The prevalence, characteristics, impact and management of headache in people with schizophrenia and schizoaffective disorder: A cross sectional cohort study

Joanne Connaughton
University of Notre Dame Australia

Follow this and additional works at: https://researchonline.nd.edu.au/theses

Part of the Physical Therapy Commons, and the Physiotherapy Commons

COMMONWEALTH OF AUSTRALIA
Copyright Regulations 1969

WARNING
The material in this communication may be subject to copyright under the Act. Any further copying or communication of this material by you may be the subject of copyright protection under the Act.
Do not remove this notice.

Publication Details
https://researchonline.nd.edu.au/theses/115

This dissertation/thesis is brought to you by ResearchOnline@ND. It has been accepted for inclusion in Theses by an authorized administrator of ResearchOnline@ND. For more information, please contact researchonline@nd.edu.au.
The prevalence, characteristics, impact and management of headache in people with schizophrenia and schizoaffective disorder: A cross sectional cohort study.

The University of Notre Dame Australia

Joanne Connaughton
Abstract

Headache is the most common pain problem reported by people with schizophrenia, with 12 month prevalence rates of around 50%. Despite this little research has been conducted into the characteristics, impact and management of headaches in this population. There is evidence to support the efficacy of physiotherapy treatment of cervicogenic headache and tension type headache and determining the prevalence, impact and current management of these types of headache was of particular interest.

A pilot study was first undertaken to identify and refine an appropriate headache questionnaire, develop an algorithm to use for classification of headache and test the repeatability and reliability of using the algorithm to classify headache types. A previously validated questionnaire was identified and slightly modified for the mental health population. A two part algorithm, which utilized information from the questionnaire, was designed to classify headaches into cervicogenic (CGH), migraine (MH) or tension type (TTH) headache against the International Classification of Headache Disorder criteria. Participants whose headache characteristics did not enable them to be classified into one of these three categories were coded as Other Headache (OH) type. A convenience sample of 12 chronic headache sufferers not currently receiving care for their headache completed the questionnaire on two occasions, separated by 6-weeks. On each occasion two independent reviewers used the algorithm to characterise the headache type. The algorithm was shown to have high inter rater reliability (weighted-κ=.827) and moderate test re-test reliability (weighted-κ=.636).

A cross-sectional observational cohort study of people with schizophrenia or schizoaffective disorder was then undertaken to determine the prevalence, characteristics, impact and management of headache in this population. Using the validated headache questionnaire, data was collected about headache prevalence and characteristics from 100 consecutive people diagnosed with schizophrenia or schizoaffective disorder. Headaches were classified using the algorithm by two independent reviewers and any disagreement settled by consensus. Clinical information, demographic data and information on current management of headache
was collected and questions from the SF-36 questionnaire were included to assess quality of life.

Males made up 66% of the sample cohort. The mean age of participants was 38.8 years and on average participants had been diagnosed with schizophrenia or schizoaffective disorder for 14.6 years. The most common comorbid physical illness was diabetes. All participants were taking antipsychotic medication, with 66/100 people taking some form of medication that listed headache as a common or very common side effect.

Twelve month prevalence of headache (57%) was slightly higher than in the general population (46%). The two reviewers demonstrated excellent agreement on headache classification (weighted-$\kappa=.85$). Prevalence of CGH (5%) and MH (18%) were comparable to the general population and TTH had a much lower prevalence (16%) than that found in the general population (42%). OH was the most prevalent (19%).

When considering the whole population we found no evidence of a relationship between mental health clinical characteristics and the presence of headache. The presence of any headache was not related to inpatient/outpatient status (OR=2.07, 95% CI [0.92-4.68]), length of time from diagnosis of mental illness (OR=0.99, 95% CI [0.95-1.03]) or taking medication with a side effect of headache (OR=0.94, 95% CI [0.40-2.19]). Similarly, there was no relationship between clinical status and the individual specific headache types. These data suggest that the specific headache types are independent of the mental health problem. We did find an association between OH type and medication use (OR=0.32, 95% CI [0.11-0.90]) and inpatient/outpatient status (OR=5.76, 95% CI [1.74-19.07]), suggesting those whose headache is not classifiable using International Headache Society (IHS) criteria might be suffering from headache which is secondary to their mental health problems.

A similar analysis was undertaken utilising only data from the headache population. These data suggest that there is a relationship between age and CGH (OR=1.14, 95% CI [1.01–1.29]), medication use and MH (OR=6.14, 95% CI [1.24-30.44]) and inpatient/outpatient status and TTH (OR=0.28, 95% CI [0.08-0.95]) when considering only those people who suffer from headache.
The quality of life of headache sufferers in this cohort was lower than seen in healthy populations. Importantly, the frequency of headache was shown to be negatively correlated with Social Functioning ($\rho = -0.44, p < 0.001$), Bodily Pain ($r = -0.44, p < 0.001$) and Role Physical ($\rho = -0.32, p = 0.01$), suggesting that headache may contribute to the reduced quality of life experienced by people with mental health problems. It was evident that very few people were receiving appropriate treatment for their headache. No participant with MH had been prescribed migraine specific medication and physiotherapy was not included in the management of headache of any participant with CHG or TTH. It is recommended that better education is provided for both patients and mental health workers about headache and its management as well as the role of physiotherapy in managing the physical health and mental wellbeing of people accessing mental health services.
Declaration of Authorship

This thesis is the candidate’s own work and contains no material which has been accepted for the award of any degree or diploma in any other institution.

To the best of the candidate’s knowledge, the thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Candidate’s name Joanne Connaughton

Candidate’s signature

Date
Acknowledgements

I would like to acknowledge the wonderful support and patience of my husband Brian who graciously accepted my spending the majority of weekends tinkering in my ‘shed’. At times this has given him leave to work in his own motorcycle shed but there have been many months over the last three and a half years where it must have been very been tedious for him.

A big thank you goes to the best supervisor, Professor Benedict Wand, who agreed to take on supervision of a project that sat outside his comfort zone. Without your amazing guidance and input I would never have completed this project, nor learnt so much in the process.

Thank you to Professor Max Bulsara. You blow me away with your statisticians mind!

Special mention goes to Professor Peter Hamer who encouraged me to undertake my Professional Doctorate and has supported me throughout.

And my children and their partners and my darling grandson Noah, hopefully now this is finished I’ll be available to spend some more time with you all.
List of Tables

Table 1  CHISG Characteristics of CGH
Table 2  ICHD Characteristics of MH without Aura
Table 3  ICHD Characteristics of TTH
Table 4  Chances of developing schizophrenia
Table 5  Frequency of headaches
Table 6  Logistic Regression predicting likelihood of headache
Table 7  Prevalence of headache by classification
Table 8  Univariate models for explanatory variables for CGH in the total population
Table 9  Univariate models for explanatory variables for CGH in the headache only population
Table 10  Logistic Regression predicting likelihood of CGH by age in headache only population.
Table 11  Univariate models for explanatory variables for MH in the total population
Table 12  Logistic Regression predicting likelihood of MH by medication, age and LOI in total population.
Table 13  Univariate models for explanatory variables for MH in the headache only population
Table 14  Multivariate logistic regression for impact of medication, age and LOI on MH within the headache only population
Table 15  Univariate models for explanatory variables for TTH in the total population
Table 16  Univariate models for explanatory variables for TTH in the headache only population
Table 17  Univariate models for explanatory variables for OH in the total population
Table 18  Logistic Regression predicting likelihood of OH by medication and inpatient/outpatient status in total population.
Table 19  Univariate models for explanatory variables for OH in the headache only population
Table 20  Logistic Regression predicting likelihood of OH by medication and inpatient/outpatient status in headache only population.
Table 21  Association to hospital admission based on headache classification
Table 22  Management of Headache
List of Figures

Figure 1 Algorithm for headache classification
Figure 2 Mechanism of pain referral from the cervical spine to the head
Figure 3 Neurodevelopmental model of schizophrenia
Figure 4 Flow chart of recruitment rate in inpatient and outpatient settings
Figure 5 People approached and participated by setting and gender
Figure 6 Age distribution of participants
Figure 7 BMI distribution of participants
Figure 8 Comparisons of BMI in the general population, people living with psychotic illness population and the sample population.
Figure 9 Length of time since diagnosis of mental illness
Figure 10 Length of time participants have been experiencing headaches
Figure 11 Length of time headache lasts in hours
Figure 12 Average headache pain intensity scores
Figure 13 Medication with headache as side effect
Figure 14 High/low and mean/median scores of BP, SF and RP
Figure 15 Mean score for BP, and median score for SF and RP of each headache classification
A Pilot Study to identify and refine an appropriate questionnaire for data collection of headache symptoms and to develop and evaluate repeatability and inter-rater reliability of an algorithm to guide headache classification......................... 8

1.1 Introduction................................................................................. 8

1.2 Review of Literature...................................................................... 8

1.2.1 Questionnaires for research....................................................... 8

1.2.2 Differential classifications of headaches and development of an algorithm........................................................................... 12

1.3 Method...................................................................................... 16

1.3.1 Design.................................................................................. 16

1.3.2 Tools................................................................................ 16

1.3.3 Procedure........................................................................ 19

1.3.4 Analysis of Data ................................................................ 20

1.4 Results................................................................................... 20
CHAPTER TWO ................................................................. 26

Introduction ............................................................................. 26

2.1 Topic and purpose............................................................... 26

2.2 Background ....................................................................... 28

2.3 Potential significance......................................................... 30

2.4 Research Questions............................................................ 33

CHAPTER THREE .................................................................... 34

Review of Literature ............................................................... 34

3.1 Overview of Headache....................................................... 36

3.1.1 Prevalence of headache in the general population .......... 37

3.1.2 Prevalence of headaches in people with schizophrenia and schizoaffective disorder ............................................. 40

3.2 Cervicogenic Headache .................................................... 43

3.2.1 Prevalence of CGH........................................................ 43

3.2.1 Clinical characteristics of CGH....................................... 43

3.2.3 Mechanisms behind CGH............................................. 44

3.2.4 Management of CGH.................................................... 49

3.3 Migraine Headache ............................................................ 51

3.3.1 Prevalence of MH........................................................ 52

3.3.2 Clinical Characteristics of MH................................. 52
3.3.3 Mechanisms behind MH ................................................................. 54
3.3.4 Management of MH ................................................................. 55
3.4 Tension Type Headache................................................................. 59
  3.4.1 Prevalence of TTH ................................................................. 59
  3.4.2 Clinical characteristics of TTH .................................................... 59
  3.4.3 Mechanisms behind TTH ......................................................... 60
  3.4.4 Management of TTH ............................................................. 61
3.5 Overview of Schizophrenia and schizoaffective disorder ............ 63
  3.5.1 Prevalence of schizophrenia and schizoaffective disorder ......... 64
  3.5.2 Clinical Characteristics of schizophrenia and schizoaffective disorder
                                                64
  3.5.3 Mechanism behind schizophrenia and schizoaffective disorder ..... 65
  3.5.4 Management of schizophrenia and schizoaffective disorder ...... 68
  3.5.5 Pain and schizophrenia ......................................................... 69
  3.5.6 Posture and schizophrenia ..................................................... 73
3.6 Managing the physical health of people with mental illness and role of
Physiotherapy ...................................................................................... 74
3.7 Factors affecting quality of life ...................................................... 76
  3.7.1 Impact of headache on quality of life ....................................... 76
  3.7.2 Impact of schizophrenia and schizoaffective disorder on quality of life
                                                78
  3.7.3 Impact of headache on quality of life of people with mental illness 79
3.8 Summary of literature review ...............................................................79

CHAPTER FOUR ......................................................................................... 82

Design and Methodology ............................................................................. 82

4.1 Study Design ......................................................................................... 82

4.1.2 Participants ....................................................................................... 82

4.2 Procedure ............................................................................................. 84

4.2.1 Demographics and Clinical characteristics ................................. 85

4.2.2 Headache characteristics ............................................................... 85

4.2.3 Headache impact ............................................................................. 86

4.2.4 Headache Classification ................................................................. 87

4.3 Data Analysis ....................................................................................... 87

4.3.1 Preparing and processing data ..................................................... 87

4.3.2 Analysing data ................................................................................ 88

CHAPTER FIVE ............................................................................................ 90

Results ........................................................................................................... 90

5.1 Participation ......................................................................................... 90

5.2 Demographics .................................................................................... 91

5.3 Headache characteristics ................................................................. 96

5.4 Relationship between clinical characteristics and headache ........ 99

5.5 Headache classification ..................................................................... 102

5.6 Relationship between clinical characteristics and specific headache types 103
5.6.1 – Cervicogenic Headache................................................................. 103
5.6.2 – Migraine Headache ....................................................................... 105
5.6.3 – Tension Type Headache ............................................................... 108
5.6.4 – Other Headache ........................................................................... 110
5.5 Hospital admission ............................................................................. 113
5.6 Quality of Life ..................................................................................... 114
  5.6.1 Impact of headache on QOL............................................................ 114
  5.6.2 Impact of specific headache on QOL ............................................... 115
5.7 Management ....................................................................................... 116

CHAPTER SIX ............................................................................................. 118

Discussion of findings............................................................................... 118

6.1 Summary of results ........................................................................... 118
6.2 Participants and recruitment ............................................................... 119
  6.2.1 Demographics of the sample population ....................................... 121
6.3 Prevalence of headache ..................................................................... 123
6.4 Clinical characteristics and headache ............................................... 125
  6.4.1 Gender and headache ..................................................................... 125
  6.4.2 Age and Headache ......................................................................... 126
  6.4.3 Age of onset of headache ............................................................... 126
  6.4.4 Chronicity of illness and headache ............................................... 126
  6.4.5 Medication and headache ............................................................. 127
  6.4.6 Inpatient/outpatient status, BMI, diabetes and headache .......... 127
7.3 Pain management (including headache) is less important than psychiatric management

7.4 Pain (including headache) as a symptom of a person’s psychotic mental illness

7.5 No understanding of the impact of headache on QOL

7.6 No understanding about how headache can be managed

7.7 Non self-reporting of the presence of pain

7.8 Difficulty accessing services

7.9 Financial constraints

CHAPTER EIGHT

Limitations, considerations, recommendations and conclusion

8.1 Limitations and considerations for future research

8.2 Recommendations for clinical practice

8.3 Conclusion

APPENDIX ONE

APPENDIX TWO

APPENDIX THREE

APPENDIX FOUR

APPENDIX FIVE

REFERENCES
CHAPTER ONE

A Pilot Study to identify and refine an appropriate questionnaire for data collection of headache symptoms and to develop and evaluate repeatability and inter-rater reliability of an algorithm to guide headache classification.

1.1 Introduction

Knowledge of the headache sufferer’s symptoms gathered from a comprehensive history, provides the clinician with essential information about the headache characteristics and enables classification of the headache against the International Headache Society’s (IHS) International Classification of Headache Disorder (ICHD) framework. Headache questionnaires are widely accepted tools commonly used to elicit this information, especially in the research environment. The purposes of this pilot study were threefold, firstly to identify and refine an appropriate headache questionnaire for data collection within the schizophrenic and schizoaffective disorder population, secondly to develop an algorithm to guide headache classification based on data collected from the questionnaire and thirdly to evaluate the repeatability and inter-rater reliability of the process of classifying headache using the questionnaire and algorithm. Headaches were to be classified into cervicogenic headache (CGH), migraine headache (MH), tension type headache (TTH) and a classification of other headache (OH) for all headaches that did not fit the other three classifications.

1.2 Review of Literature

1.2.1 Questionnaires for research

There are many forms of headache with very different mechanisms underpinning symptom production. Correct classification of the headache type is essential if the clinician is to provide appropriate and effective treatment for the headache sufferer. Only with a thorough assessment will the clinician collect the evidence required to guide effective clinical reasoning and reach the correct classification or diagnosis (Liebert, Rebbeck, Elias, Hawkins, & Adams, 2013; Stovner et al., 2007; Zito, Jull, & Story, 2006). In clinical practice, physiotherapists initially undertake a comprehensive
subjective assessment of all people presenting with headache, including but not limited to pain characteristics and distribution, associated symptoms, aggravating and easing factors, headache behaviour and progression, functional limitations and management strategies. Most of the diagnostic power in headache classification is found in information obtained from the subjective assessment, though in some instances additional information from the physical examination can aid the diagnostic process. However, the physical examination is generally utilised to provide clinicians with information about contributing factors to the clinical condition, information that is more important for treatment planning than diagnosis.

When headaches are being investigated for research a definitive knowledge of contributing factors is not always essential, mitigating the necessity for a full physical assessment. For this reason stand-alone questionnaires have been designed to collect participants subjective information to provide investigators with appropriate clinical information that will guide classification of headache against the ICHD framework (Borhani Haghighi, Aflaki, & Ketabchi, 2008; Dong et al., 2012; Jull, Amiri, Bullock-Saxton, Darnell, & Lander, 2007; Li et al., 2012; Pfaffenrath et al., 2009; Queiroz et al., 2009; Sjaastad, 2008; Zielman, Veenstra, Zwet, & Berg, 2012).

The World Health Organisation (WHO), Lifting the Burden; The Global Campaign to Reduce the Burden of Headache worldwide study exposed shortcomings and inconsistencies between headache studies (Stovner et al., 2014). An expert consensus group was subsequently formed and conducted a review of headache surveys with the aim to provide recommendations to improve the quality of future studies exploring headache prevalence and burden. The expert group suggested guidelines to encourage uniformity in research and thus allow for comparison between studies (Stovner et al., 2014). The review identified that most questionnaires collect data based on the ICHD classification system and recommended that this be the standard. This requires collecting data on severity, duration, location and frequency of headache, associated symptoms as well as aggravating and alleviating symptoms of headaches. Recommendations from their review include:

- Reduce bias by ensuring the sample selection represents the population of interest
- Reduce bias by ensuring all interviews follow the same protocol
• If it is not possible for all interviews to be administered by the same person ensure that bias is reduced through adequate training of all interviewers

• Report participation rate as the proportion of eligible people who were contacted and engaged in a meaningful way in the study

• The study instrument (questionnaire) should be suited to the purpose of the study and capture the necessary data and include
  o Identification
  o Demographics of at least age and gender
  o Screening questions (do you have headache or not)
  o One year prevalence of headache
  o Diagnostic questions on headache that explore severity, duration, location, frequency, associated symptoms, aggravating and alleviating symptoms
  o Gathering information on only one headache type per questionnaire. Participants should identify and provide information on their most bothersome headache first and then complete a separate questionnaire of other headache types
  o Elements of burden related to the purpose of the study must be measurable

• The questionnaire should be prepared and tested

• The questionnaire should be validated to prove diagnostic capability

• An algorithm developed against the ICHD criteria must be developed and used for classification purposes after the questionnaire is completed.

Many questionnaires also gather information on medication use and comorbidities (Borhani Haghighi et al., 2008; Dong et al., 2012; Jull et al., 2007; Li et al., 2012; Pfaffenrath et al., 2009; Queiroz et al., 2009; Sjaastad & Bakketeig, 2008b; Zielman et al., 2012). Dong et al., (2012) and Jull et al. (2007) included questions about previous treatments for headache and family history of headache. A study by Li et al. (2012) also included questions on quality of life exploring any perceived restriction on daily and social activities caused by the headache. The majority of questionnaires used in research about headache also gather information about socio-demographics and utilisation of healthcare systems.
Pfaffenrath et al. (2009) suggest that questionnaires should be administered face-to-face so that clarification could be provided around misunderstanding of questions. This is in line with the recommendation by Stovner et al. (2014). Many other studies have also used this method (Borhani Haghighi et al., 2008; Dong et al., 2012) although one study conducted in Brazil and another in Germany used a questionnaire administered over the telephone which may have impacted on results (Queiroz et al., 2009; Radtke and Neuhauser, 2009). To reduce recall bias most studies met the recommendations and were conducted on people who had experienced headache in the previous twelve months (Pfaffenrath et al., 2009; Queiroz et al., 2009).

Any headache questionnaire being used to classify headache in order to determine prevalence, should have high agreement between the questionnaire classification and the eventual diagnosis (Hagen, Zwart, Vatten, Stovner, & Bovim, 2000; Jull et al., 2007; Stovner et al., 2014). Jull et al. (2007) developed and validated such a questionnaire to classify headache types based on symptoms described by the ICHD.

This questionnaire was designed to collect information about the frequency and intensity of headache as well as specifics about the location of pain, associated pain, accompanying symptoms, possible triggers and possible measures that provide relief of symptoms. The tool was used to collect data on characteristics of headache in order to classify intermittent MH with and without aura, TTH, medication overuse headache and CGH. To validate that the tool was able to distinguish between CGH and other headache types, after the headache was classified Jull and colleagues conducted a physical examination to determine presence or absence of cervical musculoskeletal impairments. The purpose was to find if there was a specific pattern of musculoskeletal impairments in CGH that could differentiate it from other headache types. To test inter-rater reliability of the questionnaire, using an algorithm to guide classification, two researchers and a neurologist independently classified headache types of 11 people and compared classifications. There was 82% agreement (9/11). The validity of the questionnaire was supported by two studies both of which showed clear differences in neuro-musculoskeletal impairment in the upper cervical spine of subjects classified as having CGH compared to those with an alternative classifications (Amiri, Jull, Bullock-Saxton, Darnell, & Lander, 2007; Jull et al., 2007).
1.2.2 Differential classifications of headaches and development of an algorithm

For research purposes an algorithm is important to aid classification of headache and it must be developed applying the criteria of the ICHD (Stovner et al., 2014). The algorithm must be sensitive enough to differentiate each headache into only one classification but at the same time comprehensive enough to be able classify every case (Stanton et al., 2011).

It is evident that there is considerable overlap of clinical symptoms across CGH, MH and TTH (Fleming, Forsythe, & Cook, 2007; Frese & Evers, 2008; Sjaastad & Bakketeig, 2008a; Zito et al., 2006). Thirty percent of people with CGH meet ICHD criteria for MH and 3% of people with CGH meet the criteria for TTH (Hall, Briffa, & Hopper, 2008). Neck pain, which is considered a key indicator of CGH is also reported by 70% of headache patients with mixed intermittent headache (Hall et al., 2007) and 69% of patients with MH (Florencio et al., 2014). Pfaffenrath et al. (2009) describe this situation of headache types not being mutually exclusive as a major problem of the ICHD classification system.

Given the overlap between characteristics in different headache types it is clear that simple data collection is not enough to enable classification, and clinical reasoning of all data presented is required. Algorithms and other decision making tools have been used in previous studies to assist clinical decision making and guide classification. For headache studies the algorithm used must be comprehensive enough to facilitate classification of headache type into only one classification. As with the development of algorithms to classify back pain, an algorithm to guide classification of headache type from questionnaire responses may require an hierarchical system of criteria to help determine ‘best’ fit (Stanton et al., 2011; Stovner et al., 2014). Stovner et al. (2014) suggest that secondary headache should be diagnosed before primary headache and migraine should be diagnosed before TTH. A classification of migraine should only be given when all key criteria are met (Stovner et al., 2014).

The first step to developing such an algorithm is identifying key defining characteristics of each headache type. Tables 1, 2 and 3 list the defining characteristics for CGH, MH and TTH used to develop the algorithm for this study. Table 1 lists
defining characteristics for CGH based on the classification developed by Sjaastad and the Cervicogenic Headache International Study Group (CHISG) in 1990 (Fleming et al., 2007).

All people aged between 18 and 65 years in the town of Våga in Norway (n=2075) were invited to participate in a study exploring differences between MH without aura and CGH. There was a response rate of 88.6% (1838/2075). It was identified that CGH is the only headache where people present with unilateral pain starting posteriorly in the neck and moving anteriorly to the frontal region (Sjaastad & Bakketeig, 2008). Antonaci and Sjaastad (2011) reported cervicogenic headache almost always presents with unilateral pain, decreased neck range of motion, ipsilateral shoulder and/or arm pain brought on by either awkward neck position or pressure on the occipital structure.

Table 1 - CHISG Characteristics of CGH
Reproduced from Fleming et al. 2007.

<table>
<thead>
<tr>
<th>CHISG DIAGNOSTIC CRITERIA FOR CGH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> Signs and symptoms of neck involvement:</td>
</tr>
<tr>
<td>a. Precipitation of head pain similar to the usually occurring one:</td>
</tr>
<tr>
<td>1. By neck movement and/or sustained awkward head posturing, and/or</td>
</tr>
<tr>
<td>2. By external pressure over the upper cervical or occipital region on the symptomatic side</td>
</tr>
<tr>
<td>b. Restriction of the range of motion (ROM) in the neck</td>
</tr>
<tr>
<td>c. Ipsilateral neck, shoulder, or arm pain of a rather vague non-radicular nature or, occasionally, arm pain of a radicular nature</td>
</tr>
<tr>
<td><strong>B</strong> Confirmatory evidence by diagnostic anaesthetic blockades</td>
</tr>
<tr>
<td><strong>C</strong> Unilaterality of head pain without side shift.</td>
</tr>
<tr>
<td>For a diagnosis of CGH to be appropriate, one or more aspects of Point 1 must be present, with 1a sufficient to serve as a sole criterion for positivity or 1b and 1c combined.</td>
</tr>
</tbody>
</table>

Migraine with aura headache is distinguished from most other headaches by the associated visual and/or sensory aura. Flickering lights, spots in the field of vision,
numbness or pins and needles may be present and importantly are all fully reversible within 60 minutes (Hall et al., 2008). The headache associated with migraine with aura is normally unilateral with severe pulsating pain lasting 24 to 72 hours. In the case of migraine without aura the headache also usually presents as unilateral, pulsating or throbbing, moderate to severe pain lasting between 24 and 72 hours.

The onset of most MH is anterior in the head and is only infrequently brought on by neck position, unlike CGH. In MH pain is aggravated by activities such as climbing stairs, standing from a lying position or bending from an upright position. Nausea, photophobia, phonophobia, heightened sensitivity to smell, cognitive, emotional and motor disturbances may also be present (Noseda & Burstein, 2013). MH sufferers report nausea, photophobia, phonophobia, and pulsating pain more frequently than any other headache group. Like Stovner et al. (2007), for the purposes of prevalence of MH we did not differentiate between migraine with aura and migraine without aura as they are not too dissimilar in terms of aetiology and impact on the individual.

**Table 2 – ICHD Characteristics of MH without Aura**

<table>
<thead>
<tr>
<th>CHARACTERISTICS OF MIGRAINE WITHOUT AURA</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>D</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>E</td>
</tr>
</tbody>
</table>
Tension Type Headache is a headache that has a diverse clinical profile, however the most classical symptoms include band like, mild to moderate, bilateral pressing or tightening pain lasting from between 30 minutes to 7 days. TTH are aggravated by stress and normal physical activity does not classically aggravate symptoms. Nausea, vomiting, photophobia and phonophobia are not normally associated with TTH, however, if the headaches are chronic in nature then these symptoms may be present in a mild form thus complicating the classification process. In some studies TTH has been diagnosed by an absence of features found in other headache types or as a headache of just head pain with no other features (Fumal & Schoenen, 2008). In this study we have chosen to define TTH based on the ICHD guidelines. During this study headache not fitting any of the above criteria for CGH, MH or TTH were classified as OH.

**Table 3 – ICHD Characteristics of TTH**


<table>
<thead>
<tr>
<th>CHARACTERISTICS OF TENSION TYPE HEADACHE (INFREQUENT EPISODIC TYPE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
</tr>
<tr>
<td><strong>B</strong></td>
</tr>
<tr>
<td><strong>C</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>D</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>E</strong></td>
</tr>
</tbody>
</table>
1.3 Method

1.3.1 Design

We conducted a longitudinal cohort study on 12 people with known history of headache within the previous 12 months. This study received institutional ethics approval and all participants provided written informed consent.

1.3.2 Tools

Knowing that the questionnaire used by both Jull et al. (2007) and Amiri et al. (2007) was a validated tool it was taken to two experts in the psychiatric field, a Consultant Psychiatrist and a Mental Health Nurse who both worked across the acute inpatient hospital setting, the community setting and on the Psychiatric Emergency Response Team. Both experts reviewed the questionnaire for its suitability for use with people with schizophrenia and schizoaffective disorder. Both identified that the questionnaire was lengthy but felt that all bar one of the statements/comments exploring the possibility of migraine headache was suitable for this population. It was suggested to change the words ‘visual aura’ to ‘flashing or zigzag light’ as the words visual aura has specific connotations in the psychiatric community and may easily be misinterpreted.

Based on the fact that this was a validated questionnaire and it was deemed appropriate for people with schizophrenia and schizoaffective disorder by mental health practitioners and following consultation with Professor Gwen Jull it was decided to use what will be referred to as the ‘Jull headache questionnaire’ as the basis for data collection and classification for this current study. At the time this decision was made the recommendations from Stovner et al. (2014) had not been published but it is reassuring to know that the Jull questionnaire met their recommendations for headache questionnaires.

Questions were added to the pilot study questionnaire to gather data on the basic demographics of age, gender and current medication of participants. The word ‘aura’ was changed according to the expert’s suggestions. A copy of the final questionnaire used in the main study can be found in Appendix 1.
As is evident from the literature there are some defining characteristics unique to each headache type as well as many characteristics that are similar across headache types. No one characteristic in isolation can define a headache diagnosis. An algorithm is required to assist with the clinical decision making process and allow for classification of headaches based on the individual’s signs and symptoms as identified in their questionnaire responses. Researchers have developed algorithms to aid headache classification but these were not appropriate to be used in this study as the combination of specific headaches types chosen for classification did not match. The algorithm for this study required researchers to differentiate between the primary headaches of MH with and without aura and TTH, the secondary headache of CGH as well as allow for classification of OH for all headaches that could not be classified as MH, TTH or CGH. It is anticipated that within this population some of these OH may be headache attributed to psychiatric disorder or medication related headache.

An algorithm (Figure 1) was designed to assist with the classification of headaches based on the ICHD classification for MH and TTH and the CHISG classification for CGH. OH included headache that did not fit the classification for either MH, TTH or CGH. Once completed this algorithm was reviewed by Professor Gwen Jull who determined that it was a suitable tool to aid classification and suggested no changes were required.

The algorithm (Figure 1) was developed to be sensitive enough to allow classification of each participant’s headache into only one headache type but ensure that every headache could be classified (Stanton et al., 2011). It was divided into two sections. Part A included characteristics that were definitive of ‘classic’ CGH, MH or TTH. In the instance when responses to the questionnaires met all characteristics within Part A, then the headache could be classified without having to proceed to Part B. Part B included more detailed information derived from the ICHD, the CHISG and clinical studies to facilitate clinical reasoning and enable classification. It was expected that only a few participants would have ‘classic’ symptoms and that the information in Part B would be required for clinical reasoning to classify the majority of headaches.
**Figure 1 – Algorithm for headache classification**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the headache unilateral and side locked, precipitated by neck movement and/or sustained awkward neck position and pain starts in neck?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Migraine Headache with aura</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does this person have unilateral, moderate to severe, pulsating/throbbing, time locked pain which prohibits activity with associated aura?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tension Type Headache</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Which classification best does the patient best suit?**

<table>
<thead>
<tr>
<th>CGH Defining factors</th>
<th>Migraine Defining factors</th>
<th>TTH Defining factors</th>
<th>Other Defining factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less episodic</td>
<td>Lasting 4-72 hours</td>
<td>lasting 30 min – 7 days</td>
<td></td>
</tr>
<tr>
<td>Chronic/continuous</td>
<td>Episodic</td>
<td>Less episodic</td>
<td></td>
</tr>
<tr>
<td>*Unilateral without side shift</td>
<td>Time locked</td>
<td>Chronic/continuous</td>
<td></td>
</tr>
<tr>
<td>Starts in neck</td>
<td>Fronto-temporal location</td>
<td>Starts in head</td>
<td></td>
</tr>
<tr>
<td>Neck stiffness/injury</td>
<td></td>
<td>At least 2 of the following</td>
<td></td>
</tr>
<tr>
<td>Headache precipitated by 1 or more of *Neck movement *sustained awkward head position *pressure over upper cervical or occipital region on symptomatic side Ipsilateral neck, shoulder or arm pain Varying duration of moderate – severe pain Ache/ sharp/ non-throbbing, non-lancinating pain or fluctuating continuous pain May have associated nausea, photophobia or phonophobia, dizziness, ipsilateral blurred vision, difficulties swallowing, ipsilateral eye oedema, Aggravated by sport/exercise, stress Relief with hot packs, neck exercises, change of position, massage, relaxation</td>
<td>2 of the following *Unilateral *Pulsating/throbbing/sharp/stabbing *Moderate to severe *Aggravated by routine exercise, food, environment, stress, At least one of the following *Nausea/Vomiting photophobia or phonophobia May have associated fully reversible aura including visual –flickering lights, spots, lines or loss of vision Sensory-pins and needles, numbness Relief with medication, rest</td>
<td>Both of the following *no nausea/vomiting *no more than one of photophobia or phonophobia Unless chronic then mild nausea may be associated</td>
<td>Motor weakness</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Triggered by medication</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inconsistent characteristics of other three headache types</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aggravated by food, alcohol, lifestyle, environment, stress</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Eased by alcohol, street drugs</td>
</tr>
</tbody>
</table>

*CGH: Cervicogenic Headache, TTH: Tension Type Headache*
1.3.3 Procedure

A convenience sample of twelve people without schizophrenia or schizoaffective disorder known to have experienced a headache in the last 12 months were invited to complete the questionnaire. The inclusion criteria for participation in the pilot study were being over 18 years of age, proficient in written English and having experienced regular headache within the previous 12-months. Participants were excluded if they were unable to provide consent or reported any major extant medical condition for which headache was a likely symptom. Participants meeting selection criteria were given the questionnaires to complete. The questionnaires were de-identified for the purpose of classification.

To establish the headache classification for each participant the principal researcher and one other physiotherapist (raters) independently reviewed the questionnaires and using the algorithm to guide clinical reasoning, classified each participant’s headache type. Results were compared. Where there was disagreement on classification of a participant’s headache type, discussion was undertaken to reach consensus agreement between the two raters. If consensus could not be reached a third physiotherapy expert was to be consulted to enable final adjudication. Following this process the algorithm was reviewed by both raters and any changes deemed necessary to improve classification were made.

The same twelve people were asked to complete the same questionnaire again 6 weeks later. Following the guidelines determined by Peat (2002) to test repeatability

- the questionnaire was administered in an identical way
- the participants were blinded to initial results
- a short enough time had elapsed so that the condition had not changed but long enough time that the respondent could not remember their original answers.

A further six weeks elapsed (12 weeks in total) before the raters once again independently classified the headaches using the revised algorithm. Classifications were compared and after this a consensus classification was assigned to each participant using the process outlined above. It was decided that 12 weeks was an adequate time to elapse so that the raters would not be able to remember the previous classification allocated to each participant (Peat 2002).
Inter-rater reliability of the algorithm was determined by evaluating agreement between the two raters across all 24 completed questionnaires. Test/retest reliability of the tool was determined based on agreement of the consensus headache classification for the first questionnaire to consensus classification for the repeat questionnaire.

At the end of this process the raters reviewed the algorithm against the disagreed questionnaires from both rounds and discussed their interpretations in a process of moderation. Some minor adjustments were made to the algorithm in an attempt to clarify the points of difference.

1.3.4 Analysis of Data
Each participant was allocated an individual identification number (ID) for the first and second rounds. Continuous data was checked for normal distribution. Descriptive statistics were used to describe the participant characteristics. The Kappa Measure of Agreement was used to quantify agreement between raters across all 24 questionnaires. To evaluate the test-retest reliability of the tool, comparison of the agreed classifications for the first questionnaire were compared against those for the second questionnaire also using the Kappa Measure of Agreement. In keeping with Peat (2002) a value of 0.5 was used to represent moderate agreement, greater than 0.7 to represent good agreement and greater than 0.8 to represent very good agreement.

1.4 Results
There were 4 males and 8 females in the pilot study with an age range from 17 years to 56 years and a mean age of 39.8 years (SD=11.8 years). One person had a comorbid medical condition and was taking medication for this. The medication had a possible side effect of headache.

