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A closer look at Avolition in Schizophrenia and Bipolar disorder: Persistence of Different Types of Activities over Time

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Abstract

Background—Avolition is associated cross-diagnostically with extensive functional impairment. Participants with schizophrenia and bipolar disorder (BD) engage in fewer productive activities than healthy controls, with more sedentary activities such as sitting. We examined the temporal variability in activities of participants with schizophrenia and bipolar disorder, focusing on persistence of activities and the likelihood of performing more than one activity at a time.

Methods—101 participants with schizophrenia and 76 participants with BD were sampled 3 times per day for 30 days utilizing Ecological Momentary Assessment surveys. Each survey queried current activities along with questions about who they were with and if they were home or away and moods. We separated activities into productive, unproductive, or passive recreational categories.

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Author contributions.

Drs. Depp, Harvey, Moore, and Pinkham designed the IA study. Ms. Juan-Martinuzzi and Dr. Harvey ran the data analyses in consultation with Dr Pinkham and wrote the first draft of the manuscript. All other authors contributed to the paper in addition to writing, including supervising collection of data.

Conflict of interest statement

Dr. Raeanne C. Moore is a co-founder of KeyWise AI, Inc. and a consultant for NeuroUX. Dr. Harvey has received consulting fees or travel reimbursements from Alkermes, Bio Excel, Boehringer Ingelheim, Intra-Cellular Therapies, Minerva Pharma, Otsuka America, Regeneron, Roche Pharma, and Sunovion Pharma. He receives royalties from the Brief Assessment of Cognition in Schizophrenia and the MATRICS Consensus Battery. He is chief scientific officer of iFunction, Inc.. Dr. Pinkham has served as a consultant for Roche Pharma. The other authors have no potential Biomedical Conflicts of Interest.

Results—Participants with schizophrenia and bipolar disorder reported one activity on most surveys, with that activity commonly being passive or unproductive. No participant reported engaging in more than one productive activity. Productive activities were more likely to occur away from home, with 17% of surveys from home reporting productive activities. All three activities were persistent, but passive and unproductive activities were more likely than productive activities to be persistent at home. Negative mood states predicted unproductive and passive activities in BD participants only.

Discussion—The low numbers of activities, combined with persistence of unproductive and passive activities highlights the impact of avolition. Most persistent activities reflected sedentary behavior. People with schizophrenia or bipolar disorder may benefit from interventions targeting leaving home more often to improve their general levels of functioning and overall health.

1.0 Introduction

Schizophrenia causes impairment in emotional, social (Bowie et al., 2010), physical (Strassnig et al., 2021a), medical (Strassnig et al., 2011) and economic (Davidson et al., 2016) aspects of life. Pharmacological treatments for schizophrenia effectively target positive symptoms, whereas cognitive deficits and negative symptoms are not responsive to current pharmacotherapy (Harvey and Keefe, 2001; Keefe et al., 2007; Strauss et al., 2021). Considering that negative symptoms are correlated with worse overall outcomes for both people with schizophrenia and their families, they merit attention and investigation (Foussias et al., 2014; Stahl et al., 2007). One of the most extensively studied of these negative symptoms, avolition, is seen not only in schizophrenia but also in bipolar disorder (Strauss et al., 2016; Strauss and Cohen, 2017; Strassnig et al., 2021b). Avolition was described creatively by Bleuler in 1950 as “the image of indifference” and by Strauss et al. (2021) as “the decrease in the motivation to initiate and perform purposeful activities”, with Strauss et al. arguing that avolition is the central symptomatic feature of negative symptoms.

Avolition in bipolar disorder has similar severity to that seen in schizophrenia, with the severity of avolition (and asociality and anhedonia) found to be considerably different from ratings of healthy people (Strauss et al., 2016; 2019). In addition, higher clinical ratings on anhedonia and greater functional impairment were found to converge with passively measured GPS information that indexed physical activity and movement away from home in both bipolar disorder and schizophrenia (Raugh et al., 2020).

