Sleep quality, beliefs and attitudes about sleep: A comparison of Caucasian Australian, Zimbabwean and Ghanaian black immigrants resident in Australia

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Thesis submitted in partial fulfilment of the degree of Doctor of Psychology

(Clinical Psychology)

June, 2010

Abstract

The aim of the present study was to explore ethnic differences in sleep quality as well as beliefs and attitudes about sleep in a community sample of Caucasian Australians (CAA), black immigrants from Zimbabwe (BZW) and those from Ghana (BGH), all currently resident in Australia.

The study sample consisted of 176 participants including CAA (n = 58), BZW (n = 59), and BGH (n = 59), aged between 18 to 60 years (M = 34.04yrs, SD = 10.21). Groups were matched on age and gender, with a strong predominance of professional occupations in all groups. To be included in the study, BZW and BGH participants had to be resident in Australia for less than 15 years. BZW were resident in Australia for a shorter period (*M* = 3.88, SD = 2.6) compared to BGH (*M*= 7.25, SD = 3.9) and CAA (*M* = 32.83, SD = 10.1). All participants completed the Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), Dysfunctional Beliefs and Attitudes about Sleep (DBAS), and the SF-36 Health Survey.

No statistically significant group differences were found on sleep quality, daytime sleepiness, and physical health. However, significant group differences on beliefs and attitudes about sleep (DBAS) were found, F (10,332) = 2.65, p = .004; partial eta squared = .07 (medium effect), with the main differences arising from BZW and BGH endorsing stronger agreement that insomnia was due to aging and chemical imbalances compared to CAA. A significant Group*Gender interaction effect on DBAS was also found, F (10, 332) = 3.45, p = .00; partial eta squared = .09. BGH males held stronger dysfunctional

beliefs on the '*misattributions of the consequences of insomnia'* theme compared to BZW and CAA participants. CAA males on the other hand had more dysfunctional beliefs on the *perceptions of control and predictability of sleep* than BZW and BGH across gender. Group differences were also found on SF-36 mental health, $F(2, 170) = 2.99$, $p = .05$; partial eta squared = .03 (small effect), with CAA reporting poorer mental health compared to the BZW and BGH participants, possibly arising from a small percentage of CAA participants being not employed. BZW and BGH participants were more inclined to attribute sleep difficulties to physical rather than psychological phenomena than CAA participants.

This ethnic difference may have implications for the health education of black African immigrants, with more emphasis needed on the link between sleep and psychological problems. While previous studies (in America and New Zealand) have reported differences in sleep quality between ethnic groups, particularly those of low socioeconomic status (SES), the current results found no ethnic differences in sleep quality. This inconsistency may arise from differences in the SES levels of the participants across the studies, with no (or less) ethnic differences in sleep quality being evident in higher SES groups.

Keywords: sleep, ethnicity, beliefs about sleep, daytime functioning, sleep quality

Declaration

"I McLytton Nkonde Clever declare that the Doctor of Psychology (Clinical Psychology) thesis entitled *"Sleep quality, beliefs and attitudes about sleep: A comparison of Caucasian Australian, Zimbabwean and Ghanaian black immigrants resident in Australia*" is no more than 40,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work".

Signature: _____ Date: _____

Clinical Psychology

Submitted with emendations - December 2010

Acknowledgements

This thesis arose in part out of years of research that has been done since I came to Victoria University. Since that time, I have worked with a great number of people whose contribution in assorted ways to the research and the making of the thesis deserve special mention. First, I offer my sincerest gratitude to my supervisor, Professor Dorothy Bruck, who has supported me throughout my thesis with her patience and knowledge whilst allowing me the room to work in my own way. Without her guidance and persistent help, this thesis would not have been possible.

Second, I am appreciative of comments of several friends and colleagues particularly Mr. Joseph Musemburi, Dr Abraham Chawanji, and Dr Finex Ndlovu who spurred me on whenever they sensed a waning of my spirits due to exhaustion.

Many thanks go in particular to Mr. Mohammed Mahamdu, president of the Ghana Association in Victoria, and Mr. Tipei Gambiza of the Zimbabwe Community Association in Australia (Victoria) for their unwavering support during the recruitment of participants from their respective communities. Without their help, the recruitment of members of their communities would have been a nightmare.

I gratefully acknowledge Ms Christina Schrippa who, during her employment at the reception of the School of Psychology, helped in distribution as well as receiving of my returned research packages.

My deepest appreciation and thanks are also due to all participants who took their time to complete the survey, without their participation, this study would not have been possible.

My family knows all too well the problems of living with a mature age student. They have been wonderfully tolerant of my moods, and have patiently put up with my nag during the research process. My wife's consistent belief in me and what I was trying to achieve has been a particular source of strength, seeing me through the valleys of self-doubt, because research is sometimes a lonely business. To Evelyn, Arnold, Cheryl-Bertha, and Isabel as well as mum and dad go my love and thanks.

List of Publications and Awards

Published Abstracts

1 Clever, M., and Bruck, D. (2010) Sleep quality, beliefs and attitudes about sleep: A comparison of Caucasian Australian, Zimbabwean and Ghanaian black immigrants resident in Australia. *Journal of Sleep Research, 2010, 19(S2) p348.*

2 Clever, M., and Bruck, D. (2010) Sleep quality, beliefs and attitudes about sleep: A comparison of Caucasian Australian, Zimbabwean and Ghanaian black immigrants resident in Australia. *Sleep and Biological Rhythms, 2010, 8(1), A56*

3 Clever, M., and Bruck, D. (2010). Sleep quality, beliefs and attitudes about sleep: A comparison of Caucasian Australian, Zimbabwean and Ghanaian black immigrants resident in Australia. *AFSAAP Conference Abstracts Booklet 2010, p16 – 17.*

Conference/Poster Presentations

1 Clever, M., and Bruck, D. Sleep quality, beliefs and attitudes about sleep: A comparison of Caucasian Australian, Zimbabwean and Ghanaian immigrants resident in Australia. Poster Presentation presented at the 20th Congress of the European Sleep Research Society, Lisbon 14-18 September 2010.

2 Clever, M., and Bruck, D. Sleep quality, beliefs and attitudes about sleep: A comparison of Caucasian Australian, Zimbabwean and Ghanaian immigrants resident in Australia. Poster presented at the 2010 Australian Health and Medical Research Congress, Melbourne, 14 -18 November.

3 Clever, M., and Bruck, D. Sleep quality, beliefs and attitudes about sleep: A comparison of Caucasian Australian, Zimbabwean and Ghanaian immigrants resident in Australia. Oral and Poster presentation at the 22nd Annual Scientific Meeting of the Australasian Sleep Association, Christchurch, New Zealand, 21 – 23 October.

4 Clever, M., and Bruck, D. Sleep quality, beliefs and attitudes about sleep: A comparison of Caucasian Australian, Zimbabwean and Ghanaian black immigrants resident in Australia. Oral presentation at the 33rd Annual African Studies Association of Australasia and the Pacific (AFSAAP) Conference "Engaging Africa/Engaging Africans: Knowledge, Representation, Politics" Melbourne 2 – 4 December 2010.

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List of Abbreviations

AA	African Americans
ANOVA	Analysis of Variance
ASCED	Australian Standard Classification of Education
ASCO	Australian Standard Classification of Occupations
BAS	Beliefs and Attitudes about Sleep
BZW	Black Zimbabwean Immigrants
BGH	Black Ghanaian immigrants
CA	Caucasian Americans
CAA	Caucasian Australians
CI	Confidence Intervals
DBAS	Dysfunctional Beliefs and Attitudes about Sleep
DNB	Disruptive Nocturnal Behaviour
DS	Daytime Sleepiness
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders
EEG	Electroencephalogram
ESS	Epworth Sleepiness Scale
MANOVA	Multiple Analysis of Variance
M	Mean
Md	Median
NWAK	Number of Awakenings per night
NREM	Non-Rapid Eye Movement
NRS	Nonrestorative sleep
NSF	National Sleep Foundation

PSG	Polysomnography
PSQI	Pittsburgh Sleep Quality Index
PSQI-A	Addendum to the Pittsburgh Sleep Quality Index
PTSD	Posttraumatic Stress Disorder
RCT	Randomized Control Trial
REM	Rapid Eye Movement
SD	Standard Deviation
SOL	Sleep Onset Latency
SQR	Sleep Quality Rating
SSQ	Subjective Sleep Quality
SWS	Slow Wave Sleep
TST	Total Sleep Time
VUHREC	Victoria University Human Research Ethics Committee
WASO	Wake time after Sleep Onset

Statement of Problem

Does ethnicity have an effect on people's experience of sleep; their beliefs, and attitudes about sleep; and/or daytime sleepiness? In other words, can ethnic origin help explain variations in people's sleep experiences? A review of the literature reveals a substantial growth in the body of knowledge regarding subjective sleep quality and sleep disturbances in the general population. Nonetheless, there is a wide gap in the literature addressing sleep and ethnicity, particularly studies comparing differences in sleep quality between ethnic groups.

There is considerable literature attesting to disparities in health between ethnic groups, but there have been limited inquiries into how sleep varies by race (Hale & Do, 2007). The trend has been gradually changing in the past decade with growth in the number of studies comparing sleep between ethnic groups. Several biethnic studies in the US have shown subtle differences between African American (AA) and Caucasian American (CA) on sleep duration, continuity and subjective quality (Durrence & Lichstein, 2006), while polysomnography (PSG) studies have reported stronger and consistent differences for sleep architecture between CA and AA (Mezick, et al., 2008; Thomas, Bardwell, Ancoli-Israel, & Dimsdale, 2006). The role of socio-demographic factors in these findings is controversial. Other areas of sleep research that have received little research attention, but may shed light on ethnic differences, include the effect of site on sleep (Stepnowsky, Moore, & Dimsdale, 2003) as well as sleep accessories (such as beds, blankets, and pillows) and their effect on people's experience of sleep quality (Bader & Engdal, 2000; Lee & Park, 2006). The effect of genetics on sleep (Hamet & Tremblay, 2006) is yet another area that has begun to receive research attention.

Given the known racial disparities in health (Hale & Do, 2007), the study of racial/sleep disparities becomes particularly significant. Researchers (e.g., Rao, et al., 1999) postulate that knowledge of normative sleep patterns among different ethnic groups will help control for variations in sleep measures when comparing psychiatric patients from diverse ethnic backgrounds. In addition, knowledge of ethnic differences in sleep would allow researchers to make valid conclusions regarding the interactions between ethnicity, psychopathology, and sleep regulation (Rao, et al., 1999). Exploring differences in sleep quality among different ethnic groups serves another essential purpose. According to Rao and colleagues (1999) knowledge of cross-ethnic differences in sleep patterns would help identify ethnic groups that may be specifically at high risk of developing psychopathology. In agreement with the observations by Rao and colleagues, Jean-Louis (2008) argued that understanding ethnic differences in sleep profiles might lead to the development of new, innovative, culturally appropriate interventions that could help eradicate health disparities between ethnic groups.

While cross-cultural sleep habits of adults have been well documented in the US and a few other countries, literature searches on Psycinfo, Medline, and Scopus databases returned no published studies comparing sleep between ethnic groups in Australia. The present study involved three community-based samples comprising Caucasian Australians (CAA), black Zimbabweans (BZW), and black Ghanaian (BGH) adults resident in Australia. The first aim was to explore the possible interplay between ethnicity and sleep quality, focusing particularly on the chosen variables of subjective sleep quality, daytime sleepiness, as well as physical and mental health. The second aim of the study was to investigate whether significant differences exist between the three different ethnic groups in terms of their

beliefs and attitudes about sleep. Possible differences across gender for the above variables were also explored.

Chapter 1

Introduction and Literature Review

> *Sleep is central to society, a functional pre-requisite in fact, permeating its institutions and boundaries, its discourses and its practices, its roles and rituals, its beliefs and its mythologies. A vast amount of work indeed goes into the planning and preparation, scheduling and partaking of sleep in society: a process involving considerable activity and coordination, acknowledged or not.*
>
> *Williams and Boden (2004)*

This thesis reports on an investigation of ethnic comparisons of differences in subjective sleep quality (SSQ), and beliefs about sleep of community samples of three culturally diverse groups and relatively healthy community-based adult sample of Caucasian Australians (CAA), black Zimbabweans (BZW), and black Ghanaians (BGH) in Australia. The present study was exploratory, with a deliberate focus on subjective sleep quality, daytime functioning, and beliefs about sleep – all viewed from an ethnic dimension and at the same time attempting to understand whether sleep experiences could be explained as being influenced by ethnic origin.

The present study involved black African immigrants to Australia and thus sleep issues arising from the immigrant status were considered to be potentially intertwined. The hypotheses, opinions, and conclusions reported in this thesis represent a first step into a quest – a journey of exploring the role, and significance of ethnicity in understanding the psychological construct of sleep quality. In this chapter, a brief historical overview of sleep research is presented first followed by a review of literature pertinent to the present study, as well as hypotheses guiding the investigation.

1.1 Overview of sleep research

Writers, researchers and philosophers have been fascinated with sleep and dreams (as illustrated by the epigraph at the beginning of the chapter), for centuries. Sleep has been a subject for myths and folktales: but despite this fascination, it remained empirically unexplored until the early and middle decades of the 20th Century when scholars such as Dr. Nathaniel Kleitman conducted their pioneering work. These early studies became the basis upon which all sleep studies were to follow. In those early days sleep was viewed as a recovery process and most of the theories and studies focused on explaining the mechanisms that produced sleep, rather than what sleep does (Horne, 1988).

Researchers (e.g., Lavie, Pillar, & Malhotra, 2002) acknowledge that "the discovery of the electroencephalogram (EEG) by Hans Berger in 1928 provided a quantum leap for sleep research". Indeed, this discovery is credited for revolutionizing sleep research by enabling the possibility of measuring sleep objectively through recording brain-wave activity (Lavie, et al., 2002). Another significant milestone in sleep research was the discovery of sleep stages in a groundbreaking study by Kleitman & Aserinsky (1953). Table 1 presents the pioneering highlights of sleep research. Since then, researchers have diversified their focus to include research areas such as chronobiology of sleep, sleep architecture, sleep and general medical conditions, as well as sleep and psychopathology.

Without doubt, sleep research in the 21st Century has benefited immensely from advancement in technology particularly the improvements in the EEG, discovery and use of polysomnography and actigraphy, as well as gene analysis technology that has broadened the scope of sleep inquiry. These new technologies have enabled researchers to prospectively measure sleep processes and experiences, in contrast with early researchers who relied mostly on retrospective subjective data (gained from questionnaires and sleep

diaries) to explain sleep phenomena. Despite the growing body of knowledge in sleep research, there is paucity of literature reporting on studies in areas such as sleep and ethnicity, particularly studies comparing interethnic sleep experiences in community samples of ethnic groups. It is this gap that the present study sought to explore.

Table 1: Some pioneering classical events in sleep research

Date	Event
1907	Induction of sleep in non-sleepy dogs using serum of sleep-deprived dogs (Legendre and Pieron). Took hypnotoxin theory to its zenith
1920	Sleep deprivation results in greater sleepiness in the night than in the morning (Kleitman), demonstrating the circadian drive to sleep
1928	The discovery of electroencephalogram (EEG, Hans Berger). Enabled the possibility of measuring sleep objectively
1949	Electrical stimulation of the brain. The discovery of the reticular formation (Moruzzi and Magoun)
1953	The discovery of rapid eye movement (REM) sleep (Kleitman and Aserinsky)

Note. Adapted from "Sleep Disorders: Diagnosis, Management and Treatment A handbook for clinicians," by P. Lavie, G. Pillar, and A. Malhotra, 2002, p. 1. Copyright 2002 by Martin Dunitz Ltd.

1.2 Normal sleep

The groundbreaking sleep study by Kleitman and Aserinsky (1953), made it possible for sleep researchers to measure normal sleep in humans as well as to categorize human sleep into rapid eye movement sleep (REM) and non-rapid eye movement (NREM). Normality in this sense is defined as the absence of sleep disorder (Lichstein, Durrence, Riedel, Taylor, & Bush, 2004). Using electroencephalography (EEG) and polysomnography recordings, researchers established that sleep follows an organized pattern of NREM – REM cycles (see Figure 1), with each full cycle taking between 70 and 120 minutes (Harvey, Jones, & Schmidt, 2003). Researchers further divided NREM sleep into four

stages (Stages 1, 2, 3, and 4) through which sleep progressively deepens (Harvey, et al., 2003; Lavie, et al., 2002). In humans, Stage 1 (light sleep) and Stage 2 (consolidated sleep) are considered light sleep phases while Stages 3 and 4 (slow wave sleep [SWS]) are deepest stages of sleep (Lavie, et al., 2002, p. 4).

In describing normal sleep researchers have taken either a daily or life cycle point of view. For example researchers (e.g., Harvey, et al., 2003; Lavie, et al., 2002) described normal sleep in terms of uninterrupted daily NREM – REM cycles. Harvey et al (2003) observed that in a typical night's sleep of a normal young adult, Stages 3 and 4 were more prevalent in the first third of the night, with REM episodes increasing in length throughout the night (Figure 1). In addition, researchers have concluded that the proportion of REM sleep is much greater in the last third of the night (Harvey, et al., 2003; Webb, 1992).

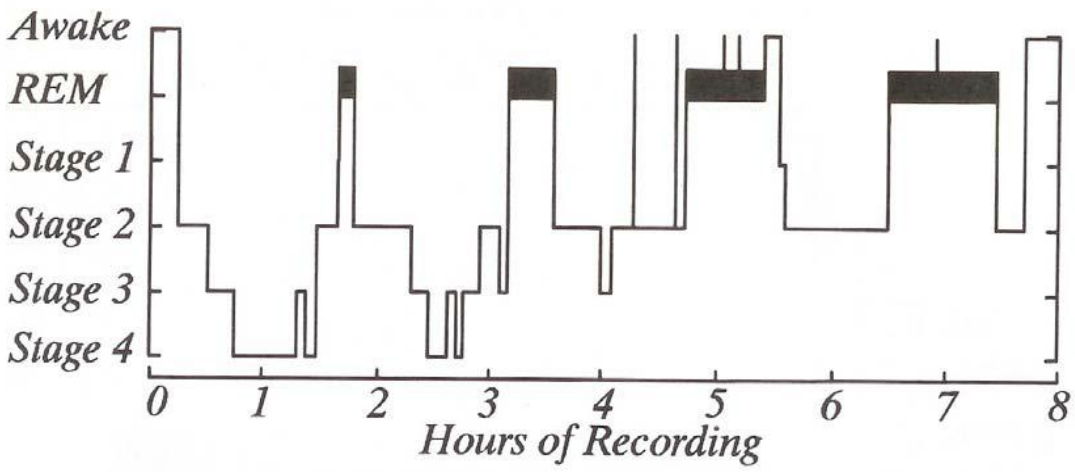

Figure 1: Normal sleep cycles for a young adult recorded over eight hours. Figure adapted from (Hirshkowitz, Moore, & Minhoto, 1997)

On the other hand, researchers who take a life cycle view (e.g., Webb, 1992) reported that normal sleep patterns change enormously across the life cycle. They found that average total sleep time (TST) declined from about 16–18 hours per 24-hour cycle in infancy to 10–11 hours in childhood to 7–9 hours in the mid-20s to 6–8 hours in the middle years. Nocturnal sleep further reduced in older adults, with a corresponding increase in daytime napping (Borbely, 1986; Harvey, et al., 2003; Horne, 1988; Kleitman, 1939/1963).

Indeed, other researchers (cf., Empson, 2002, p. 31) reported that surveys have shown that adults sleep for an average of 7.5 hours, with a standard deviation of ±1 hour (Figure 2). Plotted on a normal distribution curve, 68% of the population are expected to sleep for 6.5 – 8.5 hours, and another 17% sleep for less than 6.5 hours (Empson, 2002; Webb, 1992). Classical studies (e.g., Dement, 1972/1978; Horne, 1988; Kleitman, 1939/1963; Mendelson, 1987; Oswald, 1966; Usher, 1986) reported that on average an adult needs at least between 7.5 – 9 hours sleep. These findings have been confirmed by recent studies in the United States. A recent study by the National Sleep Foundation (NSF) reported that on average an adult sleep/wake cycle consist of 8 hours nocturnal sleep and 16 hours of wakefulness (National Sleep Foundation, 2006, p. 7). However, there is still some controversy among researchers over how much total sleep time constitutes adequate sleep for individuals. For example in his pioneering work, Kleitman (1939/1963) posed the following questions as key to sleep investigations:

> *How much sleep does one need? What can one do to improve the quality of sleep? How can one get the greatest benefit from a certain amount of sleep? Is it harmful to a person's health to cut down on the time allocated to sleep? Can one sleep too much? (p.305)*

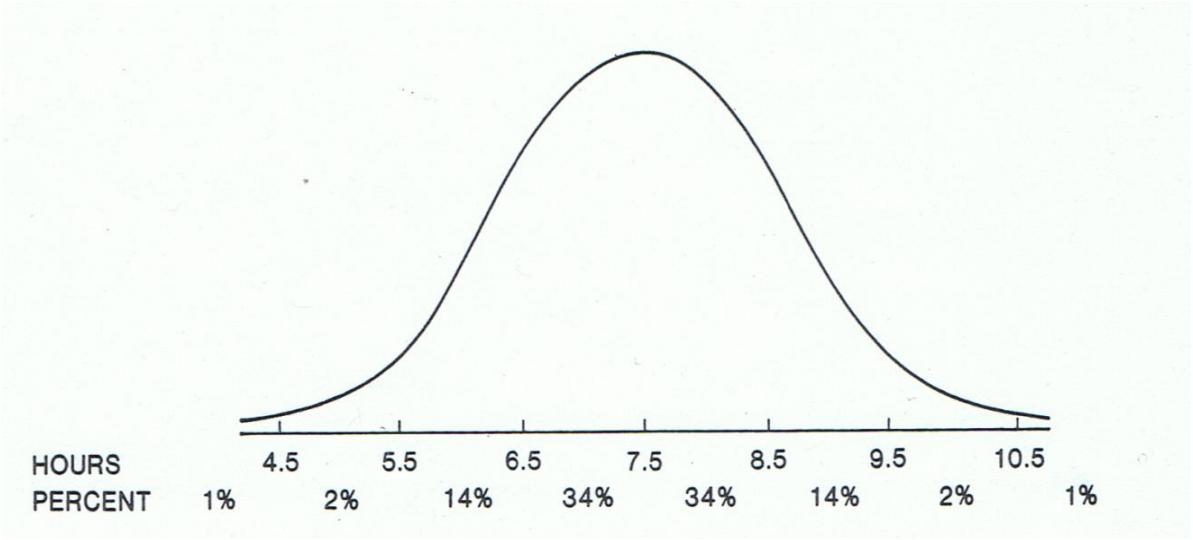

Figure 2: Distribution of total sleep time (TST) in the general adult population. Adapted from "Sleep, the gentle tyrant," by W. B. Webb, 1992. Copyright 1992 by Anker.

Today, questions posed by Kleitman still represent the core focus of sleep research. In addition, further questions about sleep that have come under the purview of researchers in recent times include the following: (1) the meaning of sleep quality; (2) whether eight hour sleep guarantees quality sleep; (3) the function of sleep; (4) how ethnic groups compare in their experience of sleep quality; and (5) whether ethnicity influences sleep quality. What has been empirically proven this far is the existence of individual differences concerning total sleep time required (see Dement, 1972/1978). As part of the growing body of inquiry in sleep and ethnicity research, this study sought to explore whether ethnicity influences sleep quality or people's beliefs about sleep.

1.2.1 Subjective and objective measures of sleep quality

The relationship between measures of objective sleep quality and subjective sleep quality in is complex. McCrae et al. (2005) suggest that the congruence between these measures of sleep quality identifies four categories of sleepers – i.e. good sleepers, complaining poor

sleepers, non-complaining poor sleepers and complaining good sleepers. Several studies have attempted to understand the factors that discriminate between these groups. To this end researchers have attempted to compare differences in sleep between groups using subjective measure (i.e., questionnaires such as the Epworth Sleepiness Scale) which relied on individual reports of sleep perception and experience. On the other hand, other researchers have used objective measures (e.g., polysomnography [PSG], actigraphy, EEG) which compare sleep processes that individuals cannot report upon.

Studies (e.g., Vitiello, Larsen, & Moe, 2004) have reported differences between male and female in relation to congruence between subjective and objective measures of sleep quality; with a stronger congruence reported in males than females For example in a study involving 150 non-complaining older sleepers, Vitiello et al. (2004) found that despite their lack of perception of poor sleep quality, significant proportions of the sample demonstrated objective sleep disruption. Older men had objectively poorer sleep quality than women, although women were more likely to report subjective experiences of poor sleep. Vitiello et al. (2004) suggest that these findings of disjunction between objective and subjective sleep measures may indicate that older persons adjust their expectations of sleep by establishing new, as yet undefined, evaluative criteria against which they self categorise as 'good' or 'poor' sleepers. In the Duke/EPESE study – using subjective measures – Blazer et al. (1995) found that blacks were less likely to complain of sleep difficulties than whites.

In another study, Mezick et al. (2008) investigated the influences of race and SES on multiple dimensions of sleep using objective sleep measures (actigraphy and PSG) Mezick et al (2008) observed that blacks slept for a shorter duration, took longer to fall asleep and had less continuous sleep, and spent a smaller percentage of time in Stage 3 – 4 sleep than

whites and Asians. In addition, they reported that blacks' had shorter and more disturbed sleep persisted even after taking into account SES measures. Another study by Hale and Do (2007) also reported racial and ethnic differences in sleep using objective measures.

The present study was designed to explore the relationship between subjectively reported sleep variables (i.e., subjective sleep quality, daytime sleepiness, and beliefs and attitudes about sleep) and ethnicity. To achieve this object, subjective measures were used (see section 2.4 for detailed description of the measures). Subjective measures were used due to the fact that most of the instruments (such as the Epworth Sleepiness Scale and Pittsburgh Sleep Quality Index) are routinely used in primary care settings for screening of insomnia.

1.2.2 Beliefs about sleep

Poor sleep and its consequences are a significant public health issue, an issue that has seen health organizations investing a lot of money into sleep education (Sateia & Nowell, 2004). Of the various psychological contributing factors to insomnia, dysfunctional thoughts and beliefs have been researched in recent times. Morin (1993) postulated that how one thinks about his/her sleep is likely to contribute to one's ability to initiate and maintain sleep. In a study designed to evaluate the impact of cognitive-behavioural and pharmacological treatments for insomnia on sleep-related beliefs and attitudes (DBAS) and the relationship between those changes and sleep improvement; Morin et al (2002) showed that changes in DBAS are associated with improved sleep outcomes in patients.

A growing body of clinical evidence in the literature suggests that a variety of faulty beliefs, expectations, and attributions are instrumental in heightening emotional arousal and in exacerbating sleep disturbances (Ellis, Hampson, & Cropley, 2007; Mayers &

Baldwin, 2006). This observation fits in with the findings by Jansson & Linton (2007) who in a study (N = 3600) examined whether arousal, distress, and sleep related beliefs were related to maintenance of insomnia. The study was conducted over a year. Jansson & Linton (2007) showed that sleep-related beliefs, anxiety, depression, and arousal were related to the maintenance of insomnia, but also that these psychological phenomena often co-occurred in individuals with insomnia.

