Psychological Management of Migraine and Tension-Type Headache

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CONQUER HEADACHES:
The Headache and Migraine Program

Martin, P.R., Meadows, G., Reutens, D.C., Piterman, L., Sharman, M., & Nejad, L.
Cognitive behaviour therapy for co-morbid chronic headache and depression.
beyondblue Victorian Centre of Excellence Grant:
2008, $100,000.
2009, $100,000.
2010, $10,000.
Martin, P.R., & Goadsby, P.J.
Should all triggers of headaches be avoided, or should headache sufferers learn to cope with some triggers?
NHMRC project grant:
2009, $213,500.
2010, $208,500.
2011, $64,000.

Acupuncture and Psychological Treatment for Tension Headache
Greenwood, K.M., Xue, C.C., Zheng, Z., Martin, P.R., Helme, R.D., & Gibson, S.J.
Acupuncture and psychological treatment for tension headache.
NHMRC project grant:
2009, $131,700.
2010, $131,700.
2011, $28,625.

ENHANCE
Enhanced Treatment for Headache
Martin, P.R., & Goadsby, P.J.
Enhancing cognitive-behavioural therapy for recurrent headache by integrating into it a new approach to the management of headache triggers (Learning to Cope with Triggers).
NHMRC project grant:
2013, $152,084.
2014, $142,334.
2015, $142,334.
2016, $62,510.
Workshop Plan

I  Headaches: The experience, classification, diagnosis, mechanisms, functional model, prevalence, impact and cost.
II  Triggers of headaches.
III  Research on psychological treatment of headaches including the treatment approach presented in this workshop.
IV  Psychological assessment of headaches.
V  Psychological treatment of headaches.

I  Headaches: The experience, classification, diagnosis, mechanisms, functional model, prevalence, impact and cost

Headaches are a Big Problem……

• “Headache disorders are common and ubiquitous… The huge public health importance of headache disorders arises from their causal association with personal and societal burdens of pain, disability, damaged quality of life and financial cost” (WHO, 2006).
• Migraine has been ranked among those diseases causing the greatest degree of handicap, together with conditions such as quadriplegia, dementia and active psychosis. (Dahlof & Solomon, 2006).
• An article published in The Lancet in 2015 identified headache disorders as the third cause of disability worldwide.
“Lord how my head aches! What a head have I! It beats as it would fall in twenty pieces”

*Romeo and Juliet*
*William Shakespeare*

‘When you’re lying awake with a dismal headache, and repose is taboo’d by anxiety, I conceive you may use any language you choose, To indulge in, without impropriety’.

*W. S. Gilbert*

Headache roameth over the desert, blowing like the wind, Flashing like lightning, it is loosed above and below: It cutteth off like a reed him who feareth not his god… This man it has struck and Like one with heart disease he staggereth Like one bereft of reason he is broken….
Migraine
Written by a sufferer of chronic migraine

Deep
Deep so very deep
No one knows how very deep
How much you have changed me so.
Craving, scouring, penetrating
Always searching my soul
Never really knowing where to go
You leave me barren, blank,
Flat, almost lifeless
Even my spouse goes away
I am migraine
History of Headache Classification

- Ad Hoc Committee (1962) (2 pages).
International Classification of Headache Disorders
(3rd edition, beta version, 2013)

Part one: The primary headaches
1. Migraine
2. Tension-type headache
3. Trigeminal autonomic cephalalgias
4. Other primary headache disorders

Part two: The secondary headaches
5. Headache attributed to trauma or injury to the head and/or neck
6. Headache attributed to cranial or cervical vascular disorder
7. Headache attributed to non-vascular intracranial disorder
8. Headache attributed to a substance or its withdrawal
9. Headache attributed to infection
10. Headache attributed to disorder of homeostasis
11. Headache or facial pain attributed to disorder of the cranium, neck, eyes, ears, nose, sinuses, teeth, mouth or other facial or cervical structure
12. Headache attributed to psychiatric disorder

Part three: Painful cranial neuropathies, other facial pains and other headache disorders
13. Painful cranial neuropathies and other facial pains
14. Other headache disorders

Migraine: 6 Types

• Migraine without aura
• Migraine with aura, 4 subtypes:
  * Migraine with typical aura (2 sub subtypes)
  * Migraine with brainstem aura
  * Hemiplegic migraine (2 sub subtypes and 4 sub sub subtypes)
  * Retinal migraine
• Chronic migraine
• Complications of migraine (4 subtypes)
• Probable migraine (2 subtypes)
• Episodic syndromes that may be associated with migraine (3 subtypes and 2 sub subtypes)

Tension-type Headache: 4 Types

• Infrequent episodic tension-type headache
  * Infrequent episodic tension-type headache associated with pericranial tenderness
  * Infrequent episodic tension-type headache not associated with pericranial tenderness
• Frequent episodic tension-type headache
  * Frequent episodic tension-type headache associated with pericranial tenderness
  * Frequent episodic tension-type headache not associated with pericranial tenderness
• Chronic tension-type headache
  * Chronic tension-type headache associated with pericranial tenderness
  * Chronic tension-type headache not associated with pericranial tenderness
• Probable tension-type headache
  * Probable infrequent episodic tension-type headache
  * Probable frequent episodic tension-type headache
  * Probable chronic tension-type headache
Migraine Without Aura

Recurrent headache disorder manifesting in attacks lasting 4-72 hours. Typical characteristics of the headache are:

- Unilateral location
- Pulsating quality
- Moderate or severe intensity
- Aggravation by routine physical activity (e.g., walking or climbing stairs)
- Associated with nausea and/or vomiting
- Associated with photophobia and phonophobia

Note: Aura - reversible focal neurological symptoms that usually develop gradually over 5-20 minutes and last for less than 60 minutes - occur just before or at onset of migraine headache.

Episodic Tension-type Headache

Episodes of headache lasting minutes to days. The pain is typically:

- Bilateral location
- Pressing/tightening (non-pulsatile) in quality
- Mild or moderate intensity
- Not aggravated by routine physical activity such as walking or climbing stairs
- No nausea or vomiting (anorexia may occur)
- May be associated with photophobia or phonophobia

Note: Chronic tension-type headache is a disorder evolving from episodic tension-type headache, with daily or very frequent episodes of headache lasting minutes to days.