Agreement between raters was 87.5% with consensus reached on 21 out of 24 headache classifications. One rater classified 8/24 headache as MH, 7/24 as TTH, 6/24 as CHG. and 3/24 as OH while the other rater identified 8/24 as MH, 7/24 as TTH, 7/24 as CHG. and 2/24 as OH. The Kappa Measure of Agreement value was 0.83, 95% CI [0.65-1.00] indicating very good agreement according to Peat (2002).
In the first round of testing 3/12 of the participants were classified CGH, 5/12 were classified MH and 4/12 were classified TTH. In the second round classifications were 4/12 CGH, 5/12 MH, 2/12 TTH and 1/12 OH. Three of the 12 participants were classified differently across the two time points. The Kappa value for agreement between the two rounds was 0.636, 95% CI [0.28-0.99] indicating moderate test retest reliability across a six week interval.

1.5 Discussion

The purpose of this pilot study was to identify and refine an appropriate questionnaire for data collection of headache symptoms and to develop and evaluate test-retest reliability and inter-rater reliability of an algorithm to guide headache classification into CGH, MH, TTH and OH. The ‘Jull headache questionnaire’ was identified as a suitably validated questionnaire to use to gather clinical information to allow classification of headache within the general population. Two independent mental health practitioners deemed the ‘Jull questionnaire’ appropriate for use with people with schizophrenia and schizoaffective disorder with one minor adjustment to wording to clarify aura in the headache context. The experts identified that the tool was lengthy and cautioned that participants with schizophrenia or schizoaffective disorder may have trouble completing it. After discussions around any possible changes that could reduce the length of the questionnaire it was determined that any significant modification would impact on its validity. The experts agreed with the decision and gave endorsement to use it in the main study with a suggestion that the researcher be present and participate in the interview process rather than give the questionnaire to participants to complete independently. The participants for this pilot study, however, did not have schizophrenia or schizoaffective disorder and so while experts had considered the questionnaire suitable for this population it was not piloted on this population. Although not available at the time it was subsequently determined that this questionnaire met the recommendations of an expert group about the design of headaches questionnaires to be used for research purposes (Stovner et al., 2014).

Based on classification research from the low back pain field (Stanton 2012) a two part algorithm was developed to assist with specific classification of headache being used in this study. The algorithm was designed using the ICHD and CHISG criteria to guide
the researchers in decision making for headache classification. Professor Jull, a world leader in headache diagnosis and management, reviewed and approved the algorithm before testing. Trials of the algorithm were encouraging with very good agreement between the two raters with consensus reached on 21 out of 24 headache classifications. There was a moderate test retest reliability of the questionnaire across a six week interval.

To determine prevalence and characteristics of headaches for research purposes it is imperative that validated and reliable tools are available. This includes both a questionnaire to gather information about history and characteristics to enable accurate classification as well as a reliable algorithm to guide clinical reasoning for classification against the ICHD (Liebert et al., 2013; Stovner et al., 2014; Zito et al., 2006). In this pilot study the algorithm was required to distinguish between CGH, MH and TTH. Unlike some previous studies TTH was not classified as being an absence of symptoms of MH (Kuritzky et al, 1999). The algorithm allowed for a classification of OH, a headache type that would not meet the characteristics of CGH, MH or TTH, but one that might be particularly important to consider in the mental health population given the potential medication side effects and the influence of the psychiatric condition. OH covers a range of headaches and no attempt was made to further classify this headache type. Understanding that some headache types that are not CGH, MH or TTH could be potentially serious medical conditions such as brain tumours or cardiovascular accidents, care was taken to review the characteristics to ensure no action was required to assure the safety of the participant.

The first step towards developing the algorithm was to reference the ICHD and the CHISG to identify characteristics that differentiate headache types. This process emphasised the similarities and cross-over between characteristics of various headache types and highlighted the difficulties associated with classifying headaches. Examples of similarities identified included characteristics such as the presence of neck pain in MH or TTH (Florencio et al., 2014; Pfaffenrath et al, 2009; Sjaastad, 2008), despite neck pain being a key characteristic of CGH (Fleming et al., 2007; Hall et al., 2008; Hall et al., 2007). Nausea and vomiting are usually associated with MH but may also be present in some instances of TTH or CGH (Fleming et al., 2007; Florencio et al., 2014; Frese & Evers, 2008; Hall et al., 2008; Hall et al., 2007; Pfaffenrath et al., 2009;
Sjaastad, 2008). These finding dictated that the algorithm should be divided into two sections.

The first section was based on ‘classic’ presentations of CGH, MH with aura and TTH. The ‘classic’ CGH was defined as unilateral, side locked pain originating in the neck and precipitated by neck movement or awkward posture. The person whose symptoms were undeniably unilateral, moderate to severe pain of a throbbing or pulsating nature, pain that was time locked and prohibited movement or activity and was accompanied by aura were given a classification of MH. TTH was classified when the characteristics were mild to moderate bilateral pain which was pressing or band like and not associated with neck pain or stiffness. When characteristics did not categorically meet all of these criteria and classification was not straightforward the second part of the algorithm was used. This section of the algorithm contained more detailed information from the ICHD, the CHISG and clinical investigations about characteristics of each headache type and guided clinical reasoning to determine the headache classifications.

Once the algorithm was ready to test for inter-rater reliability and test-retest reliability of classification of headache type, participants were approached to complete the questionnaire and then repeated the process six weeks later. The majority of the sample population in the pilot study were physiotherapists and it is possible that their clinical knowledge of expected signs and symptoms of some headache types might have biased their responses in the questionnaire and impacted on the precision of answers given. To reduce possible bias participants were asked to answer each question based only on their personal experience and not their perceived diagnosis. Participants were also known to the researcher and it was thought that her being present with them while they completed the questionnaire may inadvertently influence some participants’ answers. Therefore participants were given the questionnaire to complete independently without the researcher being present. It is recognised that this is not the preferred method (Pfaffenrath et al., 2009) as there is no opportunity to ask for clarification of questions but it was deemed appropriate for this pilot. All participants completed the questionnaire without any missing data.

Using the algorithm developed for this pilot study agreement between raters was 87.5% (21/24). The Kappa Measure of Agreement across all 24 responses was 0.83
indicating very good agreement (Peat 2002). These results are similar to those reported by Amiri et al. (2007), who found 82% agreement (9/11) with the same questionnaire. It is possible that classification may have been facilitated by the clarity of responses based on the fact that participants in this pilot study were mostly physiotherapists. Our results and the results of Amiri et al., (2007) suggest that this is a reliable tool for classifying headache although the performance may vary slightly in the schizophrenic population.

To determine test/retest reliability a comparison was made between classifications from the first round of responses to the questionnaires compared to classification from the second round of responses. While six weeks was considered an appropriate gap between questionnaires for participants to prevent recall of previous answers, a further six weeks elapsed before raters independently classified the headaches of the repeat questionnaire. This extended time was to minimise possible recall/bias on their part because discussion had occurred between the raters after the initial questionnaires were completed. It was thought they may recognise responses if enough time had not elapsed. The Kappa Measure of Agreement (0.67) between the consensuses classifications of initial and follow up questionnaire indicated moderate agreement (10/12).

Many researchers do not agree with asking participants to complete headache questionnaires independently and prefer to administer questionnaires face to face to assist with clarification of questions (Borhani Haghighi et al., 2008; Dong et al., 2012; Pfaffenrath et al., 2009). For convenience and a desire not to influence answers since the pilot study participants were known to the researcher, the questionnaire was given to them to take away and complete. It is possible that the two participants who had quite different clinical characteristics in their second questionnaire from their first might have had more consistency if there had been opportunity to get some clarity around specific questions. To reduce the possibility of this occurring in the main study it was decided to implement the suggestion of the Consultant Psychiatrist and Mental Health Nurse and ensure that the researcher would be present while the participants with schizophrenia or schizoaffective disorder completed the questionnaire.
1.6 Conclusion

This pilot study succeeded in identifying a valid and reliable questionnaire tool to use to gather clinical characteristics to guide classification of headache into CGH, MH, TTH and OH. While identified as lengthy, the questionnaire was not too complicated and was deemed appropriate for the main study population by experts in the mental health field. It was decided that the researcher should be present while participants complete their questionnaires to clarify questions for participants in order to ensure accurate and reliable responses.

A comprehensive two part algorithm was developed to guide clinical reasoning to enable classification of headaches based on the ICHD, the CHISG and clinical investigations. This algorithm was proven to be reliable with excellent agreement between reviewers classifying headaches. Test/retest agreement was good. Both instruments were deemed suitable for the project.
CHAPTER TWO

Introduction

This introduction focuses on the background and reasons for undertaking this cross-sectional cohort study exploring the prevalence, characteristics, impact and management of headache in people with schizophrenia and schizoaffective disorder.

2.1 Topic and purpose

It has long been identified that headache is one of the most common pains reported by people with schizophrenia, with a prevalence rate as high as 48% (Kuritzky, Mazeh, & Levi, 1999; Morgan et al., 2012; Watson, Chandarana, & Merskey, 1981). Research has determined that people who experience chronic headache have a poorer quality of life than healthy people (Leiper, Elliott, & Hannaford, 2006; Solomon, Skobieranda, & Gragg, 1993; van Suijlekom, Lamé, Stomp-van den Berg, Kessels, & Weber, 2003; Vinding, Zeeberg, Lyngberg, Nielsen, & Jensen, 2007). People with schizophrenia or schizoaffective disorder have also been identified as having reduced quality of life (Cuyú Carter, Milton, Ascher-Svanum, & Faries, 2011). It could be suggested that people with schizophrenia or schizoaffective disorder who also experience chronic headache may have an even poorer quality of life (Pompili et al., 2009; Smitherman & Baskin, 2008) and that treatment directed towards alleviating headache could importantly contribute to improving life quality. The first step in providing effective management is identifying the cause of the problem; that is classifying the type of headache. To date very little research has been conducted attempting to characterise and classify the headache type suffered by people with mental illness (Dworkin, 1994; Watson et al., 1981).

Reactions and/or responses to noxious input are diminished among people with schizophrenia and schizoaffective disorders (Bonnot, Anderson, Cohen, Willer, & Tordjman, 2009; Lévesque et al., 2012a; Potvin & Marchand, 2008; Wojakiewicz et al., 2013). Despite diminished sensitivity to nociception the prevalence of reported headache appears to be equivalent to that seen in the general population (Kuritzky et al., 1999). While there are a number of explanations for this paradox, one possibility is that the aetiological factors contributing to headache are present to a greater extent in people with schizophrenia, that is, the factors which drive the headache experience...
are more marked in this population. There is evidence for this phenomenon from as long ago as the 1950’s where multiple cases were documented of people with schizophrenia experiencing perforated peptic ulcers, ruptured appendix and myocardial infarction with no associated report of pain (Marchand et.al. as cited in Dworkin 1994). These incidents suggest that early recognition of any other pain related disorder including headache is particularly important in the schizophrenic population.

The International Headache Society (IHS) developed a classification for headaches in the late 20\textsuperscript{th} Century to provide diagnostic criteria for different types of headaches (The Headache Classification Subcommittee of the International Headache Society, 2004). Numerous headache types are defined by this classification system, however, the three with the most significant burden of disease are TTH, MH (Jensen & Stovner, 2008; Stovner et al., 2007) and CGH (van Suijlekom et al., 2003). Cervicogenic headache is headache that originates from a disorder within the musculoskeletal structures of the cervical spine (Sjaastad & Bovim, 1991) and is a problem that can be successfully managed with physiotherapeutic treatment directed towards normalising neuromusculoskeletal function in the cervical spine (Chaibi & Russell, 2012; Hall et al., 2007; Zito et al., 2006). Prevalence of CGH in the general population is estimated at about 4% (Bogduk & Govind, 2009; Sjaastad & Bakketeig, 2008b), though may be as high as 20% in the headache population or those attending headache clinics (Evers, 2008; Fernández-de-las-Peñas, Alonso-Blanco, San-Roman, & Miangolarra-Page, 2006; Frese & Evers, 2008). No studies to date have determined the prevalence of CGH amongst people with schizophrenia or schizoaffective disorders despite the high reported incidence of headache in this group and the fact that they demonstrate known risk factors for the development of cervicogenic headache such as poor posture and poor postural control (Jull, Sterling, Falla, Treleaven, & O’Leary, 2008; Marvel, Schwartz, & Rosse, 2004).

The purpose of this research is to determine the prevalence and characteristics of headache, in particular possible cervicogenic headache, and the perceived impact on aspects of quality of life of people with schizophrenia or schizoaffective disorder. It is also to determine how people manage their headache and whether they receive appropriate assessment and/or treatment from a health professional. This information will help identify whether changes could be implemented to better address this
manageable physical illness and possibly favourably effect general wellbeing. This may include expanding the role of physiotherapy in mental health services.

2.2 Background

The link between good physical health and good mental health is widely accepted. The role of physiotherapy in maintaining or achieving good physical health is also widely accepted. The Australian Physiotherapy Association (APA) identifies that physiotherapists are experts in the treatment of musculoskeletal conditions and chronic pain, helping people with these conditions achieve better physical health (Australian Physiotherapy Association, 2012). Physiotherapists also play a significant role in the management of many preventable and/or chronic diseases including heart disease, diabetes and respiratory diseases such as asthma, enabling people to achieve better physical health outcomes (Australian Physiotherapy Association, 2008, 2009).

People with mental illness, in particular people with psychotic illnesses, have poorer physical health than those without mental illness and increased morbidity and mortality from preventable diseases (Coghlan, Lawrence, Holman, & Jablensky, 2001; Griswold et al., 2008; McLennan, 1998; Morgan et al., 2012; Richardson et al., 2005; Stubbs et al., 2014; Vancampfort et al., 2011). People with schizophrenia are generally less physically active than the general population (Vancampfort et al, 2012; Morgan et al., 2011). Morgan et al. (2011) determined that in Australia 66% of people with psychosis smoke compared to the rate of 25.3% in the general population (Morgan et al., 2012). People with inactive lifestyles who also smoke are at high risk of many preventable diseases such as chronic pain, asthma, heart and circulatory problems and diabetes. In Australia almost one third of people with a psychotic illness have asthma (30.1%), over one quarter (26.8%) of people experience heart or circulatory problems and a further 20.5% having diabetes (Morgan et al 2011). All these conditions contribute significantly to mortality and morbidity of people with psychosis (Morgan et al., 2011).

Reporting of chronic pain is common among people with mental illness (Gureje, 2008) and as many as one in four people with a musculoskeletal condition report a comorbid mental illness (Australian Institute of Health and Welfare, 2010). Chronic back, neck
or other pain was reported by 31.8% of people in Australia with psychosis and severe headache or migraine reported by 25.4% (Morgan et al 2011).

With the high prevalence of musculoskeletal conditions and chronic disease it might be expected that physiotherapists would be integral to any mental healthcare team. In Australia this is not the case. Physiotherapy is not considered a primary profession in the Australian Mental Health Workforce and is not recognised as a discipline that has a significant role in delivering services to mental health consumers (Health Workforce Australia, 2013). In general physiotherapists play either no or an insignificant role in mental health care teams (Australian Physiotherapy Association, 2011) and as a result many people who access the mental healthcare systems are missing out on key treatment and/or preventative health measures to address their physical wellbeing. While these services are available through the general healthcare systems there are challenges and barriers that make accessing these services difficult for mental health consumers (Fagiolini, 2008). Ongoing and unmanaged poor physical health for these people could result in a further compromise to their mental health.

The omission of physiotherapists in mental health teams suggests that directors of mental health services are either unaware of the benefits to consumers of including physiotherapists as part of the multidisciplinary team or overlook the impact poor physical health has on mental health. Either way within Australia there is a need to promote the role of physiotherapy and the benefits of employing physiotherapists within mental healthcare.

One approach to highlight the value of physiotherapy as an integral profession in mental healthcare is to evidence the impact of physiotherapeutic interventions to the overall health of the person with mental illness. Research is beginning to emerge in Europe that demonstrates the positive effects of physiotherapy on the mental and physical wellbeing of people with schizophrenia (Vancampfort et al., 2012). Another approach is to identify situations where people with psychotic illness are being disadvantaged by not being able to access best practice treatment for conditions in which physiotherapists are considered experts. One such condition is headache which has already been identified as one of the most common pains reported by people with
Physiotherapeutic intervention is considered the treatment of choice for CGH (Chaibi & Russell, 2012; Hall et al., 2007; Zito et al., 2006). Physiotherapists are trained not only to diagnose and treat CGH but also to differentially diagnose CGH from MH, TTH and other headache types. Physiotherapy has also been shown to play a role in the holistic management of the person with TTH (Fernández-de-las-Penos et al., 2006). Physiotherapists are not experts in the management of MH but will refer clients to health professionals who can provide best practice treatment of these headache types. Physiotherapy is a treatment of choice to assess and if appropriate manage neck pain and postural problems that may be present alongside MH or TTH. Without access to physiotherapy, clients of mental health services experiencing headache are likely be disadvantaged by not receiving best practice, holistic management that will improve their physical health which in turn could impact positively on their mental well being.

While this study was initially conceived as a vehicle to highlight just one small way in which physiotherapists can contribute to the holistic care of people with mental illness is was also inspired by a desire to help address the much bigger issue of headache that has long been regarded as a problem for people with psychotic illness (Kuritzky, Mazeh, & Levi, 1999; Morgan et al., 2012; Watson, Chandarana, & Merskey, 1981). It was thought that a better knowledge of the prevalence and impact of headache on this population might be useful to highlight the need for mental health workers to address this significant physical health problem.

### 2.3 Potential significance

This research is significant to all the people with schizophrenia or schizoaffective disorder who experience headache. Information that leads to a better understanding of the nature, characteristics and impacts of these headaches will provide a basis to determine better management and probable improvement in wellbeing. This information could also benefit other users of mental health services.

Diminished responses to or reduced reporting of pain in this population may suggest that the impairments driving a headache need to be severe before the person will report
it to their health professional. No literature is currently available that examines the characteristics of the headache experienced by this population and compares them to the general population. If this research determines that headache characteristics are at least the same or more severe than in the general population it will provide an argument for better management strategies to be considered and implemented.

People with chronic headache experience a poor quality of life (Leiper et al., 2006; Solomon et al., 1993; van Suijlekom et al., 2003; Vinding et al., 2007) as do people with schizophrenia or schizoaffective disorder (Cuyún Carter et al., 2011). It is possible that headache experienced by people with schizophrenia or schizoaffective disorder may further impact negatively on quality of life. There is very little research investigating the impact of headache on the quality of life of people with schizophrenia or schizoaffective disorder who experience chronic headache (Pompili et al., 2009; Smitherman & Baskin, 2008). It is important to better understand the impact headache is having on the quality of life of a population that has already been identified with a reduced quality of life. The results could highlight a greater need to better manage headaches in this population.

Poor posture and impaired postural control is associated with schizophrenia and poor posture is associated with cervicogenic headache (Marvel et al., 2004; Zito et al., 2006). It is possible that this population may be at greater risk of developing cervicogenic headache than the general population. Determining the characteristics of headache and exploring prevalence of possible CGH may provide basis for further, more detailed research into the impacts of poor posture associated with schizophrenia.

Treatment protocols and guidelines have been researched and instigated for the management of headaches including physiotherapeutic intervention for CGH and TTH. Within the general population people presenting to a medical practitioner with frequent or chronic headaches are referred to the appropriate health practitioner for treatment based on the characteristics and diagnosis of their headache. Within the psychiatric population it would appear that screening and referrals for further investigation of physical health issues including headache is less common than for the general population (Griswold et al., 2008; Happell, Scott, & Platania-Phung, 2012). Happell et al, (2012) suggested that there is a tendency for many mental health workers
to undervalue complaints about physical illness and view their consumer only in terms of their mental illness. The result is that these mental health workers do not act on the reports of physical illness but dismiss them as a part of the mental illness. It was noted that if this behaviour is repeated frequently that it may result in people eventually not reporting the presence of a physical illness. It is unclear if this is occurring in the case of headache amongst people with schizophrenia or schizoaffective disorder. Kuritzky et al. (1999) suggest that people with schizophrenia do not report headache because they do not want to bother anyone, have a fear of hospitalisation or simply do not have anybody to complain to. It is possible that any of these reasons mean that treatable headache, including CGH and TTH is underreported in this population. If CGH and TTH has the same or greater prevalence in this population as in the general population then it further strengthens the argument that physiotherapists should be included as integral members of the mental health teams.

A screening tool for headache could help case managers identify when their client experiences headache and when referral or follow up of reported headache is indicated. Information about management of headache types and the role of physiotherapy could guide them towards the most appropriate referral pathway and raise the awareness of the value of physiotherapy in the care of this client group. This process would enable more timely and appropriate intervention for the mental health consumer thus preventing needless suffering and discomfort and hopefully improving both their mental and physical wellbeing.

This research aims to identify the prevalence, characteristics and determinants of headache amongst people with schizophrenia or schizoaffective disorder and compare them against the general population. It will determine the impact comorbid headache has on their quality of life and the current management of the headache. A better understanding of these could result in better management of headache amongst this population.
2.4 **Research Questions**

1. What is the prevalence of headache amongst people with schizophrenia and schizoaffective disorder?
2. What are the prevalence rates of specific headache types amongst people with schizophrenia and schizoaffective disorder?
3. Are any clinical characteristics different between people with schizophrenia and schizoaffective disorder who experience headache and those who don’t?
4. Are any clinical characteristics different between people with schizophrenia and schizoaffective disorder who experience specific headache types?
5. Are there any perceived impacts of headaches on quality of life of people with schizophrenia and schizoaffective disorder?
6. How are headaches managed in this population?
7. Is the management appropriate for the headache classification?
8. Is physiotherapy used as a treatment option where indicated?
CHAPTER THREE

Review of Literature

This literature review will be presented in eight sections providing information about headache and schizophrenia and schizoaffective disorder as described below.

3.1 Overview of headache
This section will provide information about the prevalence of headache in both the general population and in the population of people with schizophrenia and/or schizoaffective disorder.

3.2 Cervicogenic Headache
This section will report literature findings on the prevalence, clinical characteristics, mechanisms behind and management of CGH.

3.3 Migraine Headache
This section will examine the prevalence, clinical characteristics, mechanisms behind and management of MH.

3.4 Tension Type Headache
In this section literature about the prevalence, clinical characteristics, mechanisms behind and management of TTH will be reviewed.

3.5 Overview of schizophrenia and schizoaffective disorder
This section will provide an overview of schizophrenia and schizoaffective disorder. It will also review the literature on people with schizophrenia’s response to pain and explore postural anomalies, both of which could have significant implications on the presentation and characteristics of their headache experience.

3.6 Physical health of people with mental illness and role of physiotherapy
This section will provide some more information on the poor overall physical health of people with mental illness and the insight into the role of physiotherapy in overall management of physical health. It will also highlight the lack of physiotherapy input into this management within this population.
3.7 Factors that impact on quality of life
This section will provide an overview of the impact schizophrenia and/or schizoaffective disorder has on the quality of life of an individual. It will also report on the impact of headache on quality of life in the general population and investigate any literature on effect of headache on quality of life of people with schizophrenia and schizoaffective disorder.

3.8 Summary of literature review
This section will provide a summary of the above information.
3.1 Overview of Headache

The World Health Organisation (WHO) rates headache as a common disorder of the nervous system that is underestimated, under-recognised and under-treated (World Health Organisation, 2012). Headache is listed as one of the 10 most disabling conditions world-wide (Martelletti, Birbeck, et al., 2013; Martelletti, Mitsikostas, et al., 2013; Stovner et al., 2007). Four percent (4%) of medical practitioner consultations and 20% - 30% of referrals to neurological departments in the United Kingdom are for headaches (Kristoffersen, Lundqvist, Aaseth, Grande, & Russell, 2013) and in America, headache is the fourth most common presentation at emergency departments with between 1.4 - 3.3 million visits per year (Kelley & Tepper, 2012a).

Despite this, it has been identified that up to 50% of headache sufferers do not seek medical advice for headache and when they do many are wrongly diagnosed and wrongly treated. The WHO (2012) identified that worldwide an average of four hours of undergraduate medical training is dedicated to education on headache disorders. In contrast The University of Notre Dame Australia Physiotherapy undergraduate programme has 16 hours dedicated to assessment and management of the upper cervical spine and cervicogenic headache alone, suggesting physiotherapists are well prepared to be involved in the management of headache and in particular CGH (Wand, 2014). Martelletti et al. (2013) advocate for better headache health-care services and improved training of physicians within these services to deliver more comprehensive and accessible services to headache sufferers (Martelletti, Mitsikostas, et al., 2013).

Headaches are classified in the ICHD into primary and secondary headache. Primary headaches are those with a vascular or muscular origin occurring in the absence of any organic disorders while secondary headaches are attributed to other disorders such as inflammation or injury (Cathcart, Winefield, Lushington, & Rolan, 2010; Racicki, Gerwin, Diclaudio, Reinmann, & Donaldson, 2013). Secondary headache symptoms either resolve or reduce following treatment of the causative disorder.

The most prevalent primary headaches found in the adult population are TTH and MH (Cathcart et al., 2010; Fernández-de-las-Peñas et al., 2006; Fumal & Schoenen, 2008). The most common secondary headaches include those triggered by alcohol, fever and medication overuse (Kristoffersen et al., 2013). Cervicogenic headache is considered
a secondary headache type with a quality of life burden similar to that of people experiencing MH and TTH (van Suijlekom et al., 2003). While less prevalent than TTH and MH the mechanisms behind CGH are some of the best understood (Bogduk & Govind, 2009).

Each type of headache has a different pathogenesis and logically each respond to treatment specifically targeted to that headache type. Incorrect diagnosis and therefore inappropriate treatment can mean poor outcomes for the headache sufferer (Bogduk & Govind, 2009; Hall et al., 2008; Hall et al., 2007; Li et al., 2012). To complicate diagnosis and treatment even further some people will experience more than one headache type (Hall et al., 2008; Stovner et al., 2014).

### 3.1.1 Prevalence of headache in the general population

The WHO Global Burden of Headache study identified that headache affects 47% of the world’s population (Jensen & Stovner, 2008; Stovner et al., 2007). This figure was calculated to be the mean value of prevalence of headaches found in numerous headache studies conducted across North and South America, Asia and Europe (Stovner et al., 2007). Data on prevalence in these studies was collected from questionnaire or personal interview. The lifetime prevalence (47%) of headache was determined to be similar to the 1 year prevalence of 46%.

There are some significant differences in prevalence of headache in recent studies. In Brazil in 2009, during a routine home visit by health officials, face to face surveys were conducted to determine a one year prevalence of headache in the entire population of one town (Junior et al., 2009). The response rate was 98.4% (n=1605). Participants were asked if they had any headache episodes in the previous twelve months. An overall twelve month prevalence of headache of 65.4% was found with a higher prevalence in women (69.5%) than men (60.9%) and prevalence of headache diminishing in people over 60 years of age. A slightly higher twelve month prevalence of 72.1% was documented by Queiroz et al. in a study undertaken 3 years earlier using the same questionnaire (Queiroz et al., 2009). Unlike Junior et al. (2009) this survey was not limited to one town but conducted across 27 states in Brazil with 3,848 people participating. Recruitment and was through randomised ‘cold call’ telephone calls and interviews were conducted over the telephone. The response rate was only 49.9%. 

Junior et al. (2009) surmise that discrepancies in headache prevalence between these two studies may be attributed to the different response rates stemming from the two differing recruitment methods, that of the personal home visit, face to face approach versus the impersonal ‘cold call’ telephone approach. They suggest that in the case of ‘cold call’ telephone recruitment, people without headache were less likely to engage thus creating a bias in the participant cohort resulting in a higher prevalence of headache. They also suggest that cultural and ethnic differences across the different regions of Brazil may have had an impact on prevalence of headache.

Reza et al. (2012) asked an all-female population in Hawaii if they had been ‘bothered’ by headache in the preceding two weeks and found the two-week headache prevalence was 47% (Reza, Sievert, Rahberg, Morrison, & Brown, 2012). While it might appear that this prevalence is in line with the WHO Global Burden of Headache study (Jensen & Stovner, 2008; Stovner et al., 2007) for twelve month prevalence of headache no such assumption can be made. It is known that women have a higher prevalence of headache than men (Stovner et al., 2007) which might suggest that this two week prevalence is in fact less than the WHO twelve month prevalence. It is not possible to make a comparison between two week and twelve month prevalence, supporting the need for uniformity in methodology of headache research (Stovner et al., 2014). This study did support the theory of ethnicity contributing to variances in headache prevalence proposed by Junior et al. (2009) identifying that there was a higher prevalence of headache among Caucasian women (42%) compared to Chinese (30%) and Japanese (37%).

The Norwegian Nord-Trondelag Health Studies (HUNT 2 and HUNT 3) determined the mean 1-year prevalence of headache was 38% (Linde, Stovner, Zwart, & Hagen, 2011). Participants were asked in a mailed survey if they had ‘suffered’ from a headache in the past year. Linde et al. (2011) hypothesised that this low prevalence could be attributed to the number of people who responded ‘no’ to suffering from headache, who then continued to either complete some of the headache questions about characteristics of their headaches or record a headache in their diary. It could be surmised that some participants did not respond ‘yes’ because although they experienced headache they may not have felt that they actually ‘suffered’ from the headache. If the people who responded ‘no’ to suffering from headache but went on to
complete information about headache had been included with those responding ‘yes’ to suffering from headache the prevalence of 12 month headache would have been more comparable to the findings of Junior et al. (2009).

Radtke and Neuhauser (2009) determined that 60.2% of Germans experienced headache in the previous twelve months. Data was collected via telephone interview with a 52.3% response rate comparable to that of Queiroz et al. (2009). Like the Linde et al. (2011) study, participants in this survey were also asked if they ‘suffered’ from headache. Unlike the Linde et al. (2011) study there was a high ‘yes’ response rate. Although not identified by the authors it is possible that similar to the Brazilian study by Queiroz et al. (2009) there may have been some bias in the recruitment process in that people who experience headache may have been more likely to engage in the telephone interview than those who do not. This study did identify that headache created a significant burden to the individual and society with reduced quality of life, loss of productivity and an increased use of healthcare resources (Radtke & Neuhauser, 2009). Nearly one quarter of people who reported severe headache were seen by a physician equating to 8% of the population.

The twelve month prevalence of headache in the Italian city of Parma was found to be 42.8%, more comparable to the Burden of Headache study (Torelli et al., 2010). Participants in this study were asked in a face to face interview ‘did you have headache in the past year?’ It was determined in this study that most people only experience one type of headache with the number of headaches never greater than 2. Torelli et al. (2010) reported that this finding was in agreement with a previous 1999 study by Schwartz et al. who identified that 80% of headache sufferers only experience one type of headache.

Headache is a global disorder associated with a significant level of disability. While headache is widespread throughout all continents, cultural and ethnic consideration may account for local variations in prevalence. Methodological variations including the recruitment process, the framing of questions about presence or absence of headache and the interpretation of the responses used to allocate participants into ‘headache’ or ‘non-headache’ cohorts, the length and validity of questionnaires and factors such as whether the interview is conducted face to face, over the telephone or
by post impact on prevalence of headache cited in different studies. It also needs to be recognised that most people who have headache only experience one type but some people may experience two different headaches which may be problematic when trying to estimate prevalence rates of individual headache types.

Prevalence rates for CGH, MH and TTH are of particular interest to this study. TTH is recognised as the most prevalent of headaches and has prevalence ranging from 20% to 70% with global 12 month prevalence of 42%. (Bezov, Ashina, Jensen, & Bendtsen, 2011; Dong et al., 2012; Fernández-de-las-Peñas et al., 2006; Queiroz et al., 2009; Steiner, Stovner, & Birbeck, 2013; Stovner et al., 2007; World Health Organisation, 2012). The second most common form of primary headache is MH with one year prevalence rates of between 11% -31% and the most current WHO figure of 14.7% (Kelley & Tepper, 2012a; Noseda & Burstein, 2013; Sjaastad & Bakketeig, 2008a; Stovner et al., 2007; World Health Organisation, 2012). One year prevalence of CGH is between 0.17% - 4.6% and estimated to account for between 15% and 20% of all chronic headache (Chaibi & Russell, 2012; Diener, Kaminski, Stappert, Stolke, & Schoch, 2007; Liebert et al., 2013; Racicki et al., 2013). Each of these headache types will be reviewed in more detail later in this literature review.

3.1.2 Prevalence of headaches in people with schizophrenia and schizoaffective disorder
In a study exploring pain in schizophrenia, Watson et al. (1981) recognised that as long ago as 1911, Bleuler in ‘Textbook of Psychiatry’ identified headache as the most common pain experienced by people with schizophrenia. In their own study of 78 people with schizophrenia, Watson et al. (1981) too determined that headache was the pain problem most commonly experienced by this population and that all people who reported multiple pain sites included head pain as one of the sites. There is limited description of the methodology of data collection employed in this study of 46 men and 32 women, but it is likely that it was via face to face interview. This study was undertaken prior to the introduction of the International Classification for Headache (Sjaastad, Fredriksen, & Pfaffenrath, 1998) and no attempt was made to classify headache types although it was noted that no participant described their headache pain as tight, gripping or vice-like suggesting that TTH might have been uncommon.
Dworkin (1994) conducted a literature review investigating pain insensitivity in people with schizophrenia and cited previous studies stating that headache was the most common pain reported in this population (Dworkin, 1994). No data on prevalence was presented. In 1999 a controlled study of 108 people with schizophrenia and 100 healthy controls was undertaken by Kuritzky et al. (1999). Using a questionnaire to gather information in a face to face interview about headache prevalence, characteristics, management and impact the study determined that the prevalence of headache in people with schizophrenia was 48% while the prevalence in the control group was 41%. This study focused on MH and TTH and found the prevalence of MH in the study group was 19.4% (21/108) and in the control group was 24% (24/100) while TTH in the study group was 28.7% (31/108) compared to 17% (17/100) in the control group. The study found no statistically significant differences in overall headache prevalence or prevalence of either headache type between the sample and control group. There was no consideration of CGH.

There are methodological factors that may have impacted on the results of this study by Kuritzky et al. (1999). Firstly, like Linde et al. (2011), underreporting of prevalence of headache may be attributed to the process used to determine who experienced headache and who did not experience headache. People where asked if they were ‘subject to headache’ and if they responded ‘no’ were asked no further questions. However, people may interpret ‘subject to headache’ in different ways and respond differently as it is a statement open to a number of interpretations. It is possible that people who experienced infrequent headache may have answered ‘no’, believing that they would only be ‘subject to headache’ if headaches were frequent. Secondly, prevalence may be affected by the gender distribution of the participants. The only demographic questions in this study were age and socioeconomic background so it is unknown if both males and females participated. As previously noted, females have a higher prevalence of headache so if either very few or no females were in this study then the prevalence could be affected (Stovner et al., 2007). There is a need for more investigation of prevalence of headache in a cohort that can be identified as a true cross section of people with schizophrenia to be able to provide accurate estimates on the actual prevalence of headache in this population.
The second Australian National Survey of Psychosis surveyed a random cross section of people identified with psychotic illness and conducted interviews with 1,825 people (Morgan et al., 2012). Almost one third (32%) reported chronic back, neck or other pain and 25.4% reported frequent or severe headaches and migraine (Morgan et al., 2012). No explanation was given as to what severe headache meant or how a diagnosis of migraine was determined, nor was it possible to specifically identify prevalence rates within the schizophrenic or schizoaffective disorder population. Although interesting, this survey does not provide accurate representation of headache within this population.

Lake et al. (2005) noted that since 1999 very little research has been conducted into the prevalence and characteristics of headache experienced by people diagnosed with psychiatric illnesses. It is their opinion that despite an IHS classification for headache attributed to psychotic disorder (ICHD-2 12.1) where headache is a delusional belief; there are in fact very few instances where headache truly is a psychotic phenomenon. This is consistent with Watson et al. (1981) who reported that hallucinated pain was uncommon among people with schizophrenia. Lake et al. (2005) suggest more research is required to accurately identify both the psychiatric diagnosis and the headache diagnosis to determine true prevalence and characteristics of headache in this population.