Previous studies utilizing Ecological Momentary Assessment (EMA) have shown that people with schizophrenia are less likely than heathy controls to engage in productive activities (Granholm et al., 2020), being more likely to engage in unproductive activities (sleeping, smoking, “nothing”; Strassnig et al., 2021b), which is consistent with the current conceptualization of the behavioral signature of avolition. In addition, participants with schizophrenia are more likely than healthy controls to be engaged in predominantly seated activities (Strassnig et al., 2021a) and to be engaged in only a single activity since the last survey (Strassnig et al., 2021b), although participants with bipolar disorder, schizophrenia, and healthy controls in several studies seem to engage in similar amounts of passive recreation such as watching television when at home. This shift toward only one activity

is also true of people with bipolar disorder, but to a lesser extent (Strassnig et al., 2021a), as is the tendency to engage in more unproductive activities and passive recreation (watching television or listening to music) than productive activities. Further, people with both bipolar disorder and schizophrenia have been found to be home and alone for most EMA surveys, while still not engaging in productive activities that could be accomplished at home (cooking, cleaning, grooming, studying). Another finding relative to the activity streams of people with both conditions is that of no change in activities when other people are with them or not. For instance, Strassnig et al. (2021b) reported that the number of EMA surveys answered at home by participants with schizophrenia or bipolar disorder while doing only a single unproductive or passive recreation activity did not differ as a function of whether someone else was present. These findings raise the question of whether the presence of other people at home should be viewed unquestioningly as a positive or "social" stimulus.

The definition of avolition, however, suggests a persistent failure in motivation and engagement in productive or social activities. Few studies have examined the longitudinal consistency of activities of people with schizophrenia and bipolar disorder and examined the nature of the activities in which they engage, including the extent to which they are engaging in multiple concurrent activities or whether they are engaging in different types of activities across successive survey periods, which commonly span a full day. In a previous study on a different sample, we reported that participants with schizophrenia were more likely than healthy controls to be home on successive surveys, while healthy controls were more likely to be away from home on successive surveys (Parrish et al., 2020). Further, participants with schizophrenia left home more frequently than healthy controls, but also returned more rapidly from their trips away. Thus, despite leaving home more often, they were still home more of the day. That study, however, did not address whether successive surveys answered while home or away were also associated with engagement in the same or different activities and whether these activities were productive, unproductive, or passive in nature. That study also did not address the question of whether other people were present at the time of sampling and whether the presence of others was consistent across surveys.

One possible difference between avolition in schizophrenia and bipolar disorder may be the reasons for the behavioral presentation of avolition. In a previous study on an expanded (partially overlapping) sample of participants with bipolar disorder, we (Harvey et al., 2022) found that participants who reported more intense sad moods were more likely to report engaging in more unproductive and passive activities on that same survey. Momentary sad moods and the number of unproductive activities combined to predict poorer everyday functioning in social, vocational, and everyday activities as rated by independent observers. Thus, consistent with previous longitudinal studies (Judd et al.,2005), even subclinical sad moods were correlated with the momentary occurrence of behaviors consistent with the definition of avolition and concurrent disability.

In this study, we used data from an EMA study of 101 participants with schizophrenia and 76 with bipolar disorder, who were sampled up to 90 times over 30 days. We characterized the activities included in the EMAs into three distinct classes: productive, unproductive, and passive recreation based on our previously published classification strategy (Strassnig et al., 2021b). We examined the number of activities per survey, the persistence of activities

across successive surveys, and whether the presence of others was associated with activity type. In the case of surveys that reported more than one activity per survey, we examined whether the activities were from the same class or different classes and whether engaging in more than one activity was associated with the presence of others or the other type of activity. We hypothesized that participants with schizophrenia and bipolar disorder, whether alone or with others, would be more likely to be engaging in unproductive and passive recreation activities than productive activities. We also hypothesized that activities from the same classes would be reported persistently across surveys, including productive activities. We expected diagnostic differences in persistence of activities, with participants with schizophrenia showing greater persistence of unproductive activities than participants with bipolar disorder. We also predicted that being at home or away would not affect the likelihood of engaging in only one activity, but that single activities performed away from home would be more likely to be productive, such as working or attending medical appointments. Finally, in an exploratory analysis, we correlated both clinical ratings of depression and mania and EMA-derived positive and negative moods with the frequency of these three classes of activities and their persistence over time.