This finding that sleep-related beliefs, anxiety, depression, and arousal play a mediating role in perpetuating insomnia; to some extent, supports an earlier finding by Mayers & Baldwin (2006). In a review designed to examine the relationship between sleep disturbance and depression, they reported that poor subjective perceptions of sleep in depression might be associated with faulty cognitions, which have been found extensively in studies on insomnia. The present study sought to investigate whether there were any ethnic based differences in beliefs about sleep.

1.3 Content and Themes in Sleep Research

In this section, content and themes that have been the focus of sleep research are reviewed. Key content and themes that have received attention in sleep research and reviewed in the present study include sleep and ethnicity, sleep problems and disorders; sleep and gender; sleep and psychological trauma; as well as sleep, migration and acculturation. Another area that has become a focus of attention in recent times and reviewed in the present study is sleep and genetics. A discussion on the absence of an ethnic based theory on sleep foreshadows the discussion about sleep and ethnicity, which is the centre of focus in this present study.

1.3.1 Sleep problems and disorders

Lack of sleep has been found to have significant effects on concentration, memory, and other neuropsychological deficits (Sadock & Sadock, 2005), physical health and well-being (Nunes, et al., 2008), as well as psychological health (Hamilton, Nelson, Stevens, & Kitzman, 2007). Research evidence suggests that human sleep is not a passive state occurring in the absence of stimulation; rather, it is an active process reflecting the interaction of complex structures in the diencephalon and brain stem (Mendelson, 1987).

Researchers (e.g., Mendelson, 1987) postulated that each of the stages of sleep in turn, is probably not a unitary phenomenon but a combination of several simultaneously occurring processes (e.g., mechanisms controlling muscles relaxation, eye movement, and EEG activation occur together in REM sleep). Nevertheless, there is an overarching assumption that with any active process, problems are bound to occur at some point.

Sleep problems have been the subject of empirical inquiry by researchers for decades and the most common problems investigated include delay of sleep onset, difficulty staying asleep, awakening too early, as well as inadequate quantity and quality of sleep (Mendelson, 1987). In some studies, sleep problems were identified as concomitants of a variety of medical and psychiatric problems (Nassermoaddeli, et al., 2005). Other areas that have been the focus of attention include complaints of non-restorative sleep, difficulty getting back to sleep, and difficulties breathing (Ellis, et al., 2007; LeBourgeois, Giannotti, Cortesi, & Wolfson, 2005; Paine, Gander, Harris, & Reid, 2005). These researched sleep problems or complaints are the basis upon which the modern sleep disorders diagnostic classification has been built.

The modern nosology organizes sleep disorders into four major sections according to their presumed etiology (DSM-IV-TR, American Psychiatric Association, 2000; American Sleep Disorders Association, 1990). The categories are primary sleep disorders comprising the dyssomnias and parasomnias; sleep disorders related to another mental disorder; and sleep disorders due to a general medical condition.

Of particular interest in the present study are the dyssomnias, whose symptoms include the disturbance in the amount, quality, and timing of sleep. Dyssomnias are disorders characterized by inability to initiate and maintain sleep as well as excessive sleepiness. Disorders that fall into this category include primary insomnia, primary hypersomnia, narcolepsy, breathing-related sleep disorder, circadian rhythm sleep disorder, and dyssomnia not otherwise specified (American Psychiatric Association, 2000). Parasomnias on the other hand, are disorders that primarily do not cause a complaint of insomnia or excessive sleepiness but are characterized by abnormal behaviour or physiological events occurring in association with sleep, specific sleep stages, or sleep-wake transitions (American Sleep Disorders Association, 1990).

In the present study, the investigations were limited to comparison of sleep experiences among CAA, BZW and BGH participants on: a) amount, quality and timing of sleep (Primary Insomnia) measured by the PSQI; b) daytime sleepiness (measured by the Epworth Sleepiness Scale); c) beliefs and attitudes about sleep (measured by the Dysfunctional Beliefs and Attitudes Survey); as well as d) mental and physical health measured by the SF-36 questionnaire.

1.3.2 Sleep and gender

Within sleep research, several studies have reported differences in sleep between female and males. In Japan Doi, Minowa, Uchiyama, and Okawa (2001) compared subjective sleep quality between male and female adults in the Japanese population (N =1871). Doi et al (2001), found that prevalence rates of sleep problems were 26.4% and 31.1% for male and females respectively, with females reporting more disturbed sleep.

In another cross-sectional survey (Chen, Kawachi, Subramanian, Acevedo-Garcia, & Lee, 2005) in Taiwan (N = 39588), females reportedly scored 1.25 points higher than males on the insomnia inventory. In addition, Chen and colleagues (2005) reported that an association existed between women's role of homemaker and increased night time sleep disturbance and decreased daytime sequelae of poor sleep.

In the literature, there is confirmatory evidence of differences in total sleep time (TST), non-refreshing sleep, and difficulties maintaining sleep between males and females. For example a study by Lindberg, Janson, Gislason, Bjornsson, Hetta, and Boman (1997) found that females reported significantly longer TST than males (F: 425 ± 58 minutes, M: 403 ± 50 minutes). In addition, they also found that women had difficulties maintaining sleep (DMS, ≤ 3/week) (F: 20.1%, M: 10.4 %;), absence of feeling refreshed in the morning (F: 36.2%, M: 26.8%), and more excessive daytime sleepiness (EDS) (F: 23.3%, M: 15.9%). The Hospital Anxiety and Depression scale (HADS), used to measure psychological status in this study, showed that females suffered from anxiety more frequently than males (F: 32.8%, M: 18.9%; $p < 0.001$). In addition, an association was found between anxiety and many sleep disturbances. After making adjustments for age, smoking, snoring, gender and psychological status by means of multiple regression, the

gender differences mentioned above remained significant. The researchers concluded that despite a longer TST, females report insufficient sleep, EDS, DMS, and the absence of feeling refreshed in the morning more frequently than males. One of the reasons for this outcome was higher prevalence of anxiety among females, but that alone could not be used to explain the gender differences in sleep disturbances seen in this population.

In a meta-analysis of 23 studies that examined gender differences in initiating sleep, Lichstein et al (2004) reported that 17 of those studies found that women had a higher prevalence of difficulty initiating sleep than men (mean gender effect size .31, SD = .16). Furthermore, nine of the studies reported a higher prevalence of difficulties maintaining sleep in women than men (mean gender effect size .17, SD = .19). Two other studies (Janson, et al., 1995; Middelkoop, Smilde-van den Doel, Neven, Kamphuisen, & Springer, 1996) reported that women experienced a greater number of awakenings per night (NWAK) than men. Other researchers also reported that females were more likely to have early morning awakening than males (Brabbins, et al., 1993; National Sleep Foundation, 2002).

Indeed, there is consistent evidence in the reviewed studies that females have poorer sleep than males. In an interview with sleep experts (see, Meisler, 1998), Dr. Gary Zammit stated, “Sleep deprivation hits women harder because they have grown to occupy a more prominent place in the work force without reducing their responsibilities at home”. In addition, Dr Zammit also observed that women (about 1 in 4) were more prone to sleep problems than men based on hormonal changes associated with menstruation, pregnancy, and menopause (Meisler, 1998). Similarly, Dr Kathryn Lee citing data from National Sleep Foundation (NSF) stated that 48% of women and 38% of men complain of sleeping

problems at least a few nights a week attributing this difference to care-giving issues (Meisler, 1998, p. 1206).

Whereas there is a growing body of literature comparing sleep between gender groups in some Western and Asian countries, searches on databases such as Scopus, Psycinfo, and Medline returned no studies comparing sleep differences between gender groups in Australia and Africa (specifically Zimbabwe and Ghana) from which participants to the present study are drawn. Therefore, in addition to comparing ethnic differences in sleep quality, the present study also explored gender differences in sleep.

1.3.3 Sleep and psychological trauma

Research seeking to establish the relationship between sleep and posttraumatic stress disorder (PTSD) is still in its infancy (Harvey, et al., 2003). For example, Harvey et al., (2003) reported that sleep onset, difficulties maintaining sleep, and frequent nightmares are problems commonly reported by PTSD patients. However, a difference in research methodology and lack of control groups has made it difficult to confirm the veracity of these findings. Nonetheless, the importance of sleep disturbance in victims of trauma has been that it has prognostic significance (Harvey, et al., 2003), and hence worthy to investigate in sleep research.

Other researchers reported that the relationship between PTSD and sleep was complex. For example Krakow et al (2001) investigated the relationship between sleep quality and PTSD in sexual assault survivors. In that study, they found that the relationship between sleep and posttraumatic stress appeared to be more complex than could be explained by the current

PTSD paradigm; and, sleep breathing and movement disorders may be associated with this complexity (Krakow, et al., 2001, p. 647).

Furthermore, Krakow and colleagues (2001) reported that the complexity of the relationship between sleep and PTSD appeared to be associated with undiagnosed "physical" [emphasis in original article] sleep disorders, which may be exacerbating posttraumatic stress symptoms through chronic sleep fragmentation.

In the present study, the inclusion of the trauma variable and measures to assess it was made on the basis that African immigrants particularly those from Zimbabwe may have experienced trauma due to exposure to politically motivated violence and instability in their countries of origin. The assessment of trauma in the present study was an attempt to evaluate and rule out the effects of traumatic experiences on sleep quality. Indeed the assumption and assessment of trauma in the present study was validated by research evidence suggesting possible links between traumatic experiences and insomnia (Germain, Hall, Krakow, Shear, & Buysse, 2005; Harvey, et al., 2003; Krakow, et al., 2001; Sheikh, Woodward, & Leskin, 2003).

For example, at the time of the present study, Zimbabwe, from which a subsample of participants was drawn, has been in a state of political instability for a decade. Apart from political and economic dysfunction, media and other research reports reported on growing prevalence of politically motivated torture and murder of ordinary people. In addition, jobs losses due to company closures resulted in unplanned migrations to other countries. Successful migration may provide a sense of euphoria for the new migrants, particularly a

sense of a dawn of new and promising period (Markovizky & Samid, 2008). However, Markovizky & Samid (2008) also found that about one year after migration, immigrants experience the pain of parting from economically, socially, and culturally valuable resources, on one hand, the necessity of coping with attendant difficulties of adjusting to a new society, on the other. Despite lack of evidence to suggest existence of political upheaval in Ghana at the time of the present study, the same psychological issues faced by immigrants (Markovizky & Samid, 2008, p. 199) could be generalized to the Ghanaian immigrants. It is likely that migration by Ghanaians to other countries may have been a result of socio-economic factors as well.

In the present study, migration was considered a possible source of stress and traumatic experiences for the African immigrants. Hence the Addendum to the Pittsburgh Sleep Quality Index (PSQI-A) was selected for use in the present study to assess for presence of traumatic experience through evaluation of the presence of disruptive nocturnal behaviour (DNB). This measure complemented the use of the SF-36, which assessed general health (including mental health). In a review of literature on the relationship between sleep and trauma, Harvey, Jones, & Schmidt (2003) concluded that though the relationship between sleep and PTSD was complex, there was no doubt that trauma significantly affected sleep.

1.3.4 Sleep and Genetics

Understanding the mechanisms that underlie the control of sleep and wakefulness has become a major research area in neuroscience (Kilduff, et al., 2008). In the past two decades, several investigations have been done on flies and humans focusing on the interaction between the sleep homeostatic and circadian systems. Empirical inquiries with probable genetic implications to our understanding of variations in human sleep have

broadened to include (a) possible impact of mutations in genes involved in the circadian clock on sleep timing, (b) the effects of sleep deprivation on brain gene expression, (c) the discovery of "sleep active" neurons in the cerebral cortex, (d) the role of the hypocretin/orexin system in the maintenance of sleep and wakefulness, and (e) the interaction between sleep and learning (Franken & Tafti, 2003; Hamet & Tremblay, 2006; Heath, Kendler, Eaves, & Martin, 1990; Kilduff, et al., 2008; Mackiewicz, Naidoo, Zimmerman, & Pack, 2008; Taheri, 2004).

In addition, recent advances in the fields of sleep genetics, genomics, and transcriptomics attest to the broadened the scope of sleep research. Hamet and Tremblay (2006) reported in a recent study that a strong genetic basis of normal sleep has been established in both humans and animals. Furthermore, linkage and association studies have also resulted in the identification of gene mutations, gene localizations, or evidence of susceptibility genes in several sleep disorders (Hamet & Tremblay, 2006).

The etiologic role of genotype and environment in sleep pattern (daytime napping, habitual bedtime, and sleep duration) and subjective sleep quality and sleep disturbance was investigated in a general population sample of adult Australian twin pairs (N = 3,810) aged 17-88 years. In that study, researchers found a genetic contribution of 33% of variance in sleep quality and sleep disturbance and 40% variance in sleep pattern (Heath, et al., 1990). Furthermore, Heath et al (1990) found no evidence for a decline in the importance of genetic predisposition with age. In addition to the above findings, Heath et al (1990) reported that, short-term environmental fluctuations accounted for as much as 30% of the variance, and more stable non-familial environmental effects accounted for the remainder. However, no effect of shared family environment on sleep characteristics was found.

In a review of literature on sleep and genetics, researchers presented growing evidence from empirical studies including twin- and family-based studies, suggesting high heritability estimates for sleep length and that genetic factors influence sleep (Tafti, Maret, & Dauvilliers, 2005). Tafti et al, (2005) also identified that four sleep diseases were reported to result from single gene mutations and these were fatal familial insomnia, familial advance sleep phase syndrome, chronic primary insomnia, and narcolepsy with cataplexy. Other researchers (e.g., Taheri, 2004) found that most sleep disorders result from complex interactions between genes and the environment. In some studies, genetic factors have been reported to have an effect in the early-onset of childhood insomnia.

For example, Dauvilliers (2005) postulated that a familial history of insomnia increases vulnerability to insomnia, especially primary insomnia. Just like Tafti et al (2005), Hamet & Tremblay (2006) noted that sleep disorders such as delayed sleep phase syndrome, narcolepsy, sleep apnea, as well as advanced sleep phase syndrome had genetic influence. Given the influence of genetics on sleep, researchers postulate that genetic linkage studies in a large number of multiplex families affected by a well-defined sleep disorder should be more systematically carried out in the future (Tafti, et al., 2005).

Influence of genetic factors was also investigated in an epidemiological study of morningness/eveningness in an adult population in New Zealand (Paine, Gander, & Travier, 2006). The researchers investigated the influence of age, gender, ethnicity, and socioeconomic factors on morningness/eveningness in an adult (30 – 49 years) population of Maori and non-Maori. Using data collected using the New Zealand version of the Horne & Ostberg Morningness/Eveningness Questionnaire (MEQ), Paine et al (2006)

found that 49.8% of the population were morning type compared to 5.6% who had an evening preference. After controlling for ethnicity, gender, and socioeconomic deprivation, they found that participants in the 30-34 years group were more likely to be definitely evening type and less likely to be morning type compared with those in the 45-49 years group. In addition, they found that work schedules were important predictors of chronotype (Paine, et al., 2006). Using multivariate analyses, they also found that ethnicity, gender, and SES were not important determinants of morningness/eveningness preference. The researchers observed that despite the advances in genetic sequencing, little was known about variability of clock genes in the general population. They concluded that their study provided the first estimates of phenotypic variability of morningness/eveningness in a large middle-aged sample of the general population (Paine, et al., 2006).

The few available studies point to considerable advances in the study of the interaction of genes and environmental factors, and to our understanding of genetic influence on the circadian system. However, there is a dearth of literature comparing either similarities or differences in the genome sequencing between ethnic groups. The completion of the human genome sequence (International Human Genome Sequencing Consortium, 2004), will hopefully make it possible for ethnic comparison studies in sleep, incorporating our current knowledge in genetics both within and outside the country.

1.3.5 Sleep, migration and acculturation

Growth in migration has presented health professionals with significant challenges in service delivery. First, it was assumed that in the past, due to limited migration, the majority of people attending health care services (including psychological services) in a

particular country were mostly familiar members of the population. Familiarity with the population provided health care workers with predictability and certainty in communicating and understanding of the issues brought before them. Second, it was also assumed that better communication and understanding of the issues enhanced their quality of their service delivery. However, growth in migration has resulted in the introduction of languages, cultures, beliefs, values, and attitudes unfamiliar to most health professionals in the mainstream culture. New languages, cultural values, beliefs and attitudes have provided health care workers with a new frontier of challenges specifically in communication, assessment, and intervention.

Apart from the socio-linguistic challenges presented by the new arrivals, researchers have identified the migration process as a stressful life event that could be associated with "culture shock" [emphasis in original article] and requires personal, economic, social, and cultural changes (Ward, Bochner, & Furnham, 2001). Evidence in literature suggests that after migrating to a new country, immigrants often find coping and the process of adjustment required to rebuild their lives difficult and complex (Markovizky & Samid, 2008).

Other than the migration process itself, some acculturation studies have reported that length of stay in a new country was a significant factor in psychological and social acculturation. For instance, a study by Markovizky and Samid (2008) found a positive correlation was found between length of residence, satisfaction, and social contacts. Growth of multiculturalism due to immigration, has also led researchers to postulate that immigration and the differential life experiences associated with race may critically affect

the balance between physical and psychological well-being (Kutner, Bliwise, & Zhang, 2004).

However, migration, particularly the experience of migrants moving to a socio-cultural environment different from their own has provided researchers with an opportunity to study the effects of fundamental processes of adaptation (Rogler, Cortes, & Malgady, 1991) on health. Rogler and colleagues (1991) reported that the process of migration disrupted attachments to supportive networks in the society of origin. They also found that migration imposed on the immigrant populations the difficult task of integration into the primary groups of the host society. Other researchers found inconsistencies in the course of psychological adjustment arguing that immigrants' differences of distress patterns depended on age; thus, among the middle-aged immigrants, length of residence was positively associated with distress (Ponizovsky, Ritsner, & Modai, 2000). Furthermore, intercontinental migration has provided sleep researchers with an opportunity to access samples of diverse ethnic participants, the same opportunity that was taken advantage of in the present study. For example, Owens (2004) commented that diversity of samples provided researchers with an opportunity to better understand the neurobiology and chronobiology of sleep from a multicultural perspective.

Despite the opportunities created by the migration process, empirical data on the contribution of migration demands on psychological distress, particularly sleep, remain rather sparse. A few studies reviewed in the present study have all reported inconsistent findings possibly due to their differences in focus. Some of the studies focused more on psychological health and acculturation (e.g., Knipscheer & Kleber, 2007) while a few

others focused on the effects of migration on the sleep of immigrant populations (e.g., Voss & Tuin, 2008b).

One study investigated sleep quality, coping styles and level of integration in a sample of Portuguese (n=48) and Moroccan (n = 64) immigrants in Germany. In this study, Voss and Tuin (2008a) found that sleep quality was poor in 54% of Portuguese and 39% of Moroccan women which exceeded reports of sleep complaints in epidemiologic studies of sleep quality in Germany. The researchers also reported that poor sleep was attributed to higher degree of adoption of German lifestyle and high monitoring (information seeking) in the Portuguese participants compared to the Moroccan sample. Based on this finding, Voss and Tuin (2008a) concluded that non-integration into the mainstream culture may be less stressful than integration, suggesting better psychological health for those that were not integrated into the mainstream groups.

Congruent with the findings by Voss and Tuin (2008a), a study of acculturation and mental health among Ghanaians in the Netherlands, Knipscheer & Kleber (2007) found that the impact of acculturation (in particular traditional affiliation and feelings of loss) on mental health was substantial. They wrote:

> *It is not surprising that life transitions involved in migration and the often confounded factors of ethnicity, acculturation, and sociodemographic positions affect psychological functioning and mental health.(p. 370)*

In addition, Knipscheer & Kleber (2007) concluded that a subtle balance between holding on to supportive and identity enhancing traditions and moderate involvement in ruminating about pre-migration life, in conjunction with acquiring the instrumental skills of the host culture was a starting position for better health.

In a study designed to investigate sleep and mood disturbances in recent immigrants to Australia from Yugoslavia (N = 164), Pavasovic and Kennedy (2005) found that immigrant sleep was more significantly disturbed due to frequency of nightmares compared to the general Australian population. In addition, they found that immigrants had shorter sleep durations, significantly less efficient sleep, poorer overall sleep quality, and rated feelings of tension/anxiety higher than the general Australian population (Pavasovic & Kennedy, 2005). Apart from this unpublished study, extensive literature search on databases such as Psycinfo, Scopus, and Medline using key words sleep, migration, and ethnicity returned no published studies comparing sleep of immigrants in Australia. It is this gap in knowledge about sleep of immigrant minority groups that the present study sought investigate.

1.3.6 Sleep and ethnicity

Within the purview of culture, which is inextricably linked to one's ethnicity, evidence in the literature seems to suggest that sleep profiles differ between individuals from different countries or ethnic backgrounds (Jean-Louis, et al., 2008). The possibility that sleep experiences may differ across countries has been investigated in epidemiological studies conducted in the United Kingdom, China, US, Canada, South Korea, Africa and Mexico, and some of these studies will be reviewed below. There is evidence to suggest that findings from these studies varied with some reporting significant ethnic differences in sleep when socioeconomic status (SES) and health characteristics were controlled.

Despite these studies, there is paucity of data on comparative studies on sleep and ethnicity. Lamenting the availability of such data on interethnic differences in sleep, Jean-Louis et al (2008) wrote:

> *Whereas there is a body of epidemiological studies permitting the examination of insomnia symptoms of individuals in diverse countries, there is a scarcity of prevalence data on interethnic differences. Several studies have ascertained biethnic differences in the sleep profile of Americans, but most comparative studies have been limited to respondents of the black and white ethnicities, favoring fewer insomnia symptoms for blacks overall. (p. 16)*

There is a growing body of literature comparing differences in sleep experiences between US Caucasian and African samples, and this will be discussed below. The bi-ethnic differences reported in some of these studies are problematic when it comes to possible generalizations of the differences to other populations. While literature discussing the sleep of African Americans (AA) has been significantly growing, the main focus within those studies has been on exploring possible links between adult sleep problems and socio-economic status (Mezick, et al., 2008). While these few studies have significantly advanced our knowledge about the existence of ethnic differences in sleep experiences, the limited scope of some of the findings have resulted in calls for more empirical studies on ethnic variations in sleep with populations in other parts of the world. Researchers believe that comparative studies of populations in different countries were not only important in informing us on the magnitude and etiology of sleep problems in those countries, but could also help us compare and delineate interaction among various social, cultural, economic, lifestyle, as well as biological factors in sleep (Wing & Chen, 2009).

In the present study, investigations into the determinants of poor sleep experiences was considered based on findings in earlier studies that complaints about sleep quality were common (e.g., Aloba, Adewuya, Ola, & Mapayi, 2007; Durrence & Lichstein, 2006; Paine,

et al., 2005; Stepnowsky, et al., 2003), and also that poor sleep can be an important symptom for medical and psychological disorders (Nassermoaddeli, et al., 2005). The justification for studying ethnic differences in sleep was further supported by Jean-Louis et al (2001) who postulated (in a US study) that understanding demographic and cultural differences between AA and CA might be critical in interpreting subjective health-related data across ethnic groups.

1.3.6.1 Defining ethnicity

The notions of ethnic minority and race status are highly charged with potential political ramifications (Okazaki & Sue, 1995) as well as a source of disagreement among psychological researchers on usage. In psychological research, some researchers have concluded that lack of differentiation in the use of terms race, ethnicity, and culture reflects confusion at conceptual level – that is, is the research concerned with race as a biological variable, ethnicity as a demographic variable, or some aspect of subjective cultural experience as a psychological variable (Betancourt & Lopez, 1993; Okazaki & Sue, 1995).

Okazaki and Sue (1995) for example, posit that the grouping together of individuals of the same racial or ethnic background and conducting assessment research using ethnicity as a predictor variable is based on two assumptions. First, the individuals share some common psychological characteristics associated with culture, and second, such shared cultural-psychological characteristics are related to personality or psychopathology (Okazaki & Sue, 1995).

Betancourt and Lopez (1993) on the other hand noted that ethnicity as a demographic variable is relatively distal to the variable of psychological or clinical interest. In many

research studies, the participants' ethnicity may be serving as a proxy for psychological variables such as cultural values, beliefs, self-concept, minority status and so forth (Okazaki & Sue, 1995). Usually, ethnicity is used in reference to groups that are characterised in terms of common nationality, culture, or language (Betancourt & Lopez, 1993).

In keeping with the preceding arguments (Betancourt & Lopez, 1993; Okazaki & Sue, 1995) the researcher adopted usage of the term ethnicity as described in Mezick et al (2008). Ethnicity referred to a self-identified social or cultural group with shared physical features and of common descent, and not to their genetic make-up (Mezick, et al., 2008). The definition of ethnicity in Mezick et al (2008) taps into the U.S. Bureau of the Census classification system. Similarly, the Australian Bureau of Statistics also includes (Australian Bureau of Statistics, 2006) ancestry, country of birth of person and parents, languages spoken, indigenous status, religious affiliation, and year of arrival in Australia as ethnic identifiers. In the present study, ethnic identity of participants was based on self-report data in the biographical questionnaire and some of the identifier data specified in the Census Dictionary (Australian Bureau of Statistics, 2006) was collected.

It is noteworthy to recognise that in sleep literature, there is no common definition of ethnicity. The common practice for researchers has been to refer to ethnicity, culture, and race interchangeably when identifying and categorizing people by background (Betancourt & Lopez, 1993). However, Betancourt and Lopez (1993) assert that research involving individuals from different ethnic and cultural backgrounds must specify and directly measure the psychological variables associated with culture that are hypothesised to produce cultural or ethnic group differences. In the present study, ethnic groups consisted

of black Zimbabwean and Ghanaian participants and the Caucasian Australians. (More details on the composition and ethnicity of participants will be discussed in the methodology chapter.)

1.3.6.2 Absence of an ethnic based theory of sleep

Investigations of ethnic differences in sleep experiences are increasingly becoming an integral part of modern scientific inquiry in sleep research, with one aim being to identify groups that may be at higher risk of developing physical or psychological health problems. While ethnic investigations in sleep are a plausible line of enquiry for researchers, absence of a theoretical framework suggests lack of a baseline from which comparisons of differences between ethnic groups can be made. Baseline, or normative, data are required in any scientific enquiry to enable meaningful comparisons of phenomena to be made with certainty. The absence of a theoretical framework on sleep and ethnicity has created a void in the development of comparative knowledge of sleep experiences between ethnic groups. Consistent with this view the comment by Rao et al (1999), although a decade old, remains worthy of consideration to date. Rao and colleagues (1999) postulated that:

> *Knowledge of normative sleep patterns among different ethnic groups will help us to control variations in sleep measures when comparing psychiatric patients from diverse ethnic backgrounds, thus allowing us to make more valid conclusions regarding the interactions among ethnicity, psychopathology, and sleep regulation. Furthermore, knowledge of cross-ethnic differences in sleep patterns will help us identify ethnic groups that may be specifically at high risk of psychopathology. (p. 329).*

In a broader sense the argument by Rao and colleagues' (1999) suggests that knowledge of ethnic sleep variations would be helpful in developing assessment norms and treatment guidelines for individuals within specific ethnic groups, especially those who have been identified to be at risk of developing mental health problems. Similarly, the observations

by Good & Good (1986) (as cited in Vega & Rumbaut, 1991), even though they are two decades old, still rings true today regarding the lack of literature on ethnic minorities particularly in the areas of mental health research.