Headache Attributed to a Substance or its Withdrawal

Medication-overuse headache

- Ergotamine-overuse headache
- Triptan-overuse headache
- Simple analgesic-overuse headache (3 subtypes)
- Opioid-overuse headache
- Combination analgesic-overuse headache
- Medication-overuse headache attributed to multiple drug classes not individually overused
- Medication-overuse headache attributed to unverified overuse of multiple drug classes
- Medication-overuse headache attributed to other medication
General Diagnostic Criteria for Medication-overuse Headache

- Headache present on >15 days/month.
- Medication intake on ≥10 days per month (≥15 days per month for Analgesic-overuse headache) on a regular basis for ≥3 months.
- Headache has developed or markedly worsened during medication overuse.
- Headache resolves or reverts to its previous pattern within two months of discontinuation of use.

Mechanisms of Migraine I

- Migraine is a **neurovascular disorder**.
- **Peripheral mechanisms** (traditional focus)
  - constricted and dilated cranial and extracranial arteries.
- **Central mechanisms** (current focus, driven by advances in functional neuroimaging)
  - neuronal hyperexcitability (changes in threshold of cortical neurons such that they respond to triggers at lower levels of stimulation).

Mechanisms of Migraine II


- Genetics
- Spreading depression
- 5-Hydroxytryptamine
- Nitric oxide
- Calcitonin gene-related peptide
- Channelopathies
- Neurogenic inflammatory
- Blood & spinal fluid
- Female hormones
- Platelets & immunology
- Hemodynamics & neuroimaging
- Brain metabolism
- Neuropathy
- Autonomic dysfunction
- Psychological
- Synthesis
Mechanisms of Tension-type Headache I

- **Peripheral mechanisms** (traditional focus)
  - contracted pericranial muscles, perhaps important in episodic tension-type headache.

- **Central mechanisms** (current focus)
  - central sensitisation (qualitative changes in the central processing of sensory information, that is, lowering of pain threshold), perhaps important in chronic tension-type headache.

Note: central sensitisation has also been argued to be a mechanism of migraine.

Mechanisms of Tension-type Headache II


- Genetics.
- Pain from muscle.
- Sensitization of myofascial pain pathways.
- Neurophysiology.
- Hemodynamics & muscle metabolism.
- Temporomandibular disorders.
- Psychological.
- Biochemistry of blood & cerebrospinal fluid.
- Synthesis.
Maladaptive Reactions to Headaches

1. Positive and negative reinforcement from significant others.
2. Avoidance behaviour.
3. Exacerbating antecedents.
4. Enhancing pain perception.
5. Drug-induced.

Headache Prevalence

- It has been estimated that globally, the percentages of the adult population with an active headache disorder are 46% for headache general, 11% for migraine, 42% for tension-type headache, and 3% for chronic daily headache (Stovner, 2007).
- On the ranking of causes of disability of WHO, this brings headache disorders into the 10 most disabling conditions for the two genders, and into the 5 most disabling conditions for women (Stovner, 2007).
- Headache prevalence:
  * related to gender (more common in females) and age
  * not related to education, social class or mode of employment.
Impact of Headaches on Functioning

Individuals with chronic headache have a level of functioning:

- worse than individuals with:
  * arthritis
  * diabetes
  * depression
  * back problems
- similar to individuals with:
  * myocardial infarction
  * congestive heart failure
- better than individuals with:
  * symptomatic HIV infection.

(Solomon et al., 1993)

Migraine has been ranked among those diseases causing the greatest degree of handicap, together with conditions such as quadriplegia, dementia and active psychosis.

(Dahlof & Solomon, 2006)

Cost of Headaches

- It has been estimated that migraine costs European Society €27 billion per year (Olesen, 2007).
- It has been estimated that migraine costs society in the USA US$17 billion per year (Berg & Ramadan, 2006).
- Tension-type headache is the most common type of primary headache with a lifetime prevalence estimated in different studies between 30% and 78%, and it has the highest socioeconomic impact (Headache Classification Subcommittee of IHS, 2004).

II Triggers of Headaches
Reported Trigger Factors for Headaches

- Stress, negative affect (anxiety, anger, depression) & post-stress relaxation.
- Perceptual stimuli such as: flicker, glare & eye strain; noise; & odours/smells.
- Foods containing tyramine, phenylethylamine, monosodium glutamate, aspartame & caffeine, & alcohol.
- Hunger & withdrawal of reactive foods.
- Seasonal and meteorological conditions including high temperature, high humidity, high atmospheric pressure, & ionisation.
- Exercise & fatigue.
- Too much or too little sleep.
- Smoking cigarettes.
- Sexual intercourse.
- Pain in other parts of the body.
- Menstrual factors in females.

(Martin & MacLeod, 2009)

Five Independent Antecedent Dimensions Underlying the Reported Triggers of Headaches

1. Negative affect (anxiety, depression and anger).
2. Visual disturbance (flicker, glare and eye strain).
3. Somatic disturbance (sneezing, coughing and pollen).
4. Environmental stress (humidity, high temperature and opposite to relaxation).
5. Consumatory stimuli (alcohol, food and hunger).

(Martin, Milech & Nathan, 1993)
Traditional Medical Advice to Headache and Migraine Sufferers

“Migraine prevention is best achieved by avoidance of known migraine triggers”.
Skaer (1996)

“Comprehensive migraine treatment programs emphasize awareness and avoidance of trigger factors as part of the therapeutic regimen”.
Friedman & De V or Dye (2009)

One of the ‘seven elements of good headache management’ listed by WHO is “identification of predisposing and/or trigger factors and their avoidance through appropriate lifestyle change”.
WHO (2006)

Thousands of internet sites, ranging from the American Headache Society to Wikipedia, encourage avoidance of headache triggers.

What are the Problems with this Advice?

• Conceptual, practical and empirical issues.
• Avoidance as a coping and treatment strategy.
• Exposure as a treatment strategy.
(Martin & MacLeod, 2009; Martin, 2010a, 2010b)

Conceptual Issues

• Advice to avoid triggers is given in a theoretical vacuum.
• It takes no account of the possibility that reduced exposure to triggers may decrease tolerance for triggers.
• Researchers write about triggers as though the capacity to precipitate headaches is an inherent and immutable property of the trigger, and sensitivity to the trigger is genetically determined.
• Relative influence of genes in development of migraine up to 60%, and in tension-type headache significantly less (Ulrich et al., 2004).
• Longitudinal studies show that migraine and headache come and go across the life span (Bille, 1997).
Practical Issues

- It is unlikely that it could prove possible to completely avoid all potential headache triggers, and attempting to do so could result in a very restricted lifestyle (Kelman, 2007).
- Marcus (2003) pointed out that the effort to avoid triggers may itself be stressful.
- Advice to avoid triggers may lead to reduced internal locus of control for headaches, with adverse effects on self-efficacy, and Marlowe (1998) has reported that the correlation between frequency of headaches and frequency of stressful events is moderated by self-efficacy.