Kuritzky et al. (1999) determined that 40% of the people with schizophrenia who experienced headache had not ever reported it to a health practitioner and suggest that this might be for fear of hospitalisation or simply because they have no-one to complain to. In comparison Watson et al. (1981) found that 80% of people with schizophrenia who experienced pain had reported it to a health professional. Neither, Kuritzky et al. (1999) nor Watson et al. (1981) report on whether appropriate treatment was implemented or if there was any follow up once the pain was reported. As suggested by Lake et al. (2005), a headache screening tool for people attending psychiatric clinics would be useful to help guide management and better treatment outcomes for this group of people.

Developing a simple screening tool that identifies presence of headache is not sufficient to guide management because different headache types manifest in response
to different mechanisms. To develop a screening tool to help guide the user towards the pathway to access appropriate expert assessment and management of headache there needs to be an understanding of the mechanisms driving the particular headache type. The following sections will focus on prevalence, characteristics, mechanisms driving impairment and management of CGH, MH and TTH.

3.2 Cervicogenic Headache

The Cervicogenic Headache International Study Group have developed the clinical diagnostic criteria of CGH and provided the information and detail about the condition for the 2004 ICHD operational criteria (Chaibi & Russell, 2012). CGH is a secondary headache that presents as unilateral pain originating in the neck, usually without side shift and is triggered by a sustained awkward neck position or pressure over the upper cervical joints. Symptoms can be reduced through physiotherapy involving manual therapy and exercise.

3.2.1 Prevalence of CGH

The prevalence of cervicogenic headache in the general population varies from 0.17% to 4.6% depending on the characteristics of the study (Knackstedt et al., 2010). Prevalence of CGH within the headache population has been identified as between 14% - 20% (Fleming et al., 2007; Liebert et al., 2013; Zito et al., 2006). Studies have shown that the mean age of onset of CGH is 33 years with people experiencing them for between 7 and 17 years (Antonaci & Sjaastad, 2011; Hall et al., 2008). A significant difference exists between hospital based studies and community based studies in the preponderance of CGH experienced by females versus males, with females having a higher prevalence of CGH in hospital settings. This gender difference is not apparent in community settings (Anthony, 2000; Chaibi & Russell, 2012; Diener et al, 2007; Sjaastad & Bakketeig, 2008b). No studies have been conducted to identify prevalence of CGH in people with schizophrenia and schizoaffective disorder.

3.2.1 Clinical characteristics of CGH

Characteristics of CGH include unilateral, side locked headache originating from the neck, exacerbated by neck movement and/or sustained awkward neck position and/or external pressure over the occipital region on the side of pain. Moderate to severe pain refers from the neck to frontal regions supplied by the trigeminal nerve (Frese,
Schilgen, Edvinsson, Frandsen, & Evers, 2005; Vincent, 2010). There is usually restriction in ROM of the upper cervical segments. Neck, shoulder and arm pain may also be present. In general a forward head posture is associated with cervicogenic headache although this has also been observed in those with migraine and tension type headache (Jull et al., 2008).

Diagnostic anaesthetic blocks can be used to provide further diagnostic information, (Anthony, 2000; Narouze, Casanova, & Mekhail, 2007) although as identified in the pilot study, many people with MH and TTH also complain of neck pain (Fernández-de-las-Peñas et al., 2014). The value of diagnostic blocks for diagnosis is discussed later.

3.2.3 Mechanisms behind CGH

Cervicogenic headache is a problem of referred pain (Bogduk & Govind, 2009). Painful dysfunction of somatic structures within the cervical spine give rise to the experience of head pain due to the convergence of afferent information within the trigemino-cervico nucleus. The exact nature of somatic tissue dysfunction is not clear and may in fact represent different processes in different individuals. However, there is now substantial evidence that people with CGH demonstrate impairments in the articular, muscular and proprioceptive function of the upper cervical spine (Bogduk & Govind, 2009; Frese & Evers, 2008; Narouze et al, 2007; Vincent, 2010).

When a noxious input is generated from structures within the upper cervical spine it may be expected that pain would be localised to this region and not manifest as headache. However, according to Bogduk (1993) pain from the skin is the only pain that is felt locally, relating back to a basic human instinct where survival may be dependent on the brain receiving accurate information from external noxious stimuli and implementing an appropriate and immediate response. When actual or potential damage occurs to the skin the nociceptive afferent impulse is relayed to the ventral posterior lateral (VPL) nucleus of the thalamus and then to higher centres including the parietal lobe via the highly organised neospino-thalamic pathway. At the same time information from non-nociceptive receptors such as touch and pressure are also transmitted to the VPL nucleus of the thalamus via the even more organised posterior columns. The thalamus is thus receiving two highly specific and complementary
messages that can accurately define and localise the source of noxious input. As the noxious stimulation is superficial it is also likely that visual information is available to further aid localisation.

In the case of tissue other than skin, the information reaching the thalamus and cortex about the localisation of noxious stimuli is less well defined so in many instances the pain is often felt at a distance from the source or may be felt to radiate from the source. This is called referred pain (van Griensven, 2005). The exact mechanism of referred pain is not fully understood, however, the projection-convergence model is the most widely discussed. This model proposes that messages about noxious stimuli from deep tissues are relayed through the spino-reticular system which is less well organised than the neospino-thalamic pathway. At the same time the brain is not receiving additional information about touch and/or pressure to enable localisation of the noxious source. Visual information may also be lacking. As a result of receiving less specific information the brain cannot pinpoint the location of the source of nociceptive input. According to Galea (2002) the brain is probably able to localise the source of nociceptive input from deep tissue only to the level of a particular spinal segment (Galea, 2002). Armed only with this information the individual then attempts to localise the source of afferent traffic further based on other available information including other sensory information, past experiences and general knowledge.

Anatomy of the innervation and neural pathways around the upper cervical segments is essential to understanding the mechanism of headache associated with noxious stimuli in this region. The spinal trigeminal nucleus is a column of cells that descend through the pons and medulla where upper cervical segments combine to form the trigemino-cervical nucleus within the posterior horn of the upper cervical cord (Anthony, 2000). Nociceptive afferents of the trigeminal nerve and C1, C2 and C3 spinal nerves converge onto the second order neurones in the trigemino-cervical nucleus in the upper cervical cord (See Figure 2) (Bogduk & Govind, 2009; Chaibi & Russell, 2012; Knackstedt, Kråkenes, Bansevicius, & Russell, 2012).

With the convergence of spinal and cranial nerve afferents in the trigemino-cervical nucleus nociception from upper cervical region can be experienced as referred pain in the areas of sensory distribution for the cervical nerves, the occiput and auricular
regions of the head, as well as to sensory distributions of the trigeminal nerve, in particular the ophthalmic branch which innervates the parietal, frontal and orbital regions (Bogduk & Govind, 2009; Fleming et al., 2007). Anthony (2000) calls this a ‘cervico-trigeminal relay’ and suggests through it nociception from any structures innervated by C1, C2 or C3 spinal nerves can be experienced as referred pain from the neck to the frontotemporal region of the head and vice-versa (Anthony, 2000). Fleming, Forsythe and Cook (2007) suggest that pain can arise from the atlanto-occipital, median atlanto-axial, lateral atlanto-axial and C2/3 zygapophyseal joints, C2/3 intervertebral discs, musculature of the suboccipital, upper posterior cervical and upper paravertebral regions, the trapezius and sternocleidomastoid muscles (Anthony, 2000; Fleming et al., 2007). According to Bogduk and Govind (2009) the source of

Figure 2 - Mechanism of pain referral from the cervical spine to the head. (Reproduced from Bogduk & Govind, 2009)
noxious input in 70% of cases is the C2/3 zygapophyseal joint. They claim to have provided complete pain relief by using fluoroscopically guided diagnostic blocks of the third occipital nerve where it crosses the C2-3 zygapophyseal joint (Bogduk & Govind, 2009).

Identifying the primary source of noxious input is a key element in the diagnostic criteria of the ICHD and the CHISG, listed in both as ‘confirmatory evidence by diagnostic anaesthetic blockades’. The most accurate diagnostic anaesthetic blockade procedure is still to be determined. In an editorial in The Spine Journal, Carragee et al. (2007) cite many invasive diagnostic tests which have been used to diagnose CGH, including single joint injection, tests using both provocative and anaesthetic injections (similar to that used by Bogduk and Govind in 2009), tests comparing anaesthetics with varying pharmacologic-range effects and tests that include placebo-controlled injections. They maintain that none are fully validated and most studies do not meet the British Medical Journal and the Journal of the American Medical Association criteria for low risk of bias diagnostic studies (Carragee, 2007). The main criticisms are the inconsistency in what might constitute a positive block and the lack of a true gold standard against which the blocks themselves might be validated.

Physiotherapists maintain that they can diagnose CGH through examination of the upper cervical spine thus eliminating the need for invasive testing (Zito et al., 2006). Bogduk and Govind (2009) discount these claims saying they have not been validated, though how they might be validated is still an unresolved issue. While Carragee et al. (2007) do not discredit physiotherapeutic examination as a clinical test they do not support the notion that it has high levels of accuracy (Carragee et al., 2007). There is obviously a need for more rigorous studies to be undertaken on the physical assessment of CGH.

Dysfunctions in the structures innervated by the ‘trigeminal relay’ are not only evident in CGH but can be found in people with MH (Knackstedt et al., 2012; Vincent, 2010). When exploring the differences between MH and CGH, Sjaastad and Bakketeig (2008) determined that the restrictions in the average range of motion of the neck was significantly greater in people with CGH with 93% of people experiencing limitations of ≥15° compared to only 16% of people experiencing MH. Sjaastad and Bakketeig
(2008) also found that ‘cervicogenic factors’ (CF) were more significant in people experiencing CGH than MH. These CF included pain provocation through pressure on the tendon insertion in the occipital area or facet joints, ipsilateral shoulder discomfort, radicular arm pain, posterior onset of headache and unilateral pain. They determined there was clear distinction between MH and CGH and any neck involvement in MH was more subtle and of a different nature.

It is worth noting that Frese & Evers (Frese & Evers, 2008; Frese et al., 2005) demonstrated there is no increase of calcitonin gene-related peptide, an indicator of trigeminal-neurovascular activation found in MH, in people with CGH. This further supports the theory that the trigeminal nerve involvement is via the ‘cervico-trigeminal relay’ thus providing a biological marker that differentiates between CGH and MH and discredits the theory that CGH and MH are on a continuum as proposed by Watson and Drummond (2012). MH will be discussed in more detail in the next section.

Noxious input from upper cervical muscles, facet joints, and ligaments has been shown to produce head pain (Chaibi & Russell, 2012; Knackstedt et al., 2012) but dysfunctions in these structures does not necessarily mean presence of CGH clinically. Dysfunction in musculoskeletal function need not be nociceptively active and not all nociceptive activity is interpreted as pain. Vincent (2010) suggests that while dysfunction within the cervical structures is necessary for CGH to occur the headache response may not be triggered without an essential ‘central disposition’. While the experience of pain is often associated with noxious input, the two are not synonymous. For the perception of pain to emerge into consciousness, nociceptive information is integrated with other sensory inputs and scrutinised in relation to relevant psychological and contextual influences. The pain experience is constructed if the individual feels that the body is under threat and that survival/recuperation is best served by the construction of the pain experience. In the case of CGH this means recognising noxious input from the cervical region as a threatening stimulus. This cortical recognition will vary from one person to the next because psychological, emotional, behavioural and physical factors all contribute to the perception of and response to pain (Galea, 2002). A person’s previous experience with pain, their understanding of the pain mechanism and what pain represents to them all impact on their responses to input from cervical structures. These factors have been extensively
explored in people with low back pain. The role psychological factors play in experience of CGH is poorly researched and not well understood. It is also unclear how theoretical models such as fear avoidance belief model would relate to pain in the head.

3.2.4 Management of CGH

Both invasive procedures and non-invasive rehabilitative approaches have been advocated for the management of CGH (Bogduk & Govind, 2009). Invasive procedures include surgery and injection of blocking agents while non-invasive techniques include massage, exercise, manipulation and/or mobilisations.

A review conducted by Tobin and Flitman (2009) proposed that occipital nerve block is effective in the treatment of CGH citing the double blinded randomised controlled trial (RCT) conducted by Naja et al. (Naja, El-Rajab, Al-Tannir, Ziade, & Tawfik, 2006). It was noted, however, that the selection criteria for participants in the Naja et al. study was based on the 1988 ICHD criteria rather than the 2004 ICHD criteria suggesting that some participants may not have actually had CGH but could have had occipital neuralgia thus impacting on results. Three other studies where participants showed some improvement post treatment were included in the review but none of these studies were RCT’s (Tobin & Flitman, 2009). The authors identified a significant lack of RCT’s exploring the efficacy of nerve blocks in the management of CGH.

A systematic review by Ashkenazi et al. (2010) further highlighted the lack of evidence supporting the efficacy of peripheral nerve blocks for treatment of CGH (Ashkenazi et al., 2010). They identified that the most common site for nerve block injection is the greater occipital nerve. The authors pointed out once again that very few studies evaluating the use of nerve blockades in headache management were RCT’s. They highlighted that any studies undertaken thus far have limitations including small patient numbers or were retrospective designs without controls (Ashkenazi et al., 2010). While the Naja et al. (2006) study was acknowledged as a double blinded, randomised controlled study, Ashkenazi and colleagues were critical of the use of polypharmacy which could have confounded results. The Ashkenazi et al. (2010) review identified a lack of uniformity and consistency across trials in the techniques used for nerve blockade, the types of anaesthetic used, the dose and volume
administered and the location of the injection making it difficult to compare results. It is evident that more rigorous research needs to be undertaken to determine the efficacy of this treatment.

In 2010 Zhou et al. conducted a retrospective evaluation of facet joint injections in a study of 31 people following injections into C1/C2 and C2/3 facet joints using a mixture of anaesthetic (bupivacaine) and corticosteroid (betamethasone) for treatment of CGH (Zhou, Hud-Shakoor, Hennessey, & Ashkenazi, 2010). Data was collected retrospectively by looking through medical charts of people who attended a medical centre for headache. At the clinic patients had been seen for follow up 14 days after injection and then once a month for between 3 and 24 months. The researchers found that 90% of participants had greater than 50% relief of their headache immediately and then for an average of 21 days following injection (Zhou et al., 2010). They acknowledged that their study had limitations with no control group, a small sample size and that data was collected retrospectively.

A 2015 review of studies of facet joint injections by Ng and Wang discussed only three trials (Ng & Wang, 2015). These included the retrospective medical chart reviews by Zhou et al. (2010), another by Narouze et al. (2007) and a prospective study by Bovim et al. (1992) (Ng & Wang, 2015). The Narouze et al. (2007) review of 32 patients diagnosed with CGH highlighted that there was insufficient data to support the use of atlanto-axial joint injection for long term relief of CGH. In 1992 Bovim et al. conducted a small prospective study on 14 females who underwent C2/C3 facet joint injections and C2-C5 nerve blocks determining that C2 nerve block was the more effective treatment. Based on only these three reviews Ng and Wang (2015) determined that there is limited efficacy in the use of facet joint injections for the management of CGH.

No RCT’s examining the efficacy of surgery in the management of CHG could be found. In 2009 Riina et al. conducted a retrospective analysis of 1,004 patients, 2 years after they had undergone either an upper cervical arthrodesis or a disc arthroplasty for CGH (Riina et al., 2009). They determined that there was improvement in headache pain following both procedures with 64% of patients undergoing arthroplasty and 58%
of patients undergoing arthrodesis reporting reduction in pain scores of at least one point on a visual analogue scale.

Research on non-invasive management of CGH is more prolific and robust than for invasive management. Fleming, Forsythe and Scott (2007) identified in a limited retrospective review of patient charts (n=44) that participants had best outcome from manual therapy and exercise for treatment of CGH (Fleming et al., 2007). They also highlight the importance of including an holistic approach to patient care. A systematic review undertaken in 2011 went one step further to suggest there is no evidence to support the use of spinal manipulation alone as an effective treatment for CGH (Posadzki & Ernst, 2011). Another review by Chaibi and Russell (2012) identified physiotherapy treatment of exercises in combination with spinal manipulation as an effective treatment for CGH although highlighted that all RCT’s considered were based on participants who experienced only infrequent CGH and could not comment on people with more chronic CGH (Chaibi & Russell, 2012). A more recent systematic review by Racicki et al. (2013) of RCT’s exploring the efficacy of conservative management of CGH proposes that a combination of mobilisation, manipulation and exercises to strengthen the cervico-scapular mechanisms is the most effective conservative therapy.

In 2013 Liebert et al. (2013) undertook an investigation to explore physiotherapist’s perceptions of why some people were non-responsive to physiotherapeutic treatment for CGH. A survey was distributed to 290 registered physiotherapists with a mean 24.4 years of experience. There was a 31% response rate (90/290). They determined that factors associated with poor treatment outcomes were a history of severe trauma such as motor vehicle accident and a family history of any headache type. Responses to open ended questions provided some qualitative data suggesting that physiotherapists also perceived psychosocial factors such as depression and anxiety contribute to non-responsiveness.

3.3 Migraine Headache
Migraine is a primary headache and ranks seventh highest globally in the causes of disability, being responsible for 2.9% of all years of life lost to disability (Steiner et al,
Attributed to being a common neurovascular disorder, MH is characterised by unilateral, pulsating pain of a moderate to severe nature, lasting up to 72 hours (Zielman et al., 2012). MH is often associated with vomiting, nausea and/or photophobia or phonophobia.

### 3.3.1 Prevalence of MH
Prevalence of MH varies considerably between studies and regions. Kelley and Tepper (2012a) have identified that Europe has the highest prevalence of MH with 15% prevalence, followed closely by North America with 13%. Africa has the lowest prevalence of MH at 5%. According to Noseda and Burstein (2013) around 16% of the global population experience MH while Stovner et al. (2007) found a global prevalence of 11%. The World Health Organisation (WHO), Global Burden of Disease Survey 2010 estimated the worldwide prevalence of MH as 14.7% (Steiner et al., 2013). Differences in prevalence across studies can be attributed to discrepancies in data sampling used, diagnostic criteria applied for classification, data management and statistical analysis (Stovner et al., 2014). Guidelines are being developed by an expert panel to try and better standardise studies exploring prevalence of headache (Stovner et al., 2014).

Uniformly there is a higher prevalence of MH in females than males. The American Migraine Prevalence and Prevention (AMPP) study identified the prevalence of migraine in females to be 17.1% compared to males 5.6% (Stewart, Wood, Reed & Lipton, 2008). Junior et al. (2012) found a difference in the prevalence of MH with prevalence in females of 26.4% and males of 8.5%. The AMPP study also determined that women experience greater symptomology and increased disability associated with the MH than males (Stewart et al., 2008). No studies have been conducted to identify prevalence of MH in people with schizophrenia and schizoaffective disorder.

### 3.3.2 Clinical Characteristics of MH
The two categories of MH considered in this study are Migraine without Aura and Migraine with Aura. Migraine without aura has some characteristics similar to both CGH and TTH. Pain is usually unilateral, as is the case in CGH, but studies have identified that this is in only about 60% of cases with pain in the remaining 40% being bilateral, similar to the distribution for TTH. To complicate classification, the location
of the pain varies between individuals and in some instances even varies between attacks experienced by the same person (Hussain, Stiles, & Oshinsky, 2010). Pain characteristics, however, are different from CGH and TTH as pain is pulsating or throbbing, is usually more severe and generally of a shorter, relatively fixed duration. MH pain is aggravated by general physical activities such as climbing stairs, something not associated with other headache types. Nausea, photophobia, phonophobia, heightened sensitivity to smell, cognitive, emotional and motor disturbances are also more commonly present with MH (Hall et al., 2008; Noseda & Burstein, 2013).

About one third of MH are preceded by an aura which commonly presents as flickering lights or spots in the field of vision, numbness or pins and needles before the onset of pain. These symptoms are fully reversible within 60 minutes (Hall et al., 2008) and if aura symptoms do not subside in that time they may be an indicator of more serious medical conditions. The presence of an aura is a strong indicator of a MH.

Comorbid neck pain has been observed in people with MH but variations in headache classification, data sampling and data collection across different studies means that there is no consensus on the prevalence. With neck pain being a dominant feature of the unilateral CGH it can be challenging when trying to differentiate between CGH and MH. An example of this challenge can be found in Calhoun et al. (2010) who made a differentiation between CGH and MH by classifying those participants presenting with a cervical mechanical precipitation to their headache or with reduced cervical range of motion as CGH (Calhoun et al., 2010). As previously discussed presence of dysfunction in the cervical spine does not necessarily mean a diagnosis of CGH and it is possible that people were wrongly classified (Vincent, 2010). Calhoun et al. (2020) did however include people in the MH cohort who experienced neck pain (without a mechanical precipitation) that radiated forward so it is possible that these people were indeed experiencing CGH as pain starting in the neck is a defining feature of CGH (Frese & Evers, 2008; Sjaastad, 2008; Sjaastad & Bakketeig, 2008a). Some studies on MH do not consider or do not recognise CGH as a possible differential diagnosis while others view CGH as being on the continuum of MH (Ashina et al., 2014; Fernández-de-las-Peñas et al., 2006; Florencio et al., 2014; Watson, 2012).
3.3.3 Mechanisms behind MH

Migraine headache is often considered an inherited condition with many people experiencing MH having a first degree relative who also experience MH (Ashina & Bendsten 2013). Pain is not believed to be related to tissue damage or any detectable pathology but can be triggered by environmental factors such as fatigue, lack of sleep, certain foods, smoke, hunger, menstrual cycle and even bright light (Landy, Rice, & Lobo, 2004).

It is thought that the causative mechanism in migraine is an altered excitability in the brain in response to these environmental triggers activating the trigemino-vascular system (Hall et al., 2008; Noseda & Burstein, 2013). Theories have been proposed about the possible over excitability (dysexitability) of different cortical areas and Cosentino et al. reported findings that supported cortical hyper-responsivity as an explanation for susceptibility to migraine (Cosentino et al., 2014).

A phenomenon called cortical spreading depression (CSD) occurs spontaneously once a critical threshold of neurochemical changes has occurred in the brainstem in response to the environmental stimuli and prior to the onset of headache. During CSD neural activity across the cortex diminishes as does the cortical blood flow and this is thought to trigger visual aura and other prodome associated with MH (Kelley & Tepper, 2012a). Following CSD dural blood flow increases and the vessels dilate. At this stage meningeal nociceptors are activated releasing calcitonin gene-related peptide and other neuropeptides which in turn trigger further vasodilation and an inflammatory reaction.

Innervation of the meninges and intracranial vasculature originates in the trigeminal ganglion and passes along the trigeminal nerve with additional innervation arising from the neurons in the upper cervical dorsal root ganglion (Noseda & Burstein, 2013). Activation of nociceptors in the dura mater, meningeal vessels, intracranial segments of V, IX and X cranial nerves as well as intracranial segments of the basilar, vertebral and carotid arteries, trigger signals which are transmitted to the spinal trigeminal nucleus in the medulla and the dorsal horn of the upper cervical spine. Similar to CGH headache pain experienced in MH is referred through the trigeminal nerve pathways, predominately the ophthalmic branch but to a lesser extent the maxillary and mandibular branches too (Noseda & Burstein, 2013). It has been noticed that that once
a MH has begun, neuroplastic changes may alter the response profile of nociceptive neurons such that pain may continue without further noxious stimuli (Landy et al., 2004).

### 3.3.4 Management of MH

MH is associated with a significantly decreased quality of life so it is no surprise that people experiencing MH would ideally like a treatment that provides long lasting and complete pain relief, without side effects (Kelley & Tepper, 2012b; Zielman et al., 2012). Medication is the first choice of treatment for most migraine sufferers (Wells et al., 2014). The European Headache Federation identifies two steps in management of MH

- **Step One** - symptomatic therapy
- **Step Two** - specific therapy

It is advised that Step Two should not be considered unless Step One has been tried three times without success (World Health Organisation, 2012).

Symptomatic therapy includes administration of medication to target the symptoms of migraine including simple analgesics, non-steroidal anti-inflammatory drugs (NSAIDs) and antiemetic medication. Pain killers such as paracetamol and acetylsalicylic acid are taken to relieve headache pain. NSAIDs such as ibuprofen and naproxen act to reduce the inflammatory responses associated with migraine and therefore reduce the activation of nociceptors and subsequently pain. Use of antiemetic’s can reduce the symptoms of nausea and vomiting.

A systematic review by Kelley and Tepper (2012a) noted that over half of people suffering from MH use ‘over the counter’ analgesics such as paracetamol and acetylsalicylic acid to treat their headache. A Cochrane Review of the efficacy of paracetamol in the management of MH highlighted that paracetamol is superior to placebo in reducing pain from moderate or severe to mild or no pain in 2 hours (Derry & Moore, 2013). There is not enough data to determine its efficacy beyond 2 hours (Derry & Moore, 2013) resulting in the WHO guidelines for symptomatic therapy advising that paracetamol has limited efficacy in the management of MH. Another Cochrane Review identified that 1,000mg of effervescent acetylsalicylic acid is more effective in the management of MH providing a 2 hour pain free response similar to Sumatriptan (a specific therapy which will be discussed later), however, there were no
studies to provide data for 24 hour relief so the longer term benefits are unknown (Kirthi, Derry, & Moore, 2013).

Ibuprofen is an ‘over the counter’ NSAID used to manage MH. The Cochrane Review described Ibuprofen as an effective medication in the management of MH providing significant pain relief to half of the people who take it (Rabbie, Derry, & Moore, 2013). It was noted, however, that very few people experienced complete pain relief. Another NSAID used in the management of MH is Naproxen. The Cochrane Review investigating the efficacy of Naproxen for treatment of MH identified that the medication was better than a placebo but is not clinically useful being effective in less than 1 in 5 people (Law, Derry, & Moore, 2013). Kelly and Tepper’s Systematic Review (2012c) identified that intramuscular or intravenous Ketoprofen provides temporary relief of MH symptoms, however, this requires the person to present themselves to a medical practitioner to receive treatment.

WHO guidelines for Step One are

- use soluble analgesics
- take early in the attack
- use antiemetic medication as required
- rectal administration of medications may be preferable if vomiting is present.

When Step One has been implemented three times and is not successful in managing the MH then Step Two, specific therapy of either triptans or ergotamines should be instigated. The WHO recommends that triptans should be offered as a first option of treatment. Triptans act to constrict blood vessels and inhibit the release of the vasodilator calcitonin gene-related peptide responsible for further vasodilation. Triptans also inhibit the release of anti-inflammatory peptides in the meninges which subsequently reduces pain. Ergotamine acts similarly to triptans but also blocks activation of the trigeminal nucleus caudalis reducing headache (Kelley & Tepper, 2012a).

The two most common triptans are Sumatriptan and Rizatriptan. Sumatriptan was the first marketed and is used extensively world-wide (Derry, Derry & Moore 2014). An overview of four Cochrane reviews of Sumatriptan indicates it provides fast acting
pain relief and in the case of subcutaneous administration can provide relief within 2 hours (Derry, Derry, & Moore, 2014; Kelley & Tepper, 2012a). The WHO suggest that up to 40% of people who initially respond to triptans have their symptoms return within 48 hours at which time a second dose may be administered (WHO 2012). Subcutaneous administration provides more rapid response but comes with increased adverse effects which include chest pressure, neck tightness, limb heaviness, tingling, dizziness and flushes and its use is only recommended with caution.

The WHO (2012) recommends that triptans should not be used more than 10 days/month. Triptans have very varied efficacy on individuals and in many instances patients may need to try several before finding the most effective one for them. It has been identified that triptans are more effective when taken during the mild phase of the headache.

Dihydroergotamine (DHE) provides slower but longer lasting relief than Sumatriptan. Unfortunately there are side effects of which nausea is the most common, followed by diarrhoea, abdominal cramps, vasoconstriction and leg pain (Kelley & Tepper, 2012a). The WHO (2012) found that while ergotamines has a longer duration of action which can provide longer relief of symptoms than Sumatriptan, in many instances this also results in poor tolerability in the long term.

WHO guidelines for Step Two are

- use of triptans first
- do not use triptans for more than 10 days/month
- begin with only one tablet and administration of a second tablet is not recommended if non responsive to the first
- triptans are more effective if administered while headache is mild

Landy et al. (2011) noted that when treatment for MH is instigated within the first hour of the episode that the MH lasts a significantly shorter time than when treatment is commenced more than an hour after symptoms manifest (Landy, Runken, Bell, Higbie & Haskins, 2011). This finding is consistent with the WHO recommendations. Not
having medication available was the most common response for not taking medication within the hour (Landy et al, 2011).

When MH manifests more than two days a month, and acute therapy as described above does not prevent this, prophylactic medication should be considered (WHO 2012). Zielman et al. (2012) found that only 18% of people who met the criteria for prophylactic treatment referred to neurologists in The Netherlands where actually taking prophylactic medication. There exists significant variation between countries in the number of people taking prophylactic treatment for MH, although is it recognised that the number of people taking prophylactic medication is much lower than the number of people who actually meet the criteria for prophylactic treatment (Zielman et al., 2012). It is not known if this is because people are not prescribed the medication or if they chose not to take it. It appears that anti-emetic medication is also underused.

Two medications recognised by the WHO as effective prophylactic medication for MH are the mood stabiliser sodium valproate, a medication used extensively in the management of schizoaffective disorder and the antidepressant drug amitriptyline used in the management of depression associated with schizoaffective disorder or schizophrenia. It may be possible that people taking these medications for their mental illness are inadvertently receiving prophylactic medication for MH thus impacting on the prevalence of MH manifesting in this population.

Non pharmaceutical treatment may be considered by people experiencing MH either in isolation or in combination with pharmacological based treatments. A systematic review of RCT’s exploring the efficacy of spinal manipulation in the management of MH has identified a serious lack of reliable research that will either support or refute this form of treatment for MH (Fernández-de-las-Peñas et al, 2006). Neck pain, however, is often experienced by people with MH and is seen as a confounder that may affect treatment choice (Ashina et al., 2014; Florencio et al., 2014).

Other non-pharmacological treatments and/or preventative measures considered in the US Headache Consortium guidelines (Wells et al., 2014) include relaxation training and cognitive behavioural therapy (CBT). These conservative therapies have evidence to support their use in the preventative management of MH based on evidence from
39 controlled trials (Wells et al., 2014). Although there is no evidence to support the efficacy of meditation and yoga about half of Americans who experience MH report using them to assist with management (Wells et al, 2014). A more recent technique considered is mindfulness training which has been shown to assist in management of chronic pain. Despite some positive trends from a recent small RCT pilot study there is no evidence to support the use of mindfulness an effective treatment for MH (Wells et al., 2014).

### 3.4 Tension Type Headache

TTH is considered one of the most prevalent primary headaches yet the pathophysiology behind the headache is less well understood than MH and CGH (Cathcart et al., 2010; Jensen, 2003). Unlike all other headache types, diagnosis of TTH relies entirely on clinical symptoms and is often diagnosed by the absence of features of other headache types (Fumal & Schoenen, 2008). ICHD characteristics include band like bilateral, pressing or tightening pain of a mild to moderate intensity.

#### 3.4.1 Prevalence of TTH

Tension Type headache has been identified as the most prevalent headache (Li et al., 2012; Queiroz et al., 2009) with a global point prevalence estimated at 20% (Steiner et al., 2013) and a 12 month prevalence of 42% (World Health Organisation, 2012). Prevalence of TTH is higher in women than men and tends to decrease with age in both genders (Fumal & Schoenen, 2008), although one study by Queiroz et al. (2009) determined prevalence was higher in men with a higher education.

Kuritzky et al. (1999) determined the prevalence of TTH amongst people with schizophrenia to be 28.7% using the criteria that all headaches not fitting the definition for MH were classified as TTH. This cannot be an accurate figure of TTH but simply a figure of all headaches that were not MH. No other studies have explored the prevalence of TTH in this population.

#### 3.4.2 Clinical characteristics of TTH

Characteristics of TTH include bilateral mild to moderate pain most frequently in the frontal region but also experienced in the parietal and occipital regions (Li et al., 2012). Headache may last from 30 minutes to up to seven days (The Headache Classification
Subcommitee of the International Headache Society, 2004). TTH has sometimes been called a ‘featureless headache’ being simply an experience of pain predominately described as pressing or tight (Fumal & Schoenen, 2008). The presence of neck pain has been associated with TTH and in one limited cross-sectional study a prevalence of 88% neck pain in TTH was found with a strong correlation between frequency of neck pain and TTH (Ashina et al., 2014).

3.4.3 Mechanisms behind TTH

Independent reviews investigating the pathophysiology of TTH undertaken by Fumal and Schoenen in 2008 and Cathcart et al. in 2009 produced similar findings. Both described studies that identified an increase in muscle activity in pericranial muscles of people who experience TTH. This increase in muscle activity was not shown to have an association to the presence or intensity of headache, suggesting it might be an epiphenomenon (Fumal & Schoenen, 2008; Cathcart et al., 2009).

Fumal & Schoenen (2008) also reported on a series of blinded controlled studies that indicated there is an increased number of active and latent myofascial ‘trigger-points’ in the head, neck and shoulders of people who experience TTH (Fumal & Schoenen, 2008). It was considered possible that continued activation of these hypersensitive areas within pericranial and cervical muscles could lead to sensitisation of the nociceptors in the spinal trigeminal nucleus. More recently Bezov et al. (2011) reviewed literature on the pathophysiology of TTH and hypothesised that frequent nociceptive input from ‘trigger points’ within pericranial muscles induces sensitisation of the sensory afferents and second order neurones in the trigeminal nucleus. They propose it is plausible to conceive that if this process is not stopped through prophylactic measures then neuroplastic changes within the central nervous system could lead to a maladaptive sensitivity state and the precipitation of chronic TTH.

However, in 2014 Quintner, Bove and Cohen undertook a review of literature about ‘trigger points’ and surmised that the concept of ‘trigger points’ is an invention with no specific scientific basis to support it (Quintner, Bove, & Cohen, 2014). They cited a lack of diagnostic certainty to support the concept of ‘trigger points’ with limited inter-rater reliability of physical examination findings. They also cited a lack of recognised pathogenesis to explain ‘trigger points’ with a deficiency of unique specific tissue biochemistry and EMG or imagery findings. The authors did suggest that a
plausible hypothesis is emerging with new insight into the neurobiology of nociception and pain that should better explain the phenomena currently attributed to the ‘trigger point’ concept.

Both the review by Fumal and Schoenen (2008) and that by Cathcart et al (2009) reported the findings of an investigation using electrical stimulation into pain sensitivity in people with chronic TTH. This study found that there is a generalised increase in pain sensitivity in this population suggesting a central nervous system abnormality in processing pain. Both reviews also referred to a study published by Schmidt-Wilke in 2008 that found that people who experience chronic TTH have decreased cortical grey matter density in particular the pons, anterior cingulate cortex, insular cortex, temporal lobe, orbito-frontal cortex and the hippocampus. They hypothesise that this reduction in tissue density suggests supra-spinal sensitisation as a result of constant activation of these pain related areas.

Based on these reviews the authors hypothesised that TTH is the result of pain elicited by peripheral mechanisms such as overloaded pericranial muscles combined with sensitisation of nociceptors in the spinal trigeminal neurones and abnormal pain processing in the CNS, possibly as a response to stress. It is accepted that physical and emotional stress, increased nociception from pericranial muscles, lack of sleep and fatigue are common triggers for TTH (Cathcart et al., 2010; Fumal & Schoenen, 2008; Li et al., 2012).

3.4.4 Management of TTH

The majority of people who experience TTH do not consult a doctor, rather treat themselves with ‘over the counter’ medication resulting in many people with more frequent TTH overusing medications and developing associated medication overuse headaches (Fumal & Schoenen, 2008; Li et al., 2012). The European Headache Federation has indicated that pharmacological intervention is appropriate for the acute care management of people who experience infrequent TTH episodes but has limited scope in the management of chronic TTH (World Health Organisation, 2012). ‘Over the counter’ analgesic medications such as paracetamol, ibuprofen and acetylsalicylic acid are effective for relief of pain, however, caution is advised because if TTH becomes frequent and this treatment regime continues there is a risk of developing
medication overuse headache. If TTH presents on more than 2 days per week prophylactic treatment is recommended.

