

The Functionality, Evidence and Privacy Issues around Smartphone Apps for the Top Neuropsychiatric Conditions: A Comprehensive Study

Supplemental Document:

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Table S1: Defining Composite Table Terms

Term in Table	Definition
Condition	Which condition is the app targeting
Number of downloads	How many downloads? Based on number reported for the app in the Google Play Store only, as the Apple App Store did not include such information
Clinically customizable	Can the user add things like symptoms, medications, which activities they want to participate in, add an emotions/rational beliefs list for example, adjust the frequency of the tone or the voice/background music for music as intervention apps, etc
Self-help/public	Is the app designed to be used by the public/ person directly experiencing the neuropsychiatric condition in question
Part of care with clinician	Can the user connect with health professional through the app
Online coaching	Can work with online counselor/coach directly through the app, or speak with an AI bot to talk through problems
Intervention	Functions to help patient address/alleviate their problem (meditation/mindfulness for anxiety and depression, or memory games for Alzheimer's patients for example)
Intervention evidence-based	Has the app and the intervention it explicitly delivers shown to be effective amongst app users (using research methods)
Username/password	Does the app provide some kind of username and/or password for the user
Payment	Do you have to pay anything (initial app purchase, subscription/for additional features) to acquire or gain full functioning of the app and all of its features
Rewards behavior change	Can user level up for instance, receive badges for completing tasks, keeping a streak, receiving encouragement from the app for completing tasks
Privacy Policy	Is there a privacy policy present on the app store/in the app itself, or on the app website

Time to evaluate

How long did it take reviewer to evaluate the app? If app was reviewed for both operating systems, an average of this time was taken

Table S2: Defining App Features/Function Terms

Term	Definition
Tracking	Does the app have some kind of diary capacity that enables user to track/monitor their symptoms, moods, medications, etc
Generates Data Report	Is there a data report generated that displays a summary of user activity/data (graphically, or in table format for instance)
Education	Does the app offer some kind of educational information (related to the condition, the intervention provided) in the form of text or recording
Displays user entered information	Displays journal entries, passed scores, survey results, log of conversation with coach/AI bot, user input data
Data export/download	Does the user have the ability to download and export the data generated using the app
Provides guidance	Does the app guide the user to do certain activities or exercises within the app based on information users previously input in the app (for example: if user reports experiencing anxiety, does the app request the user to take deep breaths)
Intercommunicability	Does app have the ability to share information/link with other apps (for example: can you email someone through Gmail or access Facebook directly through the app?). Can you share the app data or achievements directly to another app
Social network	Can you develop an internal network with other users on the app through forums, chats, groups
Organization support/endorsement	Does the app have support listed in the app itself, on the app store, or on the app website suggesting endorsement/affiliation/support from other companies

Table S3: App Details for Stroke Apps

App Name	Developer	Operating System	Number of Downloads*	Number of Ratings, Average Rating	Cost to Purchase	Date Reviewed	Search Result Number in Store(s)
Language Therapy Lite	Tactus Therapy Solutions Ltd	iOS	N/A	17; 4.1	Free	8/23/18	1
Constant Therapy	Constant Therapy	Android, iOS	10,000	205, 97; 4.1, 4.3	Free	8/27/18; 8/23/18	5; 2
Category Therapy Lite	Tactus Therapy Solutions Ltd	Android, iOS	1,000	6, 0; 4.8, N/A	Free	8/27/18; 8/23/18	16; 8
Orienteer	Reflex Pain Management Ltd	Android	6,000	71; 4.7	Free	8/27/18	9
Visual Attention Therapy Lite - Cognitive Training	Tactus Therapy Solutions Ltd	Android, iOS	5,000	9, 0; 3.1, N/A	Free	8/27/18; 8/23/18	21; 11
Advanced Naming Therapy Lite	Tactus Therapy Solutions Ltd	iOS	N/A	0, N/A	Free	9/2/18	18
Advanced Reading Therapy Lite	Tactus Therapy Solutions Ltd	iOS	N/A	0, N/A	Free	9/2/18	24
Think Therapy	Think Therapy	Android	100	3, 4.3	Free	8/27/18	43

*Number of Downloads data was reported for Android apps only. Apps evaluated on both the Android and iOS platforms have their ratings, date reviewed, and search number result in their respective stores listed with Android data first and iOS data second.