2.0 Methods

2.1 Participants

This study involved participants who met DSM-V criteria for schizophrenia, schizoaffective disorder, or bipolar disorder types I or II. They were recruited from The University of Miami Miller School of Medicine (UM), The University of California San Diego (UCSD), and The University of Texas at Dallas (UTD). Sites for recruitment included medical centers, public mental health clinics, local community clinics, and non-profit organizations at the three different universities. All participants provided documented consent. The IRB at each university approved the study. Diagnostic information was collected by trained interviewers using the Mini International Neuropsychiatric Interview (MINI; Sheehan et al., 1998) and the psychosis module of the Structured Clinical Interview for DSM Disorders-5 (SCID-5; First et al., 2015) and a local consensus procedure was used to generate final diagnoses. The diagnosis of this sample and other methods are explained in more detail in previous publications (Durand et al., 2021; Strassnig et al., 2021b).

2.2 Inclusion/Exclusion Criteria

Participants were required to be clinically stable for a minimum of 6 weeks, meaning no hospitalizations or extended ER visits. They were also required to be on a stable medication regimen, or no medication, for a minimum of 6 weeks with no significant (>20%) dose changes for 2 weeks. Any antipsychotic or combination thereof was accepted. For those participants with bipolar disorder, they had to have at least one mood episode recurrence or incomplete remission from a first episode, signifying a severity of stage 3 or higher according to Frank et al.'s (2014) staging model.

Participants were excluded from the study if they were not proficient in English. Other exclusion criteria were history of or current 1) medical or neurological disorders that may affect brain functioning (e.g., CNS tumors, seizures, or loss of consciousness for

over 15 minutes, 2) demonstrated history of intellectual disability (IQ < 70) or pervasive developmental disorder according to the DSM-5 criteria, 3) substance use disorder with severity level of moderate or greater not in remission for at least six months, and 4) visual or hearing impairments that interfere with assessment.

2.3. Clinical ratings of Mood Symptoms.

Participants were rated at baseline and endpoint on the Montgomery-Asberg Depression Rating scale (MADRS; Montgomery and Asberg, 1979) and the Young Mania Rating Scale (YMRS; Young et al., 1978). We present endpoint scores on these measures and relate these endpoint scores to EMA measures. Raters were trained to high levels of inter-rater reliability and generated ratings while unaware of the results of the EMA surveys.

2.4 EMA Procedures

A Samsung smartphone with Android OS was used to deliver EMA surveys. A device was provided by the investigators to participants who did not have their own smartphone or did not wish to use their own device. Participants received text messages with weblinks to EMA surveys 3 times daily for 30 days, with data instantly uploaded to a cloud-based data capture system. The signals occurred at stratified random intervals that varied from day to day within, on average, 2.0-hour windows starting at approximately 9:00AM and ending at 9:00PM each day. The first and last daily assessment times were adjusted to accommodate each participant's typical sleep and wake schedules. All responses were time-stamped and were only allowed within a 1-hour period following the signal, although participants had the option of silencing alarms for 30-minute intervals (e.g., driving, naps, classes). An in-person training session (typically <20 min) was provided on how to operate and charge the device and respond to surveys, including the meaning of all questions and response choices.