Verhagen et al. (2010) undertook a systematic review of 41 RCT’s that provided evidence that paracetamol and ibuprofen are both effective for short term pain relief in the case of episodic TTH. Another systematic review by Moore et al. (2014) provided the same result (Moore, Derry, Wiffen, Straube, & Bendtsen, 2014). An earlier study by Steiner, Lang and Voelker (2003) demonstrated in a double blinded, placebo controlled trial of 638 people that there was no difference between taking acetylsalicylic acid or paracetamol for the management of TTH and that both were effective in the management of episodic TTH (Steiner, Lange, & Voelker, 2003).

In 2006 Fernández-de-las-Penos et al. undertook a systematic review of RCT’s examining the efficacy of spinal manipulation in the management of TTH, CGH and MH. They reviewed 3 papers relating to TTH and noted that in general the methodological quality was low indicating a need for more rigorous research. Physiotherapy was found to play a role in the holistic management of the person with TTH by providing ergonomic and postural education combined with muscle strengthening exercises to reduce stresses on the myofascial tissues involved in the generation of the headache. Physiotherapy can also be effective in managing neck pain that may be present in conjunction with TTH. As identified by Fernández-de-las-Penos et al. (2006) more robust research would need to be undertaken to determine if these physiotherapeutic measures impact on the frequency and intensity of TTH.

There is consensus that initial treatment of infrequent episodic TTH is the use of simple ‘over the counter’ analgesics, but when headache becomes frequent and the trigger for headache cannot be avoided then prophylactic measures should be implemented to avoid the development of medication overuse headaches. After reviewing 44 clinical trials on prophylactic pharmacological intervention Verhagen et al. (2010) found that preventative medications for TTH are either no more effective than a placebo or there was conflicting or limited evidence to support their effectiveness. If prophylactic pharmacological intervention is not effective then a more multidisciplinary approach may be required for best results. The review by Verhagen et al. (2010) examined another 44 RCT’s exploring the effectiveness of CBT and another 12 trials exploring
physiotherapy as preventative measures for TTH. No conclusions could be drawn as there were either inconsistent results or trials did not have adequate power to demonstrate a significance for the use of the specific intervention (Verhagen et al., 2010). The WHO Global Campaign to Reduce the Burden of Headache Worldwide recommends some self-management strategies of relaxation, exercise, seeking help for stress management and seeking help for depression if identified as a problem (World Health Organisation, 2012).

Ashina and Bendsten (2013) have reviewed systematic and Cochrane reviews on non-pharmaceutical management of TTH including behavioural treatments, spinal manipulation and physiotherapy and acupuncture (Ashina & Bendsten, 2013). They found the following:

- Cognitive Behavioural Therapy is effective in the management of TTH
- People taking antidepressants and receiving non pharmaceutical treatment for stress management had a 50% decrease in the number of TTH experienced
- A combination of physical therapy and exercise provides reduced frequency and intensity of TTH
- Acupuncture was not found to be superior to physical therapy

‘Over the counter’ medications such as paracetamol, acetylsalicylic acid and ibuprofen are recognised as effective form of management of infrequent episodic TTH (Fumal & Schoenen, 2008; Li et al., 2012; Moore et al., 2014; Steiner et al., 2003; Verhagen et al., 2010; World Health Organisation, 2012). In the case of frequent TTH these medications must be used with care to prevent the development of medication overuse headache (Fumal & Schoenen, 2008; World Health Organisation, 2012). There is some evidence to support the use of a combination of CBT and physiotherapeutic interventions as preventative measures for more frequent episodic or chronic TTH (Ashina & Bendsten, 2013; Verhagen et al., 2010; World Health Organisation, 2012).

3.5 Overview of Schizophrenia and schizoaffective disorder

Schizophrenia is considered one the most debilitating mental illnesses having been identified worldwide as the fifth leading cause of disability in people aged between 15 - 44 years (Sawa & Snyder, 2002; Vancampfort et al., 2012). Schizophrenia symptoms
include positive symptoms of psychotic episodes such as delusions, hallucinations and bizarre thoughts and negative symptoms such as apathy, social withdrawal and flattened affect (Kuswanto, Teh, Lee, & Sim, 2012; Sawa & Snyder, 2002). Schizoaffective disorder has features of both schizoprenia and mood disorders and can be classed as manic or depressive depending on the symptoms that are present. Prognosis is better for people with schizoaffective disorder than it is for people with schizophrenia (Essali, Al-Haj Haasan, Li, & Rathbone, 2009; Jäger, Bottlender, Strauss, & Möller, 2004).

3.5.1 Prevalence of schizophrenia and schizoaffective disorder
Schizophrenia is a disease that affects 0.4 - 1.4% of the population (Carter, 2012; Castle & Buckley, 2011; Vancampfort et al., 2012). Symptoms usually first appear in young adults with males making up nearly 60% of the patient population (McGrath, Saha, Chant, & Welham, 2008). To date there have been no large scale studies to determine the prevalence of schizoaffective disorder but according to Malhi et al. (Malhi, Green, Fagiolini, Peselow, & Kumari, 2008) prevalence has been estimated to be between 0.5% and 0.8% in the general population. The onset of thirty percent of cases is before age 25 and a further 30% between age 25 and 35 and occurs more frequently in females (Abrams, Rojas, & Arciniegas, 2008).

In the 2010 Australian National Survey of people living with a psychotic illness, 47% of people with a psychotic illness had a diagnosis of schizophrenia and 16.1% a diagnosis of schizoaffective disorder (Morgan et al, 2011). Nearly 65% of people with a psychotic diagnosis in Australia develop this illness between the ages of 25 and 34 years of age (Morgan et al., 2012).

3.5.2 Clinical Characteristics of schizophrenia and schizoaffective disorder
Emil Kraepelin was the first person to describe ‘dementia praecox’ or schizophrenia as we now call the illness. This condition is characterised by positive symptoms, negative symptoms and/or stereotypical behaviours that are evident for a period of at least one month in conjunction with a noted decline in function over a 6 month period. Positive and negative symptoms and cognitive deficits alter the person’s sense of reality which in turn may affect personal, social and occupational functioning. Positive
symptoms include psychoses such as delusions, hallucinations, bizarre thoughts, suspicion and disorganised speech and behaviour. Negative symptoms are characterised by poor motivation, apathy, flattened affect and social withdrawal. Kraepelin clearly identified a decline in cognitive function through his use of the word ‘dementia’ to describe what he was witnessing in patients. The cognitive deficits include attention, memory and executive functions (Kuswanto et al., 2012).

WHO ICD-10 identifies that schizoaffective disorder has symptoms of both schizophrenia and mood disorders which are present at the same time or within a few days of each other. The patient’s symptoms do not meet the specific criteria for either schizophrenia or depressive/manic episode. To be diagnosed with schizoaffective disorder a person must experience a major depressive episode for at least two weeks or a manic episode for one week either concurrently or within a few days of experiencing positive symptoms of schizophrenia. Two of the following must be present for more than two weeks – delusions, hallucinations, disorganised speech, disorganised behaviour or negative symptoms (Malhi et al., 2008). Schizoaffective disorder will be defined as bipolar schizoaffective disorder if mania is part of the presentation or depressive schizoaffective disorder if depression is the only mood disorder observed.

3.5.3 Mechanism behind schizophrenia and schizoaffective disorder
Schizophrenia is a complex condition in which the pathophysiology is still not clearly understood. It is believed that schizophrenia develops in response to specific stressors in vulnerable people. Stressors can be either biological factors such as infections or substance abuse and/or environmental such as death and trauma (Castle & Buckley, 2011).

Genetics are believed to contribute to a predisposition or vulnerability of an individual to develop schizophrenia. (Arnedo et al., 2014; Castle & Buckley, 2011; Lowry, 2014). Research is being undertaken to better understand the role of genetics in the development of the illness. In recent years attempts have been made to find a ‘schizophrenia gene’ without success and the complex nature of the genetic links suggest that there may not be such a gene but rather a series of gene-gene interactions (Arnedo et al., 2014). Castle and Buckley (2011) tabled a ‘gradient of genetic risk for
schizophrenia’ which evaluates the risk of developing schizophrenia based on the proximity of the genetic relationship to a person who has a diagnosis of schizophrenia. Table 4 presents information on the chances of developing schizophrenia based on this genetic link.

Table 4 - Chances of developing schizophrenia

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Chance of developing schizophrenia</th>
</tr>
</thead>
<tbody>
<tr>
<td>General population</td>
<td>1%</td>
</tr>
<tr>
<td>Sibling with schizophrenia</td>
<td>8%</td>
</tr>
<tr>
<td>One parent with schizophrenia</td>
<td>12%</td>
</tr>
<tr>
<td>Fraternal twin with schizophrenia</td>
<td>14%</td>
</tr>
<tr>
<td>Both parents with schizophrenia</td>
<td>39%</td>
</tr>
<tr>
<td>Monozygotic twin with schizophrenia</td>
<td>47%</td>
</tr>
</tbody>
</table>

Castle and Buckley (2011) identified that early life environmental factors contribute to vulnerability of developing schizophrenia but emphasise that in isolation these are not the cause of the development of schizophrenia. These factors include, but are not limited to, maternal infection, maternal anaemia or malnutrition, maternal Vitamin D deficiency, birth complications and maternal stress during pregnancy.

Karlsgodt et al. (2012) propose a more specific neurodevelopmental hypothesis where brain lesion caused by a combination of genetic and environmental factors interferes with the normal growth and development in the brain resulting in schizophrenia (Karlsgodt, Ellman, Sun, Mittal, & Cannon, 2012). The theory recognises three specific elements

1. Conception - genetic make-up
2. Early development - pre and peri-natal brain development which may be influenced by environmental factors identified above such as maternal infection and other obstetric complications
3. Later development - late adolescent and young adult stresses resulting in the structural changes to grey and white matter noted previously. Studies are currently being undertaken in an attempt to better understand the role of stress in the onset of psychosis (Mondelli & Pariante, 2012).
This complex interaction is explained in Figure 3.

**Figure 3 – Neurodevelopmental model of schizophrenia**


While the mechanisms behind the development of schizophrenia are still not fully understood there is an understanding of the structural changes within the brain of a person with schizophrenia. A systematic review of brain MRI anatomy of people with schizophrenia by McCarley et al. (1999) and a review of Diffusion Tensor Imaging studies by Kuswanto et al. (2012) have found enlarged lateral ventricles, enlarged third ventricle, reduced overall grey matter and widespread cortical and cerebellar atrophy. There is also noted volume reduction of the inferior prefrontal cortex and the amygdala, hippocampus and parahippocampal gyrus particularly on the left side (Kuswanto et al., 2012; McCarley et al., 1999).
Along with structural changes within the brain, an increase in dopamine D2 receptors has long been associated with schizophrenia (Madras, 2013). With the development of imaging technology (SPECT) it has now been determined that there is an increase in presynaptic dopamine D2 receptors as well as the previously identified increased levels in response to a ‘challenge’ (Howes, 2012). A new theory of the involvement of dopamine in schizophrenia as the final common pathway for schizophrenia has been proposed by Howes (2012). He suggests that multiple ‘hits’ on risk factors described above lead to increased dopamine levels and in particular presynaptic dopamine dysregulation through abnormalities with the function and regulation of dopamine cell bodies in the midbrain. It is unknown if there is dysregulation in other neurons within the midbrain or if they are limited to the dopaminergic cell bodies.

Malhi et al. (2008) highlight the dearth of studies into biological mechanism associated with schizoaffective disorder although some have shown enlarged ventricles, reduced white matter and asymmetry of the parahippocampal gyrus as well as an increased in dopamine D2 receptors. They also have been shown to have striatal regional abnormalities similar to those seen in people with bipolar affective disorder.

3.5.4 Management of schizophrenia and schizoaffective disorder
The main treatment of antipsychotic medication aims to reduce symptoms of schizophrenia and maintain and improve patient functioning and quality of life. Neuroleptic medication reduces positive symptoms of the illness through blocking of the dopamine D2 receptors unfortunately with neurological side effects mimicking Parkinson’s disease (Sawa & Snyder, 2002). Atypical neuroleptics have been developed that target serotonin receptors to a greater extent than dopamine D2 receptors and do not have these Parkinsonian side effects. These drugs have been shown to be effective in reducing both positive and negative symptoms of schizophrenia; however, these drugs have adverse metabolic side effects including weight gain.

Schizoaffective disorder is usually treated with a combination of antipsychotic medication and mood stabilisers but there is a lack of evidence to support that this is the optimum treatment for the condition (Murru et al., 2011). The systematic review undertaken by Murru et al. (2011) highlights this lack of research with only one
antipsychotic medication having been tested in a placebo controlled trial and no placebo controlled trials of mood stabilisers. Murru et al. (2011) noted that the basis for prescribing these medications for the treatment of schizoaffective disorder was from extrapolation of data from trials of these drugs in other populations such as bipolar disorder or schizophrenia. They cautioned this practice and proposed the need for more specific, robust RCT’s exploring the efficacy of these medications for the management of schizoaffective disorder.

Many people with schizophrenia and schizoaffective disorder are non-adherent to their treatment regime and non-compliance of medication is thought to be the biggest factor contributing to relapse (Carter, 2012; Lammers, Zehm, & Williams, 2013). Depot injections have been identified as a safe and effective way of ensuring compliance (Olivares et al., 2009; Sim et al., 2004). Some studies have associated the use of depot with males and people who have aggressive behaviour (Sim et al., 2004) while other have identified depot users as people more likely to have alcohol or substance abuse, higher involvement with police and more frequent hospitalisation (Ascher-Svanum, Peng, Faries, Montgomery, & Haddad, 2009; Rubio et al., 2006). For many users, however, the convenience of not having to remember to take medication is appealing and they voluntarily choose to receive their medication in depot form (Sim et al., 2004).

3.5.5 Pain and schizophrenia

Early pioneers in the study of schizophrenia, Kraepelin and Bleuler noted that people with schizophrenia have a reduced sensitivity to nociception (Potvin & Marchand, 2008). In 1982 Fishbain warned about the importance of clinicians exploring pain reported by people with psychoses to prevent misdiagnosis of medical conditions and even death (Fishbain, 1982). A review of literature relating to pain experienced by people with schizophrenia and psychoses conducted by Singh et al. (2006) uncovered that many people experiencing psychosis fail to respond to noxious input from life threatening conditions such as myocardial infarction, ruptured appendix and perforated bowels (Singh, Giles, & Nasrallah, 2006).

A study by Atik et al. (2007) explored the differences in pain threshold, pain tolerance and pain endurance between people with schizophrenia, bipolar affective disorder and
controls (Atik, Konuk, Akay, Ozturk, & Erdogan, 2007). The study used the cold pressor test (immersing the hand in iced water) on the non-dominant hand and recorded when the cold began to hurt (pain threshold), when participants removed their hand (pain tolerance), their pain score out of 10 using a visual analogue scale at the point where they removed the hand (pain magnitude) and then the time that elapsed before pain resolved (pain endurance time). They determined there was no statistical difference between time to pain threshold between the group with schizophrenia (mean=144.4 sec) and the control group (mean=112.5 sec) and measured pain magnitude (schizophrenia mean=6.85/10 and control group mean=6.94/10). It was determined, however, that people with schizophrenia had higher pain tolerance (mean=199.4 sec) in that they could leave their hand in the cold for longer than the control group (mean=137.5 sec) before pain forced them to remove it. In what appears to be a contradiction people with schizophrenia had longer pain endurance times (mean=56.4 sec) than the control group (mean=25.0 sec). It was suggested that this discrepancy existed because report of pain resolution was based on subjective evaluation and delay in reporting could be attributed to affective abnormalities. However, no consideration was given to the fact that having left their hand in the iced water for longer periods of time other physiological changes associated with prolonged cold might have meant it could have taken longer for pain to resolve after emersion.

In 2008 Potvin and Marchand conducted a meta-analysis of twelve studies conducted between 1966 and 2007 comparing experimental pain responses in people with schizophrenia to healthy controls (Potvin & Marchand, 2008). Six studies related to thermal stimulation of pain with two using the cold-pressor test, five studies related to electrical stimulation and one study used mechanical stimulation through pressure on the deltoid, tibia and finger to stimulate pain. They determined that people with schizophrenia had a diminished sensitivity to experimentally induced pain from electrical and thermal stimulation. An important aspect of their report was that this diminished sensitivity was present in people taking medication as well as those not taking medication suggesting antipsychotic medication alone cannot be responsible for diminished pain sensitivity in people with schizophrenia. Hooley and Delgado evaluated pain responses in relatives of people with schizophrenia using finger pressure algometer (Hooley & Delgado, 2001). They determined that relatives of a person with schizophrenia had a higher threshold to pressure pain than people who did
not have a relative with schizophrenia. This could suggest a genetic predisposition to hypoalgesia amongst people with schizophrenia.

A systematic review of literature by Bonnot et al. (2009) focused on differences between behavioural responses to pain and physiological responses to pain. Fifty-seven articles were reviewed under the following sub headings:

- Case reports of people with schizophrenia who reported no pain in known painful medical conditions
- Clinical and epidemiological studies where a high prevalence of people with schizophrenia experiencing headaches was noted
- Experimental studies with varied results, some showing higher pain threshold in people with schizophrenia and others not showing this phenomenon.
- Previously reviewed articles.

A decrease in behavioural responses to pain was found which was attributed to cognitive impairments (Bonnot et al., 2009). Bonnot et al. (2009) and Potvin and Marchand (2008) suggest that poor communication and cognitive impairments as well as negative symptoms such as blunted responses experienced by this population group could contribute to altered pain expression. They hypothesise that noxious stimuli will still provoke a pain response but the expression of the pain response may be blunted. The research evaluated in these two reviews focused on cutaneous pain and not deep tissue sensitivity which is more likely to be associated with medical conditions and musculoskeletal dysfunction.

A more recent study not included in the above systematic reviews examined responses of people with schizophrenia to both acute and prolonged painful stimuli elicited by transcutaneous electrical stimulations of the sural nerve (Lévesque et al., 2012). They determined that people with schizophrenia have a unique response to noxious input with increased sensitivity to acute nociception and decreased sensitivity to prolonged nociception when compared to a control group of people with no family history of schizophrenic spectrum disorders. The fact that participants had different responses to different types of noxious input might suggest that communication and blunted responses are not the limiting factors to pain expression. There is some consistency
between this study and that of Atik et al. (2007) mentioned above who found that people with schizophrenia have higher pain endurance and tolerance.

Engels et al. (2014) conducted a systematic review on fourteen studies on clinical pain in schizophrenia reflecting that responses to nociception induced in experimental conditions are very different from those of clinical pain experienced in daily life (Engels et al., 2014). Clinical pain included surgical pain, chronic pain and pain experienced in daily life. It appeared that prevalence and intensity of pain associated with medical causes is lower in people with schizophrenia than controls. When pain was not related to a medical cause both prevalence and intensity were the same as healthy people. Possible explanations were presented for the lower prevalence and intensity of medical related pain and these include

- Not actually reporting the pain for fear of hospitalisation or to avoid being a burden
- Diminished processing of motivational-affective aspects of pain due to dysfunction in the frontal lobe. The person may feel pain but not exhibit pain behaviour
- Decline in cognitive functioning
- Use of antipsychotic medication.

The question of whether lower prevalence and intensity of medically caused pain is a result of being less sensitive to nociception or having a blunted response to pain was not resolved. A possible explanation, not suggested by the authors, is that medical pain could be more prolonged whereas experimental pain may be more acute and as identified by Lévesque et al., (2012) there appears to be a reduced sensitivity to prolonged pain in people of this population.

According to Wojakiewicz et al. (2013) people with schizophrenia not only have a reduced response to their own pain but also that they have difficulty recognising when other people are in pain (Wojakiewicz et al., 2013). The hypothesis for this study was that response to pain is both physiological and emotional. Wojakiewicz et al. (2013) evaluated the emotional aspects of pain recognition by comparing responses to facial expressions, videos of pain sequences and a situational pain questionnaire. They compared responses of 29 people with schizophrenia against 27 controls matched on
age, gender and IQ. They found differences that suggest people with schizophrenia lack an ability to recognise basic emotions from facial expressions and are not able to differentiate between imaginative painful and non-painful situations and have an altered ability to recognise pain and pain behaviours.

Regardless of the underlying mechanism it is acknowledged that people with schizophrenia do have a diminished response to noxious input especially in the chronic stages of their illness (Bonnot et al., 2009; Engels et al., 2014; Guieu, Samuélion, & Coulouvrat, 1994; Potvin & Marchand, 2008). All researchers agree that more research into the responses of people with schizophrenia to noxious stimuli is required.

The concept that people with schizophrenia experience reduced pain responses but have a high incidence of pain and a prevalence of headache the same if not greater than the general population raises questions about the nature and characteristics of the headaches that they may experience. Are the headaches different or are the impairments driving the conditions more severe than the general population in order to provoke a response? If this is the case then it is important that headache can be identified and treated in a timely manner.

3.5.6 Posture and schizophrenia

As already noted a forward head posture has been associated with headache and in particular cervicogenic headache. Poor trunk stability and diminished postural control can be a factor in forward head posture (Beinert & Taube, 2013). There is evidence that people with schizophrenia have structural abnormalities of their cerebellar vermis a neural structure that plays an important role in maintaining postural control (Nopoulos, Ceilley, Gailis, & Andreasen, 1999). Using MRI it has been determined that the proportional relationship between volumes of grey and white matter in the cerebellar vermis region of people with schizophrenia is different compared to a healthy control group (Lawyer, Nesvag, Varnas, Okugawa, & Agartz, 2009). Diminished postural control and balance has been observed in people with schizophrenia and are often referred to as neurological soft signs (Ho, Mola, & Andreasen, 2004; Marvel et al., 2004; Picard, Amado, Mouchet-Mages, Olié, & Krebs, 2008; Varambally, Venkatasubramanian, & Gangadhar, 2012; Varambally, Venkatasubramanian, Thirthalli, Janakiramaiah, & Gangadhar, 2006).
In an experiment comparing postural sway in people with schizophrenia to healthy individuals the people with schizophrenia demonstrated more sway in the anterior-posterior plane which was even more pronounced when feet were together and arms raised (Marvel et al., 2004). In this study it was suggested that medication could be a potential confounder. Ho et al. (2004) compared cerebellar signs of 155 neuroleptic naïve people with schizophrenia against 155 healthy volunteers of similar age and gender. The tests included finger-nose, rapid alternating pronation-supination, heel-knee-shin, muscle tone, Rhomberg and tandem gait tests. It was determined that about one fifth of the study group (neuroleptic naïve) displayed positive cerebellar sign, particularly in gait and stance indicating that neuroleptic medication cannot be totally responsible for positive cerebellar signs. A possible limitation to this study was that examiners were not blinded to participant’s diagnosis. These findings of Ho et al. (2004) were reproduced in a later study by Varambally et al. (2006) in a cohort screened for comorbid alcohol abuse or dependence. People with known alcohol dependence were excluded from the study thus eliminating the possibility of alcohol abuse as a reason for cerebellar abnormalities.

Reviewing clinical, cognitive and functional literature on the role of cerebellum in schizophrenia, Picard et al. (2008) found nothing to refute the concept of cerebellar involvement in schizophrenia resulting in anomalies in postural control and equilibrium (Picard et al., 2008). A later review of current literature also supports the belief that cerebellar signs are part of the syndrome of schizophrenia and determined that their presence may have some link to poorer prognosis (Varambally et al., 2012).

3.6 Managing the physical health of people with mental illness and role of Physiotherapy

There is a strong connection between physical wellbeing and good mental health. Good mental health is fundamental to the wellbeing of individuals, families and communities (Department of Health and Aging, 2009). Good health is a result of a complex interaction of biological, psychological, social, environmental and economic factors. When any of these factors are compromised so is the health of the individual. It is widely accepted that people with mental health disorders have poorer physical
health than the general population with higher levels of mortality and morbidity from physical illness (Coghlan et al., 2001; Happell et al., 2012; McLennan, 1998; Richardson et al., 2005).

The importance of maintaining good physical health of mental health clients is recognized in the Australian National Mental Health Policy (2008). Australian mental health teams are comprised of psychiatrists, psychologists, mental health nurses, social workers, occupational therapists and Aboriginal and Torres Strait Islander mental health workers (National Mental Health Policy, 2008). Unfortunately it has been identified that people working in mental health often discount physical complaints as side effects of medication or a psychotic event and do not investigate further often resulting in poor outcomes for the client (Cuyún Carter et al., 2011; Happell et al., 2012).

In order to access holistic health care all mental health consumers are encouraged to visit a general practitioner (GP), someone who is responsible for their overall management including physical health issues. Unfortunately Morgan et al. (2011) reported that only 35.5% of people with psychotic illness who visited their GP had a general health examination. This was not a surprising finding when most GP visits (65.4%) lasted between 10 and 19 minutes allowing very limited time to address both mental and physical health issues (Morgan et al., 2011).

It would appear that mental health consumers are not getting adequate access to health practitioners who can evaluate and manage their physical health issues. Many papers recommend that better assessment and diagnosis of physical complaints of people with schizophrenia and schizoaffective type disorders is necessary (Connaughton, Patman, & Pardoe, 2013; Fagiolini, 2008; Galletly et al., 2012; Jeste, 1996; Morgan et al., 2012). Within the general healthcare system, physiotherapists play significant roles in the assessment, treatment and ongoing management of many of the more common physical health issues experienced by people with schizophrenia or schizoaffective disorder (Australian Physiotherapy Association, 2011, 2012). These include chronic back, neck or other pain (Galletly & Murray, 2009; Gureje, 2008; Morgan et al., 2012; The Chartered Society of Physiotherapy, 2008), cardiovascular disease, ischaemic heart disease, hypertension, diabetes, respiratory disease (Fagiolini, 2008; Morgan et
al., 2012; Richardson et al., 2005), and illnesses associated with obesity (Morgan et al., 2012). Given that the National Mental Health Policy (2008) advocates for good holistic health of mental health consumers it could be argued that physiotherapists should be included as integral members of mental health teams.

Physiotherapeutic interventions of aerobic exercise, muscle strengthening and relaxation have been shown to have positive effects on psychiatric symptoms, psychological distress and anxiety of people with schizophrenia as well as improving health related quality of life (Gorczynski & Faulkner, 2010; Vancampfort et al., 2012). A limited systematic review of the effects of physical exercise in schizophrenia (n=3 articles) has determined that exercise can lead to an increase in hippocampal volume, increased cardio-respiratory fitness and has been associated with an increase in cortical thickening in the left hemisphere (Vancampfort et al., 2014). It is becoming evident that physiotherapy has a bigger role to play in the holistic management of people with schizophrenia and schizoaffective disorder than just addressing their physical health, further strengthening the argument to include them as a profession within mental health workforce.

3.7 Factors affecting quality of life

Quality of life (QOL) is no longer measured by the presence or absence of disease and survival but covers a more holistic view of the person (Magnusson, Riess, & Becker, 2012). Most quality of life questionnaires explore a person’s perceptions of their physical and social functioning, their psychological status and disability attributed to disease related symptoms (Magnusson et al., 2012; Manhalter, Bozsik, Palásti, Csépány, & Ertsey, 2012).

3.7.1 Impact of headache on quality of life

The WHO identified in the document ‘Lifting the Burden’ (2012) that many people ‘belittle’ the impact headache can have on a person. It is often overlooked by medical health professionals because almost every one experiences headache from time to time and is not usually a life threatening illness (Stovner et al., 2007; Stovner, Zwart, Hagen, Terwindt, & Pascual, 2006). Headache has been recognised as one of the world’s top 10 causes of disability, is among the top 3 most prevalent diseases globally
and has been identified as the top neurological cause of years lived with disability (Martelletti, Mitsikostas, et al., 2013; Martelletti, Birbeck, et al., 2013).

The presence of headache impacts on a person’s function and quality of life. Solomon and colleagues (Solomon et al., 1993) undertook a study of 208 people attending a headache clinic using the Medical Outcomes Study Short Form Health Survey (SF-36) to determine the impacts chronic headache has on quality of life. People with headaches recorded significantly worse scores for physical, social and role functioning components and had worse mental health than people with chronic diseases such as arthritis and diabetes. The reduced quality of life results were comparable to those of people who had experienced myocardial infarction.

A Dutch study was undertaken in 2003 using the SF-36 to explore the health related quality of life of 118 people attending a headache clinic who had either CGH, TTH or MH diagnosed by neurologists against the ICHD (van Suijlekom et al., 2003). They found that people experiencing CGH had a quality of life burden greater than the normal population but similar to that of people experiencing MH without aura and TTH (van Suijlekom et al., 2003). The 2007 study by Vinding and colleagues examining the impact of headache in a Danish Headache centre population found people experiencing frequent headaches also made greater use of the healthcare system, had more time off work and were less effective when at work than the general population (Vinding et al., 2007). The need for early intervention was highlighted to reduce the burden and improve quality of life.

Wiendels et al conducted a population based survey exploring prevalence and risk factors of chronic frequent headaches (Wiendels et al., 2006). This postal survey was sent to 21,440 people who were registered with a GP in two regions of The Netherlands. There was a response rate of 76% (n=16,232). Researchers wanted to minimise selective responses so it was not identified that headache was their primary focus. They found that fifty percent of people experiencing chronic frequent headaches had significant comorbidities and reported moderate disability. The most prevalent comorbidities were gastrointestinal and musculoskeletal conditions including arthritis, back pain, neck pain and fibromyalgia. The majority of people attending headache
clinics also had comorbid mental health issues the most common of which were depression and anxiety disorder.

In a qualitative study exploring the experiences and perceptions of people with headache it was found that presence of headache had negative effects on work, family life, social activities and mood (Leiper et al., 2006). A significant worry for headache sufferers was the cause of the headache and it was identified that there was a desire for investigations to determine the cause to rule out sinister origins. There is nothing to suggest this is any different for people with schizophrenia or schizoaffective disorder.

### 3.7.2 Impact of schizophrenia and schizoaffective disorder on quality of life

People with schizophrenia and schizoaffective disorder are known to have poor quality of life and global functioning (Morgan et al, 2011). Worldwide, schizophrenia has been found to be the fifth leading cause of disability (Vancampfort et al., 2012). A study conducted over a three year period by Cuyún Carter et al. (2011) found that only 10% of people with a diagnosis of schizophrenia had good QOL outcomes including an improved quality of life, increased daily activities and global functioning. This agrees with the Australian Government Report, People Living with Psychotic Illness, 2010 (Morgan et al, 2011) which determined that 90% of people in Australia with psychotic illness report deterioration in their occupational and social functioning after their diagnosis (Morgan et al, 2011). Two thirds of people were identified as having a severe dysfunction in their ability to socialise and about one third were severely impaired in their ability to look after themselves and undertake basic activities of daily living.

Ritsner, Lisker and Grinshpoon (2014) highlight that poor quality of life in people with schizophrenia and schizoaffective disorder is linked to presence of depressive symptoms, side effects of antipsychotic medication and emotional distress (Ritsner, Lisker, & Grinshpoon, 2014). In their study Ritsner et al., (2014) only focused on psychological features that may contribute to emotional stress and overlooked impacts of physical factors such as pain (Ritsner et al., 2014).
3.7.3 Impact of headache on quality of life of people with mental illness

Presence of a psychiatric comorbidity is known to complicate the management of headache (Bera, Khandelwal, Sood, & Goyal, 2014). Verri et al. (1998) identified the most common comorbidity of people who experience chronic daily headaches were anxiety and mood disorders (Verri et al., 1998). A more recent study determined that the most common psychiatric comorbidity associated with headache is depression with Bera et al. (2014) finding depressive symptoms present in 37.5% of people experiencing MH and 30% of those with TTH compared to 10% in a headache free control group. The study examined the QOL of people experiencing different headache types but no comparisons were made in the QOL between those with depression and those without depression.

People experiencing headaches with a comorbid psychiatric condition incur increased medical costs, a higher headache related disability and a reduced quality of life (Smitherman & Baskin, 2008; Wang & Juang, 2002). Pompili et al. (2009) found that a psychiatric disorder among people with headaches decreased quality of life, resulted in poorer prognosis and response to treatment and resulted in an increased chronicity of the disease (Pompili et al., 2009). The presence of migraine or chronic non migraine headaches increased the risk of developing depression. The study found pharmaceutical intervention targeting mental health comorbidities improved mental health but did not impact on headache number or intensity. No physiotherapeutic assessment or intervention was considered.

It is already known that management of physical complaints of people with mental illness is poorer than the general population (Coghlan et al., 2001; Fagiolini, 2008; Morgan et al., 2012) and it could be suggested that people with schizophrenia and schizoaffective disorder are not receiving assessment and treatment for their headaches equivalent to the general population. Already considered a burden on the healthcare systems the addition of headaches on a person with schizophrenia or schizoaffective disorder could compound this.

3.8 Summary of literature review

Headache is recognised as one of the top ten disabling conditions worldwide yet up to 50% of headache sufferers in the general population do not seek medical advice. Prevalence of headache amongst people with schizophrenia has been determined at
48% which is comparable to that of the general population. Headache is reported to be the most common pain experienced by people with psychotic illness. People with mental illness have poorer physical health than the general population and for many reasons do not receive appropriate care. It is suggested that fewer people with schizophrenia or schizoaffective disorder report the presence of headache to their health professional which would also suggest that they do not receive appropriate assessment and treatment.

Headache of particular interest to physiotherapists is CGH. The prevalence of cervicogenic headache is about 4% in the general population and roughly 15-20% of patients suffering from ongoing headache. No studies have been undertaken to determine if this is the same for people with schizophrenia or schizoaffective disorder. Physiotherapy plays an important role in the management of CGH. TTH and MH are also of interest to physiotherapists. Physiotherapy plays a role in the management of TTH and although not a key treatment for MH, physiotherapy has a role to play when comorbid neck pain exists. Physiotherapists are able to differentially diagnose between CGH, TTH and possible MH and refer people to appropriate health professionals for the management of MH. Prevalence of TTH is 42% and MH 14.7% in the general population. Only one study has looked at the prevalence of TTH and MH in people with schizophrenia but this study did not use the ICHD to classify TTH and it is unknown how MH was classified. More research is needed to determine the prevalence of these headache types in people with psychotic illness.

Schizophrenia and schizoaffective disorder affects about 1% of the population. These disorders are associated with a diminished response to pain which could have significant implications on the presentation and characteristics of their headache experience. The cerebellum vermis is involved with postural control and can be impaired in people with schizophrenia. Poor posture can be a contributing factor to headache and in particular CGH. It could be possible that people with schizophrenia who already have poor postural control may be more at risk of developing headache than the general population.

The literature has identified that the general physical health of people with mental illness is poorer than the general population. Despite recognition of the relationship of
one to the other there is increased mortality and morbidity from preventable diseases and ailment in this population. There is a need for better assessment and diagnosis of physical complaints of people with schizophrenia and schizoaffective disorder. Physiotherapy plays an important role in the management of chronic pain, musculoskeletal conditions, cardiovascular, neurological and metabolic conditions and it could be argued that they should be more involved in the holistic management of mental health clients to address both the physical and mental wellbeing of people with mental illness.

It has been noted that chronic or regular headache reduces quality of life with particular impact on physical, social and role functioning. People with schizophrenia experience reduced quality of life in relation to global functioning. It could be suggested that the presence of headache could further reduce an already poor quality of life of the person with schizophrenia or schizoaffective disorder. There are very few studies investigating the impact on quality of life of people with schizophrenia and schizoaffective disorder who experience headache.

The purpose of this research is to determine the prevalence and characteristics of headache, in particular possible CGH, and the perceived impact on aspects of quality of life of people with schizophrenia or schizoaffective disorder. It is also to determine how people manage their headache and whether they receive assessment and/or treatment from a health professional. This information will help identify whether changes could be implemented to better address this manageable physical illness and possibly favourably effect general wellbeing. This may include expanding the role of physiotherapy in mental health services.
CHAPTER FOUR

Design and Methodology

4.1 Study Design

A cross-sectional observational cohort study was undertaken surveying patients attending the Fremantle Mental Health Services (Alma Street). Ethical approval was provided through the Human Research Ethics Committee of both The University of Notre Dame Australia (HREC Ref 012113F) and the South Metropolitan Area Health Service (HREC Ref 12/390). All participants provided informed consent and all procedures adhered to the declaration of Helsinki.