Empirical Issues

- Empirical support for counselling avoidance of triggers is very limited.
- Blau and Thavapalan (1988) encouraged migraineurs to avoid all precipitating factors and reported a 50% reduction in attack frequency in 19 out of 23 patients.
- Grant (1979) reported on 60 migraineurs who completed elimination diets and were advised to avoid stress, hunger and cigarette smoke, and claimed there was a dramatic fall in the number of headaches per month.
- A number of case studies involving avoiding certain foods have reported some success (e.g., Dalton, 1973; O'Banion, 1981; Scopp, 1991; Radnitz et al., 1990).
- All these studies suffer from major methodological limitations, including no control conditions.

Avoidance as a Coping and Treatment Strategy

- Anxiety literature – avoidance of anxiety-eliciting stimuli is the pathway to maintenance of anxiety.
- Stress literature – avoidance is considered to be a maladaptive coping response.
- ‘Experiential avoidance’ – associated with higher levels of general psychopathology, depression, anxiety, specific fears, trauma and a lower quality of life (Hayes et al., 2004).
- Allergen avoidance as a treatment for asthma doesn’t work (Gotzsche et al., 2003).
Exposure as a Treatment Strategy

- Exposure-based treatments for anxiety disorders (systematic desensitisation, flooding, implosion) are highly effective (Barlow, 2004).
- Allergen immunotherapy (gradually increasing doses of allergen) is an effective treatment for allergic asthma (e.g., Abramson et al, 1995).
- Stress inoculation training (practising coping skills during exposure to stress) is effective for phobias, and other anxiety disorders, anger and pain.
- Therapies targeting ‘experiential avoidance’, such as Acceptance and Commitment Therapy, have been shown to be effective (e.g., Bach & Hayes, 2002).
- Moses and Barlow (2006) have proposed a unified treatment approach for emotional disorders which includes preventing emotional avoidance (behavioural avoidance and cognitive avoidance) and facilitating emotional exposure.

Anxiety and Exposure

- The anxiety literature shows that short exposure to anxiety-provoking stimuli results in increments to subsequent anxiety responses to the stimuli, whilst prolonged exposure to anxiety-provoking stimuli results in decrements to subsequent anxiety response to the stimuli.
- Short exposure underlies the maintenance of phobias as phobics try and escape or avoid threatening stimuli thus minimising exposure.
- Long exposure is the basis for the highly effective treatments for anxiety such as various forms of desensitisation, flooding and implosion.

Why do Trigger Factors Precipitate Headaches?

- Development of a chronic headache disorder can be conceptualised as becoming sensitised to various headache trigger factors such that these factors precipitate headaches more readily.
- This sensitisation process may result from attempts to avoid or escape from trigger factors resulting in short exposure to the triggers.
Repetition Theory

On each occasion a trigger factor is associated with a headache, the link between the two is strengthened or consolidated, as occurs through learning by practice or repetition.

Avoidance Theory

Observation by a headache sufferer of a link between a trigger factor and a headache (whether the observation is accurate or inaccurate) results in escape/avoidance behaviour whereby the sufferer seeks to minimise exposure to the trigger factor. This avoidance of trigger factors sensitises the individual to the trigger factors in the same way that avoidance of anxiety-inducing stimuli results in increased anxiety to future presentations of the stimuli.

Headache Triggers Studies

Study I ($n = 110$):
- Experimentally validated trigger of ‘visual disturbance’ – flicker, glare and eyestrain.
- Very bright, stroboscopic light (5 flashes per second).

Study II ($n = 115$):
- Experimentally validated trigger of noise.
- 50 db of white noise.
Exposure Conditions

- No exposure 0 minutes
- ‘Very short’ exposure 5 minutes
- ‘Short’ exposure 15 minutes
- ‘Long’ exposure 25 minutes
- ‘Very long’ exposure 35 minutes

Predicted Results on Basis of the Two Theories

Visual Disturbance (Martin, 2001)
Exposure Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Headache Response (Mean of H4QR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>1.3</td>
</tr>
<tr>
<td>Very Short</td>
<td>1.4</td>
</tr>
<tr>
<td>Short</td>
<td>1.5</td>
</tr>
<tr>
<td>Long</td>
<td>1.6</td>
</tr>
<tr>
<td>Very Long</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Noise (Martin, Reece & Forsyth, 2006)

Design of Study (Martin, 2000)

- A single-case experimental design was used employing a series of simple phase-change elements (Barlow, Hayes & Nelson, 1984).
- The form of the design was A/B/B+C/B1+C.
- Where:
  - A was baseline
  - B was exposure training using ‘visual disturbance’
  - C was relaxation training
  - B1 was a variation of exposure training.
- Baseline involved one session, whilst the other three phases involved three sessions each.

Participants

- Joan, aged 38, clerical/sales, 'migraine with aura'.
- Susan, aged 39, professional/management, 'migraine with aura'.
- Jane, aged 56, clerical/sales, 'migraine without aura'.
- Ruth, aged 45, home duties, 'chronic tension-type headache'.
- Julia, aged 22, semi-skilled occupation, 'migraine with aura'.
- Lucy, aged 45, clerical/sales, 'headache of the tension-type'.

All participants had experienced regular headaches (i.e., headache frequency of once per week or more, but not continuous headaches) for more than 10 years.

All participants reported that visual disturbance either 'sometimes', 'usually' or 'always', precipitated or aggravated their headaches.
Change in Capacity of the Trigger Factor to Elicit Headaches as a Function of Repeated, Prolonged Exposure
The ‘Trigger Avoidance Model of Headaches’

- Our criticisms of the traditional advice to avoid headache triggers and our findings on exposure to headache triggers have led to us proposing the ‘Trigger Avoidance Model of Headaches’, which suggests that fear of the experience of headache drives susceptible individuals to try to avoid headache triggers, and this natural tendency is encouraged by clinicians and advice on the internet.

- Attempts to avoid triggers will result either in no exposure, or short exposure, to the triggers.

- This may lead to the capacity of the trigger to precipitate headaches being maintained or increased, through a process of sensitisation, failed habituation/adaptation, or lack of opportunity for learning to cope with the trigger.