Table S4: App Details for Migraine Apps

App Name	Developer	Operating System	Number of Downloads*	Number of Ratings, Average Rating	Cost to Purchase	Date Reviewed	Search Result Number in Store(s)
Migraine Buddy	Healint	Android, iOS	500,000	18,000, 8,580; 4.7, 4.7	Free	7/30/18	1; 1
Migraine Monitor	Health Monitor Network/Data Centrum Communications Inc.	Android, iOS	5,000	60, 18; 4.2, 3.9	Free	7/30/18; 8/10/18	2; 8
Migraine eDiary	Pifzer	Android, iOS	5,000	20, 6; 3.9, 3	Free	8/2/18; 8/2/18	9; 2
App Name	Developer	Operating System	Number of Downloads*	Number of Ratings, Average Rating	Cost to Purchase	Date Reviewed	Search Result Number in Store(s)
Migraine	Schmerzlinik Kiel GmbH & Co KG	iOS	N/A	0, N/A	Free	8/2/18	3
Migraine Relief Hypnosis	Surf City Apps	Android, iOS	10,000	139, 21; 4.2, 4.2	Free	7/31/18, 8/2/18	3; 5
Migraine Headache Diary - Headapp Lite	m3 Technology Srl	Android	10,000	409; 4.5	Free	7/31/18	4
Migraine Headache Relief Music	Rehegoo	Android, iOS	10,000	62, 2; 4, N/A	Free	7/31/18; 8/11/18	6; 26
Migraine Alert	Second Opinion Health Inc	iOS	N/A	5; 5	1.99	8/10/18	6
Acupressure Against Migraine	Dr. J Bargak	Android	5,000	40; 4	Free	7/31/18	7
Migraine Diary 2	cellHigh	iOS	N/A	0; N/A	4.99	8/10/18	9
iMigraine Tracker	Soft Archtechnologies AS	Android	1,000	39; 3.8	Free	8/2/18	10
Migraine Insight: Tracker	Shiny New App	iOS	N/A	12; 5	Free	8/10/18	11

Music to Beat Migraine	Times Music	Android	10,000	118; 3.5	Free	8/2/18	11
Headache Log	AR Products Inc	Android	10,000	479; 4.3	Free	8/11/18	11
My Migraine Triggers	GSK	Android	10,000	152; 3.6	Free	8/2/18	12
Curable	Curable Inc	Android	5,000	65; 4.3	Free	8/11/18	12
Migraine Diary	Steveloper	Android	5,000	11; 3.4	Free	8/8/18	12
Get Migraine Free! Headache and Migraine Relief by Hypnosis	Get on Apps!	iOS	N/A	0; N/A	1.99	8/10/18	13
My Ocular Migraine Journal	Digging up Logic	Android	500	3; 5	Free	8/8/18	13
MigraineMind Migraine Diary	Haptic Software Inc	iOS	N/A	0; N/A	2.99	8/10/18	15
App Name	Developer	Operating System	Number of Downloads*	Number of Ratings, Average Rating	Cost to Purchase	Date Reviewed	Search Result Number in Store(s)
Migraine Log	Jim Corbo	iOS	N/A	0; N/A	0.99	8/11/18	17
Migraine Diary	AppsByDocs	iOS	N/A	0; N/A	Free	8/11/18	19
MigCalendar-Migraine Diary	MedyCal	Android	100	2; 3.5	Free	8/11/18	19
Migraine-Triggers and Diary	Stefan Roobol	iOS	N/A	0, N/A	0.99	8/11/18	20
Migraine and Headache Diary	Samantha Roobol	iOS	N/A	0, N/A	Free	8/11/18	24

*Number of Downloads data was reported for Android apps only. Apps evaluated on both the Android and iOS platforms have their ratings, date reviewed, and search number result in their respective stores listed with Android data first and iOS data second.