EMA activity surveys (see Table 1) were check-box questions asking about behaviors performed since the previous survey. The first question in each survey sequence asked about the participant's location (home vs. away), then whether the participant was alone or with someone. If respondents indicated that they were with someone, they were next queried as to with whom and given the choice to respond with more than one response, including friends, family members, partners, pets, healthcare providers, other known people, and unknown people. The subsequent screens were then customized to deliver home alone, home with someone, and away queries tapping potential activities within the respondent determined social context, including activities ranging from working for pay, cleaning the house, watching television, or doing "nothing". Queries were structured such that the first survey of the day queried "Today" and subsequent surveys queried "since the last survey". Participants were compensated $1.00 for each survey completed, up to a total of $90.00 and they were also compensated for baseline and endpoint assessments

2.4.1. Quality of Activities.—Some activities are clearly easy to characterize as unproductive, particularly if they were the only activity since the previous survey. As such, smoking, sitting alone, sleeping, and "nothing" were designated as unproductive. Productive activities could be performed both home and away, but home and away productive activities are not overlapping. As noted in Table 1, there are several passive recreation activities

that are sampled, with our previous analyses (Strassnig et al., 2021a) finding that their occurrence was not different across healthy people and participants with schizophrenia (e.g., watching TV). We thus separated them from clearly productive vs. clearly unproductive activities. The designations of these activities were based on discussion among the primary investigators and included feedback from previous reviewers of our EMA studies and grant proposals. Each of the three activities were converted to proportion scores at each survey, such that engaging in a single unproductive activity at a survey would be coded as 1.0 for unproductive and 0 for passive and productive. Engaging in one productive and one passive activity would be coded as .50 for those two and 0.0 for unproductive.

2.42 Mood Sampling—Questions about momentary moods were also delivered at each survey. Moods were queried in sequence, so that sadness, happiness, anxiety, and relaxation were all queried with a 1 (Completely absent)–7 (Extremely Severe) scale. In line with previous studies of negative affect, we averaged the mood reports for sadness and anxiety into a single "Negative Affect" (NA) index and the mood reports for happiness and relaxation into a "Positive Affect" (PA) index.

2.5 Data Analysis

We divided the EMA responses in several ways. First, we separated surveys into those in which there was only one activity reported and those in which more than one activity was reported. We then quantified the proportion of surveys in each group and compared them across the two diagnostic groups with chi-square tests. Second, we collated the distributions of the different classes of activities reported on all surveys for the two diagnostic groups and compared them with chi-square tests. We also examined the surveys where more than one activity was reported and examined the general classification of the second activity as compared to the first. Finally, we examined the prevalence of activities that were repeated across successive surveys during the same day using a repeated measures analysis method. To increase the power in these analyses, we identified the class of the primary activity that was reported in each survey. If surveys 1 and 2 or 2 and 3 reported activities from the same class, then this repeated occurrence was classified as persistent; the number surveys with persistent activities were compared across the diagnostic groups. These comparisons were conducted with the SPSS version 28 (IBM, 2021) Generalized linear models (GLM) software. These hierarchical analyses of persistent activities were conducted with a random subject intercept, repeated-measures effects of day, time of day, location (home vs. away), and social context (alone vs. with someone), as well as diagnosis as a between-subjects factor. Participants who did not attend both in-person assessments were excluded from the analyses and missing surveys were addressed with maximum likelihood procedures. As we previously reported (Jones et al., 2021b), the median number of surveys answered was over 80% for both groups and the 10^{th} percentile for adherence was 40% of surveys answered. A final analysis examined the correlations between clinical and EMA data on mood states and the sustained activities. To do this, we created aggregated scores for each individual across the frequency of occurrence and persistence of each of the three activity classes and used Pearson correlations to relate them to MADRS and YMRS scores at endpoint and the average scores on Positive and Negative affect derived from the EMA sampling.