- Hence, whilst attempts to avoid triggers may lead to fewer headaches in the short-term, it may result in more headaches in the long-term as tolerance for triggers decreases.

- Development of a chronic headache disorder can be conceptualised as becoming sensitised to various headache trigger factors such that these factors precipitate headaches more readily.

‘Learning to Cope with Triggers’ I

- We have argued that counselling avoidance should be replaced with a philosophy of ‘Learning to Cope with Triggers’.

- The stress literature demonstrates that no one coping strategy can be selected as the best way of coping with stress for all situations and across time, but approach strategies generally are more adaptive than avoidance strategies.

- We have argued that in parallel with the stress literature, no one strategy can be singled out as the best way of managing all headache triggers.

- Sometimes avoidance will be the strategy of choice but more often, approach/engagement/exposure strategies will be the strategies of choice.

- Our approach is described in a 181 page manual that begins with ‘Principles of the Behavioural Management of Headache Triggers’, and concludes with 21 appendices devoted to the most common triggers.

‘Learning to Cope with Triggers’ II

The Behavioural Management chapter includes topics such as:

(i) Coping with stress as a model for coping with headache triggers.

(ii) Identification of triggers.

(iii) The different functions of exposure:

(a) Exposure as an ‘experiment’ – can the ‘trigger’ really precipitate headaches?

(b) Exposure as habituation/adaptation/desensitisation – will exposure lead to an attenuated response, as in our laboratory studies?

(c) Exposure as an opportunity to practice – learning to cope with stress requires practice of skills in response to a stressor.

(d) Avoidance versus exposure-based strategies for different triggers.

(e) Length and intensity of exposure to triggers.

(f) Real versus imagined exposure.

(vii) Exposure with or without relaxation and cognitive techniques.

(viii) Trigger management decisions.
Aims of MaTCH Study

- Does the standard advice to avoid all triggers ("Avoidance"), lead to a significant reduction in headaches and secondary outcome measures compared to waiting-list control ("W-L")?
- Does a novel approach to trigger management (Learning to Cope with Triggers – LCT) that includes exposure with the goal of desensitisation to some headache triggers & avoidance of other triggers, lead to a significant reduction in headaches and secondary outcome measures compared to waiting-list control ("W-L") and compared to a control intervention consisting of advice to avoid all triggers plus CBT?

Martin, P. R. et al. (2014).

Design of MaTCH Study

Randomised controlled trial comparing:
1. Waiting-list (W-L) .
2. Avoidance – 3 x 30 minutes.
3. Avoidance + CBT – 8 x 60 minutes.
4. Learning to Cope with Triggers (LCT) – 8 x 60 minutes.
Participant Sample

- Gender: 84 Female, 43 Male.
- Age: $M = 47.1; SD = 13.9$.
- Primary diagnosis: 83 migraine; 44 tension-type headache.
- Headache chronicity: $M = 26.3; SD = 14.3$.

Results: Changes in Headaches and Medication Consumption

<table>
<thead>
<tr>
<th>Group</th>
<th>Change in headaches</th>
<th>Change in medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>W-L (control)</td>
<td>+11.0%</td>
<td>+15.4%</td>
</tr>
<tr>
<td>Avoidance</td>
<td>-13.2%</td>
<td>-9.0%</td>
</tr>
<tr>
<td>Avoidance + CBT</td>
<td>-30.0%</td>
<td>-19.4%</td>
</tr>
<tr>
<td>Coping (LCT)</td>
<td>-35.9%</td>
<td>-27.9%</td>
</tr>
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</table>

Note: A minus sign indicates improvement.

Avoidance did not differ significantly from W-L (control) on either change in headaches or change in medication consumption, but LCT differed significantly from W-L on both measures.

Conclusions

- Avoidance is arguably a reasonable first step, low-cost intervention for triggers.
- ‘Learning to Cope with Triggers’ is associated with more significant reductions in headaches and medication than advising avoidance of all triggers – changes that are approximately three times as large.
III Research on Psychological Treatment of Headaches Including the Treatment Approach Presented in this Workshop

Biofeedback Training for Headaches
- EMG biofeedback
  - usually used with tension headache sufferers
  - usually accompanied by instructions to practice relaxation at home
  - feedback usually from forehead, but sometimes neck or site of highest EMG
- Thermal biofeedback (digital temperature biofeedback)
  - usually used with migraineurs
  - usually accompanied by autogenic training and home practice
- Feedback of state of dilation of extracranial temporal artery
  Electroencephalographic feedback (alpha enhancement)
  Skin conductance feedback
  Feedback of temporal temperature (on its own or as a differential response to digital temperature)
  Homeostatic reconditioning (vascular recovery reconditioning)

Alternative Psychological Treatments for Headaches
- Relaxation training
  - progressive relaxation
  - autogenic training
- Cognitive behaviour therapy
  - combination of techniques including relaxation training, cognitive therapy techniques to challenge maladaptive thoughts and beliefs, and pain management strategies
  - Hypnosis
  - Transcendental meditation
  - Operational conditioning
  - Cognitive behaviour therapy administered in group format
- Minimal therapist-contact home-based approaches
- Internet-based interventions and APPs
- Mindfulness-based approaches
EMG biofeedback training significantly superior to a number of ‘placebo’ control conditions, specifically:
- noncontingent feedback
- medication placebo control condition
- ‘most suitable alternative’ (drugs and/or physical therapy)
- pseudotherapy condition (‘meditation’)

Efficacy of Psychological Treatment for Migraine
Rains et al. (2005) summarised the results of five meta-analytic reviews for psychological treatment of migraine (thermal biofeedback, EMG biofeedback, CBT and relaxation training) published between 1980 and 1999, and concluded that average improvement ranged from 33% to 55%, compared with 5% for no-treatment controls.

Efficacy of Psychological Treatment for Tension-type Headache
Rains et al. (2005) summarised the results of four meta-analytic reviews for psychological treatment of tension-type headache (EMG biofeedback, CBT and relaxation training) published between 1980 and 2001, and concluded that average improvement ranged from 35% to 55%, compared with 2% for no-treatment controls.
Why do Psychological Treatments Work?