Good and Good (1986) observed that:

> *Minority mental health has been seriously understudied because there have been few minority researchers, and people of color often have not been represented in the clinical patient populations used to develop the epidemiologic database over decades of research... (p356)*

Researchers have apportioned the blame squarely on the ethnic minority researchers, together with others interested in minority mental health, who have reportedly "found themselves observing the development of new knowledge and services from the sidelines, unable to influence the course of events" (Vega & Rumbaut, 1991).

Developing ethnic specific sleep assessment norms and treatment guidelines could encourage compliance among the targeted populations in addition to providing certainty to clinicians who work with minority groups. Compliance with treatment has been identified as a significant issue in public health. Research evidence suggests that to date, compliance with treatment particularly for ethnic minorities, has been tackled using interpreting services as well as ethnic and cultural consultants (Okazaki & Sue, 1995).

1.3.6.3 Comparing sleep between ethnic groups

Sleep researchers posit that sleep practices vary from one region of the world to the other. Places where people sleep (e.g., the bedroom and not living-room), who they sleep with (co-sleeping), and sleep related rituals (e.g., cleaning teeth, emptying bladder before sleeping, putting on sleeping clothes, and laying on purpose built furniture) vary with cultures (Empson, 2002; Owens, 2004).

Within sleep research, several studies have consistently found differences in sleep characteristics between African Americans (AA) and Caucasian Americans (CA). For example, in a clinic based study that examined how discrimination and ethnic identity relate to sleep architecture and fatigue in AA (n=37) and CA (n=56) Thomas and colleagues (2006) found that AA had less slow wave sleep (SWS) and reported more physical fatigue than CA. In addition, Thomas et al (2006) found that although ethnic identity did not mediate ethnic differences in sleep latency, there was a significant relationship between ethnic identity and sleep latency, indicating that individuals who felt more connected with their ethnic group had more difficulty falling asleep in the hospital.

In another study that compared prevalence and consequences of insomnia between Maori (n = 2,100) and Non-Maori (n = 1,900) in New Zealand, Paine et al (2005) found that sleep problems were higher among Maori than in non-Maori. Maori were more likely than non-Maori to report difficulty falling asleep often or always (36.5% vs. 28.7%), three or more nocturnal awakenings (28.4% vs. 20.8%) and waking too early in the morning often or always (48.8% vs. 38.0%). Significant differences were also found between Maori and non-Maori in difficulty getting back to sleep (53.0% vs. 48.6%) and never or rarely waking refreshed (59.1% vs. 53.8%) (Paine, et al., 2005). In addition, Paine and colleagues found that excessive daytime sleepiness was significantly higher for Maori (21.3%) compared with non-Maori (13.9%).

Perhaps the most comprehensive epidemiological data on normal sleep was reported in Lichstein, Durrence, Riedel, Taylor, & Bush (2004). In a postal survey, 772 participants from a host of populations including men, women, and various age and ethnic groups

prepared detailed sleep diaries for a 2-week period as well as a battery of self-report sleep and health measures. The self-report measures yielded data on such characteristics as normal sleep patterns, various forms of insomnia, fatigue, depression, anxiety, and daytime sleepiness differentiated by age, sex, and ethnicity. Lichstein and colleagues (2004) reported that AAs took significantly longer to fall asleep and napped significantly longer than CA. They also found an age by ethnicity interaction effect with older AAs sleeping worse than older CA according to a sleep quality rating (Lichstein, et al., 2004). Furthermore, Lichstein and colleagues (2004) found that CA slept better than AA, but the magnitude of the difference was not great.

In another US study that investigated the influence of race and socioeconomic status on EEG measured sleep (The Pittsburgh Score Project), Mezick and others (2008) (using actigraphy, polysomnography and self-report measures) found that compared to whites and Asians, blacks spent shorter time asleep, took longer to fall asleep, and had less efficient sleep. Furthermore, they found that blacks had a higher percentage of Stage 2 sleep and a lower percentage of Stage 3-4 sleep than Whites or Asians. In addition, they also found that blacks were likely to have shorter and more disturbed sleep and this persisted even after taking into account socioeconomic (SES) measures (Mezick, et al., 2008).

One study reviewed for the present study presented different findings. In a prospective community-based participatory research investigating ethnic differences in sleep patterns, Jean-Louis et al (2001) recruited, by stratified cluster sampling, European Americans (i.e. Caucasian Americans) and African American (AA) participants (N =1118) in Brooklyn, New York. Research data was collected using mixed method – interviews and self-report measures. Logistic regression analyses revealed that ethnicity was the most likely

predictor of the complaints of difficulty initiating sleep, of difficulty maintaining sleep, of early morning awakening, and of relying on sleep medicine (Jean-Louis, et al., 2001). The study also found that worse sleep and greater reliance on sleep medicine were observed among European Americans compared to AA. In contrast (within the same study), Caribbean Americans of African ethnicity reported less sleep complaints than did U.S.-born AA, and immigrant European Americans reported greater complaints than U.S.-born European Americans. These contradictory findings could be explained by the differences in measures used in these studies – Mezick et al. (2008) used objective measures while on the other hand Jean-Louis et al. (2001) used subjective measures.

In summary, most sleep comparison studies involving ethnic minority groups in the United States have consistently reported that AAs slept poorly compared to CAs. Jean-Louis et al (2001) observed that differing sampling strategies and disparity in cohorts investigated account for most of the discrepant findings. For example, in actigraphy and PSG-measured sleep studies reviewed in the present study (e.g., Mezick, et al., 2008), blacks slept for a shorter duration, took longer to fall asleep, had less continuous sleep, and spent smaller percentage of time in deep sleep (Stages 3-4) compared to their CAs. In addition, AAs were reported to have great daytime fatigue and less slow wave sleep (SWS). While these findings shed light on ethnic differences in the Western context, very little data has been reported in the African context. The available African data is reviewed below.

1.3.6.4 Ethnic research on sleep in sub-Saharan Africa

Extensive literature searching on databases such as Scopus, Medline, Psycinfo and Proquest found no studies comparing sleep between ethnic groups in sub-Saharan Africa or

Australia. The search returned only two recent studies that were conducted about sleep and sleep disorders with an African sample in sub-Saharan Africa. This sub-region is important for the present study because two samples of participants (BZW and BGH) are drawn from the sub-region.

One study was conducted by Aloba et al (2007) on a cohort of University students in Nigeria, designed to validate the use of the Pittsburgh Sleep Quality Index (PSQI). The researchers acknowledged that the extent of sleep-related problems remains largely an unidentified public health issue, particularly so in Africa where there is inadequate personnel to assess sleep problems.

Aloba and colleagues (2007) also acknowledged that the PSQI has been widely used in diverse groups elsewhere in the world, but no such evidence of usage and validation of the instrument exists in sub-Saharan Africa (p.267). In this study of 520 students, Aloba et al (2007) found that the PSQI was of moderate value in screening for insomnia with the best cut-off score at 5 (sensitivity = .72, specificity = .55, overall classification rate = .55) similar to what has been obtained in Western cultures.

The second African study was conducted in South Africa (Reid & Baker, 2008). This study was designed to evaluate sleep habits and daytime behaviours of South African University students. In addition, the researchers sought to examine possible factors associated with sleep quality and daytime sleepiness. A cohort of 986 students completed questionnaires about their sleeping habits and their lifestyle habits over the previous month. Congruent to findings in the PSQI validation study by (Aloba, et al., 2007), Reid & Baker (2008) found that ethnicity influenced sleep timing, but was not related to either poor sleep quality or

having an Epworth Sleepiness Score >10 among their participants. Black students went to bed significantly later than white and Asian students and woke up earlier than white students during the week; consequently they were more likely to have a shorter time in bed than white students. In addition, Reid & Baker (Reid & Baker, 2008) found that black students were more likely to nap than white students were, possibly to supplement their overall sleep amount. Reid & Baker (2008) commented that their data revealed that awareness of sleep and sleep disorders was low in the general population in South Africa. In their paper (Reid & Baker, 2008) they lamented the shortage of sleep trained personnel writing thus:

> *... there is a shortage of medical and paramedical professionals trained in sleep medicine in South Africa; there is no formal training program accredited with any regulatory body to enable professional of any sort to qualify in sleep medicine ... Therefore, sleep disorders and sleep problems such as insomnia, sleep apnea, sleep deprivation, and poor sleep quality may be poorly recognized and go untreated, especially at primary care level.(p.288)*

Indeed, this observation can easily be generalized to other parts of the sub-Saharan Africa, in that by comparison, South Africa is by far better developed in its education, health and all areas of its economy and yet sleep and sleep disorders' awareness is low (Reid & Baker, 2008). It is hypothesized that a wider implication of this lack of staff and awareness about sleep, is that in sub-Saharan Africa it is likely that most sleep and sleep-related issues may be presented to primary care health workers as physical problems.

1.4 Psychological interventions in sleep

Sleep disorders, particularly insomnia, are a prevalent complaint both in the general population and in clinical practice. Defining characteristics of insomnia include dysfunctional beliefs and attitudes about sleep, complaints of daytime dysfunction, as well

as self-reported poor, insufficient, or unsatisfactory sleep (Jansson & Linton, 2005). These characteristics represent the core of the present investigation albeit that the investigation focused on differences between ethnic groups on these characteristics. Evidence in the literature suggests that sleep disorders may present as the primary concern or comorbid with physical or mental health problems (Morin, et al., 2006). Some of the studies reviewed suggest that treatment of insomnia in the early phase is appealing in that it arrests the development of chronic sleep problems (Jansson & Linton, 2005).

Overall, there has been recognition that psychological and behavioural factors have a significant role in the treatment of insomnia to the extent that there has been increased interest in therapies targeting these factors (Morin, et al., 2006). A systematic review of 37 treatment studies (N = 2246) published between 1998 and 2004 inclusive, revealed that psychological and behaviour therapies produced changes in several parameters (e.g., beliefs about sleep, sleep quality, sleep efficiency, sleep onset latency) of individuals with either primary insomnia or insomnia associated with medical or psychiatric disorders (see Morin, et al., 2006 for detailed analysis of treatment studies). According to Morin et al (2006), five treatments in particular met American Psychological Association (APA) criteria for empirically supported psychological treatments for insomnia: stimulus control therapy, relaxation, paradoxical intention, sleep restriction, and cognitive-behavioural therapy.

Five randomized controlled trials (RCT) of the 37 reviewed (Morin, et al., 2006), were conducted to evaluate the impact of psychological/behavioural interventions with primary insomnia patients in comparison to or as an adjunct to hypnotic medications. Long-term follow up data from the treatment studies reviewed suggests that subjects treated with CBT

sustained their clinical gains over time, whereas those treated with medication alone did not (Morin, et al., 2006). The combined approach (that is CBT with medication) showed some loss of therapeutic benefits at follow-up periods with variability across subjects in that condition.

In a randomized, placebo-controlled clinical trial that involved 63 young and middle-aged adults with chronic sleep-onset insomnia with interventions including cognitive behaviour therapy (CBT), pharmacotherapy, or combination therapy compared with placebo, CBT was shown to be more effective than medication (Zolpidem) on measures of SOL and sleep efficiency (Jacobs, Pace-Schott, Stickgold, & Otto, 2004). In addition, the combined treatment provided no advantage over CBT alone, whereas pharmacotherapy produced only moderate improvements during drug administration and returned measures towards baseline after drug used discontinuation (Jacobs, et al., 2004).

An 8-week randomized control trial (N = 30) (Perlis, et al., 2004) supports the findings by Jacobs et al (2004). In this study, interventions included CBT paired with placebo drug, CBT paired with drug (modanifil 100 mg), and contact control plus modanifil 100 mg. Researchers found an average SOL reduction of 17 minutes and WASO of 28 minutes among CBT patients. In addition, Perlis et al (2004) found no significant gain from modanifil in terms of sleep continuity parameters, but there were trends suggesting lower ESS scores and higher adherence to prescribed bedtime during CBT among participants receiving Modanifil.

Jansson & Linton (2005) conducted a RCT (N = 165) to compare effects of two early interventions, a cognitive-behavioural group intervention and a self-help information

package in patients with insomnia. This study had a 1-year follow-up, and 136 participants had completed the study then. The researchers found that CBT was effective in reducing dysfunctional beliefs and attitudes about sleep, negative daytime symptoms as well as improvements in sleep. At 1-year follow-up, CBT group had met criteria for clinically meaningful improvements in sleep onset latency, WASO, and sleep efficiency compared to the control group (Jansson & Linton, 2005).

Overall, the body of research evidence suggests that psychological and behavioural interventions, particularly CBT, are effective in the management of primary insomnia compared to medication and no treatment.

1.5 The Present Study

1.5.1 Purpose of the Study

The present study builds on previous studies that compared ethnic differences in sleep (e.g., Paine, Gander, Harris, & Reid, 2004; Profant, Ancoli-Israel, & Dimsdale, 2002; Rao, et al., 1999; Roberts, Roberts, & Chan, 2006; Stepnowsky, et al., 2003). The overall aim was to consider the interplay between the two variables of ethnicity and gender with daytime sleepiness, sleep quality, beliefs and attitudes about sleep, physical health, and mental health.

The first objective of this study was to explore the extent of differences in sleep quality, sleep/wake behaviours, sleep beliefs and values among CAA, BZW, and BGH adults in Australia. The second objective was to investigate whether there were any gender differences in sleep as well as interaction effects between group and gender on the sleep variables. The study also measured mental and physical health, due to their possible

differential interaction with sleep indices across the three samples (CAA, BZW and BGH), particularly as a consequence of immigration.

1.5.2 Significance of the study

This study is significant in that, in the Australian context, it potentially contributes valuable insight into the impact of ethnic origin to people's sleep experiences. Secondly, it was hoped that the findings of the present study would advance knowledge on the nature and extent of differences in sleep quality, sleep/wake behaviours, as well as beliefs and attitudes about sleep among CAA, BZW, and BGH in Australia.

Furthermore, the results of this study may have implications for research and training of clinicians as well as informing the development of strategies for intervention specific to ethnic minority groups who may seek help in relation to sleep problems. Considering that sleep difficulties are a major symptom in many medical and psychological presentations, the identification of cross-ethnic variations in sleep profiles has potential implications for the treatment of patients from different ethnic backgrounds (Thase, 1998).

1.6 Research hypotheses

The present study was designed to explore the possible interplay between ethnicity and sleep experiences among three adult community-based subsamples of Caucasian Australian (CAA), black immigrants from Zimbabwe (BZW), and Ghana (BGH) resident in Australia. Two specific questions guided the present study and these were:

- Are there any differences in sleep quality, beliefs and attitudes about sleep, and daytime sleepiness among these three ethnic groups?

- Are the differences in sleep experiences (if any) explained by ethnicity alone?

In addition to examining main effects for group, gender effects were also investigated. To answer the research questions five hypotheses were formulated to guide the investigation.

1.6.1 Hypothesis 1

There will be differences in sleep quality between the three ethnic groups studied with the CAA group having better sleep quality than the BZW and BGH groups. Furthermore, females will have poorer sleep quality than males but there will be no interaction effect between ethnicity and gender.

1.6.1.1 Operationalisation

Significant differences in sleep quality will be found among the three ethnic groups and also between males and females on the scores of the dependent variables of subjective sleep quality (SSQ), sleep onset latency (SOL), sleep duration (SLD), habitual sleep efficiency (HSE), sleep disturbances (SPD), use of sleep medication (USM), and daytime dysfunction (DD) derived from the PSQI tested using a 3 (ethnicity) x 2 (gender) Multiple Analysis of Variance (MANOVA). Furthermore, a 3 x 2 between-group ANOVA will reveal significant differences between the groups on sleep quality (global PSQI score). An independent-samples *t*-test will also reveal differences in sleep quality between male and female participants in the present study.

1.6.1.2 Rationale

Results of two studies reviewed for the present study (Rao, et al., 1999; Thomas, et al., 2006) reported that African Americans had light sleep than Caucasian Americans and that light sleep is associated with poorer sleep quality. The studies also (1999) found that African-Americans had evidence of more stages 1 and 2 and diminished stage 4 sleep, compared to their CA and Hispanic counterparts. Further, immigrant populations will have poorer sleep due to assumed poorer mental health status associated with problems often experienced by immigrants such as acculturation stress, emotional wellbeing, trauma, loss, anxiety or depression (Pavasovic & Kennedy, 2005; Ponizovsky, et al., 2000).

1.6.2 Hypothesis 2

There will be differences in the daytime sleepiness between the three ethnic groups studied with the CAA group having less daytime sleepiness than the BZW and BGH groups. Furthermore, females will have more daytime sleepiness than males but there will be no interaction effect between ethnicity and gender.

1.6.2.1 Operationalisation

Significant differences in daytime sleepiness will be found among the three groups tested using a 3 x 2 ANOVA with ethnicity as the independent variables. Furthermore, differences will be found between male and female scores on the Epworth Sleepiness Scale (ESS) tested using an independent-samples *t*-test.

1.6.2.2 Rationale

Two studies (see e.g., Rao, et al., 1999; Thomas, et al., 2006) reported that African Americans (AA) had poorer sleep quality compared to Caucasian Americans. Based on these findings, it is hypothesized that BZW and BGH in this study will likewise experience more daytime sleepiness compared to the CAA (Lichstein, et al., 2004) participants since poor sleep quality is linked to daytime sleepiness. In addition, female participants in the present study will report more daytime sleepiness compared to their male counterparts given research evidence suggesting slightly higher prevalence of disturbed sleep in females (Chen, et al., 2005; Doi, et al., 2001).

1.6.3 Hypothesis 3

There will be differences between the ethnic groups in their beliefs, values and attitudes about sleep with the CAA group having fewer dysfunctional beliefs and attitudes about sleep in comparison to the BZW and BGH groups. In addition, there will be gender differences in beliefs and attitudes about sleep.

1.6.3.1 Operationalisation

Significant differences will be found between the three groups on the scores of the dependent thematic variables of consequences of insomnia, control and predictability of sleep, sleep requirement expectations, causal attribution of insomnia, and sleep promoting practices derived from the Dysfunctional Beliefs and Attitudes about Sleep questionnaire (DBAS) tested using 3 x 2 MANOVA with ethnicity as an independent variable. Further investigation will also reveal gender differences in beliefs and attitudes about sleep.

1.6.3.2 Rationale

For example, a study by Rao et al (1999) reported differences in sleep between CA and African Americans (AA), with AA having poorer sleep. It was assumed in the present study that poorer sleep might also be associated with dysfunctional beliefs. Therefore, higher or elevated dysfunctional scores by the BZW and BGH groups will be associated with poor beliefs and attitudes about sleep. Given slightly higher prevalence of disturbed sleep in females (e.g., Doi, et al., 2001), female participants in the present study were likely to report more dysfunctional beliefs.

1.6.4 Hypothesis 4

There will be significant differences in the mental health status between the three ethnic groups studied with the CAA group reporting better mental health than the BZW and BGH groups.

1.6.4.1 Operationalisation

Significant differences will be found between the three groups on the scores of the dependent variable of mental health variables derived from the SF-36 Health Questionnaire tested using a 3 x 2 ANOVA with ethnicity and gender as the independent variables.

1.6.4.2 Rationale

Research evidence suggests that there is a close association between poor sleep and poor mental health (Bliwise, 1992). In addition immigration experiences have also been linked to poor mental health (e.g., Cernovsky, 1990; Voss & Tuin, 2008a). It is important to note that if significant differences are found in the mental health status of CAA compared to

one or both of the African immigrant groups then this factor will influence the interpretation of any possible sleep related differences found between the CAA and BZW/BGH groups. The assumption is that, migration effect would be seen by differences in mental health and stress with the immigrant participants reporting higher levels of stress compared to their Caucasian counterparts. However, if significant mental health differences are not found then any sleep differences between the CAA and African groups may be tentatively interpreted as arising from ethnic differences.

1.6.5 Hypothesis 5

There will be no differences in physical health status between the three groups studied.

1.6.5.1 Operationalisation

No significant differences will be found between the three groups on the dependent variable of physical health (scores from the SF-36).

1.6.5.2 Rationale

In the literature there are no studies found reporting differences in physical health between immigrant and non-immigrant populations. Moreover, immigrants to Australia are required to pass rigorous health check prior to being accepted.

1.7 Assumptions of the study

This study included the following assumptions: (1) participants responded to the survey accurately, (2) the data collected measured participants' sleep experiences, (3) the interpretation of the data accurately reflected the intentions of the participants, and (4) the three groups were matched on key variables known to affect sleep (i.e., age and gender).

1.8 Summary

In this chapter an overview of key issues in sleep research were presented. In addition, an estimated theoretical distribution of human total sleep time (TST) was presented in the section on normal sleep. A section on the absence of an ethnic based theory on sleep lamented a lack of a clear-cut theory in sleep research on which to base the comparison of sleep experiences particularly between ethnic groups.

This chapter also presented themes central to empirical sleep research particularly those that have ethnic implications. The literature reviewed focused on studies that reported findings on themes specific to the present study including: (a) sleep problems and disorders; (b) sleep and gender differences; (c) sleep and ethnicity; (d) sleep and psychological trauma; (e) the interplay between sleep, migration and acculturation; and (f) sleep and genetics. In addition, the purpose of the present study, its significance, research hypotheses, and the main assumptions of the present study were presented. Research methodology for the present study will be presented in the next chapter.

Chapter 2

Methodology

2.0 Study Design

This study was a cross-sectional between-groups design in which data was collected by means of postal surveys using standardized questionnaires. The research focused on exploring relationships between ethnicity and gender (independent variables); and sleep quality, daytime sleepiness, beliefs and attitudes about sleep, physical health, and mental health (dependent variables).

2.1 Sampling and recruitment procedure

2.1.1 Target ethnic groups and rationale for selection

The target population of the present study were Caucasian Australian (CAA), Black Zimbabwean[1] (BZW), and Black Ghanaian (BGH) members of the community. The CAA group was selected because they represent the majority ethnic group in Australia. On the other hand, BZW and BGH were selected on the basis that they constitute a growing part of African population resident in Australia. In addition, as discussed elsewhere in this thesis, a literature search revealed only two studies (Aloba, et al., 2007; Reid & Baker,

[1] Researcher is a member of the Zimbabwean community and migrated to Australia in 2002. During the recruitment of participants, I took pains to ensure that recruitment was not differentially affected by my membership of the Zimbabwean community, hence the use of the Zimbabwean Association to handle data collection. In addition, use of the Association ensured that researcher had no access to the names of participants' thus reducing potential effect of researcher influencing participation as well as maintaining privacy and confidentiality of participants' data.

2008) that investigated differences in sleep quality between ethnic groups in Africa. Further, a google search using terms “sleep associations in Africa”, “sleep research in Africa” returned results which indicate only South Africa has active sleep research as well as training programs. Based on these findings, it was assumed that studying the two African groups will provide new information about sleep quality of populations we currently know little about.

2.1.2 Inclusion criteria

To be included in the study participants had to be aged 18 and older. Researchers used an arbitrary maximum of fifteen years residency cut-off for inclusion of immigrant participants in the present study, based on the assumption that those who had been in Australia for longer than 15 years would be more integrated in the host community, and may have adopted (hypothesized) sleep related behaviours, beliefs and attitudes of the host community. Based on this assumption, and to be included in the present study, Zimbabwean and Ghanaian immigrants had to meet the “less than 15 year” residence rule and were 18 years of age or older at the time of migration.

Immigrant participants were limited to black members of the population to control for potential effect of lifestyle and culture on sleep experiences, given that Caucasian Zimbabweans and Ghanaians were likely to share a similar lifestyle and culture with Caucasian Australians (CAA). In addition, it is also likely that Caucasian Zimbabweans and Ghanaians may have different experiences of migration (i.e., lesser amount of trauma) and suffer less discrimination because they look like the majority population. Caucasian Australian participants should have been born either in Australia or in a Western European

country (e.g., Britain, Scotland, and Germany) and have been resident in Australia for at least 15 years.

Respondents were recruited with regard to age and sex parameters to obtain some parity among groups (see below). Zimbabweans and Ghanaians have diverse cultural/ethnic backgrounds with a mix of different cultural groups with different languages and traditions. In the present study, the samples were grouped based on nationality but not necessarily on cultural identity.

2.1.3 Recruitment procedure

Recruitment of participants was done in three phases as described in the sections that follow.

2.1.3.1 Phase 1: Recruitment of Zimbabwean and Ghanaian Participants

Following ethical approval by the Victoria University Human Research Ethics Committee (VUHREC) (see Appendix A), the researcher embarked on the recruitment of the Zimbabwean and Ghanaian participants first. The Zimbabwean and Ghanaian immigrant samples were recruited through their representative associations[2] – the Zimbabwean Association in Victoria Inc., and the Ghana Association Inc., respectively – all based in Melbourne. Before recruitment, presentations were made to the executive committees of the respective associations to explain the purpose and significance of the study, and to request their assistance in recruiting their members to participate in this study. After receiving the associations' agreement, expressed in letters of support (see Appendices B

[2] The researcher learnt from both the Zimbabwean and Ghanaian Association leaders at the time of presentation of the research idea prior to data collection that both associations had an all black membership.

and C), study packages (consisting of recruitment letter [Appendix D], information for participants [Appendix E], questionnaires, and advert for more volunteers [Appendix F]) were delivered to the association executives who then mailed the packages to their members.

Consistent with recruitment constraints of a community sample (Knipscheer & Kleber, 2007) and Australian privacy laws, it was not possible to have access to the list of names and addresses of the associations' members from which random samples of local BZW and BGH could be drawn. Therefore, in the present study, a community sample was recruited using mailing lists kept by their respective community associations and members were under no obligation to complete the research packages. Two weeks following the distribution of the packages, feedback meetings were held with the respective associations, at which the executives of the two associations were provided with reminder letters and stamped envelopes to send to their members. The two executive groups agreed to mail the reminder letters to the same members they sent research packages to earlier.

Additional participants were recruited through the 'snowballing' technique in which potential participants were asked to refer other individuals in their neighbourhood who met the eligibility criteria spelt out in the "information to participants" statement (Appendix E). A flyer with a brief statement of the study (Appendix F) and contact details of researchers was provided. New study packages were mailed directly to volunteers who contacted the researcher. Overall, 139 individuals were recruited for the immigrant sample (BGH= 67 and BZW=76).

2.1.3.2 Phase 2: Recruitment of Caucasian Participants

The second phase involved recruiting the Caucasian sample. Study packages were placed at the reception of the School of Psychology. Assistance was also sought from lecturers, non-academic staff members, and students to distribute the study packages. Flyers (Appendix F) were also put on the various notice boards at Victoria University St Albans campus. The snowballing technique was also used to recruit Caucasian participants for the present study. In the packages handed to staff and students a flyer was inserted which requested potential participants to refer their friends or relatives to participate in the study.

For all groups completed questionnaires were returned to the researcher in a postage paid reply envelope provided with each package. Victoria University students and staff who participated or helped distribute research packages, placed completed questionnaires in a return box set up at the School of Psychology reception at Victoria University's St Albans Campus.