Based on a headache prevalence of 48% (Kuritzky et al., 1999) with a 95% certainty it was estimated that 97 participants would be required to provide a level of absolute precision for our estimate of the prevalence to be within 10% of the population prevalence. It was decided to oversample by 3 for a final recruitment target of 100 participants.

4.1.2 Participants

One hundred participants with a medically confirmed diagnosis of schizophrenia or schizoaffective disorder were recruited from a cross section of people attending the Fremantle Hospital Mental Health service between 2nd July and 28th November 2013. Recruitment occurred in the outpatient depot clinic in July and the open wards at the Fremantle Hospital Mental Health complex between August and November.

Participants were not selected according whether they experienced headache or not rather they were selected using the following criteria.

Inclusion criteria

People who

- Had a confirmed psychiatric diagnosis of schizophrenia or schizoaffective disorder
- Were over 18 year of age
Were consumers of Fremantle Hospital Mental Health Services in either an inpatient open ward or as an outpatient

Were deemed stable in their recovery process so that a researcher asking questions about clinical characteristics and headache would not potentially jeopardise their recovery progress

Exclusion Criteria

People who

- Had a history of psychosis but the psychiatric diagnosis was not yet verified
- Were in the secure wards
- Were deemed cognitively impaired by their case manager/nurse to the extent they would not be able to complete the questionnaire
- Were in critical time of their recovery which could potentially be destabilised by attending an interview about headache
- Were assessed as a potential safety risk to the researcher by nurse or case manager

The first cluster of recruitment of outpatient participants was via the facility’s twice weekly depot clinic. The majority of clients attending the depot clinic have a diagnosis of schizophrenia or schizoaffective disorder which has been confirmed by a psychiatrist. Posters in the waiting room and depot injection treatment room advertised the project. The depot nurses invited everyone attending the clinic over the month of July 2013 who met the selection criteria to participate in the study. Those agreeable were introduced to the principal researcher and invited to complete a questionnaire. Recruitment saturation was achieved after one month, with all eligible attendees having been approached regarding participation by this time.

The second cluster for recruitment of inpatient participants was via the open wards at the Fremantle Hospital Mental Health Complex from August to November 2013. The Fremantle Mental Health Services have five inpatient wards comprised of two secure wards and two open wards on the main campus as well as a ‘step up/step down’ ward in a facility within short walking distance of the hospital. In the ‘step up/step down’ ward patients are monitored by medical staff while transitioning towards discharge or
avoiding admission into the hospital proper. They remain overnight in this facility but
during the day are responsible for their own activities of daily living and are
couraged to return to daily activities such as working and socialising. Patients in the
two secure wards did not meet selection criteria due to the acuity of their illness. The
nurse manager on the three open wards initially alerted the researcher as to which
inpatients had a diagnosis of schizophrenia or schizoaffective disorder. Discussion
with the nurse manager or the patient’s ward nurse manager identified those who met
the selection criteria and these people were approached by the researcher to participate
in the study.

4.2 Procedure

Once an outpatient was identified by the depot nurse as a suitable candidate, and
following their injection, they were introduced to the researcher in a private interview
room. The researcher explained the purpose of the project to them as well as the
research process. If still interested participants were given the opportunity to read the
plain language statement (PLS) and sign a consent form prior to completing the
questionnaire. In the inpatient setting once possible participants were identified the
nurse case manager introduced the researcher to them and once again the researcher
went through an explanation of the purpose and process of the study. If the patient was
still interested a private area was found on the ward and the participant was offered a
copy of the PLS to read prior to gaining written informed consent.

Based on previous research (Kuritzky et al., 1999; Pfaffenrath et al., 2009), the
researcher’s personal experience of working with this client group and on the advice
of experts consulted during the pilot study, the researcher offered the first seven
outpatient participants the option of either independently completing the questionnaire
in her presence or have her ask the questions and fill in the form. All seven people
specifically requested that the researcher ask the questions and so for consistency all
subsequent participants were not offered that option (Stovner et al., 2014).

This method proved to be essential as some participants needed clarification of
questions and prompting as to what was being asked. When some participants
appeared to be losing interest the researcher could speed up the interview. This
facilitated both participation in the study and participant’s attention to questions and task.

4.2.1 Demographics and Clinical characteristics
Questions to capture demographics of age and gender to enable comparisons to normal population studies were included (Stovner et al., 2014). Previous headache questionnaires had identified comorbidities and medication as variables to consider and questions about these were included along with data about inpatient/ outpatient status.

To evaluate the impact of chronicity of mental illness a question was initially included asking the participant how long ago they had been diagnosed with schizophrenia or schizoaffective disorder. This question was removed from the questionnaire in accordance with one ethics committee’s recommendation. This information was then determined from the case notes. It should be noted that the majority of clients volunteered this information without being asked and referral to the notes was not always necessary.

Body Mass Index (BMI) was considered a possible variable impacting on presence of headache. To determine BMI, participants were asked to give their height and weight a method that has been found to be reliable in other studies (Queiroz et al., 2009). Participants who were unsure of their height or weight were measured in the clinic or on the ward.

4.2.2 Headache characteristics
It was acknowledged that there is a low participation rate of people with schizophrenia and schizoaffective disorder in psychiatric research with a participation rate in interviews of between 53% and 85% (Haapea, 2007). When compared to a depressed population, people with schizophrenia are less willing to participate in questionnaires (Schäfer et al., 2011). Bearing this in mind important aspects of the data collection process were to collect all the necessary data in a timely manner, not overwhelm participants with too many questions and exclude irrelevant questions in order to limit losing participants (Stovner et al., 2014). The pilot questionnaire formed the basis of the study to collect data about the prevalence and characteristics of headaches. In both
inpatient and outpatient settings if a person identified more than one headache type they were initially asked to complete the questionnaire on their most worrying headache and only when this was finished were they invited to complete a second questionnaire on the other headache.

4.2.3 Headache impact
Recurrent headache is known to impact on a person’s quality of life and general health so one additional feature of this study was to determine the impact headache had on the quality of life of the participants (van Suijlekom et al., 2003). Questionnaires evaluating Quality of Life for people with schizophrenia and schizoaffective disorder can be lengthy. In order to collect data in a timely manner and to try and prevent participants from losing interest during the interview only selected questions from the SF-36 were included in the questionnaire. These were to gauge the perceived effects recurrent headache have on role-physical, social functioning and bodily pain. Questionnaires evaluating impact of headache on QOL must be specific enough to be sure they are capturing only impacts from the headache and not from other physical and psychological factors (Stovner et al., 2014). It was suggested that people with schizophrenia and schizoaffective disorder may consider the impairment to their functional role more important than actually considering what may be causing it and have difficulty answering the question (Picard et al., 2008). However, as suggested by Magnusson et al. (2012) including a qualifying phrase about headache allowed for better interpretation of the questions. The researcher found that by asking all the questions she was able to emphasise to participants that these QOL questions related only to impairments from headache not from their mental illness.

There has been mixed views on the validity of the SF-36 to evaluate quality of life of people with schizophrenia and other severe mental illnesses (Papaioannou, Brazier, & Parry, 2011). Leese et al. (2008) determined that people with schizophrenia were just as able to use the SF-36 as the general population, however, highlighted the importance that participants correctly interpret the questions providing further evidence for the researcher to present the questionnaire in person (Leese et al., 2008).
4.2.4 Headache Classification

The algorithm described in the pilot study was used to assist with the classification of headaches. A copy of the questionnaire and algorithm can be found in the Appendix 1 and Appendix 2.

4.3 Data Analysis

4.3.1 Preparing and processing data

Each participant was allocated an individual identification number (ID) from 1-100. People who experienced more than one type of headache and completed two questionnaires were allocated a second ID for the second questionnaire starting from 101. A variable coding table was developed to list all the variables in the questionnaire and assign each a numerical code. All data were double entered and screened for errors. Analysis was undertaken using IBM SPSS statistics version 22. Continuous variables were screened for normality of distribution using Kolmogorov-Smirnov test and the influence of outliers was investigated using the 5% Trimmed Mean.

Monthly Index of Medical Speciality (MIMS) searches were conducted on all medication to determine how they should be rated in relation to impacting on possibility of developing headache. All participants were taking antipsychotic medication due to the nature of their illness. Medications were divided into groups of

- antipsychotic medication only,
- all other mental health medication that did not include antipsychotics,
- all other medication that did not include any for mental health conditions.

The groups were further divided into two subgroups

- headache as a common or very common side effect
- headache as an uncommon or rare side effect

In every instance the highest rating of headache side effect of any of the drugs being taken by that participant was considered. So for example if a person was taking an antipsychotic medication which rated headache as a rare side effect but was taking another mental health medication such as venlafaxine which has a common side effect
of headache then when considering if the person was taking medication with headache as a common or rare side effect the rating was ‘common’.

4.3.2 Analysing data

Descriptive statistics were used to describe participant’s demographic, general health and psychiatric clinical characteristics. Where possible the clinical and demographic characteristics were compared to normative data.

The 12-month prevalence rate for headache was calculated for the whole sample. A series of univariate logistic regressions were conducted to determine if there were any demographic or clinical characteristics that impacted on the likelihood of participants reporting headache. Headache was the dependent variable and explanatory variables explored were gender, age, inpatient/outpatient status, BMI, length of illness, medication with headache as side effect and diabetes. A Pearson product-moment correlation was conducted to determine if there was a linear relationship between reported pain from headache and chronicity of mental illness.

Two researchers independently screened each headache questionnaire and classified each individual’s headache as MH, TTH, CGH or OH. The responses of the two raters were then compared and inter-rater agreement was assessed using the Kappa Measure of Agreement. Any disagreements between the raters headache classifications were discussed and a consensus reached on the most appropriate classification for that person. In situations where a consensus could not be reached a third review would be asked to review the questionnaire and a majority decision would be made. Prevalence rates for each of the headache types were also calculated. Within the population who experienced headache the proportion of participants experiencing each headache type was calculated.

To explore the likelihood of any demographic and/or clinical characteristics impacting on participants experiencing specific headache types a series of logistic regression analyses were undertaken, one within the whole sample and then another within the headache only population. For example when investigating the influence of clinical and demographic factors on the presence of MH, the whole sample was dichotomised into migraine or not migraine such that the non-migraine cohort contained some
headache free participants as well as headache patients who suffered from non-migrainous headache. Univariate logistic regression analyses were performed in this way for each headache type using the whole sample with the dependent variable of presence or absence of specific headache type. Explanatory variables explored were gender, age, inpatient/outpatient status, BMI, length of illness, medication with headache as side effect and diabetes. This process was repeated for each specific headache type as well as OH. To model the combined influence of significant explanatory variables on headache status a multivariate logistic regression was conducted using explanatory variables identified in the univariate logistic regression with \( p<0.2 \). No multivariate logistic regression was conducted is no variable recorded \( p<0.2 \).

Then to further explore the influence of demographic general health and psychiatric clinical characteristics on specific headache status the same series of univariate logistic regressions using the headache only population, meaning no headache free participants were included in the sample. A multivariate logistic regression was also conducted using the same parameters as described for the whole population.

Correlations were used to explore the impact of headache on quality of life. If data was normally distributed a Pearson correlation was used or if data was not normal a Spearman’s correlation was undertaken to determine if there was a relationship between quality of life scores (QOL) for Bodily Pain, Social Functioning, Role Physical and length of headache (LOH), frequency of headache (FOH) and pain (VAS). One way group analysis of variance (ANOVA) for parametric data or a Kruskal-Wallis Test for non-parametric data was used to explore if a specific headache type impacted on quality of life scores (QOL) for BP, SF and RP.

Themes of management strategies for headache were identified and ranked in order of prevalence.
CHAPTER FIVE

Results

5.1  Participation

Across the five months of recruitment 148 people met selection criteria and were approached regarding participation. There was a 68% participation rate with 48/148 people (32%) declining to participate. The final cohort consisted of 100 people with a diagnosis of schizophrenia or schizoaffective disorder confirmed by a psychiatrist. All subjects completed most aspects of the questionnaire – there was minimal missing data and specifics of missing data are detailed below. A flow chart detailing the recruitment process can be found in Figure 4.

During the recruitment period 85 people who met selection criteria attended the outpatient depot clinic and were invited to participate. Fifty five people (55/85) agreed to participate making a participation rate of 65% in this setting. Participation rate for males was 63% (31/49) and 67% (24/36) for females. The main reasons given to decline participation included

- I’m not interested (n=13)
- No reason given (n=4)
- I’m in a hurry (n = 4)
- I would but I don’t want to sign a consent form (n=3)
- My children are in the waiting room (n=2)
- I don’t want to (n=2)
- I have just completed a medical appointment and am not feeling good (n=1)
- I’m too tired (n=1)

During the inpatient recruitment phase 63 people met selection criteria and 45 people agreed to participate giving a participation rate of 71% in this setting. The participation rate for males was 80% (35/44) and 53% (10/19) for females. Main reasons given to decline participation included

- I’m not interested (n=12)
- I would but I don’t want to sign a consent form (n=4)
- I want to go to sleep (n=2)
5.2 Demographics

Sixty six percent of participants were male (66/100) and 34% were females (34/100). Participation rate for males was 71% (66/93) and 61.8% for females (34/55). Recruitment of males was distributed reasonably evenly between inpatient (53%, 35/66) and outpatient settings (47%, 31/66). In contrast, of the 34 women recruited, 71% were from the outpatient setting (24/34) with only 29% recruited from the inpatient setting (10/34). Figure 5 shows the distribution of males to females in both approached and participated groups.
Age ranged from 19 years to 60 years with a mean age of 38.8 years (SD=10.39 years). As can be seen in Figure 6 there was a slight skew to the left with scores clustered around the lower ages.
Figure 6 – Age distribution of participants

Figure 7 shows that BMI ranged from 16.8 to 55.5 with a mean score of 29.4 (SD=6.62). A normal BMI range is from 20-25, the overweight range is 25-30 and over 30 is deemed obese. The mean score for this sample population is therefore at the upper end of the overweight range. When compared to previous studies of a similar population the distribution of BMI is comparable, however, there is quite a discrepancy between BMI distribution in these two samples and the general population as indicated in Figure 8 (Morgan et. al., 2012).
Figure 7 – BMI distribution of participants

![BMI distribution of participants](image)

Figure 8 – Comparisons of BMI in the general population, people living with psychotic illness population and the sample population.

![BMI comparisons](image)
Based on results of People living with psychotic illness 2010, Australian Government. The length of time a person had been diagnosed with their psychotic illness ranged from 6 months to 50 years with a mean of 14.5 years (SD=9.2 years). It is evident from Figure 9 that more people access the mental health services in the early stages of their illness. The age on onset of mental illness ranged from self-reported 6 years of age to 51 years of age with 62% of participants having developed their illness before age 25.

**Figure 9 - Length of time since diagnosis of mental illness**

Medications were grouped according to antipsychotic medication, other mental health medications and all other medications. All patients were on antipsychotic medication due to the nature of their illness, 53/100 participants were taking other mental health medication including mood stabilisers and antidepressants and 39/100 participants were taking other medication for conditions amongst which were diabetes, high blood pressure and high cholesterol. Two thirds (66/99) of people were taking some form of medication with headache as a common or very common side effect.
Diabetes was the most common co-morbidity identified with 15% (15/100) people reporting this condition. Only 3/100 people identified co-morbid musculoskeletal problems.

5.3 Headache characteristics

The prevalence of headache within the last twelve months was 57% (57/100). Prevalence rates by gender were very similar with 58% (38/66) of males and 56% (19/34) of females reporting headache in the last 12 months.

Within the headache population 23% (13/57) experienced a headache on the day of interview and 68.5% (39/57) had experienced a headache in the last month. The majority of participants who experienced headache only reported having one type of headache (81%, 46/57). Of those people who did experience more than one type of headache (11/57) only one person completed a second questionnaire. Participants had started experiencing headaches from as recently as 5 months ago to as long as 50 years ago with a median value for length of time experiencing headaches of 20 years (IQR=5.5-24.5 years). Participants started getting headaches from as young as 6 years of age through to 58 years of age with a median age of 19 years (IQR=13-31.3 years). Four participants were missing data for this part of the questionnaire as they reported finding it too hard to remember when they first started experiencing headache.
Figure 10 - Length of time participants have been experiencing headaches

Table 5 records how frequently people experienced headache. Sixty percent of people only experienced a headache once a month or less. Twelve percent (7/57) people experienced headache daily with a further 18% (10/57) experiencing headache at least weekly.

**Table 5 - Frequency of headaches**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage of headache sufferers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>12% (7/57)</td>
</tr>
<tr>
<td>3-4/week</td>
<td>3.5% (2/57)</td>
</tr>
<tr>
<td>1-2/week</td>
<td>14% (8/57)</td>
</tr>
<tr>
<td>1/fortnight</td>
<td>10.5% (6/57)</td>
</tr>
<tr>
<td>1/month</td>
<td>31% (18/57)</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>29% (16/57)</td>
</tr>
</tbody>
</table>
Headaches were reported to last from as short a time as 10 seconds to being continuous with no relief. Figure 11 highlights that this distribution is not normal with a significant skew toward headaches of shorter duration times. When people with continuous headache are excluded the median value for length of headache time was 3 hours (IQR=1–8 hours).

**Figure 11 – Length of time headache lasts in hours**

Analysis of the intensity of headache pain using the 0-10 Visual Analogue Scale (VAS) showed (Figure 12) that average headache pain intensity ranged from 0.5/10 to 10/10 with a mean of 5.8 (SD=2.1). A negative skewness value (-0.35) indicates a clustering of scores to the higher end of the scale. All participants completed this section of the questionnaire including the person who completed two questionnaire giving a total of 58 responses. Forty one percent (24/58) reported having neck pain or stiffness at the time of their headache.
5.4 Relationship between clinical characteristics and headache

Males made up 67% (38/57) of people experiencing headache. Within both the male and female population there was a 58% and 56% prevalence respectively of participants who experienced headache (male 38/66, female 19/34). The univariate logistic regression found no significant association between gender and headache \( (p=.87) \) with an odds ratio of 1.07, 95% CI [0.47–2.47].

The mean age of people experiencing headache was 37.7 years (SD=9.4 years) and 40.2 years (SD=11.5 years) for people who did not experience headache. There was no significant relationship between age and presence of headache \( (p=.25) \) with an odds ratio of 0.99, 95% CI [0.94-1.02].

Within the headache population 53% were inpatients (30/57) and 47% (27/57) were outpatients. Inpatient/outpatient status did not impact significantly on presence of headache \( (p=.08) \) with an odds ratio of 2.07, 95% CI [0.92-4.68].
There was no significant relationship between length of time from diagnosis of mental illness and presence of headache ($p=.61$). The odds ratio for length of illness is 0.99, 95% CI [0.95-1.03]) suggesting no significant link between chronicity of schizophrenia or schizoaffective disorder and headache.

Those participants experiencing headache had a mean BMI of 29.67 (SD=7.4) compared to those not experiencing headache M=28.96 (SD=5.48). BMI did not have a significant impact on headache status ($p=.58$) with an odds ratio of 1.02, 95% CI [0.96-1.08].

All medications listed by participants were examined to determine the impact medication usage might have on headache status. Figure 13 shows the number of people taking medications with headache as either a common or rare side effect. It is apparent that almost two thirds of participants (66/99) were taking some form of medication that lists headache as a common or very common side effect. One person had missing data about their medications and was not included in this or any subsequent medication calculations. This person did not experience headache. Within the headache only population these figures were almost the same 64% (37/57) taking any medication with side effect of headache.
Taking medication with headache as a common or very common side effect was not significantly related to headache status ($p=.89$). The odds ratio was 0.94 with 95% CI [0.40-2.19] suggesting no difference between taking medication with headache as a common side effect or medication with headache as a rare side effect.

Diabetes was the most commonly occurring comorbid health problem, though only 10% of headaches sufferers reported having diabetes. Diabetes did not impact on presence of headache ($p=.15$) with an odds ratio of 0.44 and 95% CI [0.14-1.37]. A multivariate logistic regression was performed to model the combined explanatory power on potentially significant variables. Variables with $p<.2$ from the univariate analysis were considered as explanatory factors in the multivariate analysis. The variables included were inpatient/outpatient status and diabetes. This model was not statistically significant $X^2(2,n=100)=5.36,p=.07$ indicating the model had difficulty distinguishing between those who had headache and those who didn’t. This model explained between 5.2% (Cox and Snell R square) and 7.0% (Nagelkerke R square) of
variance in headache and classified 60% of cases correctly. As can be seen in Table 6 neither variable had a unique significant influence on headache.

Table 6 - Logistic Regression predicting likelihood of headache

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E</th>
<th>Wald</th>
<th>df</th>
<th>p</th>
<th>Odds Ratio</th>
<th>95% CI for odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient/outpatient</td>
<td>.76</td>
<td>.42</td>
<td>3.21</td>
<td>1</td>
<td>.07</td>
<td>2.13</td>
<td>0.93 - 4.86</td>
</tr>
<tr>
<td>Diabetes</td>
<td>-.86</td>
<td>.58</td>
<td>2.15</td>
<td>1</td>
<td>.14</td>
<td>.43</td>
<td>0.14 - 1.33</td>
</tr>
</tbody>
</table>

To evaluate the strength of the relationship between pain and chronicity of schizophrenia or schizoaffective disorder, a Pearson product-moment correlation was performed using headache pain intensity and length of illness. There was no significant relationship between pain intensity and length of illness detected ($r=.098$, $p=.465$).

### 5.5 Headache classification

Using the algorithm developed in the pilot study two physiotherapists independently classified all the headaches into migraine (MH), tension type (TTH), cervicogenic (CGH) and other (OH) headache. There was agreement on 47 out of 58 questionnaires. One rater classified 20/58 headache as MH, 17/58 as TTH, 5/58 as CHG and 16/58 as OH while the other rater identified 15/58 as MH, 20/58 as TTH, 5/58 as CHG and 18/58 as OH. The Kappa Measure of Agreement value was 0.74, 95% CI[0.59-0.88] with significance of $p<0.0005$ indicating good agreement according to Peat (2002). Following this the physiotherapists met together and discussed and reached agreement on all participants without needing to refer to a third person.

Classification of headache determined OH to be the most common type of headache experienced followed by MH and TTH. As expected CGH was the least prevalent. Prevalence rates are listed in Table 7.
Table 7 – Prevalence of headache by classification

<table>
<thead>
<tr>
<th>Headache type</th>
<th>Total Sample Population</th>
<th>Headache population only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migraine</td>
<td>17.8%</td>
<td>31.0%</td>
</tr>
<tr>
<td>TTH</td>
<td>15.8%</td>
<td>27.6%</td>
</tr>
<tr>
<td>CGH</td>
<td>4.85%</td>
<td>8.6%</td>
</tr>
<tr>
<td>Other</td>
<td>18.8%</td>
<td>32.8%</td>
</tr>
</tbody>
</table>

5.6 Relationship between clinical characteristics and specific headache types

5.6.1 – Cervicogenic Headache

The age of people experiencing CGH ranged from 37 years to 59 years with a mean age of 47.2 years (SD=8.3 years). Gender was evenly divided with 2 females and 3 males. Two people were inpatients and 3 were outpatients. The mean BMI was 27 (SD=6.6) with a range from 21.2 to 38. People with CGH had been diagnosed with a mental illness from as recently as 2 years ago to as long as 23 years ago with a mean of 16 years (SD=8.3 years). The age range of onset of headache was from 13 years of age to 58 years of age with a mean of 37 years of age (SD=14.5 years). Three of the 5 people experiencing CGH were taking medications that listed headache as a common or very common side effect. No people experiencing CGH had a history of diabetes.

As can be seen in Table 8 none of the variables age, gender, BMI, LOI, diabetes or medication had statistically significant impact on presence of CGH. No multivariate logistic regression was performed as age was the only variable that had a p<.2.
Table 8 Univariate models for explanatory variables for CGH in the total population

<table>
<thead>
<tr>
<th>Variable</th>
<th>P value</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inpatient</td>
<td>.82</td>
<td>.13</td>
<td>5.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outpatient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>.08</td>
<td>1.08</td>
<td>.99</td>
<td>1.19</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>.77</td>
<td>.12</td>
<td>4.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOI</td>
<td>.71</td>
<td>1.02</td>
<td>.93</td>
<td>1.12</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>.41</td>
<td>.93</td>
<td>.79</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td>Medication</td>
<td>.75</td>
<td>.12</td>
<td>4.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.0</td>
<td>.00</td>
<td>.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Within the headache only population age impacted significantly on CGH ($p= .03$) with an odds ratio of 1.14, 95% CI [1.01–1.29]. This suggests that there is relationship with age and CGH (Table 9). This is consistent with the clinical characteristics of CGH in the general population.

Table 9 Univariate models for explanatory variables for CGH in the headache only population

<table>
<thead>
<tr>
<th>Variable</th>
<th>P value</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inpatient</td>
<td>.53</td>
<td>.09</td>
<td>3.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outpatient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>.03</td>
<td>1.01</td>
<td>1.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>.79</td>
<td>.12</td>
<td>5.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOI</td>
<td>.66</td>
<td>.93</td>
<td>1.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>.40</td>
<td>.79</td>
<td>1.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication</td>
<td>.81</td>
<td>.12</td>
<td>5.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.0</td>
<td>.00</td>
<td>.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A univariate logistic regression using the variable aged² in the headache only population was also conducted to determine if the relationship between CGH and age followed a linear progression (Table 10). The impact of aged² on CGH was also significant $p=.03$ indicating that the association of age and CGH is not linear meaning
that while age impacts on presence of CGH there is not a direct association with each year of aging.

Table 10 - Logistic Regression predicting likelihood of CGH by age in headache only population.

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E</th>
<th>Wald</th>
<th>df</th>
<th>p</th>
<th>Odds Ratio</th>
<th>95% CI for odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>.081</td>
<td>.046</td>
<td>3.095</td>
<td>1</td>
<td>.08</td>
<td>1.084</td>
<td>.991</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.187</td>
</tr>
<tr>
<td>Headache only population</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>.135</td>
<td>.062</td>
<td>4.707</td>
<td>1</td>
<td>.03</td>
<td>1.144</td>
<td>1.013</td>
</tr>
<tr>
<td>Age²</td>
<td>.001</td>
<td>.001</td>
<td>5.010</td>
<td>1</td>
<td>.03</td>
<td>1.001</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.003</td>
</tr>
</tbody>
</table>

5.6.2 – Migraine Headache

Thirteen males and 5 females experienced MH with inpatient/outpatient status evenly spread with 9 in each setting. The mean age of people with MH was 24.8 years (SD=6.7 years) and ranged from 24 years to 57 years. BMI of people with MH ranged from 21.5 to 55.5 with a mean BMI of 29.8 (SD=8.0). The most recent diagnosis of mental illness was 1 year previously with the longest being 27 year earlier. Mean time from diagnosis was 11.4 years (SD=7.5 years). The youngest age that anyone with MH started experiencing their headache was 6 years old and the oldest was 36 years. The average age of onset of MH was 19 years (SD=9.0 years) with average age of onset for males 19.4 years (SD=9.3 years) and 18.2 years (SD=10.1 years) for females. Fifteen of the people experiencing MH were taking medication that listed headache as a common or very common side effect. Thirty three percent (6/18) of the migraine population reported neck pain or stiffness when they have a headache. Three people (3/18) reported the comorbidity of diabetes.

The logistic regression results presented first are based on the total population. Table 11 summarises the information from univariate logistic regression models exploring the impact of the explanatory variables of age, gender, BMI, LOI, medication and
diabetes on MH within the total sample population. Taking medication with headache as a common or very common side effect was significant (p=.05) within the total population.

Table 11 - Univariate models for explanatory variables for MH in the total population

<table>
<thead>
<tr>
<th>Variable</th>
<th>P value</th>
<th>Odds Ratio</th>
<th>95% CI Lower</th>
<th>95% CI Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient Outpatient</td>
<td>.64</td>
<td>1.28</td>
<td>.46</td>
<td>3.55</td>
</tr>
<tr>
<td>Age</td>
<td>.08</td>
<td>.95</td>
<td>.90</td>
<td>1.01</td>
</tr>
<tr>
<td>Gender</td>
<td>.54</td>
<td>1.42</td>
<td>.46</td>
<td>4.39</td>
</tr>
<tr>
<td>LOI</td>
<td>.12</td>
<td>.95</td>
<td>.89</td>
<td>1.01</td>
</tr>
<tr>
<td>BMI</td>
<td>.79</td>
<td>1.01</td>
<td>.94</td>
<td>1.09</td>
</tr>
<tr>
<td>Medication</td>
<td>.05</td>
<td>4.56</td>
<td>.98</td>
<td>21.30</td>
</tr>
<tr>
<td>Diabetes</td>
<td>.83</td>
<td>1.17</td>
<td>.29</td>
<td>4.65</td>
</tr>
</tbody>
</table>

A multivariate logistic regression was performed using variables with p<.2 to determine the combined effect they might have on the presence of headache (Table 12). The variables included were age (p=.08), LOI (p=.12) and medication (p=.05). This model was statistically significant $X^2(2, n=99) = 7.694, p = .05$ indicating the model could distinguish between those who had MH and those who didn’t. The model classified 82.8% of cases correctly and could explain between 7.5% (Cox & Snell R square) and 12.5% (Nagelkerke R Square) of the variance in MH. Within this model no variable had a statistically significant impact on presence of MH.
Table 12 - Logistic Regression predicting likelihood of MH by medication, age and LOI in total population.

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E</th>
<th>Wald</th>
<th>df</th>
<th>p</th>
<th>Odds Ratio</th>
<th>95% CI for odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication</td>
<td>-1.520</td>
<td>.794</td>
<td>3.662</td>
<td>1</td>
<td>.06</td>
<td>4.57</td>
<td>.964 - 21.684</td>
</tr>
<tr>
<td>Age</td>
<td>-.034</td>
<td>.037</td>
<td>.881</td>
<td>1</td>
<td>.35</td>
<td>.966</td>
<td>.899 - 1.038</td>
</tr>
<tr>
<td>LOI</td>
<td>-.019</td>
<td>.042</td>
<td>.205</td>
<td>1</td>
<td>.65</td>
<td>.981</td>
<td>.903 - 1.066</td>
</tr>
</tbody>
</table>

Amongst the headache only population the univariate logistic regression model found the impact of medication with headache as a common side effect was statistically significant \( (p=.03) \) with an odds ratio of 6.14, 95% CI [1.24-30.44]. This indicated that people experiencing headache who are taking medication with headache as a common or very common side effect are 6.14 times more likely to experience MH. None of the other variables age, gender, BMI, LOI and diabetes had statistically significant impact on presence of MH (Table 13).

Table 13 Univariate models for explanatory variables for MH in the headache only population

<table>
<thead>
<tr>
<th>Variable</th>
<th>P value</th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient Outpatient</td>
<td>.72</td>
<td>.82</td>
<td>.27 - 2.49</td>
</tr>
<tr>
<td>Age</td>
<td>.13</td>
<td>.95</td>
<td>.89 - 1.01</td>
</tr>
<tr>
<td>Gender</td>
<td>.47</td>
<td>1.56</td>
<td>.46 - 5.25</td>
</tr>
<tr>
<td>LOI</td>
<td>.13</td>
<td>.95</td>
<td>.88 - 1.02</td>
</tr>
<tr>
<td>BMI</td>
<td>.96</td>
<td>1.00</td>
<td>.93 - 1.08</td>
</tr>
<tr>
<td>Medication</td>
<td>.03</td>
<td>6.14</td>
<td>1.24 - 30.44</td>
</tr>
<tr>
<td>Diabetes</td>
<td>.30</td>
<td>2.47</td>
<td>.45 - 13.63</td>
</tr>
</tbody>
</table>

A multivariate logistic regression was conducted exploring the impact of age, LOI and medication on MH within the headache only population (Table 14). The logistic regression model was statistically significant \( (X^2(1,N=57)=9.797, p=.02) \). It could
explain between 15.8% (Cox & Snell R square) and 22.4% (Nagelkerke R Square) of the variance in MH and correctly classify 61.4% of cases. Within this model medication remained statistically significant \((p=.02)\) with an odds ratio of 7.47, 95% CI [1.39-40.02] indicating that a person taking medication with headache as a common or very common side effect was 7.47 times more likely to experience MH.

Table 14 – Multivariate logistic regression for impact of medication, age and LOI on MH within the headache only population

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E</th>
<th>Wald</th>
<th>df</th>
<th>p</th>
<th>Odds Ratio</th>
<th>95% CI for odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication</td>
<td>-2.011</td>
<td>.856</td>
<td>5.512</td>
<td>1</td>
<td>.02</td>
<td>7.468</td>
<td>1.394 - 40.016</td>
</tr>
<tr>
<td>Age</td>
<td>-.049</td>
<td>.044</td>
<td>1.273</td>
<td>1</td>
<td>.26</td>
<td>.952</td>
<td>.874 - 1.037</td>
</tr>
<tr>
<td>LOI</td>
<td>-.020</td>
<td>.044</td>
<td>.200</td>
<td>1</td>
<td>.66</td>
<td>.981</td>
<td>.900 - 1.068</td>
</tr>
</tbody>
</table>

5.6.3 – Tension Type Headache
People experiencing TTH ranged in age from 23 years to 51 years (Mean=50 years, SD=8.4 years). Of the 6 females and 10 males classified with TTH, 5 were inpatients and 11 were outpatients. BMI of this group ranged from 18 to 38.7 with a mean BMI of 29 (SD=5.8). The length of time since diagnosed with mental illness ranged from as recently as 2 years to 21 years with a mean time of 13.7 years since diagnosis (SD=5.4 years). People with TTH started experiencing them from as young as 10 years old to as old as 35 years old with a mean age of onset of headache 19 years (SD=8.1 years). A large proportion of the participants with TTH (11/16) were taking medication that listed headache as a common or very common side effect. One quarter (4/16) of people with TTH had neck pain or stiffness at the time of their headache. No people experiencing TTH reported a history of diabetes.

Univariate logistic regressions were conducted on the total population using the explanatory variables of age, gender, BMI, LOI, diabetes and medication. No one variable had a statistically significant impact on the presence of TTH within this population.
population. (Table 15) No multivariate logistic regression was conducted as no variables had a \( p < .2 \).

Table 15 Univariate models for explanatory variables for TTH in the total population

<table>
<thead>
<tr>
<th>Variable</th>
<th>P value</th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Inpatient</td>
<td>.23</td>
<td>.50</td>
<td>.16</td>
</tr>
<tr>
<td>Outpatient</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>.60</td>
<td>.99</td>
<td>.94</td>
</tr>
<tr>
<td>Gender</td>
<td>.75</td>
<td>.83</td>
<td>.28</td>
</tr>
<tr>
<td>LOI</td>
<td>.69</td>
<td>.99</td>
<td>.93</td>
</tr>
<tr>
<td>BMI</td>
<td>.81</td>
<td>.99</td>
<td>.91</td>
</tr>
<tr>
<td>Medication</td>
<td>.85</td>
<td>1.12</td>
<td>.35</td>
</tr>
<tr>
<td>Diabetes</td>
<td>.99</td>
<td>.00</td>
<td>.00</td>
</tr>
</tbody>
</table>

The univariate logistic regression models exploring the impact of these variables on TTH within the headache only population determined that inpatient/outpatient status was the only variable that was statistically significant \( (p = .04) \) (Table 16). The odds ratio of 0.28, \( (95\% \text{ CI} [0.08-0.95]) \) being less than 1, indicates that as an inpatient the odds of headache being TTH was 0.28 less likely.

