Medication Compliance
Participants were asked if they took all of their medication as prescribed the previous day.

Tobacco use
Participants were asked if they used tobacco (cigarettes) the previous day, and if so, how many cigarettes they smoked.

Demographics characteristics such as age, sex, and race (white, non-white), collected at baseline, were used as covariates in the analyses.

Statistical Modeling and Analysis
The circumplex model of affect [CITATION Rus80 \l 1033 \], [ CITATION Pos05 \l 1033 \] was used to categorize each emotion in a two-dimensional circular space, containing dimensions for arousal and valence (Figure 1). In a recent refinement of the model using regression [CITATION Pal13 \l 1033 \], the circumplex model was quantitatively visualized as a circular space of radius one unit within a two-dimensional Cartesian coordinate system, which assigns scores for valence and arousal for each emotion (Figure 2). This model includes a comprehensive list of mood items commonly considered in behavioral sciences. Scores for valence and arousal in the circumplex were obtained from this model for each of the nine mood items considered and are shown in Table 1. During each daily assessment, composite
scores of valence and arousal were created as weighted sums of the nine mood items, with the reported mood scores serving as weights. These two composite scores were the outcomes of this study. All questions in the various domains (e.g., diet, physical activity) described in the “Instruments” section, except the mood items, were considered as potential predictors of the outcomes. To reduce the large number of predictors in the model, we combined some of the variables within the same domain to create the following new variables as predictors: number of servings of healthy diet, number of servings of sweets and number of minutes of total physical activity. It is important to observe that even though the EMA mood questions asked about present mood, predictors were recalled values from the previous day. In that sense, the predictors are not momentary in a strict sense, but will be referred to as momentary variables for statistical modeling and analysis. Individual demographic characteristics (i.e., age at the onset of the EMA study, sex, race) were considered time-invariant for the duration of the study. Race was dichotomized as white and non-white as 95% of participants were either white or African-American.

Figure 1.
Table 1. Circumplex scores for the emotions considered

<table>
<thead>
<tr>
<th>Emotion</th>
<th>Valence</th>
<th>Arousal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happy</td>
<td>0.95</td>
<td>0.15</td>
</tr>
<tr>
<td>Frustrated</td>
<td>-0.50</td>
<td>0.40</td>
</tr>
<tr>
<td>Sad</td>
<td>-0.90</td>
<td>-0.40</td>
</tr>
<tr>
<td>Worried</td>
<td>-0.15</td>
<td>-0.30</td>
</tr>
<tr>
<td>Restless</td>
<td>-0.15</td>
<td>0.30</td>
</tr>
<tr>
<td>Excited</td>
<td>0.70</td>
<td>0.70</td>
</tr>
<tr>
<td>Calm</td>
<td>0.75</td>
<td>-0.70</td>
</tr>
<tr>
<td>Bored</td>
<td>-0.40</td>
<td>-0.80</td>
</tr>
<tr>
<td>Sluggish</td>
<td>-0.15</td>
<td>-0.50</td>
</tr>
</tbody>
</table>
In the general statistical model for the analysis, for each outcome, we denote the response on the $t^{th}$ assessment from the $i^{th}$ subject by $Y_{it}$, the value of the $j^{th}$ demographic predictor (out of $k$ total number of predictors) from the $i^{th}$ subject by $X_{ij}$ and the value of the momentary predictor on the $t^{th}$ assessment from the $i^{th}$ subject by $Z_{it}$. Then the hierarchical model can be presented as follows:

Level 1:  
$$Y_{it} = \pi_{0i} + \pi_{1i}Z_{it} + \varepsilon_{it}$$

Level 2:  
$$\pi_{0i} = \beta_{00} + \sum_{j=1}^{k} \beta_{0j}X_{ij} + \delta_{0i}$$
$$\pi_{1i} = \beta_{10} + \delta_{1i}$$

All analyses were performed using MIXED procedure in SAS with the intercept specified as random effect and within-subject residuals are specified to have first-order autoregressive correlation.