2.1.3.3 Practical issues during recruitment of participants

Recruitment of ethnic participants was difficult particularly for the Ghanaian sample. The researcher convened four preliminary meetings with the executive of the Ghana Association in Victoria to a) sell the research idea, b) explain why Ghanaians were chosen as participants in the study, and c) address issues of privacy and confidentiality. A provisional agreement was reached in the third meeting, but the Ghana Association went through a leadership change immediately after, which represented a significant drawback considering that the former executive had agreed upon a provisional timeline on the distribution of research packages. Further meetings were held with the new executive and

issues of privacy and confidentiality of participants' information addressed. Following the meetings a written undertaking was provided by the Ghana Association executive (Appendix C), and distribution of the survey packages commenced. On the other hand, the recruitment of the Caucasian and Zimbabwean sample was not as difficult. The Ghana Association and Zimbabwean Community in Victoria association executives were supportive of the thesis as a whole.

2.1.3.4 Response rate

One hundred and fifty research packages were mailed to the Zimbabwean sample and 76 valid questionnaires were returned, representing a return rate of 50.7%. In comparison, out of 150 research packages sent to the Ghanaian sample, 67 valid questionnaires were returned, a return rate of 44.7%. Two hundred research packages were distributed to CAA and 84 valid questionnaires were returned, a response rate of 42%.

2.2 Data management

In the present study, 224 participants responded to the survey. Table 1 presents the age and sex distribution of all participants who responded to the survey. (Note that this is not the final sample, which is shown in Table 3 below) One hundred (44.6%) of respondents to the survey were male, while 124 (55.4%) were female. Age of participants ranged from 18 to 60 years (M = 36.1, SD = 11). Broken down by ethnicity, CAA accounted for 36.2% of the total sample, BZW (33.9%) and BGH (29.9%).

Table 2**:** Distribution of participants who responded to the survey, by age, gender, and ethnicity

Age in years*	Caucasian Australians			Black Zimbabweans			Black Ghanaians			Total (N)
	M	F	Total (n)	M	F	Total (n)	M	F	Total (n)	
18 - 25	5	10	15	5	8	13	6	8	14	42
26 - 31	3	14	17	7	8	15	4	6	10	42
32 - 35	5	4	9	8	9	17	8	4	12	38
36 - 40	3	5	8	9	5	14	5	4	9	31
41 - 50	4	12	16	9	4	13	3	10	13	42
51 - 60	8	8	16	2	2	4	6	3	9	29
Total	28	53	81	40	36	76	32	35	67	224

Note. * Visual binning of participants' ages done automatically in SPSS.

Because sleep is known to be affected by age and gender parameters (see section 1.3.2 above), it was considered important to obtain more parity on these two variables across the three different groups. A two-step process was used to achieve this and this is discussed in Appendix G. Removal of extra participants to achieve parity of participants did not compromise power of the study (see section 2.7) given that a study population of 100 (for ANOVA analyses) or 80 (for MANOVA analyses) was deemed sufficient to find differences. Table 3 presents the final distribution of participants whose data was included in data analysis in the present study.

Table 3: Final distribution of participants by age group, gender and ethnicity

Age in years*	Caucasian Australians			Black Zimbabweans			Black Ghanaians			Total (N)
	M	F	Total (n)	M	F	Total (n)	M	F	Total (n)	
18 - 25	5	10	15	5	8	13	6	8	14	42
26 - 31	3	8	11	5	8	13	4	6	10	34
32 - 35	5	4	9	8	4	12	8	4	12	33
36 - 40	3	5	8	4	5	9	5	4	9	26
41 - 50	4	5	9	5	4	9	3	5	8	26
51- 60	3	3	6	2	1	3	3	3	6	15
Total	23	35	58	29	30	59	29	30	59	176

Note. *Binning of age groups generated automatically in SPSS.

2.3 Measures

The instruments elaborated below were used in this study. Except for the Biographical Information (BI) questionnaire, which was designed by the researcher to collect demographic data from participants, all other questionnaires namely: Pittsburgh Sleep Quality Index (PSQI), Addendum to the Pittsburgh Sleep Quality Index (PSQI-A), Epworth Sleepiness Scale (ESS), SF-36, and Dysfunctional Beliefs and Attitudes about Sleep (DBAS) are standardized and widely used in sleep research. Classification of participants' education was done using the education classification system designed by the Australian Standard Classification of Education (ASCED) (Australian Bureau of Statistics, 2001), while participants' employment and job classification followed the Australian

Standard Classification of Occupations (ASCO) (Australian Bureau of Statistics, 2009).

Table 4 presents a summary of the measures used in this study and their function.

Table 4: Measures used in the present study and their scale ranges

Measure	What it measures	Scale Range
1. Biographical Information (BI)	Subjective biographical information and ethnicity	Nil
2. Epworth Sleepiness Scale (ESS)	Daytime sleepiness	0 -24; 'normal' cut-off score ≤10. Higher scores indicate higher chances of daytime sleepiness
3. Pittsburgh Sleep Quality Index (PSQI)	Sleep quality	0 – 21; Cut-off score ≤5. Higher scores indicate poorer sleep quality
4. Addendum to PSQI (PSQI-A)	Disruptive nocturnal behaviours as a result of traumatic experiences	0 -21; cut-off score ≤4. Higher scores suggests presence of symptoms of trauma
5. Dysfunctional Beliefs and Attitudes about Sleep (DBAS)	Beliefs about sleep	0 – 2800mm; higher scores indicate positive beliefs about sleep
6. SF-36 General Health Survey	Physical and Mental Health	0 – 100; higher scores indicate better/best health. 50 = norm.

2.3.1 Biographical Information (BIQ)

Employment status, ethnicity, gender, and age of participants were obtained by self-report using this 11-item self-report measure (Appendix H). Following the Australian Standard Classification of Education (ASCED) (Australian Bureau of Statistics, 2001), highest education achieved was assessed on a five-point scale:

- did not complete high school,
- completed high school,
- TAFE training,
- professional training other than university, and
- University education.

Classification of employment status was done on a seven-point scale:

- not working,
- managers and administrators,
- professionals,
- trade persons,
- advanced clerical and service workers,
- production and transport workers,
- elementary and clerical service workers, and
- labourers and related workers

2.3.2 Pittsburgh Sleep Quality Index (PSQI)

Sleep quality, one of the key independent variables in the present study, was assessed using the PSQI (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The PSQI is a standardized self-rated questionnaire that provides a retrospective index of sleep quality for a 1-month interval (Appendix I). It is composed of 19 self-rated questions and five questions rated by a bed partner or roommate (only the self-rated items are used in scoring the scale). The self-administered scale contains 15 multiple-choice items that inquire about frequency of sleep disturbances and subjective sleep quality and 4 write-in items that inquire about typical bedtime, wake-up time, sleep latency, and sleep duration. The five bed partner questions are multiple-choice ratings of sleep disturbance. All items are brief and easy for most adolescents and adults to understand.

The PSQI generates seven component scores that correspond to the domains listed previously. Each component score ranges from 0 (no difficulty) to 3 (severe difficulty).

Component scores are summed to produce a global score (range of 0–21) and a PSQI global score >5 is considered to be suggestive of significant sleep disturbance. According to Buysse et al(1989) the Pittsburgh Sleep Quality Index has a good internal consistency, with Cronbach alpha coefficient reported of between .82 to .89 and validity .80. In the present study, the Cronbach alpha coefficient was .68 across all participants.

2.3.3 Addendum to the Pittsburgh Sleep Quality Index (PSQI-A)

The Addendum to the Pittsburgh Sleep Quality Index for PTSD (PSQI-A [Appendix J]) (Germain, Hall, Krakow, Shear & Buysse 2005) was used in the present study to assess the existence of any disruptive nocturnal behaviours (DNB) that may be a result of traumatic experiences.

This measure consists of seven items designed to evaluate the frequency of seven DNB reported by participants who experienced trauma. Participants were requested to indicate frequency of each of the seven DNB. The items on this measure include frequency of hot flashes; general nervousness; memories or nightmares of traumatic experience; severe anxiety or panic not related to traumatic memories; episodes of terror or screaming during sleep without fully awakening; and episodes or acting out dreams, such as kicking, punching, running, or screaming.

Similar to the original PSQI, the PSQI-A assesses the frequency of these DNB during the month preceding completion the questionnaire. Each item is rated on a 0-3 scale referring to the frequency of each disturbance, where 0 = not in the past month, 1 = less than once a week, 2 = once or twice a week, and 3 = three or more times a week. The PSQI-A yields a global score obtained by adding participant ratings of the seven items and has a range of 0

– 21. A global PSQI-A cut-off score of 4 has high sensitivity, acceptable specificity, and high positive predictive value for discriminating participants with PTSD from those without PTSD (Germain, et al., 2005). In previous studies the PSQI-A had a high Cronbach's coefficient of .85. Higher scores on the measure suggest presence of symptoms of trauma.

2.3.4 Epworth Sleepiness Scale (ESS)

Daytime sleepiness was measured by the ESS (Johns, 1991) (Appendix K). The measure asked participants the likelihood of falling asleep in eight commonly encountered situations, namely: (a) sitting and reading; (b) watching television; (c) sitting inactive in a public place; (d) as a passenger in a car for an hour without a break; (e) lying down in the afternoon when circumstances permit; (f) sitting and talking to someone; (g) sitting quietly after lunch without alcohol; and (h) in a car while stopped for a few minutes in traffic. Each item is rated on a 0-3 scale with 0 = would never doze; 1 = slight chance of dozing; 2 = moderate chance of dozing; and 3 = high chance of dozing. Possible scores range from 0 (no chance of dozing in any of the eight situations) to 24 (high chance of dozing in all eight situations).

Data from Australia shows that "normal" adults (N = 72) who do not have evidence of a chronic sleep disorder (including snoring) have a mean ESS score of 4.6 (95% confidence intervals 3.9 - 5.3; SD = 2.8; range = 0 - 10) and the normal range defined by the 2.5 and 97.5 percentiles is also 0 - 10 (Johns, 2009). In regard to different ethnic groups, Johns (2009) asserts that it was not yet clear whether the ESS scores of normal subjects in other cultures were the same. An estimated 10 - 20 percent of the general population have ESS scores > 10 (Johns, 2009). No gender differences were found.

2.3.5 Dysfunctional Beliefs and Attitudes about Sleep (DBAS)

Assessment of participants' beliefs and attitudes about sleep was done using the DBAS (Appendix L) which is a measure drawn from both clinical practice and a theoretical conceptualization of insomnia (Morin, Stone, Trinkle, Mercer, & Remsberg, 1993). The DBAS is a 28-item scale tapping various beliefs, attitudes, expectations, and attributions about sleep and insomnia. Participants rate their level of agreement/disagreement on a 100mm visual analog scale anchored at each end by descriptors "Strongly disagree" and "Strongly agree", except for item 23, for which the score was reversed, so that a higher score always indicates a more dysfunctional belief.

Five cognition clusters centred around themes namely: (a) *misattributions or amplifications of consequences of insomnia*, (b) *diminished perceptions of control and predictability of sleep*, (c) *unrealistic sleep expectations*, (d) *misconceptions about the causes of insomnia*, and (e) *faulty beliefs about sleep promoting practice* were generated through combinations of items on the measure and were used to compare differences (if any) among the participants. The DBAS has a good internal consistency, Cronbach's $\alpha = .8$ (Morin, et al., 1993). In the present study, the Cronbach alpha coefficient was .82. Higher scores on the DBAS indicate beliefs that are more dysfunctional.

2.3.6 Health Survey: SF-36 Questionnaire

Sleeping well is tied to good physical and mental health. In the present study, the SF-36 questionnaire (Ware, Kosinski, & Dewey, 2000) was used to assess participants' physical and mental health status at the time of the study. The SF-36 (Appendix P) is a self-administered questionnaire containing 36 items and takes about five minutes to complete.

It measures health on a multi-item dimensions, covering functional status, well being, and overall evaluation of health (see Table 5). The SF-36 uses eight health scales to measure three aspects of health elaborated above.

In six of the eight dimensions, patients are asked to rate their responses on three or six point scales (box) rather than simply responding yes or no. For each of the dimensions, item scores are coded , summed, and transformed on to a scale from 0 (worst health) to 100 (best health). The measure provides two aggregate summary scores the Physical Component Summary (PCS) and the Mental Component Summary (MCS). These components have been shown to have test-retest reliability, that is, Cronbach's alpha as follows: PCS = 0.92 and MCS = 0.91 respectively (Ware, et al., 2000).

Table 5: Dimensions of the SF-36 Health Survey Questionnaire

Area	Dimension	Number of questions
I. Functional status	(a) Physical functioning	10
	(b) Social functioning	2
	(c) Role limitations attributed to physical problems	4
	(d) Role limitations attributed to emotional problems	3
II. Wellbeing	(a) Mental health	5
	(b) Energy and fatigue	4
	(c) Pain	2
III. Overall evaluation of health	(a) General health perception	5
Total		35*

Note. *36th question (asking respondents to compare present health with that one year before) not included within the eight scales. Adapted from "How to Score Version 2 of the SF-36 Health Survey (Standard & Acute Forms)", by J. E. Ware, M. Kosinski, and J. E. Dewey, 2000. Copyright 2000, 2002 by the Medical Outcomes Trust and QualityMetric Incorporated.

2.4 Data analysis

All data analyses were performed using SPSS Statistics GradPack version 17.0 (SPSS Inc., 2008). Descriptive statistics such as means (*M*), standard deviations (SDs), and percentages were used to present characteristics of data on all the measures used in the study. Comparisons of differences were performed using parametric and nonparametric techniques such as *t*-test, Analysis of Variance (ANOVA), Kruskal-Wallis, and Linear Regression.

To manage measures with subsets of dependent sleep measures such as the PSQI which had seven components and DBAS with its five themes, the Multiple Analysis of Variance (MANOVA) technique (see Tabachnick & Fidell, 2007) was used. The strategy was to use MANOVA as a gatekeeper procedure to protect the analyses against findings resulting from inflated Type 1 error rates that were likely to occur if individual analyses of variance (ANOVAs) were employed. All MANOVA results used the Wilks' Lambda statistic. The data analyses were limited to participants with complete data on all measures used in the present study. The level of significance was set at $p = .05$ for all the inferential statistics.

2.5 Statistical Power

The *a priori* assumption in the present study was that the difference among the three samples had a critical effect size of .40, and power = .95. Statistical power and sample size for the research was calculated using G*Power Version 3.1, a statistical power analysis program for the social, behavioural, and biomedical sciences (Faul, Erdfelder, Lang, & Buchner, 2007). For *a priori* computation of ANOVA tests focusing on fixed effects, special, main effects and interactions (two or more independent variables) given effect size = .40, $p = .05$, it was found that a total sample of 100 participants was deemed sufficient to

find differences between groups (critical F = 3.0485, actual power = .9508383) (Faul, et al., 2007).

Furthermore, to carry out an *a priori* analysis using MANOVA tests focusing on global effects given an effect size of .40 and p = .05, a total sample of 80 participants was found to be sufficient to find differences between groups. In the present study, a sample of 224 participants was recruited which was more than the estimated minimum to find differences, assuming a large effect size, using both ANOVA and MANOVA inferential techniques chosen for the present study. Due to overrepresentation of participants in some age and gender groups, data from some participants were removed leaving a total of 176 participants, a sample size that was adequate and within the recommended range.

Chapter 3

Results

In the following presentation of results, demographic characteristics of the study sample are presented first followed by tests of the research hypotheses. Research hypotheses have been grouped into three broad themes namely: sleep quality; beliefs about sleep; and health. Under the sleep quality theme comparisons of participants' data on the Pittsburgh Sleep Quality Index (PSQI) measure, particularly the global score and the seven component scores will be presented. This will be followed by a comparison of participants' data on the Epworth Sleepiness Scale (ESS).

Next to be presented are results of analyses of participants' data on the beliefs about sleep theme assessed using the Dysfunctional Beliefs and Attitudes about Sleep questionnaire. Finally, comparisons of participants' mental and physical health status based on data gathered using the SF-36 Health Survey and the Addendum to the Pittsburgh Sleep Quality Index (PSQI-A) will be presented. For each presentation of results the specific inferential technique used to analyse the data will be identified followed by a discussion on whether the data meet the basic assumptions of each selected technique. The discussion is then followed by the report of the statistical analyses.

3.1 Demographic Variables

The first step was to confirm that participants in the three community groups did in fact identify with their community group based on question 9 of the BI questionnaire, and this

was found to be the case for all participants. Table 6 presents the demographic characteristics of participants in the present study. The BZW and BGH samples evenly matched their Caucasian counterparts on educational level and age, while sex ratios were quite well matched, with some bias towards female CAA. Given that education and employment are key indicators of economic status and there were no significant differences between the groups, it can be concluded that there is no impact of SES in comparing these groups.

Forty-two percent of participants had achieved a higher education qualification, with 19.9% reporting that they completed high school and a further 18.8% reporting that they received professional training from colleges other than university. At the time of the survey, all BZW and BGH participants were working compared to 17% of CAA participants who were not working (includes students, parents of young children, and people who may or may not have been actively seeking work). The majority of the BZW (59.3%) and BGH (49.2%) participants employed in professional occupations (e.g., nursing, and teaching) compared to CAA (44.8%). In addition, BZW participants have been in Australia for a shorter period compared to BGH and CAA (see Table 6).

Table 6: Sociodemographic characteristics of ethnic groups who participated in the present study

Demographic Characteristics	Total Sample	CAA	BZW	BGH
Total, N (%)	176 (100)	58(33)	59 (33.5)	59 (33.5)
Males, n (%)	81(46)	23 (39.7)	29 (49.2)	29 (49.2)
Females, n (%)	95 (54)	35 (60.3)	30(50.8)	30(50.8)
Age, mean ±SD	34.04 ± 10.2	33.98 ± 10.7	33.59 ± 9.01	34.5 ± 11
Range (age)	18 - 60			
Years in Australia, mean ± SD		32.83(10.05)	3.88(2.65)	7.25(3.91)
Education, n (%)				
No education data reported	1(.6)	1(.6)	0(.0)	0(.0)
Did not complete high school	5 (2.8)	5 (8.6)	0 (.0)	0 (.0)
Completed High School	35(19.9)	13(22.4)	9(15.3)	13(22.0)
TAFE/Apprenticeship	28(15.9)	9(15.5)	7(11.9)	12(20.3)
Professional Training other than University	33 (18.8)	1(1.7)	18(30.5)	14(23.7)
University (Undergraduate and postgraduate)	74 (42.0)	29 (50.0)	25(42.4)	20 (33.9)
Employment, n (%)				
Not working*	10(5.7)	10(17.0)	0 (.0)	0 (.0)
Managers/ Administrators	16 (9.1)	7 (12.1)	5 (8.5)	4(6.8)
Professionals (e.g., teachers, nurses, doctors)	90 (51.1)	26 (44.8)	35(59.3)	29(49.2)
Trade Persons and related workers	14 (8.0)	5 (8.6)	2 (3.4)	7 (11.9)
Advanced Clerical and Service Workers	15 (8.5)	5(8.6)	6(10.2)	4 (6.8)
Production and transport workers	4 (2.3)	2 (3.4)	0 (.0)	2 (3.4)
Elementary and clerical service workers	20 (11.4)	2 (3.4)	9 (15.3)	9 (15.3)
Labourers and related workers	7 (4.0)	1 (1.7)	2 (3.4)	4 (6.8)

Note. CAA = Caucasian Australian; BZW = Black Zimbabwean; BGH = Black Ghanaian. *Not working includes: students, parents of young children and people who may or may not have been actively seeking work; most of the respondents who endorsed not employed were current full time university students.

3.2 The present sample compared to census data

After collating research data, a post-hoc research hypothesis was formulated to compare any differences in characteristics between the study sample and the Victorian population from which the sample was drawn. The research hypothesis was that the distributions of people over categories in the two populations were different; the null hypothesis was that they were the same. We expected the groups to differ on birthplace because this was a recruitment criterion for half of the participants. Table 7 presents a comparison of the study sample (observed) with the actual population of Victoria (expected) based on 2006 Australian census data (Australian Bureau of Statistics, 2008).

The population characteristics compared in the chi-square goodness of fit analyses were gender, birthplace, employment, and education. Raw data used to compute the expected values used in the chi-square goodness of fit analyses are presented in Appendix N (Table 21). Expected values (presented in Table 7) were calculated as a proportion of the observed sample and the Victorian state totals. To enable direct comparison of the sample data, particularly education and employment, the data were grouped into specific categories using census definitions (Australian Bureau of Statistics, 2008) and were recoded into different variables namely; education recoded and employment recoded. The ethnicity or group variable was recoded into a new variable, birthplace. These new variables were used in the chi-square goodness of fit analyses.

Chi-square goodness of fit values obtained were variable. The value found for gender was not significant $X^2(1, n = 176) = .82$, $p > .05$. The finding suggests that there was no difference between the comparison distribution (male and female participants in the

present study) as compared with the Victorian population. On the other hand the chi-square goodness of fit values obtained for birthplace (X^2[1, n =176] = 173.11, p < .05); education recoded, X^2(3, n = 176) = 25.74, p < .05; and employment recoded (X^2[5, n = 176] = 377.07, p < .05) were all significant. These results suggest that the distribution of participants in the study sample did not mirror the Victorian population in regard to birthplace, education and employment.

Inspection of comparison categories, particularly those with significant chi-square goodness of fit tests revealed uneven distribution of people in the observed categories compared with the Victorian population. In the birthplace category, there were more overseas born participants (67%) compared to an expected (24.4%) in the Victoria population. Furthermore, the employment category revealed an overrepresentation of professionals and managers (60.2%) as compared to an expected 14.5% in the Victorian population. Finally, there were slightly more tertiary educated participants in the study sample (76.7%) compared to the Victorian population (71.3%).

Table 7: Observed and expected frequencies and Chi-square goodness of fit test for sample characteristics of study sample (observed, N = 176) and Victorian population (expected, based on 2006 Australian Census data).

Variable		Observed n	Expected n	*p*
Gender	- Male	81	87	> .05
	- Female	95	89	
Birth place	- Australia	58	133	<.05
	- Overseas	118	43	
Employment Recoded				<.05
Managers /Professionals		106	57	
Technical/Trade Persons		14	23	
Clerical/Administration/Service		35	42	
Machine operators & Drivers		4	11	
Labourers		7	16	
Not working		10	10	
Education Recoded				<.05
a. High school and below				
No education data		1	4	
Persons with Year 11 and below		5	19	
High school (Year 12 or equivalent)		35	18	
b. Higher education				
Tertiary education (Job training and University)		135	102	

Note. Categories of birthplace, employment recoded, and education recoded are new variables developed by grouping ethnicity, employment, and education data respectively following census definitions. Source: Australian Bureau of Statistics Social Trends 2008 (Cat. No. 4102.0).

3.3 Testing the Research Hypotheses

3.3.1 Theme 1: Sleep Quality

3.3.1.1 Comparison of group and gender on subjective sleep quality – Hypothesis 1

The Pittsburgh Sleep Quality Index (PSQI) was used to gather retrospective data on participants' subjective sleep quality. These data are used to compare between-group differences in subjective sleep for participants included in this study.

For inferential analyses, the PSQI was reduced to one global score (GPSQI) and seven component variables namely: subjective sleep quality (SSQ), sleep onset latency (SOL), sleep duration (SLD), habitual sleep efficiency (HSE), use of hypnotic drugs (MED), daytime dysfunction (DTD), and sleep disturbance (SDIS). Table 8 presents the descriptive statistics of the seven component scores of the PSQI and the global PSQI, as a function of ethnicity and gender.

Table 8: Mean scores and standard deviations for the PSQI and ESS by ethnicity and gender of participants

	Ethnicity					
	CAA		BZW		BGH	
	M (n = 23)	F (n = 35)	M (n = 29)	F (n = 30)	M (n = 29)	F (n = 30)
Variable	*M*(SD)	*M*(SD)	*M*(SD)	*M*(SD)	*M*(SD)	*M*(SD)
SSQ	1(.6)	.97(.71)	.86(.69)	.87(.73)	.86(.64)	1.10(.71)
SOL	1.17(.83)	1.46(.98)	1.17(.85)	1.17(.75)	.97(1.02)	1.37(.93)
SLD	.83(.58)	.69(.76)	.90(.72)	.73(.64)	1.86(.69)	.93(.83)
HSE	.52(.67)	.60(1.04)	.31(.66)	.47(.68)	.30(.60)	.73(1.02)
SDIS	1.00(.60)	1.20(.47)	1.07(.53)	1.10(.48)	1.21(.62)	1.40(.62)
MED	.09(.29)	.40(.91)	.24(.69)	.20(.66)	.24(.58)	.13(.43)
DTD	.83(.58)	1.03(.66)	.76(.69)	.97(.77)	.76(.64)	1.10(.71)
GPSQI	5.43(2.11)	6.34(3.87)	5.31(2.27)	5.50(2.43)	5.21(2.97)	6.77(3.12)
ESS	6.87(4.57)	5.74(3.14)	6.66(3.89)	7.70(3.31)	7.17(5.20)	7.13(5.10)

Note. Note – higher scores indicate more sleep difficulties. M = Male; F = Female; *M* = Mean; SD = Standard deviation. SSQ = subjective sleep quality. SOL = Sleep onset latency. SLD = Sleep duration. HSE = Habitual sleep efficiency. MED = Use of hypnotic drugs. DTD = Daytime dysfunction. SDIS = Sleep disturbance. GPSQI = Global score of the Pittsburgh Sleep Quality Index. ESS = Epworth Sleepiness Scale.

3.3.1.2 Comparison of group and gender on the Global Pittsburgh Sleep Quality Index (GPSQI) Score

To examine the hypothesis that there will between-group differences in sleep quality among the three ethnic groups, a 3 x 2 between-group ANOVA was conducted with the total Global Pittsburgh Sleep Index (GPSQI) as the dependent variable. Ethnicity and gender were entered in the analysis as the fixed factors. Preliminary assumption testing was conducted to check for normality, linearity, outliers, homogeneity of variance and multicollinearity. Levene's test of equality of error variances was significant, F (5, 170) =

2.63, p = .03 indicating a violation of the assumption of equality of variances between the groups on this dependent variable. In view of this, a nonparametric alternative, the Kruskal-Wallis Test was used to analyse these data. The Kruskal-Wallis Test allows comparison of the scores on some continuous variable for three or more groups with scores converted to ranks and the mean rank for each group used for comparison.

A Kruskal-Wallis Test revealed no statistically significant differences in sleep quality among the three ethnic groups; χ^2 (2, n = 176) = .41, p = .82. However, BGH recorded a slightly higher median score (*Md* = 6) than the other ethnic groups, which both recorded median values of 5.

In addition, an independent-samples *t*-test was conducted to compare GPSQI scores for males and females. There was a statistically significant difference in scores for males (*M* = 5.31, *SD* = 2.47) and females, *M* = 6.21, *SD* = 3.42; *t* (172) = -2.09, p = .04 (two-tailed). The magnitude of the differences in the means (mean difference = -.90, 95% CI: -1.75 to -.05) was very small (Cohen's d = -.3).

3.3.1.3 Comparison of group scores on the PSQI component scores

A 3 x 2 Multivariate Analysis of Variance (MANOVA) was conducted to compare mean scores of the three groups on the seven component scores derived from the PSQI, as shown in the first seven variables in Table 8. MANOVA compares two or more groups in terms of their means on a group of dependent variables. It tests the null hypothesis that the population means on a set of dependent variables do not vary across different levels of a factor or grouping variable. In this analysis, the component scores of the PSQI were entered as the dependent variables with ethnicity and gender as the two fixed factors.

