RAINS Port Macquarie 2017

Anxiety & MRI

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• **Anxiety** = tense unsettling anticipation of a threatening but vague event or situation, apprehensive state (autonomic nervous system), future orientated mood state (internal)

Fear and anxiety, undistinguishable or distinct phenomena?

• **Fear** = intense stimulus reaction (autonomic nervous system), elevated state of arousal, present orientated mood state (external)

• **Panic** = a sudden onset episode of intense fear, bordering on terror that disturbs bodily sensations and reasoning (catastrophic)

• **Specific phobias** = intense, irrational/excessive fear of an object or situation, which is disproportionate to the actual danger involved, leading to avoidance of that object or situation

Rachman, 2004
National Survey of Mental Health & Wellbeing (NSMHWB, 2007):

- 1 in 5 Australians experienced one or more common mental health disorders during the last 12 months
- Estimated 14% of population have anxiety disorders
- Anxiety & depression described as “high-prevalence disorders”
Anxiety Disorders

- Social Anxiety Disorder
- Generalised Anxiety Disorder
- Post Traumatic Stress Disorder
- Obsessive Compulsive Disorder
- Panic Disorder with/without agoraphobia

Specific Phobia

Phobias

Agoraphobia

Social Phobias

“OK, Mrs. Dunn. We’ll slide you in there, scan your brain, and see if we can find out why you’ve been having these spells of claustrophobia.”
F40.2 Specific (isolated) phobias

Phobias restricted to highly specific situations such as proximity to particular animals, heights, thunder, darkness, flying, closed spaces, urinating or defecating in public toilets, eating certain foods, dentistry, or the sight of blood or injury. Though the triggering situation is discrete, contact with it can evoke panic as in agoraphobia or social phobia.

Acrophobia
Animal phobias
Claustrophobia
Simple phobia

• Fear is marked and persistent
• Stimulus exposure invariably provokes immediate anxiety
• Individual can recognise the excessiveness of their fear
• Stimulus avoided or endured with dread
• Safety behaviour of avoidance is often so effective that daily life or functioning is only minimally disrupted
Aetiology of Specific Phobias

• Biological:
  – Neuronal circuitry; overactive “fear” circuitry (amygdala)
  – Neurotransmitters; altered functioning/dysregulation of serotonin, GABA, norepinephrine

• Genetic: twins studies suggest heritability for phobias, GAD, PTSD and panic disorder

• Sociology:
  – Stressful life events as triggers for biological/psychological vulnerabilities
  – Familial & interpersonal stressors
  – Modernism & Reflexive Modernism, Individualism, Social Exclusion, “anxiety and depression epidemic”

• Psychology theories: anxiety displacement (psychodynamic), low self esteem or unresolved conflicts (psychoanalytical) and conditioning

• Behavioural: conditioning, modeling, trauma, prepared learning/evolution

Psychoanalytic - Freud, 1909
Behavioural - Watson, 1920
Cognitive - DiNardo et al, 1988
Biomedical/genetic - Ost, 1992
behavioural

Aetiology...
Risk factors...
Presentation...
Maintenance...
Management...
Intervention...

cognitive

emotion/mood

physiological

Threat / Danger
Schematic view of major brain circuits involved in fear and anxiety.

**External stimuli**
- Sensory and association cortices
- Entorhinal cortex
- Hippocampus/Ventral subiculum

**Visceral afferents**
- NTS
- ANS

**Sympathetic activation**
- Tachycardia, increased BP
- LH
- PVN

**Parasympathetic activation**
- Urination, defecation, bradycardia
- DMN/NA

**Neuroendocrine stress response**
- Glucocorticoids
- ACTH
- CRF

**Contextual information**
- Sensory information
- Cognitive modulation
- Extinction (learned responses)

**Amygdala**
- BLA
- CeA

**Hypothalamus**
- LH
- PVN

**PFC**
- Thalamus

**LC**
- PAG
- PBN
- RPC

**BNST**
- GABA

**CRF**
Biological contributions to Anxiety & Panic

• Diathesis-Stress
  – Inherit vulnerabilities for anxiety and panic, not anxiety disorders
  – Stress and life circumstances activate the underlying vulnerability

• Biological Causes and Inherent Vulnerabilities
  – Anxiety and brain circuits – GABA
  – Corticotropin releasing factor (CRF) and HYPAC axis
  – Limbic (amygdala) and the septal-hippocampal systems
  – Behavioral inhibition (BIS) and fight/flight (FF) systems
Cognitive Pathway for Anxiety

Anxiety Symptoms
‘Fight or Flight’ Response

DANGER/THREAT APPRAISALS

“Explicit & Implicit Memory Bias”

‘Probability’ & ‘Cost’

“Judgmental Bias”
“Misinterpretation”

Safety Behaviours
Avoidance
Escape
Neutralising

“Avoidance Behaviours”

Anxiety/Fear & Apprehension

Hypervigilance for Danger
‘Scanning for threat’
Look for ‘confirming evidence’

“Attentional Bias”

Phobia Maintenance
linked to Beck’s Schema Theory (1976)
Of cognitive bias
A model of “specific phobia development” (Antony & Barlow, 2002)