Table S5: App Details for Depression-specific Apps

App Name	Developer	Operating System	Number of Downloads*	Number of Ratings, Average Rating	Cost to Purchase	Date Reviewed	Search Result Number in Store(s)
Mood Tools - Depression Aid	Moodtools	Android	100,000	2,803; 4.3	Free	8/6/18	4
Depression CBT Self Help Guide	Excel at Life	Android	100,000	1396; 4.2	Free	8/6/18	5
Fight Depression Naturally	Tipsbook	Android	50,000	311; 4.6	Free	8/6/18	7
Mindfulness for Depression	Mindfulness Today	Android	5,000	11; 4.2	Free	8/12/18	15
Depression Cure Music	S&R Jossan	Android	50,000	480; 4.4	Free	8/12/18	18
MoodSpace	Boundless	Android	50,000	522; 4.5	Free	8/13/18	26
GGDE Beat & Prevent Depression	Samuramu	iOS	N/A	0, N/A	Free	8/13/18	34

*Number of Downloads data was reported for Android apps only.

Table S6: App Details for Alzheimer’s Apps

App Name	Developer	Operating System	Number of Downloads*	Number of Ratings, Average Rating	Cost to Purchase	Date Reviewed	Search Result Number in Store(s)
Alzheimer's Speed of Processing Game - ASPEN	The Happy Steps	Android	1,000	15; 4.3	Free	8/13/18	4
Alzheimer's Life Therapy	Alzheimer's Light	iOS	N/A	23; 5	Free	8/15/18	6
Alzheimer's Manager	@Point of Care	iOS	N/A	0; N/A	Free	8/15/18	10
Alzheimer's VR	Alzheimer's	Android	100	3; 5	Free	7/23/18	10
MindMate- Healthy Aging	MindMate LTD	iOS	N/A	281; 4.7	Free	8/15/18	19
Vital Tones Alzheimer	Vital Tones LLC	Android	100	1; 5	Free	8/14/18	22
CogFit Brain Test & Training	CogniFit	iOS	N/A	109; 4.2	Free	8/15/18	34
Brainy App 2.0	Alzheimer's Australia	Android	5,000	12; 2.8	Free	8/14/18	38

*Number of Downloads data was reported for Android apps only.

Table S7: App Details for Anxiety-specific Apps

App Name	Developer	Operating System	Number of Downloads*	Number of Ratings, Average Rating	Cost to Purchase	Date Reviewed	Search Result Number in Store(s)
Headspace: Meditation	Headspace Inc	Android, iOS	10 million	78,360, 314,000; 4.6, 4.9	Free	8/18/18; 8/16/18	14; 2
Dare - Break Free From Anxiety	BMD Publishing	Android	50,000	785; 4.7	Free	8/16/18	2
Self-help for Anxiety Management	University of the West of England	iOS	N/A	31; 3.9	Free	8/16/18	3
Rootd- Panic Attack and Anxiety Relief	Simply Rooted Media	Android	10,000	186; 4.1	Free	8/17/18	5
Calm	Calm.com	Android, iOS	5 million	114,590, 151,000; 4.6, 4.8	Free	8/28/18; 8/16/18	8; 6
Stop Panic and Anxiety Self Help	Excel at Life	Android	100,000	2,234; 4.4	Free	8/17/18	9
App Name	Developer	Operating System	Number of Downloads*	Number of Ratings, Average Rating	Cost to Purchase	Date Reviewed	Search Result Number in Store(s)
FearTools-Anxiety Aid	Moodtools	Android	10,000	67, 4.6	Free	8/18/18	11
Aura: Calm, Anxiety & Sleep	Aura Health inc.	iOS	N/A	5,640; 4.8	Free	8/16/18	13
Anxiety	AppCounselor	Android	1,000	26; 4.0	0.99	8/18/18	16
Stop, Breathe & Think	Stop, Breathe & Think	iOS	N/A	6,190; 4.8	Free	8/16/18	22
Relax Melodies: Sleep Sounds	Ipnos Software, Inc.	iOS	N/A	84,700; 4.8	Free	9/2/18	23
Insight Timer- Meditation App	Insight Network Inc.	iOS	N/A	63,600; 4.9	Free	9/2/18	26
Breathe- Meditation & Music,	OMG. I Can Meditate! Inc.	iOS	N/A	9,100; 4.8	Free	9/2/18	27
Anxiety Relief- Help with Panic Attacks, Stress	Tom MacKay	iOS	N/A	0; N/A	2.99	9/2/18	33

*Number of Downloads data was reported for Android apps only. Apps evaluated on both the Android and iOS platforms have their ratings, date reviewed, and search number result in their respective stores listed with Android data first and iOS data second.