Electromyographic (EMG) Biofeedback

A

Learned Control of Pericranial EMG Activity

Control Exerted Appropriately

Reduction of Pericranial Activity

B

Perceived Success

Enhanced Expectations

Reduced Headache Activity

Altered Coping

Reduction of Stress Responses

Adapted from Holroyd, Martin & Nash (2006)

‘Side effects’ of Psychological Treatment for Headaches

- Decreased consumption of medication.
- Decreases in negative moods such as depression and anxiety.
- Cognitive changes such as a shift towards a more internal locus of control, enhanced self-efficacy to cope with headaches and alterations in cognitive reactions to stress such as changes in appraisal and coping processes.
- Enhanced quality of life.
(Martin, 2009)

Long-term Effects of Psychological Treatment for Headaches

- Blanchard (1987) - review of 10 prospective follow-up studies:
  * EMG biofeedback and thermal biofeedback training - headache reductions were maintained to 12 months but deteriorated at 2 and 3 years post-treatment.
  * Relaxation training - deterioration after 12 months for migraine but effects were well maintained for tension-type headache for at least 4 years.
  * CBT - benefits were maintained at 2-year follow-up.
- Sorbi et al. (1999) - benefits from relaxation training and CBT for migraine lasted 3 years after treatment.
- Blanchard et al. (1997) - 91% of migraine patients remained significantly improved 5 years after treatment.
Predictors of Response to Psychological Treatment

Negative indicators:
- Depressive symptoms prior to treatment (e.g., Jacob et al., 1983; Martin et al., 1988).
- Excessive use of analgesics (Michulka et al., 1989).
- Near continuous headaches rather than more delimited headache episodes (Blanchard et al., 1989), but possible to get positive results with this group (Holroyd et al., 2001).
- Early suggestion that people over 50 years respond less well has not been supported by subsequent research - Mosley et al. (1995) gained positive results with CBT with the elderly (60-78 years).
- Low social support prior to treatment (Martin et al., 2007).

Can Psychological Treatment be Administered Cost-Effectively?

- Minimal contact approaches (3 or 4 clinic sessions plus training in the home via printed materials and CDs) – three meta-analytic reviews have demonstrated that they can be as effective as clinic-based approaches (e.g., Rowan & Andrasik, 1996).
- Group format – Penzien et al. (1992) completed a meta-analytic review and reported 53% improvement, so similar to individual treatment.
- Internet-based approaches – can be effective but tend to have a high drop-out rate (e.g., Anderson et al., 2003; Strom et al., 2000).

Should Psychological and Drug Treatments be Combined?

- Meta-analyses comparing propranolol, flunarizine and combined relaxation and biofeedback training in migraineurs show greater than a 50% improvement in headache for each of these approaches compared to 12% improvement with a placebo pill (e.g., Holroyd et al., 1992).
- Holroyd et al. (1991) compared CBT administered in minimal contact format and amitriptyline HCL to patients with tension-type headache. Each treatment yielded significant reductions in headaches with a 56% reduction for CBT and a 27% reduction for amitriptyline HCL.
- Holroyd, Martin and Nash (2006) – psychological compared to pharmacological treatments produce improvements more slowly, yield fewer side effects, require more time and effort to complete, and produce more psychological benefits.
Evaluation of Approach Presented in Workshop (Martin et al., 2007)

Randomised controlled trial comparing:
- Cognitive behaviour therapy (as presented in the Workshop).
- Biofeedback training with feedback of state of dilation of extracranial temporal artery.
- Waiting-list control condition.

Demographic Characteristics of Participants

<table>
<thead>
<tr>
<th>Treatment conditions</th>
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<tbody>
<tr>
<td>Cognitive behaviour therapy</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Age (SD)</td>
</tr>
<tr>
<td>Chronicity (SD)</td>
</tr>
<tr>
<td>Headache diagnosis:</td>
</tr>
<tr>
<td>Migraine</td>
</tr>
<tr>
<td>Tension-type</td>
</tr>
</tbody>
</table>

Parameters of Treatment

- Therapists – four psychologists, two had completed professional training and two were enrolled in a PhD program – training and supervision provided.
- Treatment – eight one-hour sessions scheduled weekly.
Changes from Pre- to Post-treatment

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Decrease in Headache Activity</th>
<th>Decrease in Medication Use</th>
<th>Clinically Significant Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBT</td>
<td>68.4%</td>
<td>70.2%</td>
<td>77.8%</td>
</tr>
<tr>
<td>Biofeedback</td>
<td>55.5%</td>
<td>40.8%</td>
<td>63.2%</td>
</tr>
<tr>
<td>Control</td>
<td>19.7%</td>
<td>52.1%</td>
<td>23.1%</td>
</tr>
</tbody>
</table>

Predictors of Improvement with Cognitive Behaviour Therapy

The Social Support subscale of the Coping Strategies Inventory measures seeking emotional support from people, one’s family, and one’s friends.

- Pre-treatment scores on the Social Support subscale predict headache change ($r = -0.673, p = 0.003$) – high support, most improvement.
- Changes in scores on the Social Support subscale from pre- to post-treatment are correlated with headache change ($r = -0.461, p = 0.097$) – increase in support, most improvement.

Results in Perspective

- CBT – 68% decrease in headache activity at the end of treatment compared to range from meta-analytic studies of 33% to 55%.
- CBT – further decreases in headaches at 12-month follow-up (gains reversed in biofeedback training group).
- Results achieved:
  * in 8 sessions
  * with inexperienced therapists
  * in patients of average chronicity of 25 years.
IV Psychological Assessment of Headaches

Signs and Symptoms that Should Prompt Referral to a Neurologist

Several brain conditions may mimic primary headache disorders and laboratory investigation may be needed. Features that represent a warning for a possible underlying disorder causing the headache (commonly referred to as ‘red flags’) are:

- New onset headache.
- Change in previously stable headache pattern.
- Headache that abruptly reaches the peak level.
- Headache that changes with posture.
- Headache awakening the patient, or precipitated by physical activity or Valsalva manoeuvre.
- First onset of headache at or later than 50 years of age.
- Neurological symptoms or signs, trauma, fever, seizures, history of malignancy, history of HIV or active infections, and prior history of stroke or intracranial bleeding.