Table 16 Univariate models for explanatory variables for TTH in the headache only population

<table>
<thead>
<tr>
<th>Variable</th>
<th>P value</th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Inpatient</td>
<td>.04</td>
<td>.28</td>
<td>.08</td>
</tr>
<tr>
<td>Outpatient</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>.96</td>
<td>1.00</td>
<td>.94</td>
</tr>
<tr>
<td>Gender</td>
<td>.77</td>
<td>.83</td>
<td>.25</td>
</tr>
<tr>
<td>LOI</td>
<td>.77</td>
<td>.99</td>
<td>.93</td>
</tr>
<tr>
<td>BMI</td>
<td>.68</td>
<td>.98</td>
<td>.90</td>
</tr>
<tr>
<td>Medication</td>
<td>.71</td>
<td>1.27</td>
<td>.37</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.0</td>
<td>.00</td>
<td>.00</td>
</tr>
</tbody>
</table>
5.6.4 – Other Headache

Demographics of the group of people experiencing other headaches were 12 males and 7 females ranging in age from 19 years to 56 years with a mean age of 38 years (SD=11.3 years). Fifteen of this group were inpatients with only 4 in the outpatient setting. The mean BMI of this group was 30.8 (SD=8.3) with a range from 17 through to 54. This group of people had the largest distribution of length of illness ranging from 6 months since diagnosis to 50 years with a mean length of time from diagnosis of schizophrenia or schizoaffective disorder of 16.9 years (SD=12.7 years). There was also a large variation in age of onset of headaches from as young as 6 years old to 48 years old with a mean age of 14.5 years (SD=6.8 years). Less than half of the people experiencing OH were taking medication which listed headache as a common or very common side effect (9/19). Almost half (9/19) of people experiencing OH reported feeling neck pain or stiffness when they had a headache. Three people in this cohort reported having diabetes.

The impact of age, gender, inpatient/outpatient status, BMI, LOI, medication and diabetes on OH amongst the whole population was explored using univariate logistic regressions. Two variables were statistically significant (Table 17). With a \( p < .01 \) and an odds ratio of 5.76, 95\% CI [1.74-19.07] the chances of developing OH is 5.76 times more likely as an inpatient. Taking medication with headache as a common or very common side effect was also significant (\( p = .03 \)) with an odds ratio of 0.32, 95\% CI [0.11-0.90] meaning a person taking this medication was 0.32 times less likely to experience OH. The odds ratio for a person taking medication that does not have headache as a side effect is 3.15, 95\% CI [1.11-8.99] means that a person taking medication without headache as a side effect is actually 3.15 times more likely to experience OH.
Table 17 - Univariate models for explanatory variables for OH in the total population

<table>
<thead>
<tr>
<th>Variable</th>
<th>P value</th>
<th>Odds Ratio</th>
<th>95% CI  \ Lower</th>
<th>95% CI  \ Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient Outpatient</td>
<td>.00</td>
<td>5.76</td>
<td>1.74</td>
<td>19.07</td>
</tr>
<tr>
<td>Age</td>
<td>.83</td>
<td>.99</td>
<td>.95</td>
<td>1.05</td>
</tr>
<tr>
<td>Gender</td>
<td>.95</td>
<td>1.04</td>
<td>.35</td>
<td>3.06</td>
</tr>
<tr>
<td>LOI</td>
<td>.28</td>
<td>1.03</td>
<td>.98</td>
<td>1.08</td>
</tr>
<tr>
<td>BMI</td>
<td>.26</td>
<td>1.04</td>
<td>.97</td>
<td>1.12</td>
</tr>
<tr>
<td>Medication</td>
<td>.03</td>
<td>.32</td>
<td>.11</td>
<td>.90</td>
</tr>
<tr>
<td>Diabetes</td>
<td>.83</td>
<td>1.16</td>
<td>.29</td>
<td>4.65</td>
</tr>
</tbody>
</table>

A multivariate logistic regression exploring the impact of inpatient/outpatient status and medication on OH was undertaken to explore how they impacted on OH in combination with each other (Table 18). This model was statistically significant ($\chi^2(1,N=99)=14.095, p=.001$) being able to explain between 13.3% (Cox and Snell R square) and 21.7% (Nagelkerke R square) of the OH variance and classify 81.8% of cases correctly. Within the total population an inpatient ($p=.01$) is 5.85 (95% CI [1.71-19.98]) times more likely to experience OH and a person taking medication with headache as a common or very common side effect ($p=.04$) is 0.30 (95% CI [0.10-0.92]) times less likely to experience OH. The odds ratio for a person taking medication that does not have headache as a side effect is 3.32, 95% CI [1.09-10.09] means that a person taking this medication is 3.3 times more likely to experience OH.
Table 18 - Logistic Regression predicting likelihood of OH by medication and inpatient/outpatient status in total population.

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>S.E</th>
<th>Wald</th>
<th>df</th>
<th>p</th>
<th>Odds Ratio</th>
<th>95% CI for odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication</td>
<td>1.199</td>
<td>.568</td>
<td>4.453</td>
<td>1</td>
<td>.04</td>
<td>.302</td>
<td>.099 to .918</td>
</tr>
<tr>
<td>Patient</td>
<td>1.766</td>
<td>.627</td>
<td>7.941</td>
<td>1</td>
<td>.01</td>
<td>5.849</td>
<td>1.712 to 19.982</td>
</tr>
</tbody>
</table>

Within the headache only population the univariate logistic regression model found only two variables to have a statistically significant impact on OH (Table 19). Once again inpatient status had a statistically significant impact on OH \((p=.01)\) and when considered within the headache only population the odds ratio of 5.39 (95% CI [1.51-19.28]) indicates that as an inpatient the odds of headache being OH was 5.39 more likely. Taking medication with headache as a common or very common side effect \((p=.01)\) meant a person in the headache only population was 0.23 (95% CI [0.07-0.77]) times less likely to experience OH. Once again when looking at medication where headache is not a side effect the odds ratio is 4.43, 95% CI [1.36-14.40] meaning that a person taking medication that does not have a side effect of headache is 4.4 times more likely to experience OH.

Table 19 Univariate models for explanatory variables for OH in the headache only population

<table>
<thead>
<tr>
<th>Variable</th>
<th>P value</th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient Outpatient</td>
<td>.01</td>
<td>5.39</td>
<td>1.51 to 19.28</td>
</tr>
<tr>
<td>Age</td>
<td>.88</td>
<td>1.01</td>
<td>.95 to 1.07</td>
</tr>
<tr>
<td>Gender</td>
<td>.79</td>
<td>.86</td>
<td>.27 to 2.70</td>
</tr>
<tr>
<td>LOI</td>
<td>.14</td>
<td>1.05</td>
<td>.99 to 1.12</td>
</tr>
<tr>
<td>BMI</td>
<td>.48</td>
<td>1.03</td>
<td>.96 to 1.11</td>
</tr>
<tr>
<td>Medication</td>
<td>.01</td>
<td>.23</td>
<td>.07 to .77</td>
</tr>
<tr>
<td>Diabetes</td>
<td>.35</td>
<td>2.25</td>
<td>.41 to 12.38</td>
</tr>
</tbody>
</table>
A multivariate logistic regression was also undertaken in the headache only population exploring the impact of inpatient/outpatient status and medication on OH as can be seen in Table 20. This model was statistically significant ($X^2(1,N=57)=12.395, p=.002$) being able to explain between 19.5% (Cox and Snell R square) and 27.1% (Nagelkerke R square) of the OH variance and classify 71.9% of cases correctly. Within the total population an inpatient ($p=.02$) is 4.8 times more likely to experience OH (95% CI [1.27-18.27]) and a person taking medication where headache is a common or very common side effect ($p=.03$) is 0.24 times less likely to experience OH (95% CI [0.07-0.85]). Similarly to previous examples the person taking medication that does not have a side effect of headache is more likely to experience OH (OR=4.11, 95% CI [1.18-14.37]).

Table 20 - Logistic Regression predicting likelihood of OH by medication and inpatient/outpatient status in headache only population.

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E</th>
<th>Wald</th>
<th>df</th>
<th>p</th>
<th>Odds Ratio</th>
<th>95% CI for odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Medication</td>
<td>1.413</td>
<td>.639</td>
<td>4.896</td>
<td>1</td>
<td>.03</td>
<td>.243</td>
<td>.070 – .851</td>
</tr>
<tr>
<td>Patient</td>
<td>1.571</td>
<td>.681</td>
<td>5.324</td>
<td>1</td>
<td>.02</td>
<td>4.811</td>
<td>1.267 – 18.269</td>
</tr>
</tbody>
</table>

5.5 Hospital admission

Only seven people (12%, 7/58) associated headache with being admitted to hospital suggesting that unlike previous studies this is not a reason for people to fail to report the existence of headache. The following table (Table 21) indicates the headache types experienced by these people.

Table 21 – Association to hospital admission based on headache classification

<table>
<thead>
<tr>
<th></th>
<th>MH</th>
<th>TTH</th>
<th>CGH</th>
<th>OH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>2/18</td>
<td>3/16</td>
<td>0/5</td>
<td>2/19</td>
</tr>
</tbody>
</table>
5.6 Quality of Life

Quality of Life relating to Bodily Pain (BP), Role Physical (RP) and Social Functioning (SF) of the 36 people who had experienced headache in the previous four weeks and completed the questionnaire were scored using the RAND 36 Item Health Survey 1.0 scoring system (Ware & Sherbourne, 1992).

5.6.1 Impact of headache on QOL

The scoring system used in the RAND 36-Item Health Survey is designed to deliver a score between 0 and 100. The closer the score is to 100 the less impact there is on QOL. Analysis of each of the individual SF-36 items showed normality as did the category of calculated BP scores with a mean of 60.8 (SD=19.98). The categories SF and RP calculated scores were not normally distributed with the median for SF=75 (IQR 50-100) and the median for RP=50 (IQR 0-100). The high and low scores of all headache types are represented in Figure 14. The mean scores for BP and median score for SF are above 50 suggesting less impact on functioning from headache while the median score for RP is 50 suggesting moderate impact.

Figure 14 - High/low and mean/median scores of BP, SF and RP
A Pearson correlation was undertaken to determine if there was any correlations between quality of life scores (QOL) for BP and length of headache (LOH), frequency of headache (FOH) and pain (VAS). Spearman correlations were undertaken to determine if there was any relationship with QOL scores for SF, RP and length of headache (LOH), frequency of headache (FOH) and pain (VAS). Frequency of headache was the only factor that had a statistically significant correlation to QOL. There was a medium correlation between FOH and SF ($\rho = -0.44, n=56, p=.00$), BP ($r = -0.41, n=56, p=.00$) and RP ($\rho = -0.32, n=56, p=.01$). The more frequent the headache the more impact on SF, BP and RP.

5.6.2 Impact of specific headache on QOL
Comparing the mean score for BP and the median scores for SF and RP against each headache type it is clear to see that CGH and OH scored significantly worse on all three measures but in particular, along with OH, on role physical (Figure 15).

Figure 15 - Mean score for BP, and median score for SF and RP of each headache classification
Tests were conducted to determine if there were any relationships between quality of life scores for BP, SF, RP and headache classification. A one way between groups analysis of variance was conducted to explore if any headache type of MH, TTH, CGH or OH impacted on BP. There is no significant relationship between bodily pain scores and any specific headache classification $F(3,32)=.21, \ p=.89$. A non-parametric Kruskal-Wallis test was conducted to explore if any headache type impacted on SF. No significant differences were found $\chi^2(3, \ n=36) =3.43, \ p=.33$. A non-parametric Kruskal-Wallis test was also conducted to explore if any headache type impacted on RP. Once again no significant differences were found $\chi^2(5, \ n=36) =9.07, \ p=.11$.

FOH was shown to have an impact on QOL within the headache population of the sample. However, there was no significant connection between QOL scores and any specific headache classification suggesting frequency of headache rather than the type of headache has more impact on QOL for the individual with schizophrenia and schizoaffective disorder who experiences headache.

5.7 Management

Table 22 provides a summary techniques used by participants to relieve their headaches. The table is presented in order of most common to least common.
Table 22 – Management of Headache

<table>
<thead>
<tr>
<th>Strategies used to manage Headache</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication</td>
<td>47</td>
</tr>
<tr>
<td>Sleep</td>
<td>40</td>
</tr>
<tr>
<td>Massage</td>
<td>12</td>
</tr>
<tr>
<td>Heat or Ice</td>
<td>7</td>
</tr>
<tr>
<td>Drink of water</td>
<td>6</td>
</tr>
<tr>
<td>Relaxation</td>
<td>5</td>
</tr>
<tr>
<td>Physical activity and stretching</td>
<td>4</td>
</tr>
<tr>
<td>Neck exercises</td>
<td>3</td>
</tr>
<tr>
<td>Cannabis or other drugs</td>
<td>3</td>
</tr>
<tr>
<td>Pressure points on thumb or head</td>
<td>3</td>
</tr>
<tr>
<td>Alcohol</td>
<td>2</td>
</tr>
<tr>
<td>Chiropractic</td>
<td>2</td>
</tr>
<tr>
<td>Unknown</td>
<td>2</td>
</tr>
<tr>
<td>Correct posture</td>
<td>1</td>
</tr>
<tr>
<td>Eat</td>
<td>1</td>
</tr>
<tr>
<td>Depot</td>
<td>1</td>
</tr>
</tbody>
</table>

Eighty nine percent (16/18) of people experiencing MH took medication to relieve their headache and 78% (14/18) used sleep. The most common management for TTH was also medication with 75% (12/16) using medication for relief of symptoms. Sleep was also the second most prevalent form of treatment for TTH with 56% (9/16) of participants sleeping to relieve headache. No people used relaxation as a form of treatment and only 12.5% (2/16) people used massage.

No person experiencing headache reported receiving assessment or treatment from a physiotherapist. One person experiencing CGH attended chiropractic for their headache and another used pressure on the head. One person used massage while 4/5 took medication. No-one undertook neck exercises. Medication (79%, n=15/19) and sleep (74%, n= 14/19) were also the most common treatments used by people who experienced OH to relieve the symptoms.
CHAPTER SIX

Discussion of findings

6.1 Summary of results

The aims of this study were to determine the prevalence, characteristics, management and impact of headache in people with schizophrenia and schizoaffective disorder. One hundred and forty eight eligible patients from the Fremantle Hospital, Mental Health Services with a diagnosis of schizophrenia or schizoaffective disorder were invited to an interview to complete a questionnaire about headache. Forty-eight people declined to participate, leaving a sample of 100 ranging from 19 years to 60 years of age. Fifty-five people were recruited from the outpatient depot clinic and forty-five from the inpatient wards.

Sixty six of the participants were male and the mean age of all participants was 38.8 years. The BMI of participants ranged between underweight (16.8) and morbidly obese (55.5) with a mean BMI of 29.5. Participants had been diagnosed with either schizophrenia or schizoaffective disorder for between 5 months and 50 years with the mean length of illness being 14.6 years. All participants were on antipsychotic medication, 53 were taking other mental health medication and 39 were taking medication for other physical medical conditions. Sixty six people were taking some medication that had headache as a common side effect. The most common comorbid physical illness was diabetes with 15/100 people reporting the condition. Forty-one percent (24/58) of headache sufferers also experienced neck pain or stiffness.

The twelve month prevalence of headache in this population was 57% with 81% of these people only experiencing one type of headache. People had been experiencing headache from between 5 months and 50 years with a median time of 20 years. Some participants were as young as 6 years old when they started experiencing headache. Only 7 of the 57 people who experienced headache reported having them on a daily basis. Headaches lasted from 10 seconds through to continuous with the median time being 3 hours. The average reported intensity of pain associated with headache was 5.8/10.
Gender, age, inpatient/outpatient status, length of mental illness, BMI, medication type or diabetes did not impact on presence of headache. There was no correlation between chronicity of illness and intensity of pain associated with headache.

Twelve month prevalence of CGH was 4.9%, MH was 17.8%, TTH was 15.8% and OH was 18.8%. Age was shown to impact on CGH within the headache only population in a non-linear fashion. Within the headache only population people taking medication with headache as a side effect were up to 7 times more likely to develop MH. People who are inpatients have up to 4.8 times more likelihood of developing OH and those taking medication with headache as a common or very common side effect are nearly 0.25 less likely to develop an OH.

The frequency of headache impacted on quality of life with more frequent headaches impacting moderately on social function, bodily pain and role physical. There was no correlation between headache type and QOL suggesting frequency of headache is a bigger factor in impact on QOL than type of headache.

Participants reported utilising a wide variety of strategies to manage their headache, often in combinations. The most common strategies reported were medication, sleep and massage. No participants reported seeking advice or treatment from a physiotherapist to help manage their headache. This includes participants who experience CGH, though one of these participants was receiving spinal manipulation from a chiropractor.

6.2 Participants and recruitment

The 100 people recruited represented a good cross section of the Australian population of people diagnosed with schizophrenia and schizoaffective disorder with demographic and clinical characteristics comparable to those of the participants in the Australian Government survey ‘People living with psychotic illness 2010’ (Morgan et al., 2011). This finding supports that the recruitment process of using consecutive sampling in two clusters, one in the inpatient setting and the other in the outpatient depot clinic, was appropriate and captured a true representation of people with these illnesses.
Non-participation is a common occurrence in research involving people with schizophrenia and schizoaffective disorder (Haapea et al., 2007). Haapea et al. (2007) report participation rates varying between 53% and 85% which suggests that the 67% response rate in this study is appropriate for this demographic. Schafer et al. (2011) determined that the more unwell the person with schizophrenia the less likely they are to engage in research, however, this was not the case in this study. The participation rate was higher in the inpatient setting (71%) where people are deemed more acutely unwell than the in the outpatient setting (65%) (Schäfer et al., 2011). Within both populations the most common reasons for non-participation were internally driven reasons such as lack of interest, not wanting to sign a consent form or being too tired. Within the outpatient population there were other more pragmatic reasons for non-participation that could have affected the response rate, such as being in a hurry to attend another appointment, having children waiting for them or feeling unwell after just completing a difficult medical appointment with their psychiatrist. These externally driven reasons for non-participation may have influenced the different response rate between inpatient and outpatient settings or this anomaly may simply exist because in the inpatient setting there was more opportunity for the interviewer to spend time with the potential participant to better inform them about the research. Being better informed might have made people more inclined to engage in the research resulting in an improved participation rate in this population.

A Finish study by Haapea et al. (2007) determined that men were less likely to engage in psychiatric research, a finding not supported by this study. Within the inpatient setting 80% of men meeting the selection criteria who were approached agreed to participate in the study while only 53% of women agreed to participate. In the outpatient setting participation rate was more equitable with 63% for males and 67% for females approached agreeing to participate. If it is considered that people with schizophrenia who are more severely ill are less likely to participate in questionnaires (Schäfer et al., 2011) then it would be expected that there would be a higher refusal rate amongst inpatients. This gender discrepancy in participation rate in the inpatient setting could indicate that that women inpatients were more unwell than the men. There is no way to measure this possibility.
A fear of compromising privacy or concerns that information might be made available to a third party were reasons identified by Schafer et al. (2011) for non-participation of people within this population (Schäfer et al., 2011). Prior to starting this project these concerns were also considered as potential problems and possible barriers for participation. However, these fears were possibly over stated as in the outpatient population the main reasons given for non-participation were lack of interest/not wanting to participate (12/30) or simply for no reason (4/30). Only 3/30 (10%) refusals in the outpatient setting was because that person did not want to sign a consent form. In the inpatient setting the main reason given for non-participation was also lack of interest/not wanting to participate (12/18) but 4/18 people in the inpatient setting (22.2%) refused because they did not want to sign a consent form. Fears around privacy may have influenced these potential participants because initially they had given verbal consent to participate but once the researcher asked them to sign the consent form they refused, citing that they did not want to sign a written consent form and withdrew from the study. Participants were not pressured to say why they would not sign the consent form so it cannot be known what their reasons were for refusal. Privacy could have been an issue for them but it is also possible that people who were voluntary patients may have feared that they were being tricked into signing something to make them involuntary patients. There is also the possibility that they may have had paranoid tendencies or as described by Schafer et al. (2011) been concerned that information might be passed onto a third party. There is no easy solution to the problem of people refusing to sign consent forms as this is an essential component of ethical research, though greater time might need to be dedicated to allaying fears of invasion of privacy when recruiting people with mental health problems.

6.2.1 Demographics of the sample population

The prevalence of psychotic illness in Australia has been determined to be 60% in males and 40% in females (Morgan et al., 2011). In their systematic review of incidence, prevalence and mortality of schizophrenia, McGrath et al. (2008) also determined a prevalence of 60% males (McGrath et al., 2008). The male (66%) and female (34%) participation rates in this study are comparable with both studies indicating a good gender representation of people with schizophrenia in the sample population.
In contrast, however, a review of the literature on schizoaffective disorder by Abrams et al. (2008) identified that schizoaffective disorder is more common amongst women with a prevalence of around 66%. Based on this, the higher male prevalence in the sample population suggests that it might not be a good representation of people with schizoaffective disorder. It could be surmised that more participants had a diagnosis of schizophrenia than schizoaffective disorder. While a diagnosis of schizophrenia or schizoaffective disorder was an inclusion criterion the diagnosis of each participant was not recorded so it was not possible to explore the male/female prevalence in each individual disorder.

This concept of a higher representation of people with schizophrenia than schizoaffective disorder within the sample cohort is also supported by the findings of Perala et al. (2007). In their study of 8,082 people in Finland they found a lifetime prevalence of schizophrenia to be 0.87%, more than double the 0.32% for schizoaffective disorder (Perälä et al., 2007). Although their study was limited to people over 30 years of age Perala et al. (2007) identified that their prevalence findings agreed with other studies that had also determined prevalence of schizoaffective disorder to be around half of that for schizophrenia (Perala et al., 2007). Knowing that the prevalence of schizophrenia is higher than that for schizoaffective disorder and considering that there were more males than females in the sample population it is reasonable to assume that more people had the diagnosis of schizophrenia.

The mean age of people surveyed in the Australian Government survey ‘People living with psychotic illness 2010’ was 39 years with ages ranging from 18 year to 64 years. These figures are comparative to this headache study where participants’ ages ranged from 19 year to 60 years with a mean age of 39 years. Symptoms of schizophrenia and schizoaffective disorder usually appear in young adults with onset of the majority of cases before 25 years of age (Abrams et al., 2008; McGrath et al., 2008; Morgan et al., 2012). In our sample 62% of participants developed their illness before age 25 consistent with the literature further supporting that the study recruited a good representative sample of people with psychotic illness.

Obesity is a characteristic commonly observed in people with psychotic illness, partly as an unwanted side effect of psychotropic medication and partly due to lifestyle
factors associated with negative symptoms such as sedentary lifestyle (McGrath et al., 2008; Vancampfort et al., 2011). Within the general population 34% of people are considered overweight with a further 21% obese (Morgan et al, 2011). Within this sample population 31% of people were identified as overweight with a further 43% considered obese, a finding more consistent with the psychotic population in the Morgan et al. (2011) study where 28% of people had BMI in the overweight range and 45% in the obese range. Both the Morgan et al. (2011) study and this headache study reveal a worrying trend for people with psychotic illness with about three quarters of people being overweight or obese as opposed to 55% in the general population. These results support the perception of poor management of physical health among this demographic.

One consequence of increased BMI is diabetes yet despite almost 75% of the sample population being overweight or obese only 15% (15/100) of participants were identified as having diabetes. Presence of diabetes was determined either by self-reporting and/or if diabetic medications were listed in the medication chart. In the 2010 Australian study population of people with psychotic illness both self-reporting and a more accurate fasting blood triglyceride level was used to identify if a person had diabetes (Morgan et al, 2011). A slightly higher incidence of 20.5% of people having diabetes could be attributed to the different methods used to determine presence of diabetes. It is possible that some people in the Australian national study may have been unaware that they had diabetes and would not have reported it until they received results of the blood tests measuring fasting blood triglyceride level taken during the study. If fasting triglyceride levels had also been tested in this headache study sample population a higher prevalence of diabetes may have been found. This is, however, only supposition. The sample population still reported a higher prevalence of diabetes than the 6.2% found in the general population (Morgan et al, 2011).

6.3 Prevalence of headache
The prevalence of headache in people with schizophrenia or schizoaffective disorder within the previous 12 months was calculated as 57%. As explained previously there has been little research into the prevalence of headache within the schizophrenic population and none in the schizoaffective disorder population (Lake, 3rd et al., 2006; Lake et al., 2005). In 1999 Kuritzky et al. asked 108 outpatients with a diagnosis of
‘chronic’ schizophrenia (diagnosis for more than 2 years) whether they had ever experienced headache and determined a lifetime prevalence of 48%. A control group of 100 people without schizophrenia returned a headache prevalence of 41%. These findings are a little inconsistent with the findings of our headache survey. This may be due to the narrower age range employed by Kuritzky et al. (28-60 years) although this is unlikely as our study did not find any correlation to age and presence of headache.

It is possible that the discrepancy in prevalence could be due to the phrasing of the question regarding presence of headache. In the Kuritzky et al. (1999) study participants were asked if they were ‘subject to headache’ and if the person responded ‘no’, no further questioning was undertaken. It is possible that people who experienced infrequent headaches may not have thought being ‘subject to headache’ applied to them associating this term to people with more regular headaches. In the current study many people initially stated that they did not get headaches but subsequently answered ‘yes’ to having a headache in the last 12 months. In order to determine accurate prevalence the wording of the question is important (Stovner et al., 2014). Stovner et al. (2014) have created guidelines for headache research which include guidance about framing this initial question. If all future research follows these guidelines it will be easier to compare prevalence between populations.

A recent study by Guveli et al., (Guveli et al., 2014) in Turkey found a prevalence of 38.6% headache amongst people with schizophrenia, however their control group also had a low prevalence of headache (37.1%). compared to the general population. It appears that this study did not look at 12 month prevalence rather considered participants who declared a headache at the time of interview or in the past. Discrepancies in prevalence have also been attributed to cultural differences in participants and methodological differences across studies (Junior et al., 2009; Linde et al., 2011; Radtke & Neuhauser, 2009). Junior et al. (2009) attributed the high prevalence of headache in Brazil (65.4%) to cultural differences but cultural background was not explored in this survey so how much of an impact culture had on prevalence of headache in this population is not known. It is possible that cultural factors may have also contributed to the low prevalence of headache in both the schizophrenic population and the control group in the Guveli study (Guveli et al., 2014).
When compared to the general population a 57% one year prevalence of headache is slightly higher than 46% determined by the WHO Global Burden of Headache (Jensen & Stovner, 2008; Stovner et al., 2007). The willingness or not of people with schizophrenia or schizoaffective disorder to participate in research studies may have impacted on this figure. It has been observed that people in this demographic may be more willing to participate in research if they believe there is a relevance to their own lives (Schäfer et al., 2011). It is therefore possible that some people who don’t experience headache could not see any relevance of this research to themselves personally and therefore declined to participate thus increasing the final prevalence rate of headache. This may well have been the case for those participants who declined because they were ‘not interested’. It cannot be known if this trend is also the same for all headache research but it is reasonable to interpret that the prevalence of headache in this population is higher than in the general public.

6.4 Clinical characteristics and headache

This section will examine and compare the clinical characteristics of people with schizophrenia and schizoaffective disorder who experience headache to those who do not experience headache and to the general population.

6.4.1 Gender and headache

The gender distribution in this study was 2:1 males to females. Headache prevalence within genders population was the same for both males and females. This finding is incongruent with those of the general population where the prevalence of headache is higher in women than men. A review by Stovner et al. (2007) determined that both globally and within each of the continents of Africa, Asia, Australia, Europe, North America and South America the prevalence of headache in the general population is greater in women than men. There is no data on prevalence of headache by gender for people with schizophrenia and schizoaffective disorder to compare against so it is unknown if the findings of this headache study are truly representative of that population. More research is required to determine if it is a true reflection or an aberration.
6.4.2 Age and Headache
This study identified that age did not have a significant impact on the presence of headache. Junior et al. (2009) and Stovner et al. (2006) have identified that the prevalence of headache diminishes when a person is over 60 years of age but as there were no participants over 60 in this study it was not possible to determine if this is the case amongst people with schizophrenia or schizoaffective disorder. Further studies would need to be undertaken to explore if there were any changes in headache prevalence in the older adult population with schizophrenia or schizoaffective disorder. It may be worth noting that life expectancy of people with schizophrenia is 20% less than the normal population (Paton, Esop, Young, & Taylor, 2004) impacting on the number of people with the disorder over 60 available for surveying.

6.4.3 Age of onset of headache
The majority of people in this study had been experiencing headache prior to their psychiatric diagnosis. Fifty one percent (29/57) of headache sufferers developed headache before or at age 20 years. This finding is consistent with the argument made by Lake et al. (2005) and Watson et al (1981) that most headaches are not a result of psychosis rather are a comorbid physical illness which should be treated as such. However, it doesn’t rule out the possibility of headache as a trigger or early indicator of mental illness, an issue that will be explored later in the discussion.

6.4.4 Chronicity of illness and headache
Kuritzky et al. (1999) and others have suggested that people with schizophrenia and schizoaffective disorder have a diminished response to pain or a reduced sensitivity which is more pronounced in the chronic phase of the illness (Bonnot et al., 2009; Engels et al., 2014; Guieu et al., 1994; Potvin & Marchand, 2008). Therefore, it might be expected that more chronic participants, that is those with a less recent diagnosis of mental illness, would report headache less frequently than those with a shorter history of schizophrenia or schizoaffective disorder, particularly as we found age not to be a factor. This was not the case. Our data showed that length of illness did not impact on presence of headache, not the case. Our data showed that length of illness did not impact on presence of headache. A recent systematic review by Stubbs et al. (2014) also determined no significant difference in the prevalence of clinical pain, including headache, between people with schizophrenia and a control group of people of similar
age and gender without a diagnosis of schizophrenia (Stubbs et al., 2014). The lack of evidence to support that headache pain responses diminish with chronicity could indicate that in order to elicit pain and for people in the chronic phase of their mental illness to report the presence of headache the symptoms and/or impairments driving the headache must be more severe. Unfortunately this is a very complex concept and not one that can be easily tested. Stubbs et al., (2014) also suggest that more research is required to determine if this phenomenon is due to an under-reporting of pain or if people with schizophrenia have a higher pain threshold and therefore the impairments driving the pain experience are more severe.

6.4.5 Medication and headache

All participants were taking anti-psychotic medication, many were taking other mental health medication and a large number were also on medication for comorbid physical health conditions. As already mentioned 66/99 people were taking some form of medication that listed headache as a common or very common side effect and 59 of these 66 people were taking antipsychotic medication where headache was a recognised side effect. Taking medications which list headache as a common or very common side effect did not have an impact on the presence of headache suggesting that the presence of headache should not automatically be attributed to the side effects of medication. The argument that headache in this population is related to medication is not founded and many people could be missing out on appropriate assessment and treatment of their headache if this false assumption is made. This is slightly different for some specific headache groups and will be discussed more in later sections.

6.4.6 Inpatient/outpatient status, BMI, diabetes and headache

Inpatient/outpatient status does not relate to chronicity of illness, rather reflects the current acuity of illness or relapse. Inpatients represent those people who have an exacerbation of positive or negative symptoms possibly due to stress, relapse or non-compliance of medication. It could be considered feasible that the extra stresses associated with an exacerbation could potentially be a trigger for headache. However, inpatient/outpatient status was not found to have an impact on presence of headache. There is nothing to support the concept that stresses associated with exacerbations and/or the inpatient environment impact on prevalence of headache. This will be discussed further when specific headache types are considered.
Jensen and Stovner (2008) have suggested a link between obesity and headache. With the mean BMI of this population being only slightly below obese (29.4, SD=6.62) it could be expected that a large number of this population would experience headache and may be one reason why the prevalence rate in our sample is higher than the general population. However, we did not find an association between BMI and headache, for both headache in general and for each of the different headache types. Diabetes was identified as the most prevalent comorbidity, although it should be noted that only 10% of people who experienced headache also had a diagnosis of diabetes. In 2003, Warren et al. identified headache as a symptom of hyperglycaemia but no relationship was found between diabetes and headache (Warren et al., 2003).

6.4.7 Summary of clinical characteristics and headache
It is evident that no clinical characteristics included in this study have a significant impact on the presence of headache, however it is of interest to note that unlike the general population there was not a higher prevalence of headache in females. There is a lack of evidence to support that either medication or the stresses associated with hospitalisation have an impact on the presence of general headache within this population.

6.5 Prevalence of specific headache types
This section will examine and compare prevalence and characteristics of CGH, MH, TTH and OH of people with schizophrenia and schizoaffective disorder to the general population. Within this study group, prevalence of CGH was 4.9%, MH was 17.8%, TTH was 15.8% and OH was 18.8%. Within the headache only population of this study group prevalence of CGH was 8.6%, MH was 31%, TTH was 27.6% and OH was 32.8%.

Eleven people (19% of headache sufferers) reported more than 1 headache type but only 1 person completed two questionnaires. This is consistent with findings from Torelli et al. (2010) who reported that 80% of headache sufferers in the general population experienced only 1 type of headache. The reason only 1 person completed two questionnaires is that once one questionnaire was completed the other 10 people considered it too onerous a task to complete a second questionnaire. Everyone who reported more than one headache type was asked to complete the first questionnaire
on their most troublesome headache. There is no data to determine what the classification was of the second headache.

6.5.1 Prevalence of specific headache types in schizophrenia

The only study to date that has attempted to classify headache amongst people with schizophrenia was that of Kuritzky et al. (1999). That study classified all headaches into only two types MH and TTH. MH was classified against the ICHD (1988 version) but all headaches that were not MH were classed into either chronic TTH or episodic TTH with what appears to be no reference to the ICHD. Classification for MH was based on responses to questions on location, intensity, precipitating events before during and after the headache but it is not known if an algorithm was used to guide classification and there was no reference to the validity or reliability of their classification process. There was no consideration of either CGH or any other headache type.

The 19.4% prevalence of MH in the Kuritzky et al. (1999) study is comparable to the 17.8% of our study. Given the very diverse method of classification for TTH in both studies it is not surprising that there was a big difference in the prevalence of TTH. Kuritzky et al. (1999) had prevalence for TTH of 28.7%, significantly higher than our 15.8% determined by using the ICHD guidelines. Variations in the classification process clearly contributed to this discrepancy, however, both are still quite low compared to the general population prevalence of 42%.

6.5.2 Prevalence of specific headache types in the general population

The data on prevalence of various headache types by the WHO Lifting the Burden and other studies highlights some similarities and some diversity when compared to the prevalence of the same headaches types in this study (Chaibi & Russell, 2012; Diener et al., 2007; Dong et al., 2012; Fernández-de-las-Peñas et al., 2006; Knackstedt et al., 2010; Noseda & Burstein, 2013; Stovner et al., 2007; van der Feltz-Cornelis, Biemans, & Timmer, 2012). The 5% prevalence of CGH in our study was comparable to that the 4.6% determined by Knackstedt et al. (2010) in the general population. Painful dysfunction of somatic structures in the cervical spine drives the experience of CGH and can be triggered by sustained awkward neck postures, neck movement or pressure over the occiput (Bogduk and Govind, 2009). The musculoskeletal dysfunctions
associated with CGH have been linked to poor posture, muscle dysfunction, restricted range of movement, age and previous trauma but no links to schizophrenia or schizoaffective disorder have been reported in the literature (Huber, Lisinski & Polowcyk, 2013; Jull et al., 2007; Zito et al, 2006; Fernández-de-las-Penos et al., 2006).

Prevalence of MH (17.8%) within the sample population is higher than the 11% for the general population found by Stovner et al. (2007) but closer to the WHO figure of 14.7% (Steiner et al. 2013) and 16% of Noseda and Burstein (2013). It would be expected that prevalence of MH is similar in both populations as MH is considered to be an inherited condition (Robbins, Grosberg & Lipton, 2013) with pain attributed to altered excitability in the brain in response to common environmental triggers such as fatigue, lack of sleep, certain foods, smoke, hunger, menstrual cycle and even light activating the trigemino-vascular system (Noseda & Burstein, 2013; Landy, Lobo & Rice, 2004). We are unaware of any data linking this brain dysfunction and that associated with schizophrenia and schizoaffective disorder, and the equal prevalence rates for MH between the general population and the schizophrenic population might support this lack of relationship. However, as is outlined below the data on gender distribution and age of onset suggests that this relationship might be one worthy of further investigation.