Table S8: App Details for Apps Targeting Anxiety and Depression

App Name	Developer	Operating System	Number of Downloads*	Number of Ratings, Average Rating	Cost to Purchase	Date Reviewed	Search Result Number in Store(s)
Moodpath: Depression & Anxiety	MoodPath	Android, iOS	100,000	6,024, 3,110; 4.5, 4.7	Free	8/4/18; 8/19/18	2; 1
Youper	Youper Inc	Android, iOS	50,000	2,763, 574; 4.7, 4.9	Free	8/17/18; 8/11/18	1; 3
Pacifica - Stress & Anxiety	Pacific Labs, Inc	Android, iOS	500,000	10,307, 1,370; 4.4, 4.7	Free	8/11/18; 8/11/18	9; 5
7 Cups: Anxiety & Stress Chat	7 Cups of Tea	Android, iOS	500,000	13,868, 485, 4.2, 4.2	Free	8/12/18; 8/13/18	25; 6
What's up? Mental Health App	Jackson Tempra	Android, iOS	100,000	2,871, 82, 4.4, 4.6	Free	8/12/18; 8/11/18	17; 14
App Name	Developer	Operating System	Number of Downloads*	Number of Ratings, Average Rating	Cost to Purchase	Date Reviewed	Search Result Number in Store(s)
Betterhelp Counseling and Therapy	Betterhelp	Android, iOS	100,000	3,337, 1,630; 3.9, 4.4	Free	8/16/18; 8/11/18	1; 15
Wysa - AI Therapy	Touchkin	Android	100,00	7,336; 4.5	Free	8/6/18	3
Happify: for Stress & Worry	Happify Inc	iOS	N/A	1,069; 4.5	Free	8/13/18	4
Talkspace Online Therapy	Groop Internet Platform Inc	iOS	N/A	2,450; 4.2	Free	8/11/18	7
Relieve Depression Hypnosis: Mood and Anxiety Help/	Surf City Apps	Android, iOS	50,000	317, 39; 4.0, 4.2	Free	8/6/18; 8/11/18	8; 8
Innerhour - Self Help for Anxiety & Depression	Innerhour	Android	100,000	312; 4.1	Free	8/7/18	9
Mood Triggers	Mood Triggers	Android	10,000	360; 3.9	Free	8/8/18	11
Anxietyhelper	Amanda Southworth	iOS	N/A	70; 4.3	Free	8/13/18	21
SuperBetter	SuperBetter, LLC	iOS	N/A	2,780; 4.7	Free	8/13/18	24
Stigma:Mood Tracker & Journal	Stigma Inc	iOS	N/A	237; 4.1	Free	8/13/18	28

Mood App-Journal	Young Human LLC	iOS	N/A	274; 4.5	Free	8/13/18	29
eMoods Bipolar Mood Tracker	Yottaram, LLC	iOS	N/A	671; 4.8	Free	8/13/18	30
End Anxiety Hypnosis-Stress, Panic Attack Relief	Surf City Apps	Android, iOS	100,000	1,1128, 231; 4.2, 4.6	Free	8/17/18; 8/16/18	6; 10
Hypnosis for Anxiety, Stress Relief, & Depression	Pitashi Mobile Imagination	Android	50,000	250; 4.5	Free	8/18/18	12
Anxiety Tracker - Stress and Anxiety Log	Appstronaut Studios	Android	5,000	40; 3.8	Free	8/18/18	13
Abide - Christian Meditation	Carpenters Code Inc	iOS	N/A	14,000; 4.8	Free	9/2/18	25

*Number of Downloads data was reported for Android apps only. Apps evaluated on both the Android and iOS platforms have their ratings, date reviewed, and search number result in their respective stores listed with Android data first and iOS data second.