Psychological Assessment of Headaches

Semi-structured interview
- Psychological Assessment of Headaches Questionnaire (Martin, 1993)

Self-monitoring
- Daily Cards (Martin, 1993)
- Change and Control Cards (Martin, 1993)

Questionnaires
- Beck Depression Inventory (Beck et al., 1961)
- State-Trait Anxiety Inventory (Spielberger et al., 1970)
Psychological Assessment of Headaches Questionnaire

Part I – Personal and social history – provides a broad psychosocial context for the headache assessment

Part II – Headaches (nb one or more types of headaches?)
A: Headaches and associated symptoms
B: Functional analysis – antecedents and consequences of headaches
C: Assessment and treatment history

Self-monitoring: Daily cards

Scale for Rating Headache Intensity
5 - An intense incapacitating headache
4 - A very severe headache which makes concentration difficult, but during which you could perform tasks of an undemanding nature
3 - A painful headache but one during which you could continue at your job
2 - A headache that can be ignored at times
1 - A headache of a very low level type which enters awareness only at times when attention is devoted to it
0 - No headache

From Budzynski et al. (1973)
Self-monitoring: Change cards

**Scale for Rating Anxiety, Depression and Stress**

- 5 - Very severely (anxious, depressed, stressful)
- 4 - Severely (anxious, depressed, stressful)
- 3 - Moderately (anxious, depressed, stressful)
- 2 - Slightly (anxious, depressed, stressful)
- 1 - Very slightly (anxious, depressed, stressful)
- 0 - Not at all (anxious, depressed, stressful)

Self-monitoring: Control cards
App we use in our research

Question 1: How would you rate your headache intensity now?
This question relates to the intensity of your headache at the time of completing your daily diary entry.
A headache intensity scale from 0-5 is used to rate your headache intensity (see below). To view the scale description, click on the "Scale Description" button. If you are not experiencing a headache at the time that you are completing the diary, then your response would be "0". Once you have entered your response, click on the "Save & Next" button to go to the next question.

Scale Description:
• "5" = An intense incapacitating headache
• "4" = A very severe headache which makes concentration difficult, but during which you could perform tasks of an undemanding nature
• "3" = A painful headache, but one during which you could continue at your job
• "2" = A headache that can be ignored at times
• "1" = A headache of a very low level type which enters awareness only at times when attention is devoted to it
• "0" = No headache

Final question in App

Question 7: If you had a headache or headaches today which of the following triggers were responsible for precipitating the headache or headaches?
• This question is aimed at providing information as to the possible 'triggers' or factors which may be associated with your headaches. Please click on any of the listed triggers that occurred. It may be that there were a number of triggers present. Please include all of the triggers that related to you that day.
• If you noticed a trigger that is not listed you can record this by typing the trigger in the box listed as "Other Please Specify".
• If you did NOT have a headache(s) and/or headache(s) trigger(s) for that day, it is not necessary to specify a trigger for that day. Simply click "submit".
Psychological Assessment of Headaches

Semi-structured interview
- Psychological Assessment of Headaches Questionnaire (Martin, 1993)

Self-monitoring
- Daily Cards (Martin, 1993)
- Change and Control Cards (Martin, 1993)

Questionnaires
- Beck Depression Inventory (Beck et al., 1961)
- State-Trait Anxiety Inventory (Spielberger et al., 1970)

Predisposing factors (constitutional & personality characteristics that account for individual differences in susceptibility)

Onset factors (processes or events that resulted in headaches developing initially or worsening)

Setting factors (lifestyle or life situation factors that moderate current vulnerability)

Immediate factors (stimuli that precipitate or aggravate headaches - the triggers)

Central & peripheral mechanisms (headache & associated symptoms)

Immediate reactions of sufferers (maladaptive reactions that lead to feedback loops)

Long-term responses of sufferers (maladaptive responses that lead to feedback loops)

Immediate reactions of others (maladaptive reactions that lead to feedback loops)

Long-term responses of others (maladaptive responses that lead to feedback loops)

ANTECEDENTS HEADACHE PHENOMENA CONSEQUENCES

The Functional Model of Chronic Headaches
Adapted from Psychological Management of Chronic Headaches (Martin, 1993)
Supplementary Assessment Techniques I

**Headaches and Associated Symptoms**

If wish to take a multidimensional view of pain:
- McGill Pain Questionnaire (Melzack, 1975)
- Pain Perception Profile (Tursky, 1976)

**Immediate Antecedents**

If wish to pursue stress as a trigger of headaches:
- Stress diaries (Levor et al., 1986)
- Daily stress inventory (Mosley et al., 1990)
If wish to pursue negative affect as a trigger of headaches:
- Profile of Mood States (McNair & Lorr, 1982)
- Mood Scales (Harrigan et al., 1984)
If wish to pursue dietary factors as a trigger of headaches:
- Attack forms (Dalton, 1973, 1975)
If wish to clarify nature of observed associations:
- Behavioural experiments

Supplementary Assessment Techniques II

**Setting Antecedents**

If wish to pursue sources of stress:
- Hassles Scale (Kanner et al., 1981)
- Perceived Stress Scale (Cohen et al., 1985)
If wish to pursue social support as a moderator of stress:
- Social Support Questionnaire (Sarason et al., 1983)
- Interpersonal Support Evaluation List (Cohen et al., 1985)
If wish to assess marital satisfaction as a potential source of stress:
- Dyadic Adjustment Scale (Spanier, 1976)

**Onset antecedents**

Aid to recall of significant events at time of headache onset:
- Social Readjustment Rating Scale (Holmes & Rahe, 1967)

Supplementary Assessment Techniques III

**Predisposing Antecedents**

If wish to investigate personality characteristics as predisposing factors:
- Framingham Type A scale (Haynes et al., 1978)
- Minnesota Multiphasic Personality Inventory

**Immediate Reactions**

Useful questionnaire for avoidance behaviour and reinforcement hypothesis:
- Pain Behavior Checklist (Philips & Jahanshahi, 1986)
Useful questionnaire for exacerbating antecedents and enhancing pain perception pathways:
- Headache Assessment Questionnaire (Bakal, 1982)

**Long-term Effects**

- Comprehensive Pain Questionnaire (Monks & Taezer, 1983)
- Nottingham Health Profile (Hunt et al., 1986)
- Sickness Impact Profile (Borgner et al., 1981)
V Psychological Treatment of Headaches
Parameters of Treatment

Treatment sessions begin with collection of self-monitoring records and then proceed in three phases:

- **Review** – significant life events, fluctuations in their problems, insights they have had
- **Treatment techniques** – one to three techniques used in each session
- **Homework assignments** – setting up homework assignments and self-monitoring

Psychological Treatment of Chronic Headaches

1. Education
2. Relaxation training
3. Cognitive training
   - Identifying and challenging
   - Maladaptive thoughts
   - Maladaptive beliefs
4. Trigger management – Learning to Cope with Triggers
5. Imagery training
   - Incompatible imagery
   - Transformative imagery
6. Attention-diversion training
   - Internal attention-diversion
   - External attention-diversion
1. Education

- Intervention model
- The functional model of chronic headaches
- Model of patient’s headaches
- Treatment program

Intervention Model

Three main assumptions underlying the treatment approach:

1. Collaboration between therapist and patient.

2. Headaches arise from transactions between the patient and his or her environment including responses to the headaches themselves.