Since there are eleven predictors in our model, have implemented the popular Bonferroni correction to adjust the reported $P$ values for the predictors. It should be noted that the very conservative Bonferroni corrected $P$ value threshold of .05 is equivalent to an unadjusted $P$ value threshold of .0045. Since we are not interested in the statistical significance of the intercept term, it is not considered for the Bonferroni correction.

Results

Associations among Momentary Variables and Mood controlling for demographic characteristics

Analyses of the associations between momentary variables and valence and arousal were performed, controlling for three demographic predictors described in the previous section. The results for the valance and arousal outcomes are presented in Tables 2 and 3, respectively. For the predictors with an unadjusted $P$ values less than .05, we also present Bonferroni corrected $P$ values (under parenthesis). None of the demographic variables predicted either outcome at a statistically significant level after the extreme Bonferroni adjustment. However, the effect of race on valence approached significance (unadjusted $P$ value = 0.007, adjusted $P$ value = 0.08) with whites reporting much lower valence scores on average.

Minutes spent doing physical activity the previous day was a statistically significant predictor of both valence and arousal, with expected higher scores for increased physical activity. Time spent in meaningful group interaction the previous day was not a statistically significant predictor of either valence or arousal. Time spent in meaningful one-on-one social interaction the previous day was a statistically significant predictor of both valence and arousal, with expected higher scores for more interaction time. Hours spent sitting the previous day was a statistically significant predictor of both valence and arousal, with an expected lower score for an increase in time spent on sitting. Number of total servings of fruits and vegetables
consumed the previous day was a statistically significant predictor of both valence and arousal, with expected higher scores for greater servings. Number of total servings of sugar sweetened beverages and desserts the previous day was not a statistically significant predictor of either valence or arousal. Adherence to medication the previous day was a statistically significant predictor of both valence and arousal, with higher scores for adherence. Any tobacco usage the previous day was a statistically significant predictor of only valence; on average, greater smoking resulted in lower valence scores.

Influence of demographic variables on Momentary predictors for mood

Even though the model controls for demographic characteristics in analyzing the effect of momentary variables on valence and arousal, it is worthwhile to explore how much influence the demographic predictors have on the momentary predictors. A strong influence of demographic predictors on the momentary predictors can make the regression coefficients unstable and hard to interpret. Unlike in a standard multiple regression framework, in our hierarchical model, the influence cannot be measured directly by studying the multicollinearity properties and other standard regression diagnostics. Instead the amount of influence can be indirectly measured by analyzing two additional models: one with only demographic predictors and one with only momentary predictors. The change in values of the estimated regression coefficients in the full models compared to the two isolated models described above can be used to assess the influence and the robustness of the coefficients.

For the sake of brevity, the actual results from the two isolated models are not presented here, but the results are remarkably consistent with our findings from the combined model in the previous section. Not only do the statistical significances of the momentary predictors match closely, the individual estimates of the regression coefficients are also surprisingly close. The individual estimates of the regression coefficients are very close for the demographic predictors as well. The observed consistency provides fairly strong evidence on the orthogonality of the demographic predictors from the momentary predictors.

Table 2. Results for Valence with momentary predictors, controlling for demographic characteristics