3.0 Results

There were a total of 11, 564 surveys without missing data. Descriptive information on the research participants is presented in Table 2. As presented in previous publications on this sample, participants with schizophrenia were more likely to be male, members of ethnic minorities, and disabled. The only mood state variable that differed between the groups was the YMRS. At the same time, no participants with bipolar disorder had a YMRS score over 18 and 80% of the scores were in the range considered in remission from euphoric symptoms. The participants with schizophrenia answered more surveys reporting only a single activity (55%) compared to the participants with bipolar disorder (45%), $X^2(1) = 32.51$, $p<.001$. As shown in Table 3, there were differences in the frequencies of the different activities when only one activity was endorsed with bipolar disorder participants endorsing more surveys with a single productive activity, $X^2(1) = 7.28$, $p=.026$. There were no differences in the distributions of the primary activities when more than on activity was endorsed. When the distributions of the second activity were examined, there were no productive activities reported as a secondary activity. For passive and unproductive activities, participants with bipolar disorder significantly reported more passive activities and fewer unproductive activities compared to the schizophrenia participants.

3.1 HLM Modeling of Persistence of Activities Across Surveys

Table 4 presents the proportions of surveys where 2 consecutive surveys were associated with endorsement of an activity from the same general class. As can be seen in the table, approximately 80% of the surveys reflected endorsement of the same class of activity across consecutive surveys and the analyses were based on those surveys. There were significant effects of being home for all three variables and significant effects of being alone for all variables other than sustained unproductive activities. Bipolar disorder participants were home 64% of the time when responding to surveys compared to participants with schizophrenia who were home 68% of the time, $X^2(1)=17.65$, $p<.001$. Bipolar disorder participants responded to surveys while alone 40% of the time compared to 49% of the surveys for the schizophrenia participants, $X^2(1)=85.2$, $p<.001$. The omnibus effect was significant for all three analyses, as was the random subject intercept. Effects of day and time of day were not significant for any of the comparisons, but the time-of-day effect may be truncated because the first survey of the day can only be like the one after it and the last survey only like the one prior to it.

Diagnostic differences were only seen for the persistence of productive activities, with participants with bipolar disorder engaging in more sustained productive activities relative to participants with schizophrenia. There were statistically significant interactions of home × alone for all three classes of activities, which were followed up by multivariate corrected contrasts for the home and alone effects. Being away from home was associated with more sustained productive activities, as was being with other people. Being home and alone was associated with sustained passive activities. Sustained unproductive activities were more common when home and did not differ as a function of the presence of other people.

Table 5 presents the correlational results between clinical and EMA derived mood state variables and activities. For the participants with schizophrenia only one of 24

correlations was significant. For participants with bipolar disorder, higher MADRS scores were significantly correlated with fewer total productive activities and more total passive activities. MADRS scores also correlated with more sustained unproductive and passive activities. Higher average momentary scores on positive affect were correlated only with fewer sustained passive activities. Higher average momentary scores on negative mood states predicted more total unproductive and total passive activities as well as predicting more sustained unproductive and passive activities as well.

4.0 Discussion

This study analyzed the characteristics of activities in which participants with schizophrenia and bipolar disorder engage in throughout the day, using EMA surveys. As hypothesized, most surveys reported only one activity, with that activity most commonly unproductive or passive recreation. Additionally, most surveys maintained the same activity class across consecutive surveys. Although productive activities were considerably less common than passive recreation and unproductive activities, such activities were likely to be persistent across surveys when they occurred. It does appear that participants in both diagnostic groups can persist in productive activities, although they are in the minority of activities overall. Negative mood states, both clinically rated and reported over the course of the survey, appeared to relate to total and sustained unproductive and passive activities in participants with bipolar disorder, but not schizophrenia.