Preliminary tests were conducted to check whether data conformed to the MANOVA assumptions of normality, linearity, homogeneity of variance as well as multicollinearity and no serious violations of these assumptions were noted. A linear regression analysis was also conducted to check for the presence of outliers in the data. A maximum value from the analysis output, Mahalanobis Distance of 33.29 was found which exceeded the critical value of 24.32 recommended for running a MANOVA with seven dependent values (see Pallant, 2007) confirming the presence of outliers in the data. Inspection of the data revealed that only two participants had values exceeding this critical value. Because the outliers were few, and their difference with the critical value was not extreme, a decision was taken to keep these data in the analysis as recommended in (Tabachnick & Fidell, 2007, p. 77). Box's Test of equality of covariance matrices significance value was .23 indicating that the assumption of homogeneity of variance-covariance matrices was not violated (see Tabachnick & Fidell, 2007, p. 281).

There was no significant effect of group on the combined PSQI variables, F (14, 328) = .725, p = .75; Wilks' Lambda = .94. However, there was a significant effect of gender on the combined PSQI variables; F (7, 164) = 2.25, p = .03; Wilks Lambda = .91; partial eta squared = .09 (medium effect). An inspection of the individual component scores and univariate analyses revealed that male and female participants differed significantly on the daytime dysfunction variable; F (1, 170) = 5.89, p = .02; partial eta squared = .03 (small effect). Individual means for gender indicated that female participants (M = 1.03, SD = .71) were likely to report more daytime dysfunction than males (M = .78, SD = .63). Furthermore, no group by gender interaction effect on the combined variable, F (14, 328) = .644, p = .82; Wilks Lambda = .95, was found.

3.3.1.4 Comparison of group and gender differences on daytime sleepiness – Hypothesis 2

The Epworth Sleepiness Scale (ESS) was used to gather data on participants' daytime sleepiness. Figure 3 shows the distribution of ESS scores for CAA, BZW and BGH participants. The mean (*M*) and standard deviation (SD) for participants' total scores on the ESS are presented in Table 8.

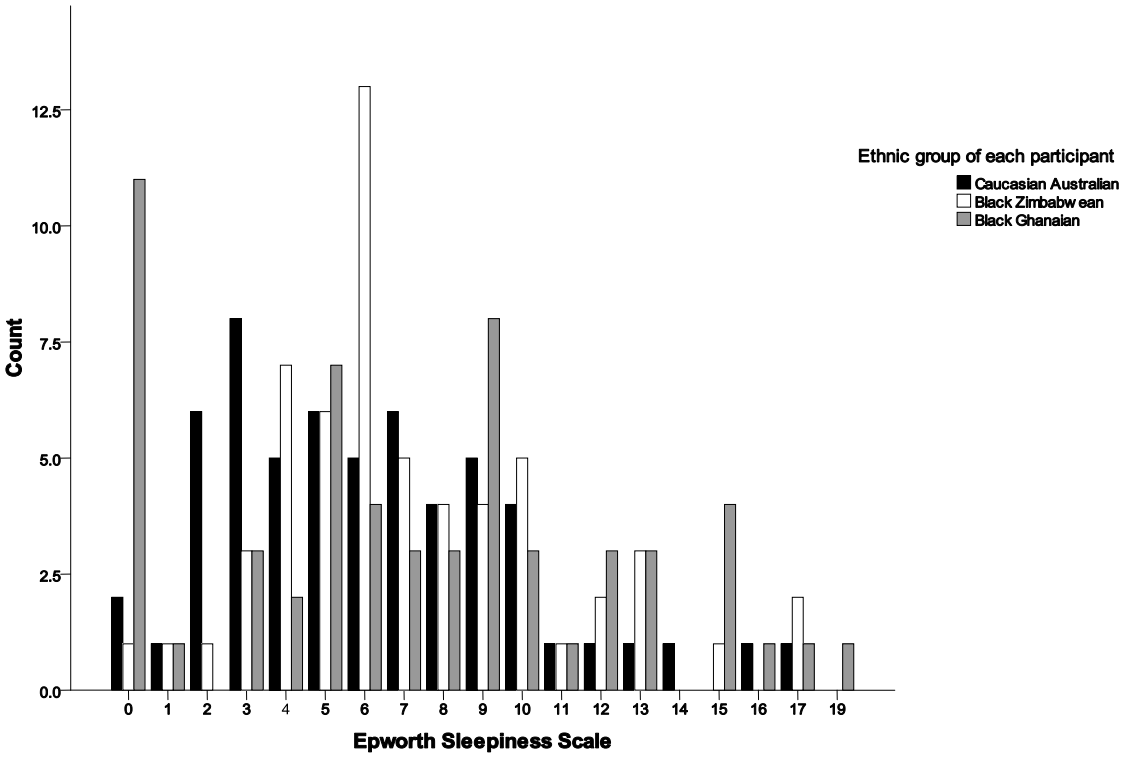

Figure 3: Distribution of Epworth Sleepiness scores for CAA, BZW, and BGH participants

To examine the prediction that group differences would be found on daytime sleepiness between the three ethnic groups, a between-group univariate ANOVA was conducted with

the total Epworth Sleepiness Score (ESS) as the dependent variable. Ethnicity and gender were entered in the analysis as the fixed factors.

Preliminary assumption testing was conducted to check for normality, linearity, outliers, homogeneity of variance and multicollinearity. Levene's test of equality of error variances was significant, F (2, 173) = 5.39, p = .005 indicating violation of the assumption of equality of variances between the groups on this dependent variable. Because of this violation, a nonparametric alternative, the Kruskal-Wallis Test was used to analyse these data.

The Kruskal-Wallis Test revealed no statistically significant differences in daytime sleepiness across the three ethnic groups, X^2(2, N = 176) = 2.40, p = .30. BGH recorded a higher median score (Md = 7) than the other ethnic groups, who both recorded median values of 6.

An independent-samples t-test was conducted to compare the daytime sleepiness scores for male and female participants in this study. There was no statistically significant difference in mean scores for males (M = 6.90, SD = 4.54) and females, M = 6.80, SD = 3.96; t (174) = .16, p = .88 (two-tailed).

Further, participants' scores were categorised into ESS scores ≤10 vs. >10 as commonly used in literature (Johns, 2009). There were more BGH participants (9.65%) with higher ESS scores compared to BZW (7.95%) and CAA (5.68%). This comparison suggests that there were slightly more BGH with high level of daytime sleepiness than BZW and CAA. Despite the differences in proportion of participants with ESS scores >10; a Chi-square test

for independence indicated no significant differences between groups on daytime sleepiness, $X^2(14, N = 29) = 10.51, p > .05$.

3.3.2 Theme 2: Beliefs about Sleep

3.3.2.1 Comparison of CAA, BZW, and BGH on Beliefs about Sleep – Hypothesis 3

The Dysfunctional Beliefs and Attitudes about Sleep (DBAS) questionnaire was used to gather data about participants' beliefs and attitudes about sleep. Table 9 presents a summary of descriptive statistics of participants' scores on the individual items of the DBAS measure. The DBAS scale had a good internal consistency with all groups, CAA (Cronbach's α = .81), BZW (Cronbach's α = .83), and BGH (Cronbach's α = .84).

Table 9: Mean and standard deviations of participants' responses to DBAS items (100-mm Visual Analog Scale) by ethnic group

	Ethnicity		
Themes and Items	CAA (n =58) *M* (SD)	BZW (n = 59) *M* (SD)	BGH (n = 59) *M* (SD)
Theme 1: ***Misattributions of consequences of insomnia***			
Sleep loss may cause " nervous breakdown"(4)	29.38(26.97)	43.66(33.86)	38.93(31.48)
Insomnia seriously affects physical health (5)	48.47(34.65)	64.83(32.87)	64.54(28.27)
Poor sleep interferes with daily activity (10)	65.52(26.94)	63.51(29.06)	63.37(25.88)
Poor sleep disturbs mood (12)	46.17(28.85)	36.61(31.32)	41.14(26.22)
Cannot function without adequate sleep (18)	37.21(22.27)	36.44(29.83)	33.19(24.76)
Lack of energy is always due to poor sleep (21)	55.72(31.85)	41.54(28.81)	46.73(26.76)
Theme 2: ***Diminished perceptions of control and predictability of sleep***			
Fear of losing control of sleep (8)	25.67(27.32)	26.51(26.15)	28.34(24.67)
A bad night's sleep will follow a good one (16)	17.40(20.96)	22.41(25.77)	23.44(26.27)
One poor night disturbs the whole week (17)	24.79(24.04)	19.49(20.72)	21.05(18.71)
Sleep quality unpredictable (19)	57.12(31.85)	48.59(31.61)	46.92(30.38)
Unable to manage consequences of poor sleep (20)	39.98(26.76)	39.49(29.92)	36.05(24.93)
No control of nocturnal thoughts (22)	51.28(28.95)	30.85(27.99)	42.47(31.72)
Can lead satisfactory life despite insomnia (23)	43.21(29.59)	55.25(29.50)	51.54(29.90)
Insomnia destroying entire life (25)	23.07(20.21)	28.54(26.35)	32.29(26.76)
Sleep problem hopeless and uncontrollable (26)	16.88(16.57)	14.59(15.72)	19.27(20.28)
Theme 3: ***Unrealistic sleep expectations***			
Need less sleep with aging (3)	32.21(21.56)	25.34(24.06)	30.14(24.98)
Need 8 hour of sleep to function (1)	66.05(24.67)	73.07(25.67)	63.36(27.02)
Should sleep as well as partner (13)	28.47(28.98)	29.69(28.86)	37.81(28.65)
Theme 4: ***Misconceptions about the causes of insomnia***			
Insomnia is due to aging (14)	18.55(17.16)	34.95(30.26)	30.81(25.41)
Insomnia is due to chemical imbalance (24)	34.50(22.06)	45.17(31.39)	43.98(27.64)
Theme 5: ***Faulty beliefs about sleep-promoting practices***			
Need to catch up on sleep loss (2)	54.76(30.60)	58.24(31.90)	57.02(32.32)
More time in bed ensures more sleep (6)	49.86(26.90)	64.63(28.71)	56.27(30.89)
Trying harder will lead to sleep (7)	41.16(28.80)	56.86(29.11)	46.95(26.63)
Earlier bedtime is necessary with aging (9)	28.29(23.44)	32.59(27.44)	31.66(23.67)
Sleeping pills needed for next-day alertness (11)	18.78(22.92)	15.31(17.26)	19.27(20.86)
Alcohol is solution for insomnia (27)	20.52(21.99)	22.17(24.27)	26.83(25.51)
Medication cures insomnia (28)	12.34(14.14)	11.58(11.62)	14.93(15.89)
Fear of dying during sleep (15)	14.10(19.86)	19.71(22.58)	20.17(23.37)

Note. Items have been grouped into themes. Theme groups adapted from "Dysfunctional Beliefs and Attitudes About Sleep Among Older Adults With and Without Insomnia Complaints," by C. M. Morin, J. Stone, D. Trinkle, J. Mercer, and S. Remsberg, 1993, Psychology and Aging, 8, p.465. Copyright 1993 by the American Psychological Association. Item numbers are shown in brackets.

Table 10 presents summary of the mean scores of the individual themes by ethnicity. These thematic means were entered in the multivariate analysis of variance analysis as dependent variables.

Table 10: Mean scores for the DBAS themes by ethnicity

				95% CI	
Dependent Variable	Ethnic group	*M*	SD	LL	UL
Misattributions of consequences of Insomnia	CAA	282.47	101.52	255.77	309.16
	BZW	286.59	118.57	255.70	317.49
	BGH	287.90	103.48	260.93	314.87
Diminished perceptions of control and predictability of sleep	CAA	256.19	115.38	225.85	286.53
	BZW	230.11	116.69	201.37	259.58
	BGH	249.83	132.97	215.18	284.48
Unrealistic sleep expectations	CAA	126.72	47.86	114.14	139.31
	BZW	128.10	44.15	116.60	139.61
	BGH	131.31	47.71	118.87	143.74
Misconceptions about causes of insomnia	CAA	53.05	30.09	45.14	60.96
	BZW	80.12	49.12	67.32	92.92
	BGH	74.80	40.96	64.12	85.47
Faulty beliefs about sleep promoting practices	CAA	239.81	95.55	214.69	264.93
	BZW	281.08	101.56	254.62	307.55
	BGH	273.10	98.84	247.34	298.86

Note. CAA = Caucasian Australian. BZW = Black Zimbabweans. BGH = Black Ghanaians. LL = Lower Limit. UL = Upper Limit. CI = Confidence Interval

A 3 x 2 between-groups MANOVA was performed to investigate ethnic and gender differences in beliefs and attitudes about sleep. The five themes; *misattributions of consequences of Insomnia, diminished perceptions of control and predictability of sleep, unrealistic sleep expectations, misconceptions about causes of insomnia*, and *faulty beliefs about sleep promoting practices*, of the DBAS were entered in the analysis as dependent variables with ethnicity and gender as the two fixed factors.

Preliminary assumption testing was conducted to check for normality, linearity, as well as multicollinearity and no serious violations of these assumptions were noted. A linear regression was also done to check for the presence of outliers in the data. A maximum value from the analysis output, Mahalanobis Distance of 22.92 was found which exceeded the critical value of 20.52 (see Pallant, 2007, p. 280) recommended for running a MANOVA with five dependent variables. Such a Mahalanobis value indicated the presence of outliers in the data. An inspection of the data revealed that there were two cases whose value slightly exceeded the recommended critical value; ID 2003 (value 21.37) and ID 2011 (value 22.92), but the difference between these scores and the critical value was not extreme. A decision was taken to leave the two cases in the analysis (see Tabachnick & Fidell, 2007, p. 77).

Levene's test of equality of error variances was significant for the *misconceptions about causes of insomnia* a theme F (5, 170) = 2.42, p = .04 indicating a violation of the assumption of homogeneity of variance on this variable. In addition, the Box's M Test of equality of covariance matrices was significant, .011, indicating that the data violated the assumption of homogeneity of variance-covariance matrices. However, Tabachnick & Fidell (2007, p. 252) recommend that, if sample sizes are equal, robustness of significance

tests is expected and thus one can disregard the outcome of Box's *M* test which is a notoriously sensitive test of variance-covariance matrices in SPSS. Given that the sample size of participants in the three cohorts was almost equal, the outcome of Box's *M* test and Levene's test (significant for one out of five dependent variables) were disregarded in the combined analysis of the dependent variables.

There was a statistically significant difference between ethnic groups on the five combined DBAS themes; F (10, 332) = 2.65, p = .004; Wilks' Lambda = .86; partial eta squared = .07 (large effect). No statistically significant difference was found for gender on the combined variables, F (5, 166) = .55, p = .74; Wilks' Lambda = .98. However, there was a significant group by gender interaction on the combined variables, F (10, 332) = 3.45, p = .000; Wilks' Lambda = .82; partial eta squared = .09 (large effect).

When the results of the dependent variables were considered separately for group, the only variable to reach statistical significant difference, was *misconceptions about causes of insomnia*, F (2, 170) = 6.74, p = .002; partial eta squared = .07. Post-hoc comparison using Tukey HSD revealed that BZW and BGH participants were more likely to express dysfunctional views on the *misconceptions about causes of insomnia* theme than CAA. Table 11 presents the results of the post-hoc analysis.

Table 11: Tukey HSD post-hoc between-groups comparisons on the DBAS misconceptions about causes of insomnia theme by ethnicity

(I) Ethnic group	(J) Ethnic group	Mean Difference (I-J)	Std. Error	95% CI	
				LL	UL
CAA	BZW	-27.07*	7.60	-45.44	-8.69
BZW	BGH	5.32	7.57	-12.97	23.62
BGH	CAA	21.74*	7.60	3.37	40.12

Note. Group differences are based on observed means. CAA = Caucasian Australians. BZW = Black Zimbabweans. BGH = Black Ghanaian. LL = Lower Limit. UL = Upper Limit. CI = Confidence Interval. Bonferroni adjustment applied in this analysis.

* The mean difference is significant at the <.05 level.

Further examination of the group by gender interaction revealed statistically significant differences on the *misattributions of consequences of insomnia* theme, F (2, 170) = 4.32, p = .02; partial eta squared = .05; and *diminished perceptions of control and predictability of sleep*, F (2, 170) = 4.18, p = .02; partial eta squared = .05. Table 12 presents a summary of mean scores of male and female participants on individual items of the two DBAS themes where significant ethnic group, or group by gender, differences were found. (For a full distribution of mean scores for all individual items of the DBAS, refer to Appendix O).

Table 12: Mean scores and standard deviation of items on the misattribution of consequences of insomnia and diminished perceptions of control and diminished perceptions of control and predictability of sleep

Themes and Items	Ethnicity											
	CAA				BZW				BGH			
	Male		Female		Male		Female		Male		Female	
	M	SD	*M*	SD	*M*	SD	*M*	SD	*M*	SD	*M*	SD
Theme 1*: Misattributions of consequences of Insomnia*												
Sleep loss may cause " nervous breakdown"(4)	31.35	31.34	28.09	24.07	40.72	33.73	46.50	34.31	41.97	31.95	36.00	31.29
Insomnia seriously affects physical health (5)	52.43	34.08	45.86	35.26	54.10	35.93	75.20	26.23	74.52	17.63	54.90	33.21
Poor sleep interferes with daily activity (10)	63.39	31.52	66.91	23.85	57.17	30.65	69.63	26.51	68.45	23.89	58.47	27.16
Poor sleep disturbs mood (12)	39.57	29.20	50.51	28.19	37.14	31.34	36.10	31.84	41.03	24.95	41.23	27.82
Cannot function without adequate sleep (18)	34.83	23.64	38.77	21.53	30.69	28.02	42.00	30.93	40.69	26.76	25.93	20.58
Lack of energy is always due to poor sleep (21)	50.74	28.79	59.00	23.40	37.07	26.73	45.87	30.51	49.41	28.97	44.13	24.66
Theme 2: *Diminished perceptions of control and predictability of sleep*												
Fear of losing control of sleep (8)	33.26	29.81	20.69	24.74	25.66	25.66	27.33	27.03	25.76	21.19	30.83	27.75
A bad night's sleep will follow a good one (16)	22.17	25.31	14.26	17.21	21.24	24.78	23.53	27.07	22.83	27.49	24.03	25.50
One poor night disturbs the whole week (17)	26.87	29.70	23.43	19.83	23.69	24.64	15.43	15.42	18.97	18.41	23.07	19.08
Sleep quality unpredictable (19)	68.57	26.98	49.60	32.90	47.86	31.10	49.30	32.62	38.41	29.83	55.13	29.07
Unable to manage consequences of poor sleep (20)	50.13	31.09	33.31	21.44	42.14	30.22	36.93	29.92	32.14	21.68	39.83	27.55
No control of nocturnal thoughts (22)	49.13	29.49	52.69	28.93	30.17	27.20	31.50	29.20	35.45	31.95	49.27	30.48
Can lead satisfactory life despite insomnia (23)	23.04	19.50	12.83	13.08	13.21	11.65	15.93	18.96	15.28	16.16	23.13	23.22
Insomnia destroying entire life (25)	41.96	34.51	44.03	26.38	56.31	30.76	54.23	28.71	49.62	30.29	53.40	29.92
Sleep problem hopeless and uncontrollable (26)	33.26	29.81	20.69	24.74	25.66	25.66	27.33	27.03	25.76	21.19	30.83	27.75

Figure 4 illustrates the interaction effects of Group*Gender on the *misattributions of consequences of insomnia* theme of the DBAS. The interaction appear to reflect the fact that BGH males held slightly higher dysfunctional beliefs on the *consequences of insomnia* theme compared to CAA and BZW male participants. In addition, BZW females held slightly higher dysfunctional beliefs on this theme compared to the CAA and BGH females. Overall, BZW male and BGH female participants held less dysfunctional beliefs on this theme.

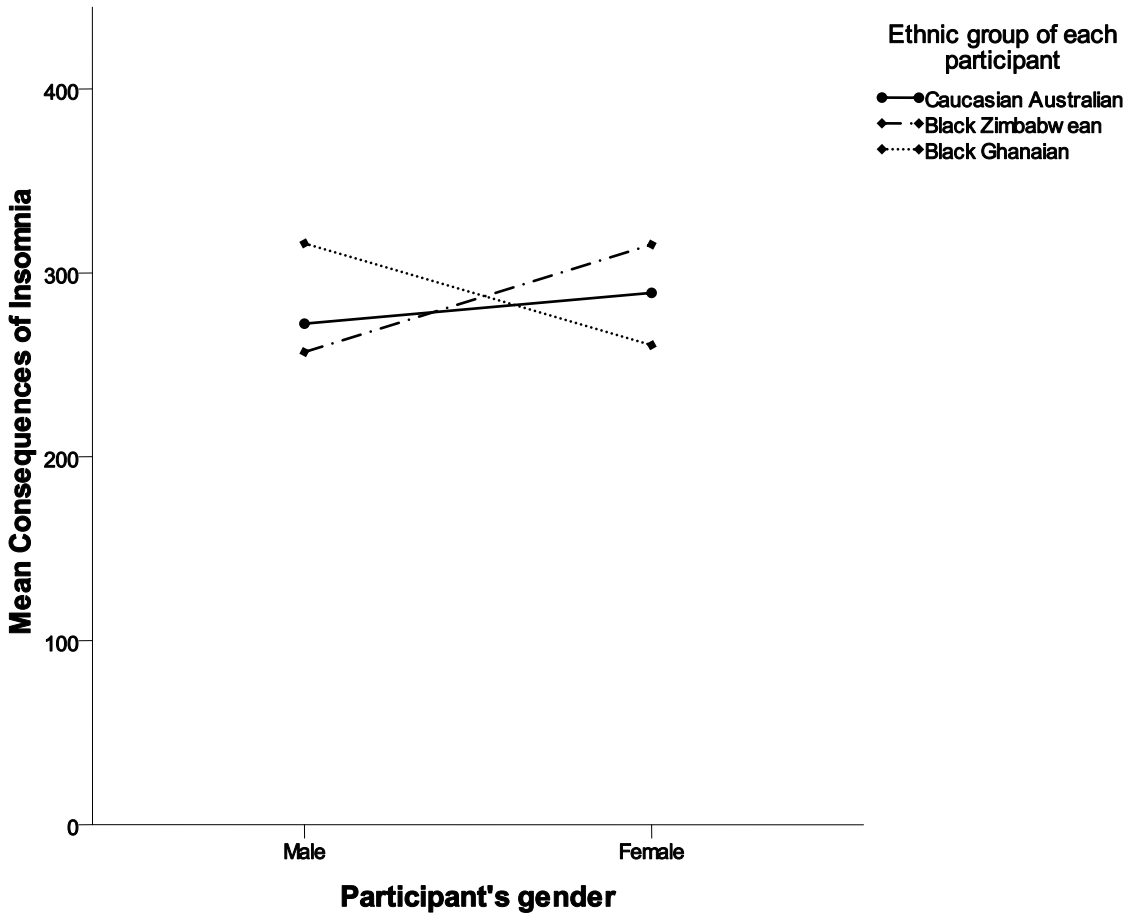

Figure 4: Mean scores illustrating the group by gender interaction effect on the DBAS misattributions of consequences of insomnia theme.

Figure 5 illustrates the interaction effects of Group*Gender on the *diminished perceptions of control and predictability of sleep* theme of the DBAS. The interactions appear to reflect the fact that CAA males strongly agreed with the dysfunctional views on the diminished perception of control and predictability of sleep, followed by BGH females. BZW females, CAA females, BGH males and BZW males had similar views on the control and predictability of sleep.

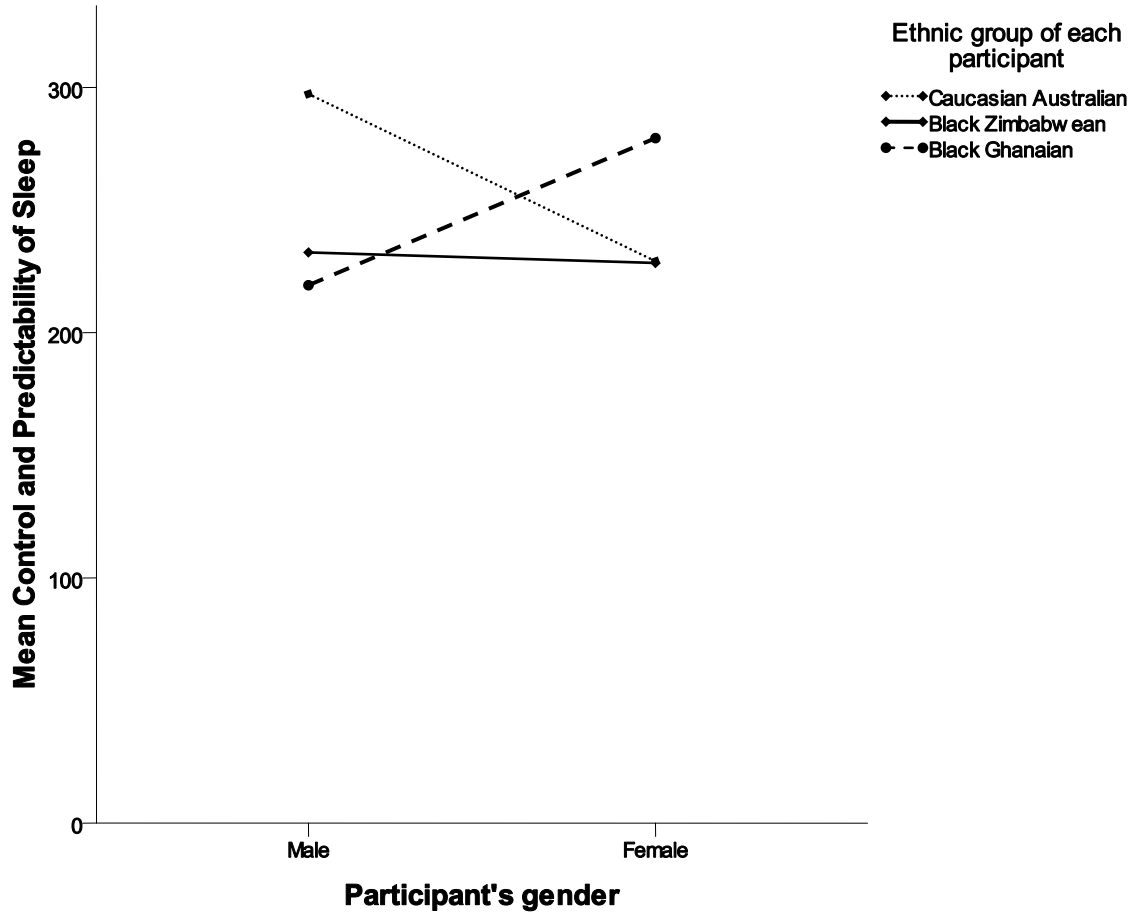

Figure 5: Mean scores illustrating the group by gender interaction effect on the DBAS diminished perceptions of control and predictability of sleep theme.

