

Diagnosis moderates the association between depression and digital communications in BPD, BD & HC

Identifying digital communication markers of depression in borderline personality disorder, bipolar disorder and healthy control populations

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BACKGROUND

Digital phenotyping offers the potential to recognise early signs of mental health crises and predict episode course using digital data from patients' naturalistic environments¹⁻⁴. Objective digital communication metrics (phone call and SMS use) may represent novel biomarkers of mood in BD and BPD⁵⁻⁷.

AIMS

To explore the association between self-reported mood symptoms and use of digital communications in Borderline Personality Disorder (BPD), Bipolar Disorder (BD) and Healthy Control (HC) subjects.

METHODS

BPD (n= 17), BD (n=17) and HC (n= 21) participants enrolled in the AMoSS study⁸ used a smartphone application which monitored phone call and SMS messaging frequency, duration and length, alongside weekly mood (Quick Inventory of Depressive Symptomatology)⁹ (Table 1). Linear mixed-effects regression models were used to assess the association between digital communications and mood symptoms and episodes.

REFERENCES & DISCLOSURES

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RESULTS

Transdiagnostically, depressive symptoms were associated with increased cumulative incoming call duration (seconds; B=24.42, p<0.01) (Table 2). In BD, depressive episodes were further associated with decreased cumulative total call duration (seconds; B=-1598.62, p<0.01), cumulative outgoing call duration (seconds; B=-875.95, p=0.01), total SMS frequency (B=-28.78, p<0.01), outgoing SMS frequency (B=-12.42, p<0.01) and cumulative total SMS length (characters; B=-1463.73, p=0.02) (Figure 1, Table 3). However, these associations were not identified in BPD participants (p>0.05).

CONCLUSIONS

The association between self-reported depression and communications appears to be moderated by diagnosis. In particular, BPD participants appear to generally maintain digital communications when depressed, compared to BD participants. These results may inform our understanding of differential psychopathologies in BD and BPD patients. Future work could assess the association between trait-impulsivity, anxiety and manic symptoms and digital communications. Together, this may facilitate the development of digital tools which aid clinical diagnosis, remotely monitor patients' symptoms in their naturalistic environments and identify more targeted treatments¹⁰.

Table 1: Participant characteristics & self-reported mood by diagnostic category

		HC	BD	BPD	Total
Participant Details	Participants, n	21	17	17	55
	Age, mean (SD)	42.38 (11.71)	42.24 (14.24)	38 (11.39)	40.98 (12.38)
	Male gender, % (n)	28.57% (6)	41.18% (7)	5.88% (1)	25.45% (14)
	Weeks in study, median (IQR)	23 (26)	19 (19)	21 (22)	21 (24.5)
Mood details	Aggregate weeks in study, n	642	456	401	1499
	Euthymic weeks, n (%)	540 (84.11%)	279 (61.18%)	64 (15.96%)	883 (58.91%)
	Depressed weeks, n (%)	99 (15.42%)	90 (19.74%)	308 (76.81%)	497 (33.16%)
	Manic or mixed weeks, n (%)	3 (0.47%)	87 (19.08%)	29 (7.23%)	119 (7.94%)
	QIDS, median (IQR)	2 (5)	4 (7)	15 (8)	5 (10)

Table 2: Transdiagnostic association between depressive symptoms & communications

	Coefficient	S.E.	p value
Cumulative total call duration	15.569	16.250	0.338
Cumulative incoming call duration	24.417	8.936	0.006 **
Cumulative outgoing call duration	-8.635	10.920	0.429
Cumulative total SMS length	6.09	22.52	0.787
Cumulative outgoing SMS length	-0.992	12.720	0.938

Mixed-effects analyses adjusted by age. The coefficient represents the amount (frequency of calls/messages, seconds of call or number of characters) by which a communications variable changes when depressive symptoms (QIDS) are increased by one unit. Frequency & cumulative duration/length is summed across the 7 days prior to a mood assessment.

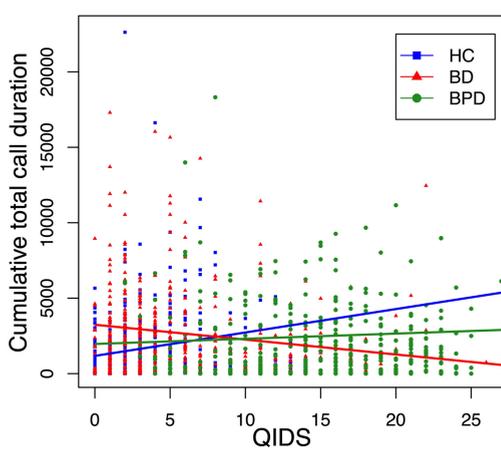


Figure 1: Relationship between depressive symptoms and cumulative total call duration, by diagnostic group

Regression lines adjusted for age only; presented here for an age of 41 years (mean age of cohort). Depressive symptoms measured by raw QIDS score, cumulative total call duration is summed across the 7 days prior to a completed mood assessment.

Table 3: Diagnosis-specific relationships between depressive state & communications

	Coefficient	S.E.	p value
Cumulative total call duration			
BD x Depression	-1598.620	464.923	0.001 ***
BPD x Depression	59.514	418.485	0.887
Cumulative outgoing call duration			
BD x Depression	-875.947	320.467	0.006 **
BPD x Depression	162.283	288.689	0.574
Total SMS frequency			
BD x Depression	-28.781	7.180	<0.001 ***
BPD x Depression	1.476	6.405	0.818
Outgoing SMS frequency			
BD x Depression	-12.424	3.667	0.001 ***
BPD x Depression	-0.074	3.271	0.982
Cumulative total SMS length			
BD x Depression	-1463.73	632.69	0.021 *
BPD x Depression	286.06	564.47	0.612

Mixed-effects analyses adjusted by age, diagnosis, mood state (depressed vs euthymic), and interaction between diagnosis and mood state. Interaction coefficients are presented here, representing the amount by which a communications variable changes when a participant in either diagnostic group becomes depressed. HC used as dummy coding reference level.

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