For those participants who reported engaging in more than one activity, the secondary activity was never from the productive category, indicating that not one of 11,564 surveys reported two productive activities in the same survey period. Passive and unproductive activities were reported in concert with each other, as primary and secondary activities, as well as in conjunction with productive primary activities. The most common type of secondary activity was passive recreation. For those participants whose activities in successive survey responses were the same, it was equally common for these to be passive and unproductive, and the total of those activities was greater for both groups than persistent productive activities. As described by Strauss et al. (2021) in their discussion of avolition, reduced motivation to engage in productive activities is a central feature and, while at home, participants engaged in very few productive activities. The definition of home-based productive activities established quite a low bar for achievement (e.g., eating), with still little engagement in these activities. The only real diagnostic differences in occurrence of activities were driven by slightly higher levels of productive activity and lower levels of unproductive activities in bipolar participants, with no differences in passive recreational activities. Passive recreation was also equally common in participants with schizophrenia and healthy controls in our previous study (Granholm et al., 2020).

There were substantial differences between activities performed at home versus away. Participants were more likely to sustain productive activities when away from home, even though there are multiple possible at-home productive activities. Work activities were endorsed on 7% of the surveys, making it the third most common activity following watching television (18%) and lying down and resting (17%) even over the course of successive surveys separated by 3 or more hours. Moreover, participants were more likely

to sustain productive activities when in the presence of others versus alone, likely because work includes the presence of other people. The frequency of unproductive activities was not significantly related to the social context of being alone or in the presence of others. These findings expand our previous report regarding single surveys, in that engagement in unproductive activities does not appear to be responsive to the presence of others as a social stimulus. Decreased social drive, a central feature of avolition, may also underlie failures to leave home to engage in activities that involve potential social contact even with unknown people like visiting a park or beach.

The co-occurrence of passive and unproductive activities suggests high levels of sedentary behaviors, which were sustained over time. This extensive amount of time engaged in sedentary behaviors appears to be consistent with developments in our society in general wherein that people generally move less and sit more (Owen et al., 2010). The implications of these findings, including higher risk of obesity (Correll et al., 2017), hypertension, and all-cause mortality amongst others, is that the consequences of sedentary behaviors can contribute to the already low level of motivation that participants with schizophrenia experience. We previously showed in a different sample of participants with schizophrenia and bipolar disorder that indicators of poor physical fitness, including waist circumference, the ability to rise from a chair, and body mass index predicted unemployment (Strassnig et al., 2017). Further, these indicators of poor fitness were more strongly correlated with poor everyday functioning than the more commonly understood predictors such as cognition and clinically rated negative symptoms (Strassnig et al., 2018). Thus, sedentary behavior can have a direct impact on everyday disability, meaning that avolition may have multiple impacts on functioning.

In a previous publication on an expanded sample of participants with bipolar disorder (n=91, including these 76), we (Harvey et al.,2022) reported that momentary sad moods assessed with EMA were related to the likelihood of concurrent engagement in unproductive behaviors. In this study, we find that momentary NA and clinical ratings of depression correlate both with total scores and sustained occurrences of unproductive and passive activities. These data suggest that negative moods may underlie both the momentary occurrence of the defining behaviors subsumed within the avolition construct and their persistence over time. The lack of similar correlations in participants with schizophrenia may be due in part to difficulties in the identification and reporting of negative mood states. In this sample, 18% of the participants with schizophrenia never answered a single mood state survey with a sadness intensity score of greater than 1 (Jones et al., 2021), leading to considerably less variation in NA than seen in the participants with bipolar disorder.

One of the limitations of this study is the 1-hour time window allowed for participants to respond to the survey. With a longer time period allowed for a response, it seems like that we would capturing more co-occurring activities, although this would not affect detection of sustained activities. However, some studies have used EMA response windows of 15 minutes (Strassnig et al., 2021a). Our one-hour window suggests more diversity of activities than that captured with the shorter window (Strassnig et al., 2021a:sitting 32%; watching television 40%; Current paper: sitting: 6%, Television: 18%). Additionally, it could be argued that surveys that were received while a participant was busy performing

a productive activity, such as working, may have gone unanswered. As we previously reported, however, there was no difference in the likelihood of nonresponse to a survey if the previous survey was answered at home or away (Durand et al., 2021). As we are detecting persistent productive activities largely outside the home, the home vs. away issue may be less significant that it first might appear. A limitation of many studies such as this one is the bias towards recruitment of participants who are unemployed or not engaging in full-time productive activities, thus creating a study population which is more unproductive at baseline. Further, this study did not have a healthy control group. However, previous studies that did include a control group showed very similar EMA results in certain domains compared to participants with schizophrenia (Granholm et al., 2020) and healthy controls in the Granholm et al. study generated NA ratings that were too low to correlate meaningfully with any other outcomes.