3. Importance of patient’s efforts between office sessions.

Education

- Intervention model
- The functional model of chronic headaches
- Model of patient’s headaches
- Treatment program
2. Relaxation Training
Progressive Relaxation Training (Bernstein & Borkovec, 1973)

1. Tension-release cycles (16, 7, 4 muscle-groups).

2. Relaxation by recall and counting.

3. Cue-controlled and differential relaxation.

Modifications to Relaxation Training for Chronic Pain Sufferers Recommended by Turk, Meichenbaum and Genest (1983)

1. Particular attention should be given to muscles in the pain area.

2. Patients should be encouraged to notice any differences taking place, and to interpret the changes as becoming more relaxed.

3. It should be emphasised that relaxation is under the patient's own control via statements such as “Notice the changes you bring about”.

Autogenic Relaxation
(Schultz & Luthe, 1959, 1969)

Six standard exercises:
1. Heaviness
2. Warmth
3. Cardiac regulation
4. Respiration
5. Abdominal warmth
6. Cooling of the forehead
3. Cognitive Training

Rationale for Cognitive Approach
Focusing on Thoughts and Beliefs

1. The relationship between headaches, stress and negative emotions.
2. The nature of stress and emotions.
3. The relationship between thoughts and beliefs.

Targets for Change

1. Stress-related thoughts.
2. Thoughts and negative emotions.
3. Thoughts related to headaches and associated factors.
Verbal Challenging of Maladaptive Thoughts (based on Fennell, 1989)

1. What is the evidence?

2. What alternative views are there?

3. What are the advantages and disadvantages of this way of thinking?

4. What logical errors am I making?

Five Steps for Setting up Behavioural Experiments to Challenge Maladaptive Thoughts (based on Fennell, 1989)

1. Prediction

2. Review

3. Design

4. Results

5. Conclusions
Six Clues to Aid Process of Identifying Maladaptive Beliefs (based on Fennell, 1989)

1. Themes
2. Logical Errors
3. Global Evaluations
4. Early Memories
5. Excessive Emotions
6. Vertical Arrow

Verbal Challenging of Maladaptive Beliefs (based on Fennell, 1989)

1. In what way is the belief unreasonable?
2. In what way is the belief unhelpful?
3. Where did the belief come from?
4. What would be a more moderate alternative belief which would confer the advantages of the maladaptive belief without the disadvantages?

Behavioural Experiments for Challenging Maladaptive Beliefs can Take Following Forms

1. Gathering information about other people’s standards rather than assuming one’s own are universal.
2. Observing what others do as an indication of their differing standards.
3. Acting contrary to assumptions and observing the consequences.
4. Testing the new rule in action.
4. Trigger Management – Learning to Cope with Triggers

Steps involved:
• What are the triggers – self-report and testing with behavioural experiments?
• For each trigger what is the preferred strategy:
  - exposure with the goal of desensitisation/habituation/adaptation or to enable practising coping skills in the presence of the trigger?
  - avoidance?
  - note, some triggers are not controllable, that is, cannot use exposure or avoidance – in such situations sometimes the goal is to work on the triggers that aggregate with the uncontrollable triggers.
• Development and implementation of Action Plans for exposure and avoidance with respect to the targeted triggers.

See Martin et al. (2015) for three case examples (triggers - stress, tiredness and heat) illustrating how this is done.

Behavioural Management of Triggers: Avoidance Versus Exposure-Based Strategies

<table>
<thead>
<tr>
<th>Approach/Exposure</th>
<th>Avoidance</th>
<th>Exposure → Avoidance</th>
<th>Cue for Avoidance of Triggers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress, tension &amp; negative emotions</td>
<td>Hunger</td>
<td>Food &amp; drink</td>
<td>Menstruation</td>
</tr>
<tr>
<td>Sensory triggers</td>
<td>Lack of sleep or excess of sleep</td>
<td>Alcohol</td>
<td>Weather</td>
</tr>
</tbody>
</table>

Length of Exposure to Triggers

• Exposure long enough to represent a sufficient challenge for learning to take place, whether this learning is best described as desensitization, habituation, extinction, adaptation, developing tolerance, or learning to cope.
• On the other hand, exposure should fall short of being overwhelming for the patient, or resulting in a severe headache being induced.
• Graduated exposure preferable to intense exposure, with length of exposure increasing as patient adapts/habituates.
5. Imagery Training

**Incompatible imagery**
- Emotive imagery
- Sensory imagery

**Transformative imagery**
- Contextual imagery
- Stimulus imagery
- Response imagery

---

Procedure for Imagery Training

1. Simplified account of nature of imagery
2. Imagery for coping with aversive experiences
3. Imagery as a skill (vividness and controllability)
4. Imagery exercises
5. Patient's use of imagery
6. Five imagery strategies
7. Organising home practice
   - Developing imagery ability (phase I)
   - Using imagery coping strategies (phase II)
6. Attention-diversion Training

**Internal attention-diversion**
- Mental activity
- Bodily processes and sensations

**External attention-diversion**
- Features of the environment
- Distracting activities

**Procedure for Attention-diversion Training**
1. Discussion of properties of attention
2. Significance of attentional processes to headaches
3. Attention as a skill (controllability)
4. Attentional exercise
5. Patient's use of distraction
6. Four attention-diversion strategies
7. Organising home practice
   - developing attentional control (phase I)
   - using attention-diversion strategies (phase II)
Treatment Techniques Appropriate for Chronic Headaches with Particular Controlling Variables I

Immediate antecedents (Learning to Cope with Triggers)

Triggers - Identify triggers, then exposure or avoidance.
Note for food - Elimination diet.
Note for fasting intake - Frequent (high protein, low carbohydrate) food.