3.3.3 Theme 3: Health

3.3.3.1 Comparison of ethnic and gender differences on mental and physical health status (Hypotheses 4 and 5)

To investigate whether there were significant differences in health status among the three ethnic groups studied, three 2 x 3 ANOVA analyses were conducted. In the first analysis, the total score on the Addendum to the Pittsburgh Sleep Quality Index (PSQI-A) was entered in the analysis as a dependent variable, the Mental Health component score (MCS) of the SF-36 was the dependent variable in the second analysis, while the Physical Health component score (PCS) of the SF-36 was the dependent variable in the third analysis. Ethnicity and gender were used as independent variables in the analyses. Table 13 presents descriptive statistics on the three dependent variables.

Table 13: Descriptive statistics for the PSQI-A, MCS, and PCS by ethnicity and gender

Variable	Ethnicity					
	CAA		BZW		BGH	
	Male (n =23) *M*(SD)	Female (n = 35) *M*(SD)	Male (n = 29) *M*(SD)	Female (n =30) *M*(SD)	Male (n = 29) *M*(SD)	Female (n = 30) *M*(SD)
PSQI-A	1.57(1.73)	2.86(3.75)	3.00(4.14)	2.40(2.75)	2.17(2.00)	2.40(2.44)
MCS	45.81(8.47)	44.91(10.80)	49.79(10.63)	49.60(8.24)	47.88(8.52)	45.92(10.27)
PCS	53.34(6.29)	54.51(6.57)	53.68(6.28)	51.58(5.92)	50.40(7.76)	53.16(7.31)

Note. On the PSQI-A higher scores indicate more problems. On the PCS and MCS higher scores indicate better health. PSQI-A = Addendum to the Pittsburgh Sleep Quality Index. MCS = Mental Health Component Score of the SF-36. PCS = Physical health component score of the SF-36. CAA = Caucasian Australian. BZW = Black Zimbabwean. BGH = Black Ghanaian. M = Mean score. SD = Standard Deviation.

3.3.3.2 Comparison of ethnic and gender differences on mental health status: PSQI-A Score

Before performing a 3 x 2 between-groups ANOVA on the total score on the PSQI-A, preliminary assumption testing of the data was conducted to check for normality, homogeneity of variance and linearity and there were no noted violations. Levene's test of equality of error variance was not significant F (5, 170) = 1.47, p = .20, indicating that the assumption of equality of variance was not violated.

The main effect that traumatic experience as measured on the PSQI-A varied by ethnicity was not statistically significant F (2, 170) = .45, p = .64. The mean scores of the participants on this variable are presented in Table 13. There were no statistically significant gender effects on traumatic experiences, F (1, 170) = .45, p = .50. In addition, there was no significant interaction effect between ethnicity and gender F (2, 170) = 1.43, p = .24.

3.3.3.3 Comparison of ethnic and gender differences on mental health status: SF-36 mental health component score (MCS)

Before performing univariate ANOVA group comparisons on the MCS scores, preliminary assumption testing of the data was conducted to check for normality, linearity, and homogeneity of variance, and there were no violations noted. Levene's test of equality of error variance was not significant, F (5, 170) = 1.20, p = .31, indicating that the assumption of equality of variance was not violated.

A 3 x 2 between-group ANOVA was conducted to explore ethnic and gender effects on mental health status as measured by the SF-36 Health Survey. The mean scores of the participants on this variable are presented in Table 13. There was a statistically significant difference in MCS scores for the three groups: F (2, 170) = 2.99, p = .05. Despite reaching statistical significance, the actual difference between the groups was very small (partial eta squared .03). The interaction effect between group and gender was not statistically significant, F (2, 170) = .13, p = .88. The main effect for gender, F (1, 170) = .48, p = .49, did not reach statistical significance.

Post-hoc comparisons using the Tukey HSD test indicated that the mean score for CAA group differed significantly from that of the BZW group. Mean of the BGH group did not differ significantly from either the CAA or the BZW. The mean values show that the CAA achieved lower scores than the BZW with lower scores indicating more mental health problems. Table 14 presents the post-hoc comparisons of the three groups on the MCS.

Table 14: Tukey HSD post-hoc multiple group comparisons of differences between means on the MCS

				95% CI	
Ethnic group (I)	Ethnic group (J)	Mean Difference (I-J)	Std. Error	LL	UL
CAA	BZW	-4.42*	1.78	-8.63	-.21
BZW	BGH	2.80	1.77	-1.39	7.00
BGH	CAA	1.61	1.78	-2.60	5.83

Note. The differences have been calculated based on observed means. CI = Confidence Interval. LL = Lower Limit. UL = Upper Limit. CAA = Caucasian Australians. BZW = Black Zimbabwean. BGH = Black Ghanaian.

*. The mean difference is significant on the .05 level.

3.3.3.4 Comparison of ethnic and gender effects on physical health status: SF-36 physical health component score (PCS)

Before performing group comparisons on the physical health component scores, preliminary assumption testing of the data was conducted to check for normality, linearity, and homogeneity of variance, and there were no violations noted. Levene's test of equality of error variance was not significant, F (5, 170) = .97, p = .44, indicating that the assumption of equality of variance has not been violated.

A 3 x 2 between-groups ANOVA was conducted to explore the main effects of ethnicity and gender on physical health, as measured by the SF-36 Health Survey. The mean scores of the participants on this variable are presented in Table 13. There was no statistically significant ethnic differences on physical health: F (2, 170) = 1.48, p = .23. In addition, gender differences in physical health status, F (1, 170) = .36, p = .55, did not reach statistical significance. The interaction effect of ethnicity and gender was not statistically significant: F (2, 170) = 2.00, p = .14.

3.4 Summary

Results of multivariate analyses revealed statistically significant differences among the three ethnic groups; CAA, BZW and BGH on the beliefs and attitudes about sleep variable, as measured by the DBAS. Zimbabwean and Ghanaian participants held more dysfunctional beliefs, particularly on the causes of insomnia theme of the DBAS, compared to CAA. Furthermore significant group-gender interaction effects were found on the consequences of insomnia and the control and predictability of insomnia themes of the DBAS. Further analyses revealed significant differences on mental health status with

CAA reporting slightly poor mental health compared to the immigrants. No statistically significant differences were found among the ethnic groups on sleep quality, daytime-sleepiness, as well as physical health status at the time of the study. However, there was a small gender effect on sleep quality. In addition, no significant gender effects were found on the daytime sleepiness, sleep quality, and health variables.

Chapter 4

Discussion

The current chapter presents the discussions of the main findings beginning with a brief summary of the study. The summary is followed by a discussion of the main findings, comments about the strengths and limitations of the present study, some methodology issues, as well as implications for practice. Finally, concluding remarks are offered to capture the substance and scope of what has been attempted in this research and recommendations are made for further research

4.1 Summary of the study

The purpose of the present study was to explore, through quantitative research, possible ethnic and gender differences in sleep quality, beliefs about sleep as well as mental and physical health, by analysing survey data of a cohort of adult community samples of Caucasian Australians (CAA), and immigrants from Zimbabwe (BZW) and Ghana (BGH) resident in Australia. Five specific hypotheses were formulated to provide guidance and scope to the investigation.

To explore group and gender differences on sleep, trauma, and health variables, inferential analyses were performed on quantitative data gathered using (a) the Pittsburgh Sleep Quality Index (PSQI) (subjective sleep quality), (b) the Epworth Sleepiness Scale (ESS) (daytime sleepiness), (c) the Dysfunctional Beliefs and Attitudes about Sleep (DBAS)

(beliefs and attitudes about sleep), (d) the Addendum to the PSQI (Disruptive Nocturnal Behaviours), and (e) the SF-36 Health Survey (physical and mental health).

4.2 Discussion of present findings

4.2.1 Comparison of group and gender on sleep quality – Hypothesis 1

It was predicted that significant group differences would be found in sleep quality among the groups with CAA enjoying better sleep quality compared to black Zimbabweans (BZW), and black Ghanaians (BGH). Furthermore, it was also predicted that females would experience poorer sleep quality compared to males. Contrary to these predictions, statistical analysis using the nonparametric Kruskal-Wallis Test on the total Global Pittsburgh Sleep Quality Index (GPSQI) revealed no statistically significant group differences on the subjective sleep quality variable. Participants in the present study were well matched with regard to age and sex and the groups were also well matched on educational level. All groups had a high percentage of people in professional occupations.

By comparison, ethnic studies in the United States and New Zealand have reported ethnic differences in sleep when socioeconomic and race variables were taken into account. In the US studies, African Americans (AA) were reported to have poorer sleep compared to Caucasian American (CA) (e.g., Durrence & Lichstein, 2006; Lichstein, Durrence, Taylor, Bush, & Riedel, 2003; Mezick, et al., 2008). Two New Zealand studies, reported that Maori had poorer sleep and daytime dysfunction compared to non- Maori and this was attributed to factors such as low socioeconomic status (SES) and high prevalence of shift work (e.g., Gander, Marshall, Harris, & Reid, 2005; Paine, et al., 2005).

In the present study, it is not possible to comment on the effect of SES on sleep as SES differences, as evidenced by educational level and occupation, were not evident across groups. In those US and New Zealand studies where ethnic differences in sleep quality were found SES was acknowledged as a possible confounding factor by the authors of those studies. The present finding is in agreement with (Roberts, et al., 2006), whose study of a cohort of 4175 adolescents and their caregivers found no significant ethnic differences in sleep (between European American (EA), African American (AA), and Mexican American (MA) groups). This finding also supported their hypothesis that observed ethnic differences in sleep were due primarily to the effects of status differences (e.g., age, socioeconomic status).

Multivariate analysis conducted on the seven component scores of the PSQI, revealed no significant group differences in sleep experiences among the CAA, BZW, and BGH participants. This finding (as with the GPSQI) is suggestive of a similarity in perception of sleep quality among the cohorts who participated in the present study. By contrast, a study of perceived sleep quality and daytime sleepiness conducted by Reid and Baker (2008) among university students in South Africa, found significant differences in perceived sleep quality between black students relative to white and Asian students and drew the conclusion that different cultures had different perceptions of sleep quality. However, it should be noted that SES was not considered in the Reid and Baker (2008) study.

Furthermore, a subtle statistically significant gender effect was found on the combined component scores of the PSQI (i.e. GPSQI). Female participants reported poorer sleep quality compared to male participants. This finding of poorer sleep quality among females

is consistent with findings reported in other studies (e.g., Baker, Wolfson, & Lee, 2009; Foley, et al., 1995; Lack, Miller, & Turner, 1988; Lichstein, et al., 2004; Roberts, et al., 2006).

In the present study the reported lack of significant differences in sleep quality across ethnic groups were found using data from self-report measures. Empirical evidence suggests that self-report data does not provide information on sleep stages and sleep architecture (Riedel & Lichstein, 1998) and subjective and objective sleep data have been shown not to correlate well (Lichstein, et al., 2004).

Researchers (e.g., Profant, et al., 2002) argue that when objective measures are used in assessing sleep quality they yield sleep stage differences across ethnic groups. For example, polysomnography (PSG) studies to compare sleep architecture between AA and CA (Profant, et al., 2002) found that AA slept longer but not as deeply compared to CA. Although findings from the present study show no differences in sleep quality between ethnic groups studied, there may still be differences in objectively-measured sleep architecture that do not impact on the perception of sleep quality.

4.2.2 Comparison of group and gender on daytime sleepiness – Hypothesis 2

In the present study, it was predicted that ethnic differences would be found on the daytime sleepiness variable with CAA reporting less daytime sleepiness compared to the BZW and BGH. This prediction was made based on findings (Rao, et al., 1999; Thomas, et al., 2006) that African Americans (AA) had poorer sleep quality compared to Caucasian Americans (CA), and poor sleep quality was linked to daytime sleepiness (Lichstein, et al., 2004).

Contrary to this prediction, the Kruskal-Wallis Test (for group) revealed no ethnic differences in daytime sleepiness among the participants in the present study. This finding also contradicts findings reported in the US (Sanford, et al., 2006) that AA had higher ESS scores compared to CA. Furthermore, a New Zealand study (Gander, et al., 2005) also found Maori had higher ESS scores. Possible explanations of the ethnic differences in ESS scores include prevalence of sleep disorders, overall health status, and work related risk factors such as shift work or unemployment (Gander, et al., 2005). Whilst work related risk factors and socioeconomic conditions were not considered in the present study, the three ethnic groups had good parity in terms of occupation and education. If daytime sleepiness varies as a function of SES, this cross-group parity in the current study may have contributed to the finding of no statistically significant group differences on the ESS scores.

Regarding gender effects on the ESS scores in the present study, the independent samples *t*-test revealed no statistically significant differences between males and females on this variable, a finding that is similar to that reported by Sandford et al (2006). The finding of no significant differences in daytime sleepiness between male and females was in keeping with that by Johns (2009) who asserted:

> *... it is not yet clear whether the ESS scores of normal subjects in other cultures are the same. ESS scores do not differ significantly between normal men and women (13), nor do they change much with age. About 10 – 20 percent of the general population have ESS scores > 10 (i.e. 11 +).*

Contrary to the present finding, two studies, one by Gander and colleagues (2005) and the cardiovascular health study (Whitney, et al., 1997), reported gender effects on ESS scores when factors such as body mass index (BMI), use of medication, use of alcohol, circumference of neck (for Maori participants) and socioeconomic factors were considered.

It is possible that one or more of these confounding factors, which were not part of the data that was collected for the present study, influenced those results. In the cardiovascular study, men had generally higher ESS scores than females and this was attributed to frequent awakenings, coughing, snoring, and leg cramps. Similarly, the study by Gander et al (2005) also reported higher ESS scores for male participants in their study relative to female.

4.2.3 Comparison of group and gender on beliefs about sleep – Hypothesis 3

The present study predicted that ethnic groups would differ in their beliefs and attitudes about sleep. Caucasian Australians (CAA) were expected to have fewer dysfunctional beliefs about sleep compared to their African counterparts. The direction of this prediction was influenced by findings by Rao et al (1999) who reported differences in sleep between Caucasian Americans (CA) and African Americans (AA) and the assumed link between poorer sleep and dysfunctional beliefs about sleep (Morin, et al., 1993).

Findings of the present study indicate existence of variations in beliefs and attitudes about sleep among the three ethnic groups. When scores on the DBAS themes were pooled, MANOVA analysis revealed group differences in beliefs and attitudes about sleep. Of the five themes, *the misconception about the causes of insomnia* discriminated best between the ethnic groups. Post-hoc comparisons on this theme revealed that BZW held stronger dysfunctional beliefs (strongly agreed with the statements that insomnia was due to aging [item 14] and that insomnia was due to chemical imbalance [item 24]) compared to CAA and BGH.

Furthermore, the present study found group by gender interaction effects on the DBAS themes. These statistically significant interaction effects were on the *misattributions about the consequences of insomnia* and the *diminished perception of control and predictability of sleep* themes. The *misattribution of the consequences of insomnia* theme has six items. BZW female participants endorsed stronger agreement with dysfunctional beliefs and attitudes about sleep relative to other participants. Out of the six items on this theme, BZW females endorsed strong agreement that a) sleep loss may cause nervous breakdown (item 4), b) insomnia affects physical health (item 5), and c) one cannot function without adequate sleep (item 18) relative to other participants. On the other hand, CAA female participants endorsed stronger agreement with statements; a) poor sleep disturbs mood (item 12), and (b) lack of energy is always due to poor sleep (item 21) compared to other participants.

On the *diminished perception of control and predictability of sleep* theme, CAA male participants endorsed stronger dysfunctional beliefs and attitudes about sleep relative to other participants. They endorsed strong agreement with four out of nine items on this theme. They agreed more with beliefs that (a) they feared losing control of sleep (item 8), (b) one poor night's sleep disturbs the whole week (item 17), (c) sleep quality was unpredictable (item 19), as well as that (d) they would not be able to manage consequences of poor sleep (item 20). BGH females endorsed a slightly strong agreement with the dysfunctional belief that their sleep was getting worse and that nobody would help (item 26). On the other hand, BZW males endorsed stronger agreement with the statement that "I feel insomnia is ruining my ability to enjoy life and prevents me from doing what I want" (item 25). CAA females on the other hand endorsed stronger agreement with the statement

that “I get overwhelmed by my thoughts at night and often feel I have no control over this racing mind” (item 22).

Findings of group differences and group by gender interaction effects in beliefs about sleep should be considered as an initial step for a more rigorous investigation of ethnic influences on beliefs about sleep in Australia. Given that ethnicity is associated with health outcomes, cross-ethnic variations in sleep belief profiles have potential implications for the treatment of insomnia and psychological illnesses such as depression in patients of different ethnic backgrounds (Thase, 1998). For example, the CBT treatment of insomnia includes a focus on tackling dysfunctional beliefs about sleep and this aspect may need particular emphasis in group or individual treatments of insomnia with relevant ethnic minorities.

4.2.4 Comparison of group and gender on mental health status – Hypothesis 4

In the present study, the first prediction was that statistically significant differences in mental health status (as measured by the SF-36) would be found, with the CAA having fewer mental health problems. The prediction was made against the black participants on the basis of research evidence suggesting a link between migration and poor mental health (e.g., Cernovsky, 1990; Voss & Tuin, 2008a), existence of elevated levels of psychological distress in new migrants (Markovizky & Samid, 2008; Ponizovsky, et al., 2000), and the association between poor mental health and poor sleep (Hamilton, et al., 2007). (Note that this hypothesis was formulated in the context that CAA were hypothesized to have better sleep quality than the two black groups.)

Contrary to this prediction, the present study found statistically significant differences in mental health with CAA reporting poorer mental health relative to both BZW and BGH participants. An inspection of the self-reported demographic characteristics revealed that 10 CAA participants (17 %) were not working at the time of the study. Seven of these participants were female full time university students; one male was retired and two other male participants were TAFE graduates actively seeking work. It is possible that stress arising out of academic demands and looking for work may have had a confounding effect on the mental health status of CAA participants (e.g., LeBlanc, et al., 2007). On the other hand, it may also be likely that the black groups had better mental health compared to their Caucasian counterparts because they felt more part of a tight, supportive (immigrant) community (Voss & Tuin, 2008a).

The second prediction regarding finding group differences in mental health status was influenced by outcomes of studies reported in the literature that suggested an association between Post Traumatic Stress Disorder (PTSD) and sleep (Harvey, et al., 2003; Krakow, et al., 2001; Sheikh, et al., 2003). In the present study, this variable was included to investigate whether traumatic experience had confounding effects on sleep, particularly for the immigrants from Zimbabwe.

Univariate ANOVA analysis on the trauma variable (PSQI-A) revealed no statistically significant group and gender effects. This finding negates the earlier speculation made in relation to immigrant participants, in particular BZW participants who it was assumed would report higher traumatic experience due to exposure to political violence in their country of origin. However, the present finding may suggest that BZW participants had coping skills and resilience, which protected them against the psychological effects of

political violence and economic upheavals in their country of origin, or that the BZW immigrants were a selected population who were less exposed to such traumas. Zimbabweans had been resident in Australia for an average of 4-years (7 years for Ghanaians) and it is not immediately clear whether the period of stay had any effect on their adjustment and hence their ability to cope with possible traumatic experiences. In addition, the present data did not solicit information regarding exposure to trauma, apart from the few disruptive nocturnal behaviours measured by the PSQI-A and so inferences about existence of traumatic experiences or lack thereof cannot be successfully made on basis of the present data.

4.2.5 Comparison of group and gender on physical health status – Hypothesis 5

In the present study, it was predicted that there would be no differences in physical health among the three ethnic groups. This prediction was made based on evidence that immigrants to Australia are required to pass rigorous health checks prior to being accepted. Physical health status of participants was evaluated in the present study, considering that physical health and sleep are interlinked.

Univariate ANOVA analysis on the physical health scores on the SF-36 revealed neither group nor gender differences on physical health status. Thus physical health had no confounding effect on the outcomes of the present study. Comparison of this finding with other research investigating differences in physical health status between immigrant and non-immigrant populations is not possible because of the general lack of literature in this area and the likely large differences as a function of the particular circumstances of different immigrant groups (e.g. malnourishment, exposure to serious health risks etc).

4.3 Strengths and limitations of the present study

4.3.1 Overall design of the research

This study was an exploratory investigation of sleep quality and beliefs about sleep among a non-clinical sample of participants. The foremost strength of this research was its multi-dimensional exploration of the phenomena of sleep quality as well as beliefs and attitudes about sleep among ethnic minorities. Research evidence suggests that comparison of sleep differences between ethnic groups is under researched (Durrence & Lichstein, 2006) and by conducting this exploratory study, the goal of adding to the knowledge on the subject was achieved. The present design achieved its purpose of collecting sufficient data from a community sample of participants to explore differences based on retrospective data, however, future studies should integrate the use of retrospective methods with focus groups to get better range and depth of information. Another strength of the present design was that the groups were quite well matched on age, gender, and educational level. Studies with a wider range of SES across all ethnic groups would allow for further exploration of possible interaction effect between SES and ethnicity.

4.3.2 Immigrant participants

Immigrants who participated in the present study were all from former British colonies; and were mostly from the main cities (which may be considered to be more affluent) with a higher level of education. Higher educational level is associated with better lifestyles due to easier access to better job opportunities and resources. The present study found no statistically significant differences on three of the research hypotheses (i.e., sleep quality, physical health, and daytime sleepiness among the ethnic groups). In addition, the finding of no differences in sleep quality could be attributed to the fact that immigrant participants

enjoyed similar lifestyles to the CAA, worked similar hours, worked in professional jobs, and reported similar physical health at the time of the study.

4.3.3 Methodological and sampling issues

The present study relied on self-administered surveys where participants were required to retrospectively report on their typical sleep. Previous studies have reported that this method is problematic (Riedel & Lichstein, 1998) with other researchers reporting that the use of self-report measures limited generalizability of findings because retrospective reports are not as accurate as prospective reports such as sleep diaries (Ellis, et al., 2007; Jansson & Linton, 2007; Laessle, Tuschl, Schweiger, & Pirke, 1990). Some of the identified problems include error of recall of information (particularly if there was no motivation for the participants to keep information) and a tendency to over-estimate symptoms relative to more prospective methods of data collection such as sleep diaries (Lichstein, et al., 2004). This methodological disadvantage may have affected absolute values achieved in the questionnaires but would only affect the group comparisons if such over-estimations were more prevalent in some ethnic groups than others. In addition to the above limitations, questionnaire-based studies may have relatively low response rates, which may create bias. It can be argued that in a sleep survey (e.g., the present study), people who have a sleep problem are more likely to respond to a questionnaire about sleep. This would apply to all three groups studied so would not be expected to affect examination of differences, although it would limit conclusions about prevalence rates.

While the snowballing strategy is ideal for recruiting minority samples, the technique results in samples of questionable representativeness (Schofield, 2004). In the present study, the researcher could not employ any strategies to reduce bias (e.g., chain referral of

participants) due to use of executives of community groups (Zimbabwean and Ghana Associations for the BZW and BGH participants respectively) in the recruitment process. Similarly, comparison of study sample with census data (Australian Bureau of Statistics, 2008) for the Victorian population showed an over-representation of overseas born, tertiary educated, and managerial or professional participants (see section 3.2, Table 7). Although the sampling method used in the present study may limit the generalizability of the findings, the study yielded adequate and well-matched data across groups that to date have received no similar empirical inquiry in Australia.

It must also be clearly recognized that the BZW and BGH groups are highly selected immigrant groups (due to Australian government migration criteria) and that their data are unlikely to be generalizable to the populations of their home countries. It is possible that the black participants were very good at adapting to their new immigrant life in Australia, and this idea is supported by the immigrants' above average professional status. A worthwhile avenue for future research would be to compare sleep quality in immigrant populations to that of populations in their home countries.

4.3.4 About measures used in the study

Instruments used to measure the constructs were all developed and normed in the USA, predominantly with a Caucasian sample. One disadvantage for using the measures with immigrant participants in the present study was that the measures (e.g., the PSQI) have not been normed with an African population except in two exploratory studies (reviewed in the Introduction) found in South Africa (Reid & Baker, 2008) and Nigeria (Aloba, et al., 2007). Ethnic comparison studies between Caucasian Americans and African Americans

in the US, found subtle differences in sleep using these measures (e.g., Durrence & Lichstein, 2006; Lichstein, et al., 2004).

4.4 Answer to the research question

In the statement of the problem section of the present study, the author posed the following question: Does ethnicity affect people's perception of sleep quality; their beliefs, and attitudes about sleep; and/or daytime sleepiness? The present study, found no group differences on self-reported sleep quality, daytime sleepiness, and physical health.

Although findings from the present study show no differences in sleep quality between ethnic groups studied, there may still be differences in objectively-measured sleep architecture that do not impact on the perception of sleep quality. This study was unique because, unlike other studies of ethnic differences in sleep, there was no SES difference between groups. All groups in the current study were of a higher than average SES for the overall Australian population. Other studies comparing blacks and Caucasians in the USA have all been confounded by SES differences, which have been controlled statistically.

The present study found significant group differences on beliefs and attitudes about sleep. We can only assume, given the limited scope of the present study that the beliefs and attitudes expressed by the BZW and BGH immigrants come from their homelands. The observations by Aloba et al (2007) as well as by Reid & Baker (2008) regarding shortage of qualified personnel to assess sleep lends to speculation that such phenomena was likely to be presented to primary health care workers for intervention, with the assumption that the sleep problems are physical ailments. It seems likely that migration to Australia did not in fact change BZW and BGH participants' beliefs about sleep.

4.5 Implications for clinical practice

The key finding of significant differences in beliefs about sleep has potential implications for clinical practice. Existence of cross-ethnic variations in sleep beliefs could, at a clinical level, be used to develop treatment guidelines for interventions with specific ethnic groups. Ethnic specific treatment guidelines enhance service delivery and encourage treatment compliance (Rao, et al., 1999). From the findings of the present study, it can be argued that treatment guidelines could be developed that better meets the needs of new or recent immigrants given that they come with a different set of beliefs and value systems and for some, potentially traumatic experiences, driving their migration when they engage with the health system.

However, there are three points in relation to this that make caution important. One is that we do not know if the current findings on sleep beliefs can be generalized to other black African immigrant groups, the second is that we do not know if the current findings can be generalized to black people in their African countries of origin, and third, whether generalizations across sub-Saharan Africa populations may apply. All these points require further research and need to be kept in mind in relation to the discussion below. Awareness about sleep and sleep disorders may be low in the black African immigrant population as shown by the greater endorsement by the blacks in this study of dysfunctional beliefs such that insomnia is due to aging (DBAS item 14) or that insomnia is due to chemical imbalance (DBAS item 24). Given these differences in beliefs, health education targeting black African immigrants with more emphasis placed on the link between sleep and psychological problems may be helpful.

Revelations about lack of qualified personnel in sleep and limited knowledge about sleep disorders (Aloba, et al., 2007; Reid & Baker, 2008) raise speculation about the understandings of psychological phenomena in sub-Saharan Africa. Based on this research evidence, it is highly likely that some phenomena with psychological components, like poor sleep, are presented primarily (or solely) as physical health problems at African primary care health centres. Research evidence suggests that some ethnic groups "somatise" psychological problems (Vega & Rumbaut, 1991). Therefore, one goal of the education program would be to address somatisation of psychological problems (Vega & Rumbaut, 1991) as well as the effects of medication use on sleep.