5.0 Conclusions

In congruence with previous literature regarding avolition in people with schizophrenia or bipolar disorder, participants were more likely to be at home engaging in a single unproductive activity with little variability in their activities throughout the day. Further, for those participants who reported more than one activity in a single survey, the co-occurring activities were likely to be from the same category (unproductive or passive recreation). Being away from home or in the presence of others increased the likelihood of sustained productive activities. Negative emotional states were related to unproductive and passive activities in participants with bipolar disorder, but not schizophrenia. These findings suggest that people with schizophrenia or bipolar disorder could benefit from increased social interactions and leaving the home in terms of their productivity and associated health outcomes. The present study again demonstrates the feasibility and usability of EMAs in people with schizophrenia or bipolar disorder (Wright et al., 2021). EMAs may be utilized as therapeutic interventions (Hanssen et al., 2020), with surveys including reminders or encouragements to change activities.

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Table 1.

EMA Sampled Activities and Their Overall Frequency

(34 Total Activities Sampled)			
Unproductive Activities	**% of Total Surveys**	**Passive Recreation**	**% of Total Surveys**
Sit alone	6.2	Watching Television	18.8
Lie down and rest	16.6	Listening to Music	2.8
Nothing	4.9	Social Media	1.8
Smoking	4.1	Reading (not schoolwork)	1.8
Total	**31.8**	Other Nonphysical Leisure	1.2
Productive Activities		**Total**	**26.4**
Home based			
Eating or Drinking	5.6		
Cooking	4.4		
Cleaning the House	2.5		
Grooming	2.3		
Doing Laundry at Home	1.3		
Changing Clothes	1.1		
Meditating	0.6		
Working on a Hobby	0.2		
Paying Bills with computer	0.3		
Shopping Online	0.2		
Gardening	0.1		
Total	**17.6**		
Away from Home			
Working/Looking for Work	6.9		
Eating Out	4.6		
Transportation	3.7		
Shopping	2.6		
Exercising	2.1		
Visiting Family	1.5		
Volunteer Work	1.4		
School/School Work	1.3		
Therapeutic Activities	0.8		
Movie, Theater	0.8		
Religious	0.7		
Social Activity	0.6		
Beach/park	0.3		
Doing Laundry Away	0.2		
Total	**24.2**		

Table 2.

Descriptive and Demographic Information on Participants

	Schizophrenia n=102		Bipolar disorder n=71			
	M	**SD**	**M**	**SD**	**t**	**p**
Age	41.98	10.44	39.22	11.75	1.63	.11
Years of Education	12.53	2.32	14.22	2.64	4.42	<.001
Mothers Education	13.05	3.54	13.67	3.67	1.81	.069
WRAT-3- Standard Score	95.42	11.85	102.13	11.70	3.67	<.001
Montgomery-Asberg Depression Rating Scale	10.38	10.93	13.28	11.07	1.65	.10
Young Mania Rating Scale	0.98	3.27	3.09	4.85	3.48	<.001
Positive Affect Mean	4.24	1.26	3.95	1.10	1.41	.16
Negative Affect Mean	2.78	1.32	3.12	1.33	1.67	.097
					X^2	**p**
Sex (% Female)	48		69		8.22	.004
Racial Status (%)						
Caucasian	32		53		15.27	.009
African American	54		25			
Asian	2		3			
Native American, Hawaiian, Alaskan	1		1			
Other, Multiple, Unknown	11		12			
Ethnic Status						
Hispanic	24		29		0.64	.42
Non-Hispanic	76					
Ever Married or Equivalent (%)	49		70		7.14	.007
Financially Responsible (%)	71		70		0.02	.88
Unemployed for More than one Year (%)	60		45		2.74	.10

Table 3.