<table>
<thead>
<tr>
<th>Effect</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>t Value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2.3209</td>
<td>1.4219</td>
<td>1.63</td>
<td>.10</td>
</tr>
<tr>
<td>Age</td>
<td>-0.00772</td>
<td>0.02740</td>
<td>-0.28</td>
<td>.78</td>
</tr>
<tr>
<td>Male</td>
<td>-0.4930</td>
<td>0.4589</td>
<td>-1.07</td>
<td>.28</td>
</tr>
<tr>
<td>Caucasian</td>
<td>-1.2283</td>
<td>0.4569</td>
<td>-2.69</td>
<td>.007 (&lt;.08)</td>
</tr>
<tr>
<td>Total physical activity</td>
<td>0.007341</td>
<td>0.000834</td>
<td>8.80</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Effect</td>
<td>Estimate</td>
<td>Standard Error</td>
<td>t Value</td>
<td>P value</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>----------</td>
<td>----------------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Minutes of one-on-one interaction</td>
<td>0.003738</td>
<td>0.000392</td>
<td>9.53</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Minutes spent in group interaction</td>
<td>0.000080</td>
<td>0.000474</td>
<td>0.17</td>
<td>.87</td>
</tr>
<tr>
<td>Hours spent sitting</td>
<td>-0.03691</td>
<td>0.01080</td>
<td>-3.42</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Fruits and vegetables</td>
<td>0.1232</td>
<td>0.01443</td>
<td>8.54</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Sweets</td>
<td>0.02088</td>
<td>0.01560</td>
<td>1.34</td>
<td>.18</td>
</tr>
<tr>
<td>Medication</td>
<td>0.7600</td>
<td>0.1052</td>
<td>7.23</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Number of cigarettes</td>
<td>-0.06010</td>
<td>0.007521</td>
<td>-7.99</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Table 3. Results for Arousal with momentary predictors, controlling for demographic characteristics

<table>
<thead>
<tr>
<th>Effect</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>t Value</th>
<th>Pr &gt;</th>
<th>t</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-2.9743</td>
<td>0.5198</td>
<td>-5.72</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.00012</td>
<td>0.01000</td>
<td>-0.01</td>
<td>.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>-0.1738</td>
<td>0.1674</td>
<td>-1.04</td>
<td>.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>-0.4169</td>
<td>0.1666</td>
<td>-2.50</td>
<td>.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total physical activity</td>
<td>0.002675</td>
<td>0.000361</td>
<td>7.40</td>
<td>&lt;.0001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minutes of one-on-one interaction</td>
<td>0.001902</td>
<td>0.000170</td>
<td>11.17</td>
<td>&lt;.0001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minutes spent in group interaction</td>
<td>0.000344</td>
<td>0.000206</td>
<td>1.67</td>
<td>.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours spent sitting</td>
<td>-0.01965</td>
<td>0.004679</td>
<td>-4.20</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Discussion

#### Principal Results

These findings provide an important glimpse into factors that affect mood valence and arousal in a population of individuals who were residing in supportive housing. To our knowledge, this is the first study to examine the connection between mood and other factors among people with mental health disorders and a history of chronic homelessness. Notably, this underserved population is often excluded from research studies due to co-occurring mental and physical disorders, resulting in substantial gaps in our understanding of their health and health behaviors.

Our analyses provide evidence to support a number of observations about the relations between health behaviors and subsequent mood. First, we found that physical activity was significantly associated with positive mood the following day. This finding is consistent with the literature showing that moderate physical activity is associated with improved and maintained mood [CITATION Pel05 \l 1033], as well as decreased symptoms of depression and anxiety [CITATION Pen05 \l 1033]. We also found a positive relationship between fruit and vegetable intake and mood the following day. Similarly, a study using data from the Canadian Community Health Survey (CCHS) found that fruit and vegetable intake was significantly associated with lower odds of depression and psychological distress [CITATION McM13 \l 1033]. Taken together, these results suggest that a coordinated program to improve physical activity and dietary behaviors could be a fundamental component to future interventions targeting individuals with mental health disorders and a history of chronic homelessness.

We also found that smoking cigarettes had a negative effect on mood valence the following day. Although nicotine may have a calming effect due to the inhibition of negative emotions such as anger [CITATION Geh09 \l 1033], our results suggest that this effect may not carry forward to the following day. Research has suggested that nicotine dependency exacerbates stress [CITATION Par99 \l 1033], and a meta-analyses of changes in mental health after smoking cessation revealed that smoking cessation is associated with reduced depression, anxiety, and stress, with effect sizes equal to or larger than those of antidepressant treatment for mood.