The mechanisms behind TTH are less clear but it is accepted that physical and emotional stress, lack of sleep and fatigue are common triggers (Cathcart et al., 2010; Fumal & Schoenen, 2008; Li et al., 2012). These triggers are associated with lifestyle factors in both the general population and people with schizophrenia and schizoaffective disorder. It is therefore surprising to find the prevalence of TTH was significantly lower at 15.8% in the sample population compared to the WHO of twelve month prevalence of 42% for the general population (WHO, 2012). However, knowing that there are disparities around classification of TTH, with it often being classified as an absence of MH or CGH, if the prevalence of TTH and OH in this study were combined the overall prevalence of 34.6% is closer to the WHO prevalence for TTH.
6.6 Clinical characteristics and specific headache types

The following pages will examine and compare the clinical characteristics of specific headache types experienced by people with schizophrenia and schizoaffective disorder to the general population.

6.6.1 Clinical characteristics and CGH

The prevalence of CGH among the general population and people with schizophrenia and schizoaffective disorder is the same. Although poor posture resulting from cerebellar changes associated with schizophrenia was previously considered a possible mechanism to precipitate CGH the finding of similar prevalence between the sample population and the general population seems to confirm that increased postural anomalies do not equate to an increased prevalence of CGH (Ho et al., 2004; Picard et al., 2008; Varambally et al., 2012). There is always the possibility that poor posture may contribute to CGH but be mitigated by the decreased pain sensitivity experienced by people with schizophrenia. This concept requires further investigation (Bonnot et al., 2009).

CGH is a headache usually experienced later in life. Five people with schizophrenia and schizoaffective disorder had headaches classified as CGH with a mean age of onset of headache at 37 years of age. This is consistent with the general population mean age of onset of 33 years found in the literature (Antonaci & Sjaastad, 2011; Hall et al., 2008). Our data also demonstrated a relationship between age and CGH which was not linear. Though we are not aware if this relationship has been explored in the CGH population, there is clear evidence of a non-linear relationship between age and neck pain in the general population (Skillgate, Magnusson, Lundberg & Hallqvist, 2012). These findings of similar prevalence and association with age support the notion that the sample population has characteristics of CGH consistent with the general population and the mechanisms driving the condition are the same.

No other clinical characteristics, gender, medications, inpatient/outpatient status, length of illness and BMI impacted on the presence of CGH. The fact that we found no relationship between markers of the length and severity of mental illness and CGH strengthens the idea that CGH exists as a discrete health problem in this population.
and should not be dismissed as simply part of the clinical condition of schizophrenia. Consideration should be given to appropriate management of CGH in this population.

### 6.6.2 Clinical characteristics and MH

The higher prevalence of MH found in males with schizophrenia and schizoaffective disorder compared to the general population is notable because amongst the general population female gender is usually a strong predictor of MH (Stovner, 2006). Buse et al. (2013) report the prevalence of MH as determined by the American Migraine Prevalence and Prevention (AMPP) study to be 17% in females compared to 5.6% in males (Buse et al., 2013). This is a marked difference to the results in this sample population where of the total population 13% of men (13/100) experienced MH and only 5% of women (5/100). It must be remembered that there was a 2:1 ratio of males to females in the sample population and this will have had some impact on the prevalence by gender, however, the prevalence within each gender was similar with 19.7% (13/66) of the men and 14.7% (5/34) of the women experiencing MH and so unlike the general population gender did not have a statistically significant impact on MH.

The most common age of onset of MH is between 10 and 30 years of age (Jensen & Stovner, 2008) with a median age of about 24 years (Asuni et al., 2010). The study undertaken by Asuni et al. (2010) also explored age of onset of MH without aura in a population of people attending a headache centre and determined the mean age of onset of headache of that population to be 16 years (Asuni et al., 2010). The authors attribute this younger age of onset in headache clinic population to the presumption that people attending the headache clinic would have more severe symptoms of headache which could include earlier onset. A mean age of onset of MH without aura of 17.7 years in our study population is more consistent with that of people attending a headache clinic (Asuni et al., 2010) than that of the general clinical population (Jensen & Stovner, 2008). This similarity might suggest that MH headaches experienced by people with schizophrenia and schizoaffective disorder are more severe than those experienced by the general population and more comparable to people attending headache clinics.

In 2008, Stewart et al. undertook a population based study that did not differentiate between MH without aura and MH with aura (Stewart, Wood, Reed, Roy, & Lipton,
They surveyed 163,186 people aged over 12 years and looked at age of onset within each gender. They determined that 1.2% of men with MH had an age of onset younger than 10 years and 5.4% before age of 20 years (Stewart et al., 2008) much lower than the 17% and 50% in the sample population. Similarly with females, in the sample population 20% of women had an age of onset before 10 years and 60% before age of 20 compared to 2.3% and 17.3% in the general population (Stewart et al, 2008). The high prevalence of childhood MH amongst people with schizophrenia and schizoaffective disorder is worth further investigation in larger samples. If the same prevalence is found further studies would need to be undertaken to explore the relationship between early onset MH and psychotic illness. Is early onset MH another possible predictor of developing schizophrenia or schizoaffective disorder? Is there a possible mechanistic link between the two conditions?

The similarity with age of onset of MH is the only characteristic that appears to be shared between people with schizophrenia and schizoaffective disorder and people attending a headache clinic. The length of time that headache lasts is significantly longer in the headache clinic population and the frequency of headaches is also significantly higher (Asuni et al. 2010). Within the sample population 83% (10/12) of people experiencing MH without aura reported a headache lasting less than 24 hours many more than the 28% in the headache clinic population suggesting the headache symptoms may be less severe in people with schizophrenia and schizoaffective disorder than in people attending a headache clinic. Similarly only 43% (6/14) of people in the sample population experienced MH without aura more than twice a month compared to 75% of people in the headache clinic population. In an example of non-uniformity between studies while Asuni et al. (2010) looked at frequency of headache in terms of more or less than 2/month, Buse et al. (2013) looked at frequency in terms of more or less than once/month. When compared to the general population the frequency of MH was similar in the sample population. Buse et al. (2013) determined that 65.5% of females and 74.4% of males in the general population experienced MH more than once a month and within the sample population 72.2% (13/18) people experienced MH more than once a month. So while the age of onset of migraine is comparable to people attending a headache clinic, characteristics related to length of headache appear less severe and frequency is more aligned to the findings in the general population.
It could also be hypothesised that people taking the mood stabiliser sodium valproate or the antidepressant drug amitriptyline, two medications recognised by the WHO as effective prophylactic medication for MH, are inadvertently receiving prophylactic treatment and contributing to the decreased frequency and duration. However, our data suggest against this as none of the MH patients were taking amitriptyline and only one migraineur was taking sodium valproate and they reported experiencing headache, twice a month suggesting the sodium valproate was not an effective prophylactic treatment for their MH.

Another possible explanation for the differences in length or frequency of headache between the headache clinic population and the sample population could be linked to diminished pain responses in the people with schizophrenia as previously identified by many authors (Bonnot et al., 2009; Engels et al., 2014; Guieu et al., 1994; Levesque et al., 2012; Potvin & Marchand, 2008). Diminished pain responses have been linked with chronicity (length of time experienced the psychotic illness) so it might be that as children, before the symptoms of schizophrenia or schizoaffective disorder develop, the pain response is more akin to the general population but with increasing age, as pain responses diminish, the clinical characteristics of MH may become less noticeable with a reduction in frequency and duration. It is not possible to evaluate this theory from this study as there was no exploration of how MH had changed in the individual over time. Perhaps this phenomenon of shorter duration and lower frequency of headache is related to the responses to pain described by Levesque et al. (2012) where people with schizophrenia have a reduced response to prolonged pain or to the findings of Engels et al. (2014) where people with schizophrenia or schizoaffective disorder have diminished responses to medical pain? More investigation is required and the question still remains at to whether MH is an example of the impairments driving the headache needing to be more severe than the general population in order to provoke a response?

No clinical characteristics significantly impacted on the presence of MH within the total sample population. However, within the headache only population, medication with headache as a common or very common side effect did have a statistically significant impact on the presence of MH. If a person was experiencing headache and taking medication with headache as a side effect then it was 6 times more likely that the headache they were experiencing was MH. As already discussed most people
started experiencing MH at an age prior to being diagnosed with schizophrenia or schizoaffective disorder and therefore before they started taking this medication so more research is needed to determine if the nature of MH changed after starting on medication. Ideally a medical review of medications should be conducted to determine which of their medications are contributing to the problem or if it is a combination of medications.

Obesity has been linked to MH so it might be reasonable to assume that with such a high number of overweight and obese people that BMI would have an impact on MH (Verrotti, Di Fonzo, Penta, Agostinelli, & Parisi, 2014). In this population of people experiencing MH the average BMI was 29.7 (SD=8.0) and it was determined that contrary to literature BMI did not have an impact on MH.

### 6.6.3 Clinical characteristics and TTH

The lower prevalence of TTH in this population (15.8%) compared to the general population (42%) could be explained by the classification algorithm used. In this study TTH was classified against a set of characteristics identified in the ICHD classification unlike many other studies where TTH is assigned because characteristics of the headache do not fit MH or CGH (Fumal & Schoenen, 2008; Kuritzky et al., 1999). This could have resulted in lower than expected prevalence of TTH. As already noted if all headaches that were not MH and CGH were included in the classification of TTH then prevalence would have been recorded as 34.6%.

The finding by Ashina et al, (2014) that there is 50% reduction in TTH if taking antidepressant medication could be another explanation for the low prevalence in this population. About one quarter (26/100) of participants were taking antidepressant medication and of these only 5 people were experiencing TTH meaning that the majority of participants taking antidepressants were not experiencing TTH. Further investigation needs to be undertaken to evaluate if there is a causative relationship of medication leading to the discrepancy in prevalence of TTH between the general population and people with schizophrenia and schizoaffective disorder.

With the main triggers for TTH being emotional and physical stress, fatigue and lack of sleep it could be anticipated that inpatients, people with exacerbations of their
illness, in a known stressful environment would have a higher prevalence of TTH (Cathcart et al., 2010; Fumal and Schoenen, 2008; Li et al., 2012). This is not the case with inpatient/outpatient status not impacting on TTH. Indeed no one variable had a statistically significant impact on TTH in the total cohort. Within the headache only population being an inpatient, while statistically significant, meant a person was actually 0.28 times less likely to experience TTH.

Once again the association between pain responses and presence of headache need to be explored. It is hypothesised that TTH is the result of pain elicited by prolonged overloading on pericranial muscles combined with sensitisation of nociceptors in the spinal trigeminal neurones and abnormal pain processing in the CNS (Cathcart et al., 2010; Fumal & Schoenen, 2008; Li et al., 2012; Jensen, 2003). Engels et al. (2014) noted that the prevalence and intensity of responses to nociception from clinical pain experienced in daily life was diminished in people with schizophrenia. They hypothesised that this lower prevalence and intensity of medical related pain could be attributed to abnormal processing of motivational-affective aspects of pain due to dysfunction in the frontal lobe, in other words the person may feel pain but not exhibit pain behaviour. Levesque et al. (2012) identified that people with schizophrenia have a reduced response specifically to prolonged pain. It is possible that in the case of TTH the person with schizophrenia and schizoaffective disorder may still experience prolonged overloading on pericranial muscles in response to stressors provoking sensitisation of nociceptors in the spinal trigeminal neurones but somehow the abnormal pain processing in the CNS evident in people with TTH is altered resulting in lack of translation of nociception to headache which in turn translates to a lower prevalence. If this is the case then further investigation is needed to determine if the impairments driving TTH are more severe than the general population in order to provoke a response from the person with schizophrenia or schizoaffective disorder.

### 6.6.4 Clinical characteristics and OH

The classification of OH was assigned if presenting characteristics were not consistent with those of MH, TTH or CGH as identified against the algorithm. This resulted in quite a high prevalence of this headache type. There are no studies against which to make a comparison of prevalence as OH is not any one specific headache type based on specific characteristics, rather all headaches that are not CGH, MH or TTH.
More people experienced OH on the day of interview than MH or TTH with 36.8% (7/19) of people reporting OH compared to 1/18 (5.5%) for MH and 2/16 (12.5%) for TTH. In the case of CGH 3/5 (60%) of people were complaining of headache at interview. The small number of people experiencing CGH makes it difficult to compare with the other headache types. This phenomenon of many people experiencing OH on the day of interview was not evident when looking back over the previous 4 weeks where almost 2/3 of people experiencing MH, TTH and OH had experienced a headache. Once again CGH was slightly higher (80%) but again small numbers make comparison more difficult. This high prevalence of OH on the day of interview may be linked to inpatient status and will be explored further in the following paragraphs.

Both inpatient/outpatient status and the taking of medication with headache as a side effect impacted significantly on the presence of OH with an inpatient being over 5 times more likely to experience OH. As previously stated the number of people experiencing an OH on the day of interview was 7/19. Five of these people (5/7, 71.4%) were inpatients. Similarly, thirteen people or 68.4% of people experiencing OH reported having had headache in the previous 4 weeks with ten (10/13, 76.9%) of these people being inpatients. Data was not collected on admission dates to the inpatient setting so it is unknown how long participants had been in hospital prior to interview and more importantly if OH has been experienced only since admission or if people were experiencing them prior to admission. The following discussion will explore some factors that may contribute to presence of OH within the inpatient setting.

When a person is an inpatient it is quite possible that they are trialling new prescribed medication and if this medication has a common or very common side effect of headache it is also quite reasonable to assume that the headache can be attributed to this medication. However, we found this not to be the case because a person is 4.5 times more likely to experience MH if they are taking medication where headache is not a common or very common side effect. Medication with headache as a side effect is clearly not the cause of headache.
If medication is not the cause of headache in this population then there must be other reasons why a person is experiencing OH while an inpatient in hospital. Some possible causes could include a reduced caffeine intake (Torelli et al., 2009), effects of either nicotine increase and passive smoking (Aamodt, 2006), lack of exercise (Varkey, Hagen, Zwart, & Linde, 2008), reduced fluid intake (Spigt et al., 2005), cannabis withdrawal (Hesse & Thylstrup, 2013), sleep disturbances (Lateef et al., 2011), side effects of electroconvulsive therapy (ECT) (Drew, King, & Callahan, 2005) and other possible unknown factors.

Excessive intake of caffeine has negative effects on a person’s health both physical and mental, especially people with bipolar affective disorders (Rizkallah et al., 2011). People with schizophrenia are known to have an elevated level of caffeine consumption, in some instances up to 7 times higher than that of the general population (Thompson, Pennay, Zimmermann, Cox, & Lubman, 2014). Within the psychiatric hospital setting tea and instant coffee are available to patients only during morning and afternoon tea and at meal times. This limited access may contribute to a reduction in the intake of caffeine compared to when at home. Many people with schizophrenia and schizoaffective disorder also drink quite a lot of carbonated soft drink (Roick et al., 2007; Amani, 2007). According to the Mayo Clinic most of these drinks contain caffeine. These drinks are not available on the wards and although obtainable in the hospital must be purchased from areas outside the wards. Any person on restricted leave cannot access these areas of the hospital, any people who are experiencing significant negative symptoms may not be motivated to access them and people without any cash are not in a position to purchase them. So on admission to hospital it is possible that many people will experience a reduction in their tea or coffee intake and/or a sharp reduction in the amount of soft drink they consume meaning that their caffeine intake may be diminished possibly resulting in symptoms of headache as identified by Torelli et al. (2009). More research should be conducted to determine if caffeine reduction is a cause for OH in this population and if it is, education can be provided around the harm of too much caffeine and counselling provided to assist with reduction strategies.

People with psychotic mental illness have a high prevalence of cigarette smoking with 2/3’s of people on average smoking 21 cigarettes a day (Morgan et al., 2012). At the
time of this study smoking was banned in hospitals in Western Australia with the exception of psychiatric hospitals and units. Until smoking bans were implemented there was a high rate of smoking in the units including both patients and staff (Wye et al., 2010). People being admitted to an inpatient setting may well have increased their nicotine intake because it was an accepted pastime to help alleviate boredom. Smoking was only permitted in outdoor areas but because these were not large areas it would have been difficult for non-smokers to avoid passive smoking. Headache is frequently a side effect of an increase in nicotine and of passive smoking and may contribute to the high rate of OH in inpatients (Aamodt, 2006). It would be good to reassess both the prevalence of nicotine use and rate of OH now that smoking is banned in the inpatient settings to determine if this is a factor associated with headache. Physiotherapists have long been involved in facilitating smoking cessation programmes and would be a very useful resource in any mental health setting.

It has already been identified that people with schizophrenia and schizoaffective disorder have reduced physical activity (Morgan et al., 2012; Vancampfort et al., 2012). Although not a given, some people may have been admitted to hospital for exacerbation of negative symptoms of schizophrenia or schizoaffective disorder or be experiencing comorbid depression. Side effects in both instances could be a reduction in physical activity. Further investigation should be undertaken to determine if this is indeed the case and if reduction of physical activity does contribute to the prevalence of OH in this population in this setting. Physiotherapists are experts in the implementation of exercise programmes especially where comorbidities exist and are a valuable asset to any mental health facility (Australian Physiotherapy Association, 2011; Vancampfort et al., 2012).

Reduced fluid intake is a trigger for headache (Spigt et al., 2005). One third (5/15) of inpatients experiencing OH reported drinking water to relieve their headache suggesting that they were becoming dehydrated and their headache was related to this. Further investigations would need to be undertaken to determine why people in the inpatient setting might become dehydrated as water is readily available. It is possible that people with an increase in negative symptoms are drinking less if they are lacking motivation to get up and get themselves a drink. Other factors that could have an influence a reduced fluid intake and dehydration are if prior to admission the person
was used to consuming soft drinks which are no longer freely accessible or the person is commenced on medication with dehydration as a side effect. More research needs to be undertaken to determine the reason behind headaches from dehydration in the inpatient setting.

The use of cannibis and illicit drugs is high in people with psychotic illness in Australia. According to Morgan et al. (2010) 63% of males and 42% of females with psychotic illness record a lifetime history of illicit drug abuse much higher than the 12% for males and 6% for females in the general population. Street drugs are known to increase the risk of experiencing psychosis in people with schizophrenia and schizoaffective disorder (Castle & Buckley, 2011) which in turn can lead to hospitalisation. People being admitted to the inpatient facilities due to increases use of cannibis could well be experiencing headache as a withdrawal symptom. In this study only 3 people reported using cannabis to relieve their headache but none of these people were inpatients suggesting that cannibis withdrawal within the inpatient setting may not have been a factor contributing to pesence of OH.

Within general medical and general surgical wards the night-time lighting has been identified as a problem contributing to patients not getting adequate sleep (Bernhofer et al., 2014). It is unknown whether this is a similar problem in this mental health setting, however if it is then lack of sleep could contribute to the high prevalence of OH amongst inpatients (Lateef et al., 2010). Quality of sleep was not evaluated in this study, however, it would be useful to find out how many inpatients experience headache because of sleep disturbances. If it was discovered to be the case then further investigation could be undertaken to determine the cause for lack of sleep and steps could then be taken to make the inpatient environment more condusive to sleep.

ECT is a modality used mainly for the treatment of depression but is also used for the management of other psychiatric conditions that do not reposnd to psychotropic medication (Drew et al., 2005; Tharyan & Adams, 2005; Read & Bentall, 2010). It is not known how many people in this study, if any, were undergoing ECT and therefore we were not able to determine if ECT was a factor associated with OH in this population.
6.6.5 Summary of clinical characteristics and specific headache type

Age of onset of CGH is consistent with literature from the general population and no other clinical characteristics were identified that impacted on the prevalence of this headache type. It can be assumed that clinical characteristics of CGH are the same as in the general population and should be treated as such. This includes referral to physiotherapy.

The high prevalence of MH amongst males and the high prevalence of early age of onset of MH are worth exploring further. Within the sample population no variables, including gender, impacted on presence of MH. It is worth noting that if a person experiencing headache is taking medication with headache as a common or very common side effect then MH should be considered a possibility with a need for further investigation and/or referral to a neurologist.

It is interesting to note that no clinical characteristics were linked to TTH suggesting that when TTH is present it is not related to the mental illness and should be treated appropriately following guidelines for TTH management. More research is required to determine if the low prevalence of TTH is related to diminished pain responses.

Inpatient status had a significant impact on presence of OH but medication with headache as a common or very common side effect, while significant was not the cause with people on these medications less likely to experience OH. Further investigation to determine the underlying causes for these headaches is recommended.

These findings reinforce the concept that headaches in this population are driven by the same mechanisms as in the general population and are not simply a side effect of schizophrenia or schizoaffective disorder. Importantly headaches are not usually related to medication. This highlights the importance of thoroughly assessing people with schizophrenia when they complain of headache. It is important to determine the precise headache type in order to initiate appropriate management strategies.

6.7 Impact of headache on quality of life

The literature identifies a poor quality of life for people with schizophrenia and schizoaffective disorder (Cuyún Carter et al., 2011; Vancampfort et al., 2012). People
who experience headache and have a comorbid mental health issue are also known to have a reduced quality of life (Smitherman & Baskin, 2008; Wang & Juang, 2002). Is it possible to assume that people with schizophrenia and schizoaffective disorder who also experience headache may have an even further reduced QOL.

This project did not set out to evaluate the QOL of all participants rather to explore how headache impacts on the QOL of people of this demographic. As a result no comparisons can be made between QOL of those who experienced headache and those who did not experience headache. Recall questionnaires about QOL were used so participants were only invited to complete the QOL section if they identified that they had experienced a headache in the preceding four weeks, in line with the SF-36 recommendations (Ware & Sherbourne, 1992). Thirty six people completed this section meaning that 63% of the people experiencing headache in the previous 12 months (36/57) and over 1/3 of all participants had experienced a headache in the last month.

It has already been detailed that only three sections of the SF-36 were explored in this study. These were Bodily Pain (BP), Social Functioning (SF) and Role Physical (RP). It is known that people with schizophrenia and schizoaffective disorder have decreased social functioning (Cuyún Carter et al., 2011; Morgan et al., 2012; Ritsner et al., 2014) as do people with headache. It was hypothesised that headache could further decrease the social functioning of the individual with schizophrenia or schizoaffective disorder. Studies exploring the impact of headache on QOL have also identified bodily pain and role physical as other key areas of functioning that are reduced (Leiper et al., 2006; Solomon et al., 1993; Stovner et al., 2007; Stovner et al., 2006) which is why these were included in this study. It is acknowledged that using the whole SF-36 questionnaire would provide much richer information about quality of life but there were concerns about the length of the tool used in this study and so the decision was made to include only these three measures as a way of capturing a snapshot of the impact of headache on the person with schizophrenia or schizoaffective disorder.

While the SF-36 is recognised as a validated and reliable measure of QOL of people with physical illness there are doubts about the validity of it as tool in patients with schizophrenia (Papaioannou et al., 2011). However, in most studies looking at QOL
of people with schizophrenia or schizoaffective disorder researchers are exploring the impact of emotional distress, the side effects of medication or negative symptoms of the mental illness on QOL rather than associated physical illnesses (Ritsner et al., 2014). In the instance where the impact of a physical health issue on QOL is being explored the SF-36 is the most appropriate tool. However, unfortunately because most QOL studies undertaken with this demographic do not use the SF-36 it is difficult to make comparisons with other QOL studies.

Before reviewing the findings of the impact of headache on QOL it is worth bearing in mind that in the general population women have a higher prevalence of headache than men (Stovner et al., 2007) and the American Migraine Prevalence and Prevention has determined that women also have increased symptoms and increased disability associated with headache (Wells et al., 2014). Within the headache population of people with schizophrenia and schizoaffective disorder there was not an increased prevalence of headache amongst women and this under representation of women might mean that overall headache will be shown to have less of an impact on QOL than expected. Impact on QOL was not analysed by gender.

Our analysis did suggest that headache has a moderate impact on RP with less impact on BP and SF. More frequent headaches were associated with greater impact on QOL. Many respondent identified that within the previous four weeks the presence of headache had impacted on their normal ability to work or perform regular daily activities. This finding is consistent with studies undertaken in the general population indicating that headache impacts on role physical (Leiper et al., 2006; Solomon et al., 1993; Stovner et al., 2007; Stovner et al., 2006).

While direct comparison against SF 36-data for this population is not possible it is known that two thirds of people with psychotic illness have severe dysfunction in their ability to socialise and one third had severe impairment in their ability to look after themselves (Morgan et al., 2011). About one fifth of people with psychotic illness do not do their own shopping and cooking. It could be argued that people with schizophrenia and schizoaffective disorder already have significant reduction in quality of social functioning (Cuyún Carter et al., 2011; Morgan et al., 2012; Ritsner et al., 2014) and the presence of headache may not have as much of an impact on an already dimished quality of life.
Unlike the general population the presence of headache had less impact on bodily pain. This is not an unexpected finding considering people with schizophrenia have reduced responses to pain with lower intensity of pain associated with medical causes and a diminished response to prolonged pain (Bonnet et al., 2009; Potvin & Marchand, 2008; Engels et al., 2014; Levesque et al., 2012).

The presence of either CGH or OH was shown to have more impact on BP, SF and RP than MH and TTH which differs from literature in the general population which has found CGH, TTH and MH to all have similar impacts on BP, SF and RP (van Suijlekom et al., 2003). In particular CGH is known to have a significant impact on a person’s SF something that has already been identified as a reduced QOL measure in people with schizophrenia and schizoaffective disorder. The person within this demographic experiencing treatable CGH would be further disadvantaged. It must be noted that the small number of people with CGH in this study has possibly impacted on the results and studies of larger sample size would need to be conducted to determine if this is a trend or an aberration.

6.8 Management of headache

Once a headache type has been identified, to reduce the negative impact on QOL the person needs to receive best practice treatment. Lake et al. (2005, p. 498) state ‘Psychiatric comorbidity’ is often a negative prognostic indicator for headache treatment’ highlighting that behavioural and psychological factors such as non-attendance at appointments may contribute to the treatment outcome (Lake et al., 2005). Kuritzky et al. (1999) suggests that poor treatment outcome might be related to people not reporting their headache in the first instance for fear of hospitalisation (Kuritzky et al., 1999). This claim was not supported by our study with only 7 of the 57 people (12%) who experienced headache relating it’s presence to hospitalisation. Still people not reporting headache, for whatever reason is probably contributing to poor outcomes. According to Vinding et al. (2007) about 50% of people in the general population experiencing headaches seek medical help. Only one person in this study group was taking medication prescribed by their GP and only 1 other was receiving treatment from a chiropractor suggesting that much less than 50% of headache sufferers (3.5%) have sought medical help to manage their symptoms. Without accurate clinical diagnosis there will always be poor treatment outcomes and even if
diagnosis is correct if the right pathway for management of the headache is not followed subsequent suboptimal intervention or treatment will result in poor outcomes. This section explores the management of headaches experienced by people in this study in relation to best practice.

Within a population of people attending a headache clinic Vinding et al. (2007) identified that 56% were accessing physiotherapy and 36% were accessing chiropractic for some management of their headache. These numbers were significantly reduced in the general population with 9% accessing physiotherapy and 5% accessing chiropractic (Vinding et al., 2007). However, in comparison the numbers in this sample population were very poor with only 1 person (1.8%) accessing chiropractic and none accessing physiotherapy despite physiotherapy being available at the hospital. There are limitations to the physiotherapy service at this mental health facility but regardless of that the fact that no one with headache was accessing the service suggests it is either undervalued by staff and consumers, mental health workers are not aware of the services offered by physiotherapists or mental health workers and patients are not informed about the benefits of receiving appropriate physiotherapy. This suggests that more education around the role of physiotherapy and promotion of the benefits of physiotherapeutic services in this area is required.

Forty one percent (24/58) of people reported associated neck pain while experiencing headache. This is lower than the 70% found in people with intermittent headache reported by Hall et al. (2007) or the 69% of patients with MH determined by Florencio et al. (2014). No one person identified accessing physiotherapy for assessment of their neck pain.

6.8.1 Management of CGH
Physiotherapists are particularly interested in CGH with manual therapy in conjunction with exercise well recognised in the management of CGH (Bogduk & Govind, 2009; Jull et al., 2002). No participant in the study accessed physiotherapy for treatment of their CGH although one person did report that correcting their posture helped relieve their CGH.
One person was receiving cervical manipulation from a chiropractor which might sound like good management of their CGH, however, it has been identified that manual therapy/manipulation without exercise prescription is a sub-standard treatment for CGH (Bogduk & Govind, 2009; Fumal & Schoenen, 2008; Jull et al., 2002). Physiotherapy using a combination of manual therapy, exercise and education is recognised as the most effective form of non-invasive management of this headache type and should be the treatment of choice. There is limited physiotherapy available to people in this population and it must be made more available and accessible if they are to receive optimum treatment.

6.8.2 Management of MH

Best practice treatment for MH consists of both acute and prophylactic measures (Kelley & Tepper, 2012a; Zielman et al., 2012). The WHO (2012) recommend symptomatic measures be implemented and trialled unsuccessfully three times before specific measures are implemented. People with schizophrenia and schizoaffective disorder experiencing migraine were mostly treating their symptoms with ‘over the counter’ medication and sleep with no one taking specific measures.

In accordance with the findings of Kelley and Tepper (2012a) the most common medication being used by the sample population was simple analgesics, however, very few people were reporting rapid relief. One person took no medication opting to sleep to relieve the headache and symptoms. The majority (12/18) took paracetamol (Panadol) and slept including the people who reported their headache lasting 12, 48 and 72 hours. These people were obviously not receiving optimum treatment because if paracetamol was to be effective it should provide at least 2 hours of relief (Derry & Moore, 2013). Only one person was taking analgesic medication prescribed by their GP and their headache still lasted for 48 hours suggesting that they too were not receiving the best treatment for their MH. Those people with poorly managed MH would benefit from a specialist neurologist review and might possibly be considered for specific measures such as triptans and ergotamine to reduce the negative impact that MH is having on their lives. Symptomatic relief described by the WHO includes all symptoms, not just pain, yet while three people reported vomiting occasionally and a further 6 people were occasionally nauseous none took any antiemetic medication. Once again best practice treatment was not being utilised.
Prophylactic measures are usually recommended when people experience migraine two or more times a month. In this survey 11/18 people (61.1%) reported experiencing MH at least once each month and 7/18 (39%) of these at least once/fortnight. None of these people were on prophylactic treatment for their migraine. Referral to a neurologist who can prescribe appropriate prophylactic measures for these people may mean they experience less disruption to their lives. Other preventative measures include CBT and relaxation and once again no-one reported accessing services that provided these.

With best practice treatment for MH being both acute (symptomatic and/or specific) and prophylactic measures (Kelley & Tepper, 2012a; Zielman et al., 2012) it is quite unsatisfactory that so few people with schizophrenia and schizoaffective disorder are receiving adequate symptomatic, specific or prophylactic treatment for their migraine.

### 6.8.3 Management of TTH

Medication and sleep are also the most common treatments adopted by people with schizophrenia and schizoaffective disorder who experience TTH. The use of pharmacology for TTH is complex and many variables impact on which medication is the most appropriate for each person (Fumal & Schoenen, 2008). It is not possible to consider all those variables in this study to determine if participants are taking the best medication for their TTH.

There is evidence to support the use of relaxation for TTH and to a lesser extent massage (Fumal & Schoenen, 2008). It is disturbing to note that no people used relaxation as a form of treatment for headache and only two people with TTH accessed massage, although it is unknown if this was from a professional massage therapist. This would suggest that no health professional has explored the headache and given appropriate advice on management.

Physiotherapy and exercise have been shown to reduce the frequency and intensity of TTH (Ashina & Bendsten, 2013) and education on ergonomics and posture to reduce the load on myofascial tissues associated with TTH might also be effective (Fernández-de-las-Peñas et al., 2006). No person experiencing TTH reported, accessing a physiotherapist for treatment, receiving an exercise prescription or
undertaking an ergonomics or postural review, suggesting that people are receiving sub-optimal measures to address their headache issues.

6.8.4 Summary of management of headache

The majority of people with schizophrenia and schizoaffective disorder who experience MH, TTH or CGH are not receiving appropriate nor adequate treatment to manage this potentially disabling condition. The suggestion earlier that many people with schizophrenia and schizoaffective disorder report a headache and are recommended to take paracetamol unfortunately appears to be the case.

It has already been identified that a negative prognostic indicator for treatment of headache is a comorbid psychiatric condition (Lake, 3rd et al., 2006). There could be a couple of explanations for this as identified by Birgenheir et al. (2013) who suggests that people with severe psychotic illness may be undertreated for pain conditions because

- They are considered difficult to treat and not accepted into mainstream health systems
- Pain management (including headache) is considered less important to psychiatric management and overlooked or discounted
- Mental Health workers may see the pain (including headache) as a symptom of a person’s psychotic mental illness rather than a separate condition and not refer them to appropriate services
- Mental Health workers may either not understand and/or underestimate the impact of headache on QOL and fail to act on information
- Mental Health workers may have an understanding of the impact of headache but not know about how headache can be managed and so fail to act on information from the patient
- The person themselves does not report presence of pain for their own reasons which may include perceptions of all of the above, fear of being hospitalised etc.
- It is difficult to access services for various reasons including waiting lists, transport issues, fear of unfamiliar places, fear of stigma etc.
- Financial constraints
6.9 Summary of Discussion

This was a cross sectional cohort study that consecutively recruited 100 participants with schizophrenia or schizoaffective disorder from the Fremantle Hospital Mental Health Services. This cohort represented a good cross section of people with psychotic illness in Australia. Demographic data collected in the study sample was comparable to that collected in the Australian Government’s survey ‘People living with psychotic illness 2010’.

Twelve month prevalence of headache is slightly higher than the general population. Previous surveys have identified that people with schizophrenia will mainly only engage in surveys if they can see the relevance to them. It is possible that many people who don’t experience headache chose not to engage in the study resulting in a slightly higher prevalence. The prevalence is also higher than a previous study conducted in 1999, but the recruitment criteria were different in both studies suggesting differences might have been related to demographic differences.

None of the clinical characteristics assessed (inpatient/outpatient status, length of illness, or medications) impacted on the presence of headache suggesting that headache might not be related directly to the mental illness. Regardless of the headache type, 41% of people experiencing headache also reported associated neck pain. There was no evidence of anybody either seeking or being referred to physiotherapy to assess and manage this pain. Headache frequency was found to be negatively correlated with quality of life, while there was no relationship with intensity or duration.

CGH had the same prevalence and clinical characteristics in this population as in the general population with age being the only significant factor to impact on the presence of CGH. It was disappointing to note that while CGH can be successfully managed with physiotherapeutic intervention no one in this study reported receiving physiotherapist treatment.

MH also had a prevalence rate comparable to the general population. The most noticeable differences in clinical characteristics of people experiencing MH were the disparate prevalence in females/males compared to the general population. There were also a much higher percentage of people with early age of onset of MH. While medication with headache as a side effect had some impact on the presence of MH
most participants had started getting MH well before they started taking this medication. Unfortunately for the majority of people with MH the management of the condition did not follow best practice guidelines and no one was under the care of a neurologist, nor was anyone on prophylactic regimes despite meeting the criteria.

Stress is a recognised trigger for TTH and it could be presumed that people with schizophrenia and schizoaffective disorder are subject to considerable stress especially as inpatients, though our data found no relationship between TTH and inpatient/outpatient status. It would be expected that there would be some discrepancies in prevalence of this headache type within the literature as many previous studies have not used the ICHD to identify TTH, rather classify TTH when the characteristics do not fit MH or CGH. The low prevalence of TTH may be associated with diminished pain responses to prolonged pain. Regardless of the prevalence there was no associations found between clinical characteristics and presence of TTH. It is obvious that people experiencing TTH were not accessing adequate treatment for the condition.

Inpatients are more likely to experience OH but those taking medications that do not list headache as a side effect are also more likely to have OH. This can only make one wonder what the mechanism is that is driving OH in the inpatient population. More research will need to be undertaken to determine this. Some possibilities could be around reduced caffeine intake, increased smoking, withdrawal from illicit drugs, dehydration, sleep disturbances, reduced physical activity or ECT. Adequate management of this type of headache can only be achieved once the mechanism driving the headache is known.

