Background: Behavioral activation is a pen and paper-based therapy form for treating depression. The patient registers their activity hourly, and together with the therapist, they agree on a plan to change behavior. However, with the limited clinical personnel, and a growing patient population, new methods are needed to advance behavioral activation.

Objective: The objectives of this paper were to (1) automatically identify behavioral patterns through statistical analysis of the paper-based activity diaries, and (2) determine whether it is feasible to move the behavioral activation therapy format to a digital solution.

Methods: We collected activity diaries from seven patients with bipolar depression, covering in total 2,480 hours of self-reported activities. A pleasure score, on a 1-10 rating scale, was reported for each activity. The activities were digitalized into 6 activity categories, and statistical analyses were conducted.

Results: Across all patients, movement-related activities were associated with the highest pleasure score followed by social activities. On an individual level, through a nonparametric Wilcoxon Signed-Rank test, one patient had a statistically significant larger amount of spare time activities when feeling bad (z=–2.045, P=.041). Through a within-subject analysis of covariance, the patients were found to have a better day than the previous, if that previous day followed their diurnal rhythm (ρ=.265, P=.029). Furthermore, a second-order trend indicated that two hours of daily social activity was optimal for the patients (β2=–0.08, t (63)=–1.22, P=.23).

Conclusions: The data-driven statistical approach was able to find patterns within the behavioral traits that could assist the therapist in as well as help design future technologies for behavioral activation.