Setting antecedents

Stress - Treatment focused on sources of stress (e.g. child management training, marital therapy, family therapy, assertion training, social skills training, vocational counseling) or aimed at increasing perceived social support.
Negative emotions - Treatment focused on anxiety, depression and anger.
Lifestyle approaches - Techniques aimed at establishing regular routines, engaging in leisure activities and regular exercise, and good quality sleep.
Related problems - For example, treatment targeting associated problems such as low back pain, insomnia and overweight.
Treatment Techniques Appropriate for Chronic Headaches with Particular Controlling Variables II

Onset and predisposing antecedents

Personality characteristics - interventions aimed at modifying personality features that make headache sufferers vulnerable to stress-related headache:
* Personality factors that set up an individual for experiencing situations as stressful (e.g. perfectionism, rigidity, need for control).
* High trait anxiety, anger and depression.
* Type A personality.
* Low self-esteem and low self-confidence.

Immediate reactions

Reactions of sufferers - modification of maladaptive behavioural reactions (e.g. overactive or underactive, taking excessive medication).
Reactions of others - contingency management procedures directed towards relative shaping up appropriate coping behaviours.

Long-term consequences - techniques aimed at reversing the effects of chronic headaches such as decreased self-efficacy; depression, insomnia and marital distress; reduced leisure activities, exercise and perceived social support; and lowered self-esteem.

Case 1: Clare

Treatment Plan
1. Education.
2. Relaxation training (progressive relaxation).
3. Cognitive training focussing on maladaptive thoughts and beliefs.
4. Imagery training.
5. Attention-diversion training.
7. Child management training.
8. Modification of lifestyle factors aimed at increasing hobbies and interests.
9. Modification of maladaptive behavioural reactions to headaches.
10. Contingency management procedures targeting husband's responses to headaches.

Treatment Sessions with Clare
1. (a) PAHQ I; (b) Started Daily cards; (c) Given BDI and STAI I.
2. (a) PAHQ II.
3. (a) Jim attended I I (a) Education; (b) Started Change and Control cards.
4. (a) Relaxation training I (8 muscle groups).
5. (a) Relaxation training II (16 muscle groups); (b) Cognitive training for identifying and challenging maladaptive thoughts and beliefs.
6. (a) Cognitive training II; (b) Modification of immediate antecedents; (c) Modification of maladaptive behavioural reactions to headaches.
7. (a) Jim attended II I (a) Contingency management I; (b) Imagery training I; (c) Modification of setting factors; child management training, and increasing hobbies and interests I.
8. (a) Contingency management II; (b) Imagery training II; (c) Relaxation training II (recall and differential relaxation); (d) Cognitive training II; (e) Increasing hobbies and interests, and child management training II.
9. (a) Jim attended III I (a) Contingency management II; (b) Relaxation training V (recall and counting); (c) Imagery training I.
10. (a) Imagery training II; (b) Attention-diversion training.
11. (a) Attention-diversion training III; (b) Cognitive training V; (c) Relaxation training.
12. (a) Jim attended IV I (a) Review of progress, and relapse prevention training; (b) Good BDI and STAI IV; (c) Given BDI and STAI IV; (d) Started Daily cards; (e) Given BDI and STAI IV; (f) Started Change and Control cards; (g) Started Change and Control cards; (h) Started Change and Control cards; (i) Started Change and Control cards; (j) Started Change and Control cards; (k) Started Change and Control cards; (l) Started Change and Control cards; (m) Started Change and Control cards; (n) Started Change and Control cards; (o) Started Change and Control cards; (p) Started Change and Control cards; (q) Started Change and Control cards; (r) Started Change and Control cards; (s) Started Change and Control cards; (t) Started Change and Control cards; (u) Started Change and Control cards; (v) Started Change and Control cards; (w) Started Change and Control cards; (x) Started Change and Control cards; (y) Started Change and Control cards; (z) Started Change and Control cards.
Outcome for Clare

<table>
<thead>
<tr>
<th></th>
<th>Pre-treatment</th>
<th>Post-treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Headaches (Daily cards)</strong></td>
<td>0.41 and 0.49</td>
<td>0.03 and 0.01</td>
</tr>
<tr>
<td><strong>Medication (Daily cards)</strong></td>
<td>3.9 and 4.2</td>
<td>0 and 0</td>
</tr>
<tr>
<td><strong>Depression (BDI)</strong></td>
<td>14 (mildly depressed)</td>
<td>5 (normal range)</td>
</tr>
<tr>
<td><strong>Anxiety (STAI)</strong></td>
<td>75th percentile (state)</td>
<td>57th percentile (state)</td>
</tr>
<tr>
<td><strong>71st percentile (trait)</strong></td>
<td>71st percentile (trait)</td>
<td>60th percentile (trait)</td>
</tr>
</tbody>
</table>

Case II: Frank

Treatment Plan
1. Education.
2. Relaxation training (autogenic training).
3. Cognitive training focusing on maladaptive thoughts and beliefs.
4. Imagery training.
5. Attention-diversion training.
7. Modification of lifestyle factors aimed at increasing hobbies and interests.
8. Training in time management and problem-solving.

Treatment Sessions with Frank
1. (a) PAHQ I; (b) Started Daily cards; (c) Given BDI and STAI I.
2. (a) PAHQ II.
3. (a) Education; (b) Started Change and Control cards.
4. (a) Relaxation training I ("heaviness")
5. (a) Relaxation training II ("warmth"); (b) Cognitive training for identifying and challenging maladaptive thoughts and beliefs I.
6. (a) Cognitive training; (b) Modification of immediate antecedents I.
7. (a) Modification of immediate antecedents II; (b) Modification of setting factors; increasing exercise and leisure activities; time management; problem-solving.
8. (a) Relaxation training III ("cardiac regulation"); (b) Cognitive training III.
9. (a) Relaxation training IV ("respiration"); (b) Imagery training; (c) Given BDI II.
10. [Hazel attended] (a) Relaxation training V ("abdominal warmth"); (b) Review of progress, and relapse prevention training.
### Outcome for Frank

<table>
<thead>
<tr>
<th></th>
<th>Pre-treatment</th>
<th>Post-treatment</th>
</tr>
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<tbody>
<tr>
<td><strong>Headaches (Daily cards)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.72 and 0.64</td>
<td>0.24 and 0.21</td>
</tr>
<tr>
<td><strong>Medication (Daily cards)</strong></td>
<td>3 - 4</td>
<td>&lt; 1</td>
</tr>
<tr>
<td><strong>Depression (BDI)</strong></td>
<td>21 (moderately depressed)</td>
<td>11 (mildly depressed)</td>
</tr>
</tbody>
</table>

### The End!!

"Really, Chang, why don't you just take an aspirin?"