**Generalized biological vulnerability**
Includes heritable tendency to be “prepared” to associate fear with objects or situations that have been dangerous to the human species (e.g., heights, snakes, spiders), and low threshold for specific defensive reactions (e.g., alarms: tendency to faint at sight of blood) (vasovagal response)

**Stress due to life events**

**False alarm**
Associated with specific object or situation

**Direct experience**

**Vicarious experience**

**Specific psychological vulnerability**
A specific object or situation is dangerous

**Generalized psychological vulnerability**
To develop anxious apprehension focused on future contact with phobic object or system

**Learned alarm**

**True alarm**

**Specific phobia**
Berlin, 1872, Carl Otto Westphal; new syndrome “agoraphobie” (foundation of “Platzangst” or “spatial fear”)

Paris, 1879, Benjamin Ball; proposed new neurosis, “claustrophobia”

New York, 1880, George Beard; “neurasthenia” & “topophobia”

Vienna, 1896-1909, Freud; birth trauma (psychoanalysis > psychodynamic approach)

Vienna, 1924, Otto Rank; “antinatalism” in “The Trauma of Birth”

1857, Elisha Otis; installation of first passenger elevator in New York

1882, Nikola Tesla discovers the rotating magnetic field

1937, Felix Bloch & Edward Purcell discover magnetic resonance phenomenon

1973, Paul Lauterbur pioneers NMR in chemistry

1977, Raymond Damadian builds the first MRI scanner and performs the first ever scan on a patient

Pittsburgh, 1973, Raymond Gehl; “claustrophobic generation”

1989, Hawton, Salkovskis, Kirk & Clark; Cognitive Behaviour Therapy (“practical guide”)

1993, functional MRI of the brain introduced

1997, Rachman; fear of “restriction” or “suffocation” in claustrophobia

2000, Ost & Csatlos; cognition of anticipation in claustrophobia

2001, Randomsky et al.; “The Claustrophobia Questionnaire” validated psychometric tool used to predict panic
Interventions for anxiety in clinical MRI
Choice Literature Review Findings

Previous research:

- Predominantly quantitative & many studies are retrospective
- Significant medical & positivist paradigm
- Principally focused on “claustrophobia” during or immediately prior to the examination
- Active exclusion of anxious patients with comorbidities
- Physiological or psychoanalytical evaluation of symptoms
- Screening or predicting claustrophobia
- Efficacy/evaluation of interventions for “claustrophobia”

Literature gaps:

- Limited qualitative methodologies
- Holistic understanding of the complete anxious patient experience/journey
- Investigation of patient-practitioner interaction/relationship
- Role of the referrer
- Understanding of practitioner knowledge, recognition, attitude and skill to manage anxious patients
- Post examination management of patients who present with anxiety disorders
Research Article

Do MRI Patients Tweet? Thematic Analysis of Patient Tweets About Their MRI Experience

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ABSTRACT

Background: Twitter is an online, multimedia microblogging tool used actively by millions across the world. Twitter may provide a unique insight into the magnetic resonance imaging (MRI) patient experience.

Methods: In-depth, qualitative content analysis of MRI patient tweets during one calendar month.

Results: Overall, 464 tweets were categorized into three themes: MRI appointment, scan experience, and diagnosis.

Conclusions: This study demonstrates that MRI patients do tweet about their experiences and that Twitter is a viable platform to conduct research into patient experience within the medical radiation sciences.

RÉSUMÉ

Contexte : Twitter est une plateforme de microblogage multimédia en ligne utilisée activement par des millions de personnes dans le monde. Twitter pourrait offrir un coup d’œil intérieur unique sur l’expérience des patients en IRM.

Méthodologie : Analyse qualitative approfondie du contenu des gazouillis des patients en IRM sur une période d’un mois.


Conclusions : L’étude a permis de démontrer que les patients en IRM utilisent Twitter pour parler de leur expérience et que Twitter est une plateforme viable de recherche sur l’expérience des patients dans le domaine des sciences de la radiation médicale.

Keywords: Twitter; anxiety; music; support; diagnosis
Key Findings

• Anticipatory anxiety can manifest over an extended time period and that the focus can shift and change along the MRI journey
• Anxiety is often at its highest immediately prior to the MRI examination
• Anxiety relating to results is an important clinical consideration for MRI facilities and referrers
• A lack of control over music was the most frequent source of negative scan experience
• Music was highlighted as a common coping strategy
• Music choice is a simple intervention that can provide familiarity within a “terrifying” environment
• Patients are regularly using Twitter and social media to dynamically capture and share their MRI experiences
• For some individuals, support from family and friends appeared to be the key motivation for tweeting about their MRI experience
A phenomenological study of the anxious patient experience in magnetic resonance imaging

The principle purpose of this study is to acquire a deep, holistic understanding of the phenomenon of anxiety within clinical MRI and how this is experienced by patients and MRI practitioners:

1. Illuminate the lived experience of anxious adult patients undergoing clinical MRI examinations along the entire MRI journey, the meanings that anxiety has for those who experience it, and what factors are perceived as enablers and barriers

2. Explore the lived experience of MRI practitioners working with patients presenting with anxiety, and their perception and experience of factors that facilitate or inhibit anxiety management

3. Explore the patient-practitioner relationship/interaction and the role of trust/rapture and patient centered/personalised care