The data available from our survey suggest that the mechanisms behind most headaches experienced by people with schizophrenia and schizoaffective disorder are the same as for the general population, however, overall the management of headache in this population is very poor. Very few people were identified as receiving adequate treatment for their particular headache type. Models to address this problem could include education in the form of training sessions, educational pamphlets and posters; employment of mainstream health professionals into mental health services; implementation of mainstream health clinics that people with schizophrenia and
schizoaffective disorder can access and screening tools for mental health workers. More research will need to be undertaken to determine if any of these measures are useful and/or cost effective.
CHAPTER SEVEN

Possible solutions to issues impacting on management of headache as identified in the discussion

7.1 Introduction

The discussion highlighted some potential perceptions, prejudices and misunderstanding of both health workers and patients around mental health issues and headache issues. This section aims to address and provide possible solutions to these problems. The hope is that these measures will result in better management of headache and improved quality of life for people with schizophrenia and schizoaffective disorder who experience headaches.

7.2 Perceptions and prejudices

Flawed perceptions and prejudices are not restricted to people in the general health workforce but also apply to mental health workers. It has been identified that many people who work in the mental health field perceive their role is to only address the mental health needs of their clients. Many are not cognisant of the importance of addressing the physical health needs of their clients in their overall holistic management or are uncertain about their role in the monitoring of physical health (Happell et al., 2012; Fagiolini, 2008). Regardless of the reasons, it is obvious that many people with severe mental illness are not linked to appropriate medical services for their physical health needs (Griswold et al., 2010). Griswold et al., (2010) recommend improved access for care coordination resulting in better health outcomes.

Within the physical health workforce many health professionals, including physiotherapists, do not believe that they are adequately prepared to work with and support patients who have a comorbid mental health issue (Arvaniti, 2009). In this instance staff will draw on their previous experiences, understandings and beliefs about mental illness and unfortunately many people have negative perceptions of people with psychotic illness, possibly partly due to the way people are portrayed in the media (MacNeela, Scott, Treacy, Hyde, & O'Mahony, 2012). Education about mental health issues helps improve attitudes towards people with mental illness. Inclusion of more education into undergraduate medical, nursing and allied health
courses could help address negative perceptions and prejudices towards people with psychotic illness (Probst & Peuskens, 2010). Better perceptions and reduced prejudices would result in more positive and welcoming environments within the wider health care community thus enabling people with severe mental health issues better access to services that provide specialist care for their physical needs (Kuhnigk et al., 2009).

One solution to the problem of access to physical healthcare for people with schizophrenia or schizoaffective disorder is to promote the role that physiotherapy can play in improving the wellbeing of people who access the mental health services. Physiotherapists are key health workers in the management of people experiencing chronic pain and musculoskeletal conditions including CGH, TTH and neck pain (Australian Physiotherapy Association, 2011, 2012) and in the management of chronic illnesses such as diabetes (Australian Physiotherapy Association, 2008, 2009, 2011). Physiotherapists cannot treat the primary causes behind MH, however, they can recognise these headache and provide treatment to secondary symptoms such as associated neck pain, soft tissue pain and tension as well as address postural and ergonomic anomalies. Physiotherapists are well equipped to refer people to appropriate services for management of the headache condition. Physiotherapy interventions as part of a multidisciplinary team approach are known to assist with management of factors that possibly impact on OH such as excessive nicotine intake, reduced physical activity levels and associated sleep disturbances.

As an outcome of this research a brochure has been developed to promote the role of physiotherapy in maintaining good physical and mental health and wellbeing for people accessing mental health services (APPENDIX Three). This brochure includes information about how physiotherapy can be beneficial in the management of musculoskeletal conditions as well as in chronic disease. Further research needs to be undertaken to evaluate the impact to patients and the cost effectiveness of employing physiotherapists into mental health services.
7.3 Pain management (including headache) is less important than psychiatric management

There is a belief amongst some mental health workers that psychiatric management is the only aspect of the health management for the person with psychotic illness in which they should be involved (Happell et al., 2012). During an acute psychotic episode management of the psychotic illness would certainly take precedence over physical illness, especially if the physical health condition is not life-threatening.

There is no argument that psychotic illness has a serious impact on quality of life and mental wellbeing, however chronic pain, including headache, also has significant impacts on quality of life, overall wellbeing and as has been demonstrated the combined impact of mental illness and headache does further reduced quality of life, especially role physical (Cuyún Carter et al., 2011; Leiper et al., 2006; Smitherman & Baskin, 2008; Wang & Juang, 2002). What many mental health workers fail to recognise is the impact physical health issues, including pain, can have on the overall well-being of the person and the close relationship between physical and mental wellbeing (Happell et al., 2012). A person experiencing pain from frequent, poorly managed headaches is at risk of compromise of their mental health and wellbeing. The brochure developed to highlight the role of physiotherapy also focuses on the impact of pain on a person’s mental health and the role physiotherapy plays in the management of pain. This brochure can be found in Appendix 3.

This study has provided evidence that prevalence of headache in this population is similar to that of the general population. A non-stabilised, acute psychotic episode (patients in locked wards) was an exclusion criterion so no comment can be made about prevalence, characteristics or impact of headache during a very acute phase of illness, however, headache experienced at other times is not normally a side effect of psychotic illness. Headache does have an impact on quality of life and functioning, especially if headache is frequent. Education of mental health workers about the impact of headache is essential if clients of that service are to receive appropriate and timely treatment. A brochure addressing some basic information about headache, questions to ask and some simple management strategies can be found in Appendix 4.
Further studies will need to be undertaken to evaluate the effectiveness of providing this information to mental health staff.

7.4 Pain (including headache) as a symptom of a person’s psychotic mental illness

Our data suggests that headache is not simply a side effect of schizophrenia and schizoaffective disorder and is not normally associated with antipsychotic or any mental health medication. Literature indicates that response to pain is diminished in this population and it is still unknown if the characteristics driving headache in this demographic are in fact more severe in order to illicit a response and prompt behaviour to seek assistance for the pain (Bonnot et al., 2009).

CGH is triggered by noxious input from structures innervated by the upper cervical nerve roots being referred along the sensory distribution of the trigeminal nerve via the ‘cervico-trigeminal relay’. Migraine is a headache activated by the trigeminovascular system and physical and/or psychological stress can increase muscle tension in the head area resulting in perception of pain and TTH. Education of mental health workers about the pathophysiology of headache may help them develop a better understanding of the condition. The brochure in Appendix 4 could assist a little with this but a series of professional development training sessions could be developed for case managers.

7.5 No understanding of the impact of headache on QOL

Education of mental health workers about the impact of headache is essential if clients of that service are to receive appropriate and timely treatment. Frequency of headache was identified as the most significant factor impacting on QOL. It is important that mental health workers are aware of this and carefully monitor the frequency of headache experienced by their clients. The brochure in Appendix 4 contains this information.

7.6 No understanding about how headache can be managed

Education about management of different headache types may assist mental health workers to be better equipped to help their clients who experience headache. If a
service employed physiotherapists they could provide this education on a regular basis to remind staff of the impact of headache and assist with case management for the client.

Lake et al. (2006 & 2005) advocate that the development of a screening tool for managing people presenting in psychiatric clinics with comorbid headaches would be a step towards improving management and treatment outcomes for this group of people. The questions included in the brochure (Appendix 4) should assist case managers with this process. A screening tool would be of little use without knowing what to do with the information so the brochure provides information for a referral pathway to appropriate services. This should assist mental health workers to provide better advice to their clients.

7.7 Non self-reporting of the presence of pain.
It has been suggested that many people with schizophrenia and schizoaffective disorder do not report pain or headache to their mental health worker. There are different reasons why this might be the case, such as fear of hospitalisation, not wanting to bother anyone, believing that nothing can be done to help anyway etc.

It is important to emphasise a few things to people with schizophrenia and schizoaffective disorder.

1. People with schizophrenia and schizoaffective disorder experience headaches the same as the general population
2. Headache is not connected to mental illness
3. Reporting headache will not result in you being admitted to hospital
4. Effective treatment does exist for headache
5. To access the best treatment you need to be assessed by an appropriate health professional.

The brochure developed in Appendix 4 was done so with the intent of being useful for both health care practitioners and patients. It is hoped that by making this available throughout the service that patients themselves might identify a pathway for management of headache. Further studies will need to be undertaken to evaluate the effectiveness of providing this information to patients.
7.8 Difficulty accessing services

There are many reasons, some valid and some not, why a person with a psychotic illness will not access mainstream health services. There are a few solutions to this problem.

1. Employ staff who can provide appropriate management. Physiotherapists working in the mental health field have skills to lead the promotion of physical health amongst users of mental health services (Stubbs et al., 2014). A systematic review by Vancampfort et al. (2012) found that targeted physiotherapeutic interventions not only improved physical health but also improved psychiatric symptoms in many patients. Employing physiotherapists could be cost effective when considering the overall wellbeing of patients accessing mental health services.

2. Broker in expert services and conduct regular clinics that are easy for patients to access.

3. Ensure case manager or support workers assist people with schizophrenia and schizoaffective disorder as required to negotiate appointment times and accompany clients to appointment that are in mainstream health services.

4. Provide ‘Care Navigators’ as described by Griswold et al. (Griswold, Homish, Pastore, & Leonard, 2010). Trained care navigators help patients with severe psychiatric conditions to access health services by assisting with communication and education and guiding the individual through the complex healthcare system.

The 2001 study ‘Duty to Care’ highlights not only the poor physical health of people with mental health but also their poor access to services (Coghlan et al., 2001). Linking patients to primary care has been shown to produce better outcomes (Griswold et al., 2010; Griswold et al., 2008).

7.9 Financial constraints

Eighty percent of people with schizophrenia and schizoaffective disorder receive their income through Government pensions and are not in a financial position to access private physiotherapy (Morgan et al., 2011). Physiotherapists are included in all outpatient departments in Australian General Hospitals but it is obvious that none of
the people with CGH in this study have accessed these services. Employing appropriate staff or brokering in staff for regular clinics could be suitable ways to address these problems.
CHAPTER EIGHT

Limitations, considerations, recommendations and conclusion

8.1 Limitations and considerations for future research

The sample size calculation used for this study was based on a prevalence rate for any headache, however a larger sample size would have provided richer data for exploring issues related to individual headache types. This is particularly the case for CGH. A larger sample size would mean that trends observed amongst MH, CGH and TTH could be more reliable.

It could be argued that this study is restricted because the participants were recruited from one health facility in Perth. When demographic data collected from the sample population was compared to that of an Australian wide survey of people with schizophrenia and schizoaffective disorder it was demonstrated that the sample was a good representation of people with schizophrenia and schizoaffective disorder in Australia. In 2011, 216,266 people lived in the catchment area for the facility in the southern regions of the greater city of Perth in Western Australia representing 12.5% of the total population for Perth at that time.

Collecting data about length of patient illness from files, as required by Fremantle Hospital and Health Service ethics committee, proved to be very difficult. Lack of this information would impact on the ability to determine chronicity of illness. Many patients with long term psychotic illnesses have multiple files with the ones containing original admission and diagnosis data being up to thirty years old and many files needed to be requested from archives. Many participants had come to Alma Street Mental Health Services from other countries, interstate or other health facilities in Perth and their original files were no longer available. Fortunately most patients volunteered the information about how long they had been unwell with a mental illness without being asked. It is assumed therefore that this is a question that they are regularly asked in medical type interviews and they are comfortable answering.

Recruiting all outpatients from the depot clinic may have impacted on the data collected if all were involuntary patients on an enforced Community Treatment Order (CTO) due to non-compliance of medication or aggression. However, since many
people voluntarily opted for a depot injection as it made it easier for them to manage their medication there was in fact a cross-section of outpatients. It is not known if the cross-section of outpatients would have been different if case managers had enough time to engage and recruit other participants who did not attend the depot clinic.

Getting access to an accurate list of ALL medications was challenging as people with schizophrenia and schizoaffective disorder are often prescribed medication from their psychiatrist as well as their GP and in some instances other medical people. Not all participants could remember what they were taking and medications not prescribed in the hospital were not often recorded in case notes. All avenues were explored to try and ensure accurate data was obtained.

Prior to data collection it was recognised that some participants may be overwhelmed and/or suspicious if presented with too much written information to read prior to undertaking the questionnaire. Human Research Ethic Committee (HREC) requirements include providing a plain language statement as well as a consent form to be read and signed. During data collection the majority of participants did not want to read the information sheet or the consent form but specifically asked for an oral version. It is not known whether this is because of poor literacy, difficulty to concentrate or an aversion to reading lengthy documents. Morgan et al. (2011) identified that in Australia 1 in 5 people with a psychotic illness have trouble reading and writing. In future this is something that needs to be considered when researching this demographic.

It became evident quite quickly that due to the length of the questionnaire, maintaining attention of the participant was sometimes a challenge, in keeping with the Schafer et al. (2011) observation that people with schizophrenia have an aversion to questionnaire surveys. Two considerations for future research are to

- Conduct trials of shorter versions of the questionnaire to determine if classification can still be accurately determined with less information and without compromising validity and reliability.
- Continue to use researchers who have experience working with this population to ensure they have strategies to maintain engagement of the participant.
Gathering data on more than 1 headache when a person experienced multiple headache types was difficult. Only one person completed a second questionnaire despite 11 people identifying that they experienced more than one headache type. The questionnaire is lengthy and people lost concentration and focus after completing only one. As a result some valuable data was not collected. There is no immediate solution to this problem but a shorter questionnaire may prove useful. Throughout this study, in order to gather the most appropriate data, people were asked to report about their most problematic and troublesome headache first.

Many participants had difficulty rating the intensity of the associated symptoms that accompany headache of nausea, vomiting, photophobia, phonophobia, light-headedness, dizziness, blurred vision, eye swelling, loss of appetite and confused thinking. When working with this population again it might be worth considering if knowledge of intensity is crucial to classification of headache or if knowledge of presence of the symptoms is more important as this was a point where many people began to lose impetus to continue with the questionnaire. Pilot studies would need to be undertaken to determine the appropriateness of a tool that explores frequency of symptoms but not intensity of symptoms.

Collecting data on quality of life of all participants might have given richer information about the impact of headache. As indicated the SF-36 is not used much to evaluate QOL in psychiatric research so making comparisons between this study and the norms for this population was difficult. Gathering SF-36 information from all participants, regardless of presence of headache would have provided a reasonable comparison to determine the impact of headache on QOL and will be considered in future research.

Rich information was obtained from the client interviews but more rich information would have been obtained if case managers were also interviewed or surveyed. Determining how many case managers knew if their client’s experienced headache would have provided valuable information about how headache is considered amongst mental health workers and directed educational support. It would also have given some insight into the holistic management of the patient. In the instance where case managers were aware of the presence of headache further information about what they perceived was the impact of that headache and what were they doing to assist the
person would have directed what to target in management strategies developed to address the problems. This is something that is being considered for future studies.

This research has highlighted the prevalence of headache in this population. Physiotherapists are seen as experts in treating CGH and have a role to play in the management of TTH and therefore should be considered in the health workforce of mental health services. There is some research beginning to emerge from Europe exploring the physical and mental health benefits to people with schizophrenia receiving physiotherapeutic intervention for physical conditions (Vancampfort et al, 2012; Stubbs et al, 2014). More research needs to be undertaken to explore the cost effectiveness of employing physiotherapists in mental health settings to provide expert input on prevention and/or management of physical health issues and the impact this has on mental wellbeing.

8.2 Recommendations for clinical practice

There is a need for more education for patients and mental health workers in the psychiatric setting about headache and an understanding that headache is not simply related to psychotic illness such as schizophrenia or schizoaffective disorder. Education should highlight that the person with schizophrenia or schizoaffective disorder does not have to tolerate the pain and discomfort associated with headache and that appropriate treatment is available. To this end pamphlets with information about headache and its management will be provided in the outpatient waiting rooms and ward areas at Alma Street (Appendix 4). A future research project could survey people with schizophrenia and schizoaffective disorder to determine if there is any changes in the management and effect on QOL secondary to headache with this information being available.

Information and education about headaches, impacts and management of headaches should be provided to psychiatrist, case managers and mental health workers. At the Alma Street centre this will take the form of a lecture with handouts for future reference. Once again a future research project could evaluate if there are any changes in the management and quality of life of their clients with schizophrenia and schizoaffective disorder who experience headache.
Perhaps one of the most important recommendations for clinical practice is to alert physiotherapists that the prevalence and characteristics of CGH in people with schizophrenia and schizoaffective disorder is the same as for the general population and they should be taking an active interest in this group of people as they are currently missing out on best practice treatment.

Another important recommendation for clinical practice is to highlight to neurologists and headache specialists that the prevalence and characteristics of CGH in people with schizophrenia and schizoaffective disorder is the same as for the general population. It is also important to highlight that the prevalence of MH is similar but with different clinical characteristics around gender and age of onset and they should be taking an active interest in this group of people as they are currently missing out on best practice treatment. More research should be conducted to determine the reason that inpatients are more likely to experience OH so that appropriate measures can be taken to address this issue.

Finally there is a need to advertise the role that physiotherapy can play in the management of other physical health issues and the advantages to employing physiotherapists in this setting. A pamphlet has been developed for distribution providing information about the role and benefits of physiotherapy for the overall wellbeing of the person with schizophrenia or schizoaffective disorder (Appendix 3).

8.3 Conclusion

This study has shown that the prevalence rate of headache amongst people with schizophrenia and schizoaffective disorder is similar to that of the general population. Medication, acuity or chronicity of schizophrenia and schizoaffective disorder do not play significant roles in the presence of headache. The prevalence of CGH and MH are within the same parameters as the general population. The mechanisms driving these headaches appear not to be related to psychosis or mental illness. There are some differences in gender distribution and age of onset of MH which should be explored further. More investigation is required to have a better understanding of why inpatients are more likely to experience OH.

The frequency of headache has been shown to have the most impact on QOL and it was evident that very few people are receiving appropriate treatment for their
headaches. Physiotherapy was not included in the management of headache of any
people including those with CGH. It is recommended that better education is provided
for both patients and mental health workers about headache and its management as
well as the role of physiotherapy in managing the physical health and mental wellbeing
of people accessing mental health services.
APPENDIX ONE

Questionnaire

Code Number ________________

Location of interview

Depot Clinic ☐
Inpatient ☐
Outpatient ☐

Length of illness ________________________________

BMI

Height ________________________________

Weight ________________________________

Calculated ________________________________
Headache Questionnaire

Thank you for participating in this headache study. Please answer the following questions about you and your headache to the best of your ability. It is important that you try to answer All the questions.

1. What is your age? _______________ years

2. What is your gender?
   - Male □
   - Female □

3. Have you had a headache in the last 12 months?  Yes □ No □

4. Please list all your current medication.
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

5. Please list any conditions you are receiving treatment for (e.g. diabetes, high cholesterol, asthma, arthritis).
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

If you haven’t experienced a headache in the last 12 months please go straight to the end of the questionnaire.
6. Are you suffering from the headache today? 
   Yes ☐  No ☐

7. Have you experienced a headache in the last month? 
   Yes ☐  No ☐

8. Some people can experience more than one type of headache. Different types of headache can
   • Feel different (have different pain)
   • Have different triggers
   • Be in different parts of the head
   • Have a different effect on day to day functioning

   Do you suffer from more than one type of headache? Yes ☐  No ☐

   If YES, how many different types of headache do you have? ________

   If you suffer from more than one headache type, please complete a separate form for each headache type.

   Headache No. ____________

9. About how long have you been getting headache? _____years _____months

10. About how often do you have headache?

    Almost every day ☐
    Three or four per week ☐
    One or two per week ☐
    One per fortnight ☐
    One per month ☐
    Other ☐ how often ______

11. On average how long does your headache last ______hours ______ days

12. Do your headaches last about the same length of time? Yes ☐  No ☐

13. Does your headache go away completely between episodes?

    Yes ☐  No ☐
14. Please shade in the chart the area where you usually feel your headache or any other pain. If applicable, please mark as number 1, where you first feel pain when a headache starts and mark as number 2 where pain spreads to, and so forth.

15. Does your headache usually start: in the head ☐
in the neck ☐

16. My headache is: always on one side ☐
can be on either side ☐
on both sides ☐
on both sides but one side is always worse ☐

17. I have neck pain or stiffness with my headache Yes ☐ No ☐

18. I feel my headache as (tick as many boxes as applies to your headache)

Aching ☐
Throbbing ☐
Pulsating ☐
Stabbing ☐
Shooting ☐
Band-like ☐
Tightness ☐
Sharp ☐

19. Please mark on the line below, how bad your headache is when you get it.

| No headache | Worst headache imaginable |

168
20. Please tick (√) which if any of the following symptoms accompany your headaches and rate their intensity

<table>
<thead>
<tr>
<th>Accompanying symptoms</th>
<th>How often</th>
<th>Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never</td>
<td>Occasionally</td>
</tr>
<tr>
<td>Nausea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vomiting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light sensitivity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise sensitivity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lightheaded/dizzy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsteadiness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blurred vision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eye swelling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of appetite</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confused thinking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoulder or arm pain on the same side as the headache</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other._________________________</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

21. Do you feel any of the following sensations for a period of minutes to an hour before the onset of your headache?

<table>
<thead>
<tr>
<th>Sensations</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>things such as blind spots, flashing or zigzag lights</td>
<td></td>
<td></td>
</tr>
<tr>
<td>feeling of pin/needle or numbness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>feeling of weakness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>feeling of difficulty speaking</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
22. Please tick (✓) any of the following which can either give you a headache or make it worse (tick as many boxes as applies to your headache)

- Certain foods (e.g. chocolate, cheeses)
- Alcohol (e.g. red wine, beer, spirits)
- Awkward head or neck postures or neck movement
- Sustained neck postures (e.g. reading)
- Pressure over the neck or base of skull on the headache side
- Medication
- Routine physical activity or walking stairs
- Lifestyle factors (e.g. excessive sleep, fasting or dieting, fatigue)
- Exercises/sports
- Environmental factors (e.g. strong odours, smoke, weather changes)
- Stress or anxiety
- Other. Please describe_______________________
- I do not know what brings on my headache

23. I would like to know what you think started your headaches

- I do not know
- I think I know what caused my headache
- Please describe_____________________________

24. Please tick (✓) any of the following which can relieve your headache

- Medication
- Heat/ice applications
- Physical activity
- Neck exercise or change of position
- Alcohol
- Relaxation
- Massage
- Sleeping/rest
- Unknown
- Cannabis or other street drugs
- Other
Please describe
_____________________________________________________

25. Do other members of your family suffer from similar headaches?

   Yes ☐   No ☐   Unsure ☐

26. When you have a headache do you notice or do other people comment on changes in your thinking, feeling or actions?  Yes ☐   No ☐
   If Yes, what changes are noticed?
   ______________________________________________________
   ______________________________________________________

27. Do your think recurrent headaches are ever related to you being admitted to hospital?  Yes ☐   No ☐

28. During the past four weeks, have you had any of the following problems with your work or other regular daily activities as a result of your headache?
   Yes ☐   No ☐

   Cut down on the amount of time you spent on work or other activities ☐ ☐
   Accomplished less than you would like ☐ ☐
   Were limited in the kind of work or other activities ☐ ☐
   Had difficulty performing the work or other activities ☐ ☐
   (for example, it took extra effort)

29. How much headache pain have you had during the past four weeks? (Circle one)

   None ____________________________ 1
   Very mild ______________________ 2
   Mild ____________________________ 3
   Moderate ________________________ 4
   Severe __________________________ 5
   Very severe ______________________ 6
30. During the past four weeks, how much did headache interfere with your normal work (including both work outside the home and housework)?

Not at all __________________________☐
A little bit __________________________☐
Moderately __________________________☐
Quite a bit __________________________☐
Extremely __________________________☐

31. During the past four weeks to what extent has your headache interfered with your normal social activities with family, friends, neighbours, or groups?

Not at all __________________________☐
Slightly __________________________☐
Moderately __________________________☐
Quite a bit __________________________☐
Extremely __________________________☐

32. During the past four weeks how many days has your headache keep you from doing your usual activities?

Number of days _________________
None ☐

Thank you very much for your assistance in this research into headaches. I really appreciate your taking the time to answer these questions. If you would like to be contacted about the classification of your headache please let Jo know and she will arrange for this.

A poster in the waiting room will be displayed when we have analysed all the results. I hope you enjoy your DÔME voucher.
APPENDIX TWO

Algorithm for headache classification

Is the headache unilateral and side locked, precipitated by neck movement and/or sustained awkward neck position and pain starts in neck?

Yes → Cervicogenic headache

No ↓

Does this person have unilateral, moderate to severe, pulsating/throbbing, time locked pain which prohibits activity with associated aura?

Yes → Migraine Headache with aura

No ↓

Does this person have mild to moderate, pressing/tightening pain which is always bilateral and no neck symptoms?

Yes → Tension Type Headache

No ↓

Which classification best does the patient best suit?

<table>
<thead>
<tr>
<th>CGH Defining factors</th>
<th>Migraine Defining factors</th>
<th>TTH Defining factors</th>
<th>Other Defining factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less episodic</td>
<td>Lasting 4-72 hours</td>
<td>lasting 30 min – 7 days</td>
<td></td>
</tr>
<tr>
<td>Chronic/continuous</td>
<td>Episodic</td>
<td>Less episodic</td>
<td></td>
</tr>
<tr>
<td>*Unilateral without side shift</td>
<td>Time locked</td>
<td>Chronic/continuous</td>
<td></td>
</tr>
<tr>
<td>Starts in neck</td>
<td>Fronto-temporal location</td>
<td>Starts in head</td>
<td></td>
</tr>
<tr>
<td>Neck stiffness/injury</td>
<td></td>
<td>At least 2 of the following</td>
<td></td>
</tr>
<tr>
<td>Headache precipitated by 1 or more</td>
<td>2 of the following</td>
<td>*Bilateral</td>
<td></td>
</tr>
<tr>
<td>*Neck movement</td>
<td>*Unilateral</td>
<td>*Pressing/tightening pain/bandlike</td>
<td></td>
</tr>
<tr>
<td>*sustained awkward head position</td>
<td>*Pulsating/throbbing/sharp/stabbing</td>
<td>*Mild to moderate pain</td>
<td></td>
</tr>
<tr>
<td>*pressure over upper cervical or occipital region on symptomatic side</td>
<td>*Moderate to severe</td>
<td>*Not aggravated by exercise</td>
<td></td>
</tr>
<tr>
<td>Ipsilateral neck, shoulder or arm pain</td>
<td>*Aggravated by routine exercise, food, environment, stress,</td>
<td>Least pain</td>
<td></td>
</tr>
<tr>
<td>Varying duration of moderate – severe pain</td>
<td>At least one of the following</td>
<td>Both of the following</td>
<td></td>
</tr>
<tr>
<td>Ache/ sharp/ non-throbbing, non-lancinating pain or fluctuating continuous pain</td>
<td>*Nausea/Vomiting</td>
<td>*no nausea/vomiting</td>
<td></td>
</tr>
<tr>
<td>May have associated nausea, photophobia or phonophobia, dizziness, ipsilateral blurred vision, difficulties swallowing, ipsilateral eye oedema,</td>
<td>photophobia or phonophobia</td>
<td>*no more than one of photophobia or phonophobia</td>
<td></td>
</tr>
<tr>
<td>Aggravated by sport/exercise, stress</td>
<td>May have associated fully reversible aura including visual –flickering lights, spots, lines or loss of vision</td>
<td>Unless chronic then mild nausea may be associated</td>
<td></td>
</tr>
<tr>
<td>Relief with hotpacks, neck exercises, change of position, massage, relaxation</td>
<td>Sensory-pins and needles, numbness</td>
<td>Not made worse by normal physical activity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relief with medication, rest</td>
<td>Aggravated by stress</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relief with physical activity, relaxation, massage, rest alcohol</td>
<td>Motor weakness</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Triggered by medication</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inconsistent characteristics of other three headache types</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aggravated by food, alcohol, lifestyle, environment, stress</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Eased by alcohol, street drugs</td>
</tr>
</tbody>
</table>
APPENDIX THREE
Pamphlet about Role of Physiotherapy

Physiotherapists:
- Help recovery from injury
- Manage joint and muscle pain without drugs
- Prescribe exercise programs to improve mood and promote wellbeing
- Provide individual advice on lifestyle and weight management
- Manage falls and mobility issues
- Help people recover from stroke and other illnesses

ROLE OF PHYSIOTHERAPY IN MENTAL HEALTH

Prepared by
Associate Professor Joanne Connoughton
School of Physiotherapy
The University of Notre Dame Australia
Physiotherapy and You
Physiotherapists are trained to treat muscle and joint problems and manage some heart, lung, and neurological conditions.

Improvements to physical wellbeing can improve mental wellbeing
Improving balance, posture and flexibility can give you a sense of improved alignment and better self-esteem.
Physiotherapists can help you plan and make decisions about your physical health and advocate for your physical health needs.
Physiotherapists will encourage you to take an active role in your own care and self-management.

How to find a physiotherapist
Physiotherapists are employed at the Alma Street Centre. You can ask your doctor, nurse or case manager to link you to the physiotherapy department for advice or treatment.

If you have private health insurance that covers you for physiotherapy visit the Australian Physiotherapy Association website to find one near you.


You do not need a referral from a doctor to make an appointment with a private physiotherapist but you will need to pay some money. Check with the physiotherapists before you attend to find out how much it will cost.

For more information about physiotherapy visit the
Australian Physiotherapy Association website

https://www.physiotherapy.asn.au/

Physiotherapy and pain
Physiotherapists can reduce pain or give you skills to manage your pain to improve your quality of life. Physiotherapists have the knowledge and skills necessary to help you to self-manage chronic pain.

Physiotherapy and chronic diseases
Physiotherapists prescribe exercises and education for people who have been diagnosed with or are at risk of developing
- Type 2 diabetes
- Chronic lung disease
- Asthma
- Heart disease
- Osteoarthritis
- Osteoporosis
- Stroke
- And other chronic illnesses
Summary of headache

**Migraine headache** affects between 16% - 30% of people and can often be quite debilitating. Migraine headache is believed to be triggered by disturbances in the neurovascular system. Stress can bring on a migraine headache but so too can other things like smells and bright lights. There is good medication available to treat and help prevent migraine headache.

**Tension type headache** is a common headache that is triggered by stress. The cause of tension type headache is still unknown. Relaxation, massage and physiotherapy exercises usually help relieve tension type headache. A doctor might be able to help if headaches occur more than twice a month.

**Cervicogenic headache** affects about 4-10% of the population. Most people develop cervicogenic headache in their 30’s. Cervicogenic headache is caused by problems in the neck and usually starts after a period of neck pain or holding the neck in an odd position for a long time. There is good evidence to show that physiotherapy can treat and help prevent cervicogenic headache.

---

**APPENDIX FOUR**

**Pamphlet about Headache**

Headache!

A pain you can do something about

---

This brochure contains useful information about headache, questions you should ask and suggestions about where to get help.
Headache overview

Research has shown that people with schizophrenia and schizoaffective disorder at Alma Street Centre have similar headaches to that of the general population.

Headache is not normally a side effect of psychosis or mental health issues. Help should be sought if headache is severe, continuous or impacting on daily functioning.

Research shows that chronic headache impacts on quality of life, yet our research found that very few people we interviewed were accessing appropriate treatment for their treatable headaches.

Questions to ask

- How often do you get headache?
- How long does your headache last?
- Where do you feel your headache?
- Is your headache always on one side, on either side or on both sides at the same time?
- Where does your headache start? Head or neck?
- Is your headache pain aching, stabbing, pulsating, band-like, tight or sharp?
- On a scale of 0-10 how severe is your headache pain? 0= no pain.
- Do you see black spots, flashing or zigzag lights for up to an hour before you get your headache?
- What makes your headache worse or better?
- What do you do to get rid of your headache?
- Does anyone else in your family have similar types of headache?

Management pathway

See a doctor if

- Have more than 3-4 headaches a year
- Headache is not relieved by paracetamol within an hour
- Headache is accompanied by flashing lights etc.
- Headache is pulsating, stabbing or sharp
- Pain is rated from 5-10
- Exercise makes headache worse
- Always have to go bed and sleep off for a few hours to a day
- Vomiting accompanies headache

See a physiotherapist if

- Headache starts in the neck
- Headache is always on the same side
- Pain is sharp or stabbing
- Neck movements or positions make headache worse
- Pain is aggravated by exercise

Physiotherapy might help if

- Pain is tight or band-like
- Pain is not aggravated by exercise
APPENDIX FIVE

INFORMATION SHEET

Exploring headache amongst users of Alma Street Services

Jo Connaughton from the School of Physiotherapy at the University of Notre Dame invites you to be a part of her doctoral research project investigating headaches in people accessing Alma Street Services. Jo worked as the Senior Physiotherapist at Alma Street between 2002 and 2007. Approval for this project has been granted by the Research Committee of the College of Health Sciences under the authority of the Human Research Ethics Committee of the University of Notre Dame Australia and the South Metropolitan Area Health Services Human Research Ethics Committee.

Nature and Purpose of the Study
The aim of the project is to find out how many people who access Alma Street experience headaches and how often, what type of headaches, how the headaches impact on each person and what, if any treatment, each person is receiving for the headaches. Your case manager has identified you are over 18 and might be willing to be part of this study. You do not need to experience headaches to be part of this study.

What the Study Will Involve
If you decide to participate in this study a researcher will guide you through 30 questions from a questionnaire. This should take about 15 minutes to complete.

Benefits
The results of the project will help provide guidelines for identification of headaches and the management of headache for clients of Alma Street and other mental health services.

Confidentiality
All questionnaires will be de-identified and then data will be kept at the University in a password protected computer. This information will only be available to the researcher for the express purpose of performing the study. All of the collected information will be destroyed after 5 years. If publications arise from this research, the identity of participants will not be revealed in any of the published material.

Voluntary Participation and Withdrawal from Study
Your participation in this study is entirely voluntary and you may withdraw at any time from the project.

If you should have any complaints or concerns about the way in which the study is being conducted, you may contact the Chair of the South Metropolitan Area Health Service Human Research Ethics Committee on 9431 2929 or the Executive Officer of The University of Notre Dame Australia, phone (08) 9433 0964.
If you have any questions about this study please contact Associate Professor Joanne Connaughton on 9433 0186.
CONSENT FORM

TO BE USED IN CONJUNCTION WITH THE INFORMATION SHEET

Exploring headache amongst users of Alma Street Services

Participant’s Name:…………………………………….. Date of Birth……………………

1. I agree entirely voluntarily to take part in this study exploring headache amongst users of Alma Street Services. I am over 18 years of age.

2. I have read and understood the information sheet about this project and my questions have been answered to my satisfaction.

3. I understand that I am entirely free to withdraw from the study at any time without prejudice or affect on access to treatment at Alma Street.

4. I understand that all information gathered by the researcher will be treated as strictly confidential.

5. I understand that the protocol adopted by the University Of Notre Dame Australia Human Research Ethics Committee for the protection of privacy will be adhered to and relevant sections of the Privacy Act are available at http://www.nhmrc.gov.au/

6. I understand that I will not be referred to by name in any report concerning this study. In turn, I cannot restrict in any way the use of the results that arise from this study.

Signature by patient  Signature by researcher

Signed:…………………………………….. Signed:………………………………………………

Date:…………………………………………..Date:………………………………………………

If participants have any complaint regarding the manner in which a research project is conducted, it should be directed to the Executive Officer of the Human Research Ethics Committee, Research Office, The University of Notre Dame Australia, PO Box 1225 Fremantle WA 6959, Phone (08) 9433 0943.
REFERENCES


Coghlan, R., Lawrence, D., Holman, C., & Jablensky, A. (2001). *Duty to Care: Physical Illness in People with Mental Illness*. Perth: The University of Western Australia


National Mental Health Policy (2008), Commonwealth of Australia


Papaioannou, D., Brazier, J., & Parry, G. (2011). How valid and responsive are generic health status measures, such as EQ-5D and SF-36, in schizophrenia? A systematic review. *Value In Health: The Journal Of The International Society For Pharmacoeconomics And Outcomes Research, 14*(6), 907-920.