Activities Endorsed by Diagnosis

Single Activity			
	Unproductive	**Passive**	**Productive**
Bipolar disorder	32%	22%	46%
Schizophrenia	34%	24%	42%. X^2=7.28, p=.026
Multiple Activities: Primary Activity			
	Unproductive	**Passive**	**Productive**
Bipolar disorder	26%	26%	46%
Schizophrenia	26%	28%	46%. X^2=1.83, p=.40
Activity 2			
	Unproductive	**Passive**	
bipolar disorder	40%	60%	
schizophrenia	45%	55% X^2=6.14, p=.012	
Primary Activity	**Secondary Activity**		
	Unproductive	**Passive**	
Productive	23%	77%	
Unproductive	21%	79%	
Passive	19%	81%. X^2(2)=748.77, p<.001	

Table 4.

Percentage of Surveys Where the Primary EMA Reported Activity was from the Same Activity Class as the Survey Immediately Before or After

	Productive	Unproductive	Passive	Total
Bipolar disorder	39%	22%	22%	83%
Schizophrenia	34%	23%	22%	81%

	Productive			Unproductive			Passive		
	X^2	(DF)	p	X^2	(DF)	p	X^2	(DF)	p
Omnibus	715.8	(35)	<.001	351.2	(35)	<.001	256.9	(35)	<.001
Intercept	10490.0	(1)	<.001	3568.4	(1)	<.001	2487.7	(1)	<.001
Diagnosis	43.7	(1)	<.001	3.70	(1)	.061	0.0	(1)	.999
Day	41.9	(29)	.058	39.7	(29)	.088	40.0	(1)	.08
Time	4.31	(2)	.061	1.9	(2)	.38	2.25	(2)	.33
Home	507.5	(1)	<.001	182.4	(1)	<.001	113.3	(1)	<.001
Alone	10.5	(1)	<.001	0.9	(1)	.34	9.1	(1)	.003
Home × Alone	3.9	(1)	.049	32.2	(1)	<.001	8.3	(1)	.004
Group Contrasts for Significant effects and Interactions									
Sustained Productive:				Sustained Unproductive			Sustained passive		
Away> Home		p<.001		Home>Away, p<.001			Home>Away, p<.001		
Not Alone> Alone		p<.001					Alone>Not alone, p<.001		

Table 5.

Correlations of Clinically Rated and EMA reported Mood State Variables with EMA reported Activities

Schizophrenia						
	Productive Total	**Unproductive Total**	**Passive Total**	**Productive Sustained**	**Unproductive Sustained**	**Passive Sustained**
MADRS	.01	.07	−.09	−.02	.14	−.03
YMRS	.11	−.18	.07	.14	−.19	.06
PA	.02	−.20	.27**	−.03	−.19	.03
NA	.04	−.03	.03	.00	.02	.12
Bipolar disorder						
	Productive Total	**Unproductive Total**	**Passive Total**	**Productive Sustained**	**Unproductive Sustained**	**Passive Sustained**
MADRS	−.28*	.09	.24*	−.20	.27*	.26*
YMRS	.03	−.10	−.14	.11	.10	−.10
PA	.10	.04	−.16	.09	.04	−.24*
NA	−.14	.28*	.29*	−.10	.31**	.28*

*: p<.05

**: p<.01

Note.

MADRS: Montgomery Asberg Depression Rating Scale

YMRS: Young Mania Rating Scale

PA: Mean Score on EMA Ratings of Positive Affect

NA: Mean Score on EMA Ratings of Negative Affect