Furthermore, the present finding of differences in beliefs about sleep suggests that successful intervention with ethnic minorities should attempt to address these more dysfunctional beliefs particularly about the causes and consequences of insomnia. From available intervention studies as reviewed in the introductory chapter, there is compelling evidence showing the efficacy of cognitive-behavioural strategies such as psychoeducation, cognitive restructuring and behavioural experiments in treating sleep-related beliefs (Harvey, 2002; Morin, et al., 2002).

4.5 Conclusions and Future Research

The key finding in the present investigation was the existence of between-group differences and group by gender interactions in beliefs about sleep among the three ethnic groups. This finding suggests that comparative studies on the efficacy of cognitive behavioural approaches in the treatment of dysfunctional beliefs about sleep in ethnic minorities may be an important area for future cross-cultural research. For example in

CBT groups with black Africans it is possible that more focus be directed on cognitive dysfunctional beliefs that may be perpetuating poor sleep than in groups with all Caucasian patients. Further research is needed to replicate this finding with a larger sample, including different African ethnic groups as well as immigrants and non-immigrants. This is especially important given the role of dysfunctional beliefs about sleep in perpetuating poor sleep and the implications of poor sleep quality on mood, quality of life and daytime functioning (Morin, et al., 1993).

As has been mentioned in the review of literature, the link between sleep and genetics has become a topical area in sleep research. Genetic studies reviewed by Hamet & Tremblay (2006) have demonstrated a link between genetic factors and the development of sleep disorders such as narcolepsy, sleep apnoea, insomnia, and delayed sleep phase syndrome (see Hamet & Tremblay, 2006 for a review of studies on genetic factors and sleep disorders).

Researchers have postulated that there is a possibility that genetic factors, in concert with socio-cultural forces, may determine sleep regulation in different ethnic groups Partinen et al., 1981 (as cited by Rao, et al., 1999). A key finding of the current study, that there was no difference in reported sleep quality or daytime sleepiness between the different ethnic groups studied, provides no support for the idea that genetic variations that affect sleep quality or sleepiness may exist across ethnic groups. The study of possible links between ethnicity, genetics and sleep is an area in its infancy and there are many questions that remain unexplored and unanswered. Even if this study had found differences in sleep quality and daytime sleepiness by ethnicity, it still would not mean that these differences were necessarily due to genetics.

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Appendices

Appendix A Victoria University Ethics Approval Memorandum

MEMO

TO	Prof. Dorothy Bruck School of Psychology St Albans Campus	DATE	20/03/2008
FROM	Dr. Harriet Speed Acting Chair Faculty of Arts, Education & Human Development Human Research Ethics Committee		
SUBJECT	Ethics Application – HRETH 07/225		

Dear Prof. Bruck,

Thank you for resubmitting this application for ethical approval of the project:

HRETH07/225 Differences in Sleep Quality, Sleep/Wake Behaviours, between Caucasian Australians and Immigrant Zimbabwean Adults in Australia

The proposed research project has been accepted by the Acting Chair, Arts, Education & Human Development Human Research Ethics Committee. Approval for this application has been granted from 20 March 2008 to 20 March 2010.

Please note that the Human Research Ethics Committee must be informed of the following: any changes to the approved research protocol, project timelines, any serious or unexpected adverse effects on participants, and unforeseen events that may effect continued ethical acceptability of the project. In these unlikely events, researchers must immediately cease all data collection until the Committee has approved the changes.

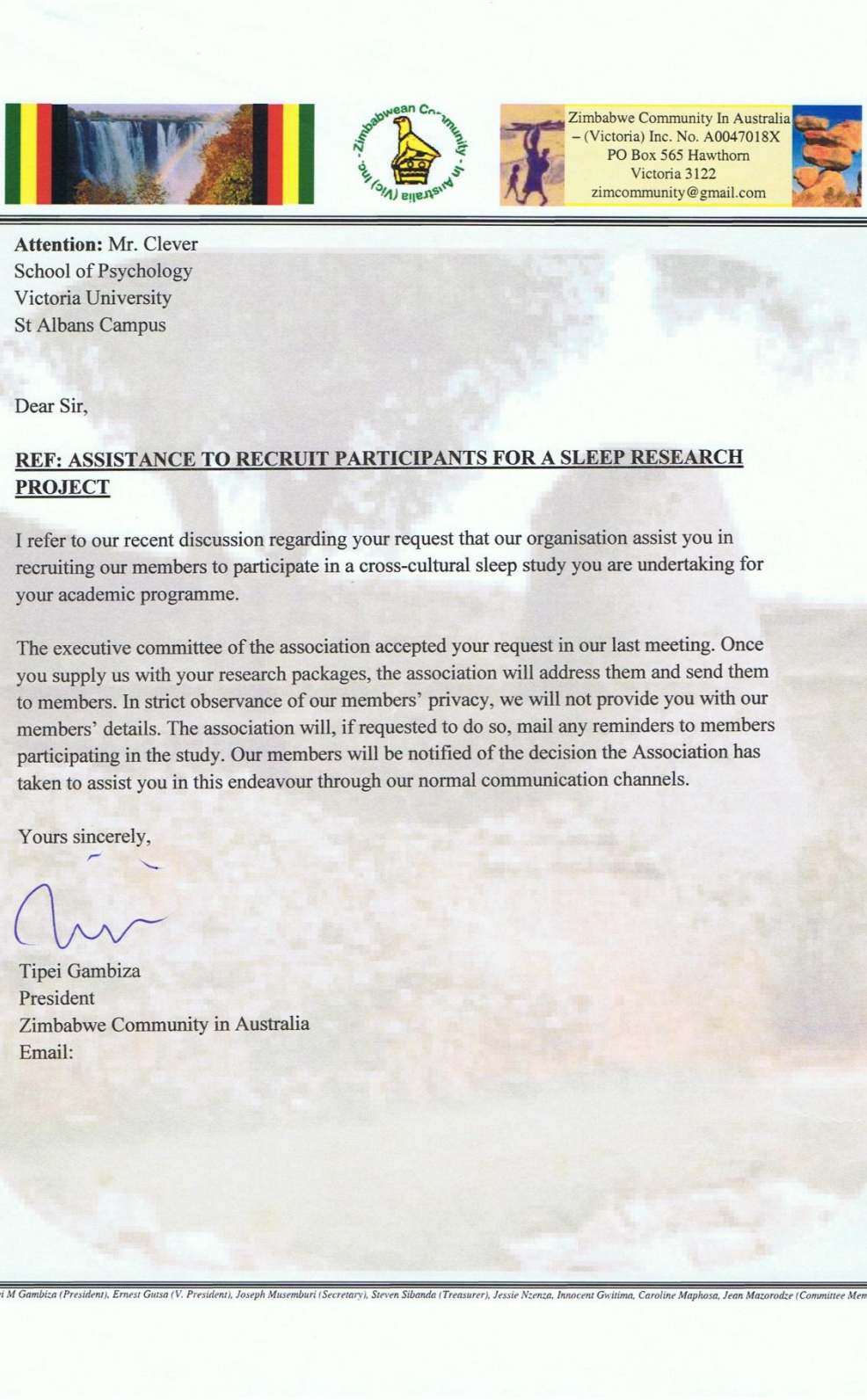
Continued approval of this research project by the Victoria University Human Research Ethics Committee (VUHREC) is conditional upon the provision of a report within 12 months of the above approval date (by **20 March 2009**) or upon the completion of the project (if earlier). A report proforma may be downloaded from the VUHREC web site at: http://research.vu.edu.au/hrec.php

If you have any queries, please do not hesitate to contact me on 9919 5412.

On behalf of the Committee, I wish you all the best for the conduct of the project.

Dr. Harriet Speed
Acting Chair
Faculty of Arts, Education & Human Development
Human Research Ethics Committee

Appendix B Letter of Support from the Zimbabwe Community (Victoria) Inc



Zimbabwe Community In Australia
– (Victoria) Inc. No. A0047018X
PO Box 565 Hawthorn
Victoria 3122
zimcommunity@gmail.com

Attention: Mr. Clever
School of Psychology
Victoria University
St Albans Campus

Dear Sir,

REF: ASSISTANCE TO RECRUIT PARTICIPANTS FOR A SLEEP RESEARCH PROJECT

I refer to our recent discussion regarding your request that our organisation assist you in recruiting our members to participate in a cross-cultural sleep study you are undertaking for your academic programme.

The executive committee of the association accepted your request in our last meeting. Once you supply us with your research packages, the association will address them and send them to members. In strict observance of our members' privacy, we will not provide you with our members' details. The association will, if requested to do so, mail any reminders to members participating in the study. Our members will be notified of the decision the Association has taken to assist you in this endeavour through our normal communication channels.

Yours sincerely,

Tipei Gambiza
President
Zimbabwe Community in Australia
Email:

Tipei M Gambiza (President), Ernest Gutsa (V. President), Joseph Musemburi (Secretary), Steven Sibanda (Treasurer), Jessie Nzenza, Innocent Gwitima, Caroline Maphosa, Jean Mazorodze (Committee Members)

Appendix C Letter of Support from the Ghana Association

Ghana Association of Victoria Inc
P.O. Box 470, Northcote Vic 3070
www.ghana.websyte.com.au

January 11, 2008

McLytton N. Clever
Doctoral Student-Clinical Psychology
Victoria University

Dear Sir,

The Ghana Association of Victoria is pleased to advise you that after consultation, and discussing the privacy issues we will distribute the research papers to our members on your behalf.

Regards

Jennifer Forson
Secretary
Ghana Association of Victoria
p/f 03 9747 63894
m 0414 482 650

Appendix D Recruitment letter

Dear Potential Participant,

I am writing this letter to invite you to participate in a sleep quality research project. I am carrying out this research as part of my Doctor of Psychology studies and am very keen to obtain a large enough number of completed questionnaires to make meaningful comparisons.

In this study, I have set out to explore links between ethnicity and sleep experiences especially the critical dimensions of sleep quality, attitudes, behaviours, and beliefs that may exist among samples of Caucasian, Zimbabwean, and Ghanaian adults. Data from the completed questionnaires will be used to build a clearer picture of whether ethnicity influences sleep experiences.

A plain language statement titled '**Information for Participants**' has been included with this research package. It will describe the purpose of this project, and provide information about issues of privacy and confidentiality. Your participation in this study is voluntary, but would be greatly appreciated. Please try to complete this package **within** seven (7) days and post it in the reply paid envelope.

Also enclosed at the end of this package is a flyer titled '**Volunteers Wanted**'. I am asking you to help distribute this flyer to your acquaintances who may be willing to participate in this study. Research packages can be ordered directly from me by emailing mclytton.clever@research.vu.edu.au or through the Ghana Association Victoria or Zimbabwean Community in Victoria.

The Victoria University Human Research Ethics Committee (VUHREC) has approved this project. Please contact me if you would like to discuss aspects of the project or your involvement.

Yours sincerely,

McLytton N. Clever
Doctoral Student
Victoria University
mclytton.clever@research.vu.edu.au

Professor Dorothy Bruck
Principal Researcher
Victoria University
Tel.: (03) 9919 2158

Appendix E Information for Participants

Information for Participants

Project title: Sleep quality, beliefs and attitudes about sleep: A comparison of Caucasian Australian, Zimbabwean and Ghanaian black immigrants resident in Australia

Introduction

At Victoria University, our research team has been looking at the question of whether there are any significant cross-cultural differences in sleep quality, sleep/wake behaviours, and beliefs between a sample of Caucasian Australians and immigrant Zimbabwean adults. This issue is currently unexplored. We are pursuing this study in an effort to establish whether there are any significant differences in sleep quality and sleep related behaviours between Caucasian and immigrant Africans. We are aware that the Caucasians represent the mainstream majority of the population of Australia and intervention measures in sleep disorders are normed on the mainstream standards. However, the growing number of African immigrants in the Australian society presents us with an opportunity to investigate and understand sleep beliefs, attitudes, and values from different cultural groupings. Findings of this study will inform future development of intervention to improve sleep quality, and general psychological well-being of immigrant minorities. We are also interested in learning of any cultural differences in sleep practices or attitudes.

Selection Criteria

For this project we need volunteers who meet our selection criteria:

1. Be aged 18+
2. For the black Zimbabwean and Ghanaian immigrants, they should have been resident in Australia for less than15 years and were over 15 years of age when they migrated
3. For Caucasian Australians, they should have been born either in Australia or in a developed Western country (e.g., Britain, USA, Canada) and have been an Australian resident for at least 15 years.

Procedure

In this study we will be asking volunteers to complete a series of questionnaires (self-report measures) most of which ask for information about individual experiences and

thoughts regarding sleep or health. Volunteers will complete a number of questionnaires, which will take up to 50 minutes. Please answer the questions as honestly as you can. Do not dwell too long on any question, as we are most interested in your first response.

Confidentiality

As a protection of your confidentiality, the researchers will not collect any identification details. No individual data will be reported in any way as to allow for any possible identification of any participant. The data will be kept securely in the School of Psychology for five years from the date of publication, before being destroyed.

Will participation prejudice me in any way?

Please be advised that your participation in this study is voluntary. Should you wish to withdraw at any stage you are free to do so without prejudice. Your decision to participate or not, or to withdraw, will be completely independent of any dealings with the researchers. If you do not wish to participate in this study, simply ignore this package.

Further Information

Should you require any further information, or have any concerns, please do not hesitate to contact either of the researchers on the numbers given below. Should you have any concerns about the conduct of the project, you are welcome to contact:

The Ethics Secretary
Victoria University Human Research Ethics Committee
Telephone: 9919 4148
Email: researchethics@vu.edu.au

Researchers contact details:

Professor Dorothy Bruck (Supervisor)
Principal Researcher
School of Psychology
Victoria University
Phone: (03) 9919 2158
Email: dorothy.bruck@vu.edu.au

McLytton N. Clever
Doctoral Student/ Researcher
School of Psychology
Victoria University
Email: mclytton.clever@students.vu.edu.au

Appendix F Flyer for recruiting more volunteers

VOLUNTEERS WANTED

RESEARCH TITLE: Sleep quality, beliefs and attitudes about sleep: A comparison of Caucasian Australian, Zimbabwean and Ghanaian immigrants resident in Australia

Our research team is looking for volunteers to participate in a study being conducted by the researchers below. This study is investigating differences in sleep quality, sleep/wake behaviours and beliefs between Caucasian, immigrant Zimbabwean, and immigrant Ghanaian adults in Australia. We are looking for volunteers both men and women aged from18 years and beyond. Volunteers will fill a series of questionnaires, which should take not longer than 50 minutes to complete. The Victoria University Human Research Ethics Committee has approved this study.

If you are interested, please contact the researchers for a research package:

Professor Dorothy Bruck
Principal Researcher
Phone: (03) 9919 2158
Email: dorothy.bruck@vu.edu.au

Mr. McLytton N. Clever
Doctoral Student/**Researcher**
Email: mclytton.clever@live.vu.edu.au

Appendix G Procedure for removal of participants from the study

Removal of participants

Step 1: Questionnaires from three female CAA participants (aged 60+) and one BZW female (70 years old) were excluded because they were no similar aged respondents in the other subsamples (males or BGH) to match with these respondents.

Step 2: Further exploration of Table 2 revealed overrepresentation and lack of cell balance of participant numbers in some age groups. Compared to BZW and BGH subsamples, there were more CAA participants, both male and female, in the 26 – 31, 41 – 50, and 51+ age groups. There were more Zimbabwean participants in the female (32 – 35 age group) and in the (26 – 31; 36 – 40; and 41 – 50) male age groups. For Ghanaian participants, there were more male participants in the 51+ age group as well as females in the 41 – 50 age group.

To achieve parity within these ages and gender groups for all subsamples, a decision was made to remove some participants to achieve more parity in the distribution of participants in all age groups prior to data analysis. Figure 6 and Figure 8 present distribution by age group, of female and male participants in the present study before removal of participants. Table 15 presents summary of participants whose data was removed from the study before data analysis.

Table 15: Summary of participants removed from final data analysis by ethnicity, gender and age group.

Ethnic Group	Gender	Age range	Participants Removed
CAA	F	26 – 31	6
	F	41 – 50	7
	F	51+	5
	F	60+	3
	M	51+	5
BZW	F	32 – 35	5
	F	70	1
	M	26 – 31	2
	M	36 – 40	5
	M	41 – 50	4
BGH	F	41 - 50	4
	M	51+	3

Note. CAA = Caucasian Australian. BZW = Black Zimbabweans. BGH = Black Ghanaians.

Removal procedure of cases from subsamples

In order to allow for a fair and objective removal of cases, a Random Sequence Generator[3] was used to generate random numbers (Table 20) based on the case identities allocated to the ethnic groups. Integer range, 1000 – 3100 (minimum to maximum), similar to Case IDs allocated to the CAA, BZW, and BGH groups was entered to generate random number sequence (see output in below). The output was colour-coded as follows: CAA cases yellow, BZW blue, and the BGH red. Case identity numbers targeted for removal in each age group for all ethnic groups were searched one at a time following the generating rule, i.e., numbers were generated across columns. The case identities were removed following the rule that the first number sequence to match with the case identity of a targeted

[3] Haahr, M. (1998 - 2009). Random.Org: True random number service Retrieved 16 December, 2009, fromhttp://www.random.org/sequences/?min1000&max2100&col=10&format=html&rnd=new

participant identity was removed first followed by all the subsequent matches until the target removals were achieved.

Table 16: Distribution of participants in the present study by ethnicity and age group (binned)

		Ethnic group of each participant			
		Caucasian Australian	Black Zimbabwean	Black Ghanaian	Total
Age in years (Binned)	18 - 25	10	8	8	26
	26 - 31	14	8	6	28
	32 - 35	4	9	4	17
	36 - 40	5	5	4	14
	41 - 50	12	4	10	26
	51+	8	2	3	13
	Total	53	36	35	124

Count: Gender (Female)

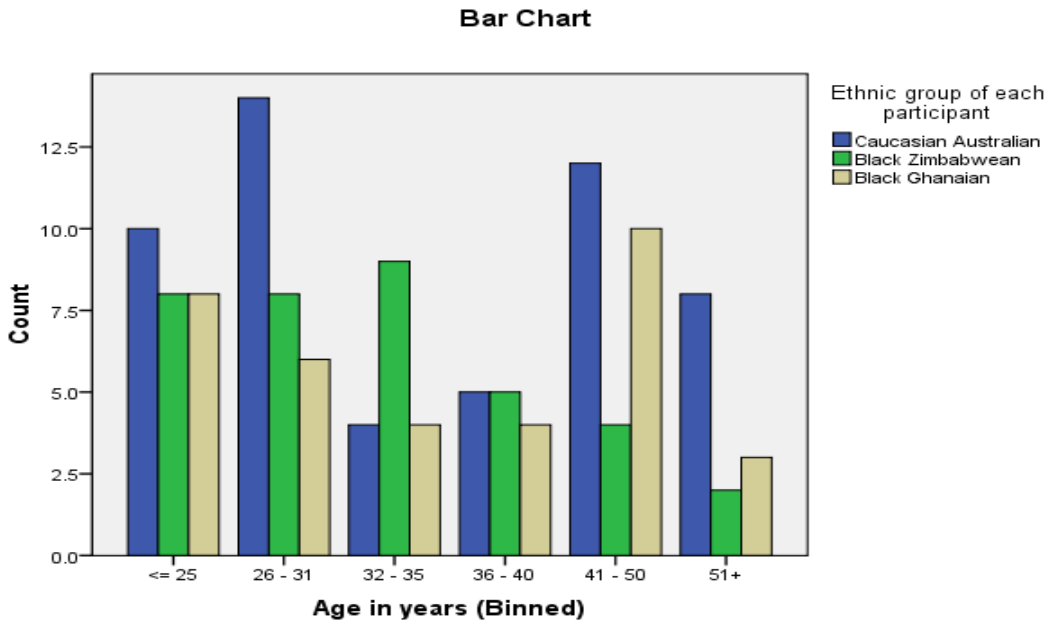


Figure 6: Illustrative distribution of female participants with complete data who were included in the preliminary data analysis by age group and by ethnicity

Table 17: Distribution of female sample following removal of participants in overrepresented age groups by ethnicity

		Ethnic group of each participant			
		Caucasian Australian	Black Zimbabwean	Black Ghanaian	Total
Age in years (Binned)	18 - 25	10	8	8	26
	26 - 31	8	8	6	22
	32 - 35	4	4	4	12
	36 - 40	5	5	4	14
	41 - 50	5	4	5	14
	51+	3	1	3	7
	Total	35	30	30	95

Gender: Female

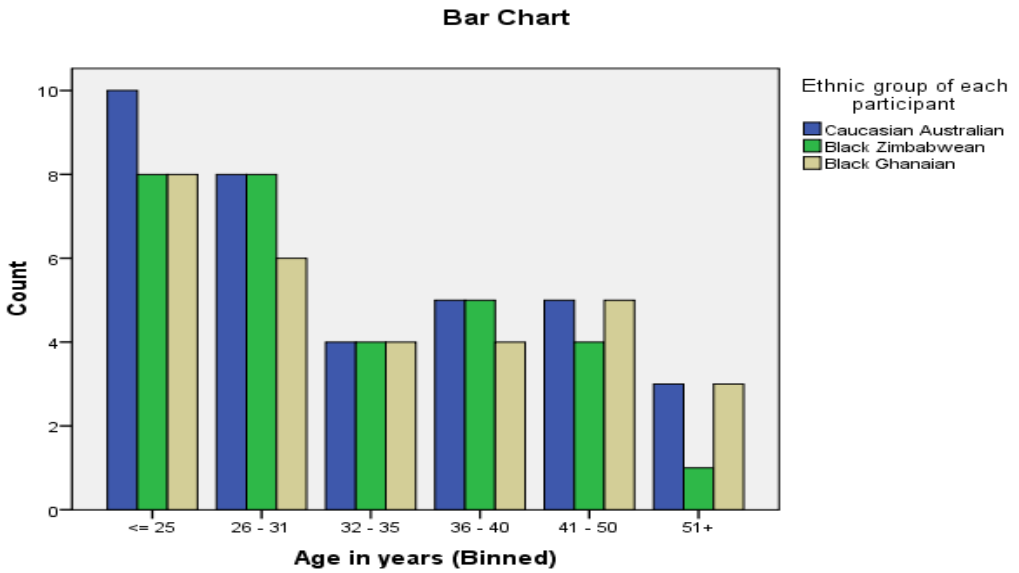


Figure 7: Distribution of male participants following removal of participants in some over represented age groups.

Table 18: Distribution of male sample in the study by age and ethnicity

		Ethnic group of each participant			
		Caucasian Australian	Black Zimbabwean	Black Ghanaian	Total
Age in years (Binned)	18 - 25	5	5	6	16
	26 - 31	3	7	4	14
	32 - 35	5	8	8	21
	36 - 40	3	9	5	17
	41 - 50	4	9	3	16
	51- 60	8	2	6	16
	Total	28	40	32	100

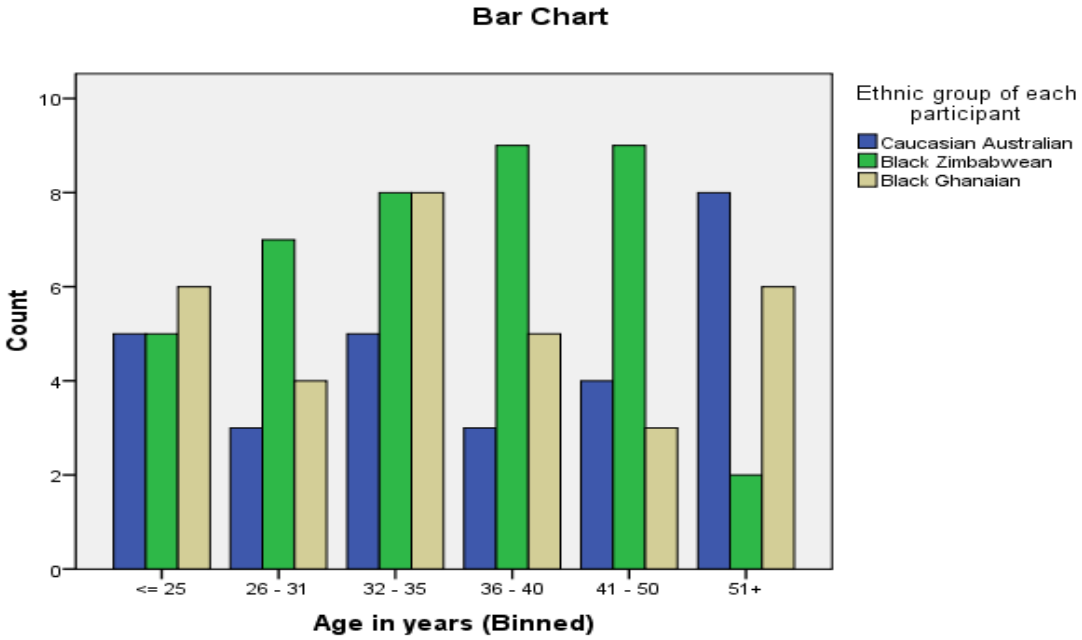


Figure 8: Distribution of male participants with complete data who were included in the preliminary data analysis by age group and by ethnicity

Table 19: Distribution of male sample following removal of participants in overrepresented age groups by ethnicity

		Ethnic group of each participant			
		Caucasian Australian	Black Zimbabwean	Black Ghanaian	Total
Age in years (Binned)	18 - 25	5	5	6	16
	26 - 31	3	5	4	12
	32 - 35	5	8	8	21
	36 - 40	3	4	5	12
	41 - 50	4	5	3	12
	51- 60	3	2	3	8
	Total	23	29	29	81

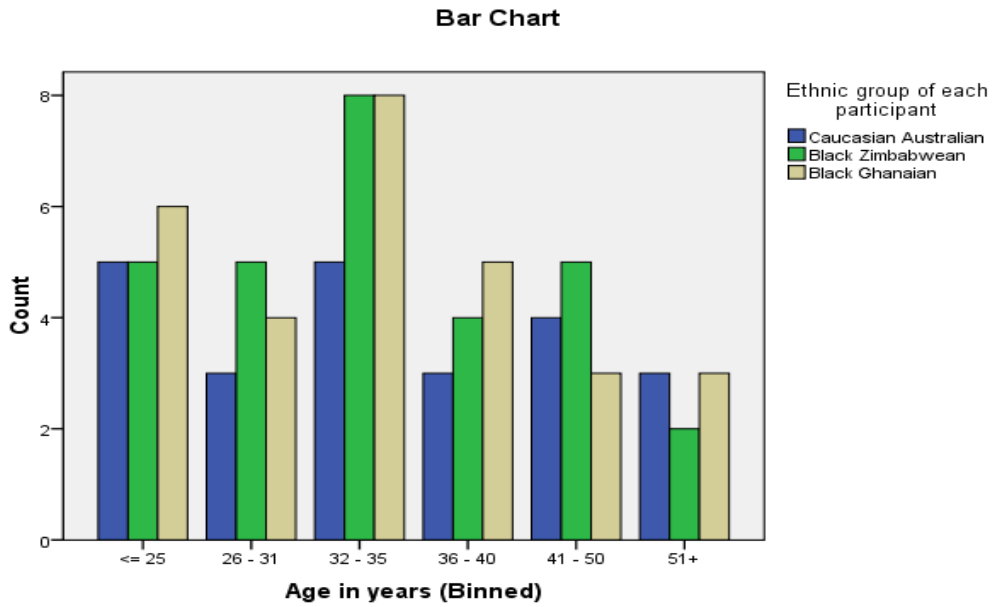


Figure 9: Distribution of male participants by age group and ethnicity following removal of participants from overrepresented age groups