<table>
<thead>
<tr>
<th>Effect</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>t Value</th>
<th>Pr &gt;</th>
<th>t</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits and vegetables</td>
<td>0.02546</td>
<td>0.006253</td>
<td>4.07</td>
<td>&lt;.001</td>
<td>(&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Sweets</td>
<td>-0.00918</td>
<td>0.006755</td>
<td>-1.36</td>
<td>.17</td>
<td>(.17)</td>
<td></td>
</tr>
<tr>
<td>Medication</td>
<td>0.1481</td>
<td>0.04549</td>
<td>3.26</td>
<td>.001</td>
<td>(.01)</td>
<td></td>
</tr>
<tr>
<td>Number of cigarettes</td>
<td>-0.00610</td>
<td>0.003246</td>
<td>-1.88</td>
<td>.06</td>
<td>(.06)</td>
<td></td>
</tr>
</tbody>
</table>
disorders [CITATION Cha \l 1033 ]. Thus, individuals receiving treatment for mood disorders may benefit from concurrent smoking cessation therapy.

We also found a strong relationship between the amount of time spent in individual social interactions and mood. Interestingly, “time spent on meaningful one-on-one social interaction the previous day” was strongly associated with mood arousal and valence, while the “amount of time spent interacting in a group setting” was not significantly associated with mood. This finding was somewhat unexpected given the substantial evidence that social support predicts quality of life in many areas [ CITATION Hel03 \l 1033 ]. However, supportive housing residents are encouraged to attend support groups that address topics such as lifestyle skills, chronic disease management, and substance use. For this population, it may be that group interactions do not contribute to mood unless the individual feels personally connected to at least one other person in the group. Thus, group interactions by themselves may not predict mood, while individual interactions outside of the group setting may be one indicator of healthy, rewarding relationships.

Finally, in the analysis of the effect of demographics on the association between momentary predictors with valence or arousal, demographic variables had minimal effects on the regression coefficients of the momentary predictors, even when statistically significant. Hence, it is reasonable to conclude that the demographic predictors operated almost independently of the momentary variables in terms of influencing mood.

Limitations and Strengths

Our study had a number of limitations. Notably, our protocol included only daily morning assessments. Thus, we were not able to examine within-day variability. However, unlike other EMA studies, which typically run for a few days to at most a few weeks, our study ran up to 334 days with an average of 156 days of monitoring among all participants. This allowed us to examine associations for a much longer period than most other EMA studies. In addition, our results are generalizable only to a population of individuals residing in PSH with a history of homelessness and mental health issues. It is unclear whether the findings are generalizable to other populations of patients with mental health problems, let alone the population in general.

Conclusions

Despite the limitations, our study offers an important glimpse into health behaviors that affect daily mood arousal and valence of persons with a history of chronic homelessness and mental health problems. One of the goals of the m.chat program was to provide individual support and assistance in meeting health goals. Because mood was an important target for m.chat, there is value in evaluating mood-based interventions that promote positive affect in this population which, in turn, can help to bring about stability and help to prevent future homelessness. To that end, identifying modifiable behaviors associated with negative and positive moods, is a first step. Understanding factors associated with mood and behaviors, particularly in
vulnerable populations such as formerly homeless individuals, can help providers design more targeted treatment plans and provide more appropriate referrals to ancillary care services [CITATION Nya12 \l 1033 ].

We can surmise that at least for the population considered in this study, behaviors considered to be positive (e.g., physical activities, consumption of fruits and vegetables, adherence to prescribed medication, and one-on-one social interaction) generally enhance positive affect and restrain negative affect. The opposite appears to be true for behaviors considered to be negative, such as smoking. In fact, the positive and negative impacts on physical health for most of these behaviors are well established and it is noteworthy that their effects on positive and negative affect appear to be consistent with previous literature among other populations. Such behaviors can be targeted with a goal of enhancing positive affect and restraining negative affect in order to improve the overall mental health of individuals. Such an intervention has a far-reaching potential towards treating individuals with mood and other psychological disorders.

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Conflicts of Interest

None.

Abbreviations

EMA: ecological momentary assessment

References


2009.