Table 20: Table of random numbers produced by a Random Sequence Generator used in the removal of participants from the study

2288	2027	1034	2268	3063	1002	1283	1820	2029	2649	1967	2077	2723	1894	2079
2995	3055	2778	2350	2426	1437	1703	2132	1778	1564	2215	2458	2578	1165	1401
1382	2708	2483	2053	2567	2938	3077	2358	2147	1071	1510	1356	1185	1526	2611
2098	1317	1152	3021	1519	2021	1481	2592	2773	1176	1087	1337	2476	1455	2958
1931	1276	1178	1515	1697	2890	2914	2779	1651	2915	1320	1406	1038	1958	2520
1084	2064	2475	2415	1552	2868	2159	2332	2163	1166	2593	1384	2472	1794	1012
2697	1143	1786	1405	1644	2069	2537	2748	1699	1900	2237	2164	1492	2115	2909
1470	2038	1818	2284	1870	1372	1033	1187	2967	1544	1284	2923	1800	1554	2856
1981	3047	1418	1303	2570	2173	1921	3080	2231	1368	2193	1376	1077	1189	3060
3009	1116	1680	1464	2487	2388	2035	1690	2825	2878	2396	1634	1369	1556	1604
1563	2063	2628	1241	1712	2759	2478	1209	2054	2244	2307	1903	2707	2540	2850
2110	2254	2561	2102	2774	2185	2663	2032	2851	2169	1700	1774	2687	2763	2124
1609	2096	2184	2188	1719	2049	1509	3049	1879	1205	1581	1535	1146	2186	1011
1342	2111	2616	2690	2742	1561	2892	1883	2495	2315	2729	1578	2808	1789	1847
2526	2456	2924	1946	2442	1635	1247	1528	1212	2503	2515	1045	1878	2105	1249
1568	2202	2459	2710	1408	1741	2939	1106	2271	2139	1161	2364	2028	1379	1933
1725	2694	1767	2229	1856	2953	1132	2303	1218	1521	1929	1583	1676	1278	1461
2420	1976	1083	1467	1396	2427	1329	2180	2419	1271	3020	1547	1213	1538	2898
1282	2598	3045	2405	2705	1773	2600	1410	1804	2671	1562	1790	2717	2010	1641
1419	2080	2733	1574	2387	1144	1523	2835	2449	1656	3072	1850	2151	3014	2691
1385	1728	1631	2921	1743	1761	1216	2820	2949	1167	1797	1668	2775	2870	2436
1605	1633	1632	2095	1683	2434	3013	2689	1810	3023	1983	2780	2265	2216	1322
1956	1864	2074	1463	1545	1429	1328	2165	3012	2299	2099	2479	2724	1530	2181
2664	2981	1713	2220	2675	2261	2513	1145	1341	2418	2699	1037	2880	2447	2977
2031	1817	2706	1640	2884	1724	2000	2521	1896	2586	2996	1232	2116	2430	2787
1428	2137	2951	1431	1679	1826	2737	1911	1796	2796	1062	1474	2886	2550	1228
2370	1056	1008	1851	1762	1172	1349	2978	2614	2858	2698	2431	2043	2134	2435
2226	2114	2326	2320	1664	2966	1483	2218	1307	2530	2874	1239	1652	2372	1865
2654	2631	2356	1294	1028	2865	1299	1569	1973	2448	1621	2716	2360	2833	1768
2363	2626	1323	1264	1374	2826	2040	1815	1050	1357	2993	2960	2908	1557	2221
2357	1729	2864	1390	1673	2930	1612	2764	1289	3054	2957	3001	1813	1128	1987
1616	1882	1922	1442	1237	2312	2946	2581	2317	1231	2106	1154	1340	2772	2441
1421	1279	2998	1831	1058	1507	2799	2214	1139	1426	2590	2380	2093	1330	1571
1159	2146	1798	2287	1123	2555	2746	2384	2935	1343	1575	2457	1257	1991	1348
1133	1959	2264	1229	2182	2554	2469	1226	1698	2243	2575	2635	1836	2752	1622
1078	2062	2371	2546	1915	1505	1595	1313	3031	1387	2731	3003	2056	1345	1645
1715	2238	2272	2385	2801	2920	2036	2620	1498	2088	1466	2910	1280	1392	1244
1288	2580	1974	2681	1308	1251	1808	1015	2889	1777	1025	2065	1637	2008	1862
2819	1654	2929	2020	1905	1806	2126	1234	2769	1780	1695	2234	2002	1876	2162
1057	1296	2911	1969	1624	1302	3005	2067	2916	2041	1909	1009	1134	1606	1925
1630	2140	1478	2389	2847	1917	1691	2516	1020	1753	1402	2986	2976	2917	1017
1215	2143	1208	2721	1486	2607	2343	2290	1051	1902	1968	2465	1807	2351	2761
2342	1069	1597	1787	1026	1321	2551	3048	1360	2440	1103	1587	2573	1453	1763
2131	1415	2969	2784	3006	1286	2289	1004	1908	1147	1352	2673	1332	3016	1707
2844	1073	1746	2325	2817	2605	1537	2400	1182	2632	2682	1585	2123	2867	2052
2715	1997	2810	1760	2219	1046	2610	1380	2481	1543	2834	2595	2033	1904	3041
1814	1158	3017	1513	2291	1060	2390	2643	1726	2274	2423	2204	1975	2120	2407
1203	1907	2973	2933	2666	2227	1930	2743	2959	1838	2768	1451	1059	2172	1890
2044	1941	1576	1517	1945	1448	2154	2568	1109	2860	2130	1832	3038	1170	2295
2997	2625	1590	3070	2642	2563	1781	2450	1375	1722	1589	2484	2397	1039	1694
1614	2068	2983	1843	2148	2798	1253	3011	2187	2524	1848	2852	1842	1169	1067
2191	2012	2213	2016	2177	1318	2329	2092	2803	1871	1041	2394	2547	2979	1150
2961	2233	1108	2158	1441	1998	2506	1875	2135	1511	1013	3076	1685	3019	1098
1872	2560	2302	3044	2486	2453	1262	2473	2275	2239	2692	1834	2900	1943	2583
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2565	1371	2576	1964	1190	1607	1459	2696	1733	2601	1716	3079	2308	1153	2129
2224	2805	2145	1489	2125	2071	3002	3004	2714	1594	1957	2241	1734	2572	1747

2882	2971	1655	1250	2089	1793	1395	2670	2566	1171	2873	2991	2359	1504	2507
1855	1542	1540	1754	2544	2918	2744	2260	1338	1188	1472	1411	2334	1611	2246
2876	1970	1080	2952	2361	1682	1591	1287	1500	2791	1494	2494	2034	2624	2166
2749	2912	2945	2466	3008	1532	2678	2433	1484	1550	2615	1191	1202	3010	2662
1709	1706	1006	1121	1736	1642	1868	2416	1465	1994	2855	1845	2046	2556	2211
3064	2249	1584	1065	1365	2672	1659	2258	2508	2974	2425	1692	1620	2375	1085
1389	1479	2005	2518	2192	3037	1962	2055	1942	3069	2902	2623	2512	1899	2879
2741	2408	2848	1869	1913	2980	1567	1745	2348	2891	1671	2499	1333	1291	2637
2059	1924	1381	1210	2428	1156	1802	1104	2117	1705	2112	2754	1874	2445	2736
1413	2621	2446	2085	1735	2338	1217	2720	2285	2464	2259	2196	2047	1996	2467
1388	2943	1661	2857	1102	2523	1791	1963	1488	1471	1259	1534	2931	1982	1985
2251	2296	1898	1889	2534	2987	1412	2639	2793	2859	2963	1989	1110	2652	2197
1439	1099	1738	2349	1155	2636	1293	2245	1704	2622	1370	2627	2305	1853	2552
2726	1068	1053	1138	1756	2087	2183	1752	2335	1684	2579	1240	1771	2613	1748
2365	2482	1090	1177	1074	2200	1686	3026	1811	2824	3025	2119	2255	1895	1588
2492	1580	3000	2970	1893	2250	2633	1024	2836	2406	2948	1577	1193	1326	1124
2030	2677	2760	1681	2091	1047	1846	1266	3078	2072	1737	1835	2477	1444	1353
1650	2562	2596	2877	2903	1355	1079	2517	1347	1936	2368	2454	2641	1457	2344
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1536	1394	2045	2161	1091	2553	1423	2324	1665	2727	1965	1292	1346	1248	2504
3043	1107	2060	1054	2189	2149	2413	2203	1749	2150	1211	2374	1823	2489	1986
2378	2828	2195	1966	1885	2222	1192	1617	2653	3039	2591	2719	2109	1197	2113
2493	1559	1828	2602	1693	2156	1048	1125	2814	2841	2751	1952	2023	2718	1602
1627	1450	1200	2122	2496	1016	3007	1066	1999	1805	1839	2968	2276	2837	2253
1235	2514	2680	2262	1131	1496	1702	2619	2657	1548	1438	1404	2232	2090	2382
1358	1827	2081	1432	2950	1670	2086	2587	2101	1961	2758	2429	1300	2797	1252
2519	2897	1306	2383	2157	1546	2956	1304	3040	2011	1366	1990	1980	1275	2048
2755	1485	2651	3073	3057	2722	1174	2297	1101	2455	2658	2606	1456	1555	2127
1420	1696	2660	1043	2795	2190	1687	3053	1623	1560	2703	1638	3003	2665	2174
1493	2839	2061	1181	1508	2954	2410	1949	1782	1422	2352	2293	2006	1937	1888
2536	2655	2693	1531	2084	1052	2831	2257	2463	1114	1242	1339	2176	1886	2316
2853	1822	2491	1770	2001	2732	1476	2070	2443	1238	1663	3075	1919	1586	1901
1819	2905	2230	1852	1533	2353	1783	2270	2883	2076	1031	1477	1880	1849	2965
2990	2542	2278	2167	1739	2679	1566	1018	1363	1647	2893	1315	1475	2558	1955
1744	1180	1220	1409	1019	2198	2094	1100	1295	2947	3067	1255	1601	2471	1336
1516	2409	1142	2686	2676	2345	1653	1361	2776	2417	1573	2711	1029	1541	2346
2294	2725	2223	2369	2118	1316	1829	1003	1932	2199	2153	1137	2685	1549	2582
1335	1089	2832	1407	1452	2887	1135	1618	2392	2750	1551	2462	2266	2928	2155
2082	2283	3071	1195	2168	1672	1732	1619	1675	2701	1525	2617	2142	1503	1327
2247	2367	2018	1660	1362	2985	1378	2648	1920	2972	2107	1558	2057	2282	2757
2004	2777	1750	2702	1435	1157	2794	2659	1164	2073	2013	3050	1759	1036	1021
1032	1446	1148	2944	2964	1608	3027	1758	1803	2901	1995	2913	1934	1141	2298
2311	1095	1120	2225	2286	2712	2818	1628	1344	2599	2256	1460	2470	2322	1183
1518	1615	1785	1830	1658	2788	2936	2175	1501	2941	1042	1881	2321	2634	1445
2379	1914	1674	1140	2141	1812	2667	2386	1391	2829	1809	2906	2533	1168	1221
1198	1775	2770	2314	2545	2024	2806	2872	1910	1723	1469	1072	2862	1993	2277
1449	2739	1265	2336	1127	2319	1222	2630	1350	1988	1866	2790	1310	2017	2529
2753	2559	2432	1063	1258	1951	2252	2618	2982	2994	1462	1857	1233	2527	3062
2894	1245	2144	2888	1667	1841	2460	2585	3058	1105	2051	2340	1669	3018	2421
2171	1678	1593	1263	1816	1613	1984	2747	2377	1224	2866	2341	1524	1162	1527
2842	2522	2050	1297	2391	2786	1751	1324	2511	1755	3052	2438	1795	1093	2373
2895	2603	2366	2347	1718	1625	1373	1565	1064	1126	1646	1331	2838	1184	1386
1711	1506	2688	1260	1833	1417	1274	1799	1772	2301	2668	3029	3022	1173	1935
1603	1514	1433	1023	1122	2066	1858	2745	1273	1227	1610	2208	1788	1014	2461
1824	2816	2273	2543	1076	2444	2399	2812	1186	2398	2713	2355	1206	1225	1765
2782	1301	2206	2984	1701	1272	1979	1377	1730	1821	2136	1086	1840	1677	2309
2488	2451	2042	1151	3028	1689	1657	2026	1129	3056	2178	1416	1075	2528	2999
2009	2402	1236	2823	2871	1311	2097	2376	2640	2907	2548	2281	2738	2597	1440
2497	1351	2604	2452	2861	1837	1270	1436	1792	3024	1214	1688	2210	2501	2781
1662	1906	1877	1443	1766	1179	1230	2644	1367	1859	2170	1948	1861	1254	2756
1873	2104	1061	1261	1912	2922	2854	2734	2815	1468	2899	2330	2783	1088	2669
2569	1764	1892	2485	1490	1277	1497	1359	1243	2414	1194	2498	2318	2510	2179
1354	1403	1891	1427	1539	1599	1473	2813	1196	2039	2310	2025	2594	3032	1600
2925	2863	2766	2100	2248	1884	2531	2468	2304	1825	1710	2869	2822	2327	1414
1007	1727	2439	3042	2103	1267	1325	1860	1044	1499	1096	1081	2811	2645	3035
3065	2840	1256	1001	2108	2767	1092	1731	3074	1246	1312	2075	2362	1201	2988
2608	1636	3034	2313	2333	2003	2437	2942	2849	2403	1113	1887	2207	1854	1130

3033	2771	2975	2535	2539	2807	2934	1648	2292	2022	1118	1454	1082	1207	1960
1035	1285	1582	2395	1953	1027	2236	2541	2919	2412	2037	1502	1863	1070	2549
1972	2589	2992	1867	1400	1708	1717	2827	1117	2740	1149	2564	1223	1579	1447
2802	2735	1897	2505	2896	3068	1940	1954	1425	3059	1977	1480	2955	2015	1290
2612	1314	2571	1119	1801	1482	1458	2279	2728	1643	1000	2133	2306	2128	2490
1334	1944	2937	2019	2280	2674	2138	1570	2927	1928	2875	1010	2267	2940	2201
2647	1666	2904	2014	1757	2730	2331	1520	2205	2228	1487	2843	2704	2683	2328
2830	2502	1204	2480	1978	1397	1112	2577	2411	1160	1947	1916	2404	2300	1939
1319	2804	2263	2709	2474	2609	2792	1022	3015	2337	3051	2422	2532	1383	2121
3030	2393	2557	1927	1268	1040	2509	1398	1424	2525	2926	2684	1030	2629	2212
1049	1950	2354	1598	1639	2160	1281	2217	1769	2574	1491	2424	2962	2845	2083
1992	2785	1111	2989	1596	1779	2765	3046	1430	1175	1309	1553	1094	1364	2078
1005	2809	1926	1305	2638	2058	1529	1784	1298	2242	2789	2846	2695	2152	1649
1923	3066	1399	1495	1163	1115	1776	1626	2209	2800	2584	1918	2240	2538	1721
2650	2646	2821	1199	1938	2235	1055	2762	1592	2194	1269				

Timestamp: 2009-12-16 11:57:28 UTC

Appendix H Biographical Information Questionnaire

Biographical Information

1. What is your age? _____ Years

2. What is your sex? *(Please circle your answer below.)*

Male 1 Female 2

3. What is your occupation?

_____

4. What is the highest level of education you have completed?

[ ] Did not complete High School
[ ] Completed High School
[ ] TAFE/Technical/Apprentice
[ ] University
[ ] Other *(Specify)* _____

5. What is your country of birth? _____

6. How long have you been in Australia? _____ years

7. What is your father's country of birth?

_____

8. What language(s) do you speak at home?

_____

9. What is your cultural/ethnic background? (*e.g., English, Zimbabwean, Ghanaian, Australian*)

_____

10. To what extent do you identify with this cultural background?

(Please tick one item to indicate your answer)

Not at all	[ ]	A little	[ ]	Somewhat	[ ]
Quite a bit	[ ]			Very much	[ ]

Appendix I Pittsburgh Sleep Quality Index Questionnaire

PITTSBURGH SLEEP QUALITY INDEX (PSQI)

Instructions:

The following questions relate to your usual sleep habits during the past month ONLY. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

1. **During the past month, when have you usually gone to bed at night**?

USUAL BED TIME_____

2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night?

NUMBER OF MINUTES_____

3. During the past month, when have you usually gotten up in the morning?

USUAL GETTING UP TIME_____

4. During the past month, how many hours of *actual sleep* did you get at night? (This may be different than the number of hours you spend in bed.)

HOURS OF SLEEP PER NIGHT_____

For each of the remaining questions, check [X] *the one best response. Please answer all questions.*

5. During the past month, how often have you had trouble sleeping because you……..

(a) Cannot get to sleep within 30 minutes

Not during the past month	☐	Less than once a week	☐	Once or twice a week	☐	Three or more times a week	☐

(b) Wake up in the middle of the night or early morning

Not during the past month	☐	Less than once a week	☐	Once or twice a week	☐	Three or more times a week	☐

(c) Have to get up to use the bathroom.

Not during the past month ☐ Less than once a week ☐ Once or twice a week ☐ Three or more times a week ☐

(d) Cannot breathe comfortably.

Not during the past month ☐ Less than once a week ☐ Once or twice a week ☐ Three or more times a week ☐

(e) Cough or snore loudly.

Not during the past month ☐ Less than once a week ☐ Once or twice a week ☐ Three or more times a week ☐

(f) Feel too cold.

Not during the past month ☐ Less than once a week ☐ Once or twice a week ☐ Three or more times a week ☐

(g) Feel too hot.

Not during the past month ☐ Less than once a week ☐ Once or twice a week ☐ Three or more times a week ☐

(h) Had bad dreams.

Not during the past month ☐ Less than once a week ☐ Once or twice a week ☐ Three or more times a week ☐

(i) Have pain.

Not during the past month ☐ Less than once a week ☐ Once or twice a week ☐ Three or more times a week ☐

(j) Other reason(s), please describe

_____

_____

How often during the past month have you had trouble sleeping because of this?

Not during the past month ☐ Less than once a week ☐ Once or twice a week ☐ Three or more times a week ☐

6. During the past month, how would you rate your sleep quality overall?

Very good ☐ Fairly good ☐ Fairly bad ☐ Very bad ☐

7. During the past month, how often have you taken medicine (Prescribed or "over the counter") to help you sleep?

Not during the past month ☐ Less than once a week ☐ Once or twice a week ☐ Three or more times a week ☐

8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?

Not during the past month ☐ Less than once a week ☐ Once or twice a week ☐ Three or more times a week ☐

9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

No problem at all ☐
Only a very slight problem ☐
Somewhat of a problem ☐
A very big problem ☐

10. Do you have a bed partner or share a room?

No bed partner or do not share a room ☐
Partner/ flat mate in other room ☐
Partner in same room, but not same bed ☐
Partner in same bed ☐

11. If you have a bed partner or share a room, ask him/her how often in the past month you have had……

(a) Loud snoring.

Not during the past month ☐ Less than once a week ☐ Once or twice a week ☐ Three or more times a week ☐

(b) Long pauses between breaths while asleep.

Not during the past month ☐ Less than once a week ☐ Once or twice a week ☐ Three or more times a week ☐

(c) Legs twitching or jerking while you sleep.

Not during the past month ☐ Less than once a week ☐ Once or twice a week ☐ Three or more times a week ☐

(d) Episodes of disorientation or confusion during sleep.

Not during the past month ☐ Less than once a week ☐ Once or twice a week ☐ Three or more times a week ☐

(e) **Other restlessness while you sleep (please describe)**

_____

_____

Not during the past month ☐ Less than once a week ☐ Once or twice a week ☐ Three or more times a week ☐

Adapted from "The Pittsburgh Sleep Quality Index: A New Instrument for Psychiatric Practice and Research", by D. J. Buysse, C. F. Reynolds, T. H. Monk, S. R. Berman and D. J. Kupfer, 1989, *Psychiatry Research*, 28: 193-213.

Scoring Template of the PSQI

Component 1 #9 Score . . . . . C1_____

Component 2 #2
Score (15min=0; 16-30 min=1; 31-60 min=2, >60 min=3) + #5a Score

(If sum is equal 0=0; 1-2=1; 3-4=2; 5-6=3) . . . . . C2_____

Component 3 #4 Score (>7=0; 6-7=1; 5-6=2; <5=3) . . . . . C3_____

Component 4 (total # of hours asleep)/ (total # of hours in bed) x 100

>85%=0
75%-84%=1
65%-74%=2
<65%=3 . . . . C4_____

Component 5

Sum of Scores #5b to #5j (0=0; 1-9=1; 10-18=2; 19-27=3) . . . . . C5_____

Component 6 #6 Score . . . . . C6_____

Component 7

#7 Score + #8 Score (0=0; 1-2=1; 3-4=2; 5-6=3) . . . .C7_____

Global PSQI Score (Add the seven component scores together _____

Appendix J PSQI Addendum for Post Traumatic Stress Disorder Questionnaire

PSQI Addendum for PTSD

Instructions

Please answer the following additional questions regarding your sleep in the past month. Include any observations from your bed partner/roommate. Tick a box to indicate your response.

1. During the past month, how often have you had trouble sleeping because you…

a. Feel hot flashes:

- Not during the past month ☐
- Less than once a week ☐
- Once or twice a week ☐
- Three or more times a week ☐

b. Feel general nervousness:

- Not during the past month ☐
- Less than once a week ☐
- Once or twice a week ☐
- Three or more times a week ☐

c. Had memories or nightmares of a traumatic experience:

- Not during the past month ☐
- Less than once a week ☐
- Once or twice a week ☐
- Three or more times a week ☐

d. Had severe anxiety or panic, not related to traumatic memories:

- Not during the past month ☐
- Less than once a week ☐
- Once or twice a week ☐
- Three or more times a week ☐

e. Had bad dreams, not related to traumatic memories:

- Not during the past month ☐
- Less than once a week ☐
- Once or twice a week ☐
- Three or more times a week ☐

f. Had episodes of terror or screaming during sleep without fully awakening:

- Not during the past month ☐
- Less than once a week ☐
- Once or twice a week ☐

- Three or more times a week

g. Had episodes of "acting out" your dreams, such as kicking, punching or screaming:

- Not during the past month ☐
- Less than once a week ☐
- Once or twice a week ☐
- Three or more times a week ☐

2. If you had memories or nightmares of a traumatic experience during sleep (question 1c above)

a. How much anxiety did you feel during the memories/nightmares?

- None ☐
- Very little ☐
- Moderate ☐
- Severe ☐

b. How much anger did you feel during the memories/nightmares?

- None ☐
- Very little ☐
- Moderate ☐
- Severe ☐

c. What time of night did most memories/nightmares occur?

- Early in the night ☐
- Middle of the night ☐
- Late night near morning ☐
- No particular time ☐

Adapted from "A brief Sleep Scale for Posttraumatic Stress Disorder: Pittsburgh Sleep Quality Index Addendum for PTSD", by A. Germain, M. Hall, B. Krakow, K. M. Shear, and J. D. Buysse, 2005, *Anxiety Disorders* 19, p233–244.

Appendix K Epworth Sleepiness Scale Questionnaire

Epworth Sleepiness Scale (ESS)

The following questionnaire will help you measure your general level of daytime sleepiness. You are to rate the chance that you would doze off or fall asleep during different routine daytime situations. How likely are you to doze off or fall asleep in the following situations, in contrast to just feeling tired? Even if you haven't done some of these activities recently, think about how they would have affected you. Use this scale to choose the most appropriate number for each situation:

0 = would never doze

1= slight chance of dozing

2 = moderate chance of dozing

3 = high chance of dozing

It is important that you circle a number (0 to 3) on each of the questions.

Situation	**Chance of dozing (0 to 3)**			
Sitting and reading	0	1	2	3
Watching television	0	1	2	3
Sitting inactive in a public place-for example, a theatre or meeting	0	1	2	3
As a passenger in a car for an hour without a break	0	1	2	3
Lying down to rest in the afternoon	0	1	2	3
Sitting and talking to someone	0	1	2	3
Sitting quietly after lunch (when you've had no alcohol)	0	1	2	3
In a car while stopped in traffic	0	1	2	3
Total score				

Adapted from "A new method for measuring daytime sleepiness: The Epworth Sleepiness Scale", by Murray W. Johns, 1991, *Sleep, 14*(6), 540-545. *Copyright 1991, Dr M. W. Johns*

Appendix L DBAS Questionnaire

Dysfunctional Beliefs and Attitudes about Sleep (DBAS)

A number of statements reflecting people's beliefs and attitudes about sleep are provided below. Please indicate to what extent you personally agree or disagree with each statement. There is no right or wrong answer. For each statement, place a mark (X) somewhere along the line wherever your personal rating falls. Please consider the line to represent your own personal range. Try to use the whole scale rather than simply putting your marks at one end or the other of the line. Even if you do not have a sleep problem, please answer all questions.

Note. For each statement, the subject indicates his or her level of agreement or disagreement on a visual analog scale. For example:

The weather in Melbourne is often cold.

Strongly disagree——————————————————X——————— Strongly agree

---

1. I need 8 hours of sleep to feel refreshed and function well during the day.

Strongly disagree ——————————————————————— Strongly agree

2. When I don't get the proper amount of sleep on a given night, I need to catch up the next day by napping or the next night by sleeping longer.

Strongly disagree ——————————————————————— Strongly agree

3. Because I am getting older, I need less sleep.

Strongly Disagree ——————————————————————— Strongly agree

4. I am worried that if I go for 1 or 2 nights without sleep, I may have a "nervous breakdown."

Strongly Disagree ——————————————————————— Strongly agree

5. I am concerned that chronic insomnia may have serious consequences on my physical health.

Strongly Disagree ——————————————————————— Strongly agree

6. By spending more time in bed, I usually get more sleep and feel better the next day.

Strongly Disagree ——————————————————————— Strongly agree

7. When I have trouble falling asleep or getting back to sleep after night-time awakening, I should stay in bed and try harder.

Strongly Disagree ——————————————————————— Strongly agree

8. I am worried that I may lose control over my abilities to sleep.

Strongly Disagree ——— Strongly agree

9. Because I am getting older, I should go to bed earlier in the evening.

Strongly Disagree ——— Strongly agree

10. After a poor night's sleep, I know it will interfere with my activities the next day.

Strongly Disagree ——— Strongly agree

11. To be alert and function well during the day, I believe I would be better off taking a sleeping pill rather than having a poor night's sleep.

Strongly Disagree ——— Strongly agree

12. When I feel irritable, depressed, or anxious during the day, it is mostly because I did not sleep well the night before.

Strongly Disagree ——— Strongly agree

13. Because my bed partner falls asleep as soon as his or her head hits the pillow and stays asleep through the night, I should be able to do so too.

Strongly Disagree ——— Strongly agree

14. I feel insomnia is basically the result of aging and there isn't much that can be done about this problem.

Strongly Disagree ——— Strongly agree

15. I am sometimes afraid of dying in my sleep.

Strongly Disagree ——— Strongly agree

16. When I have a good night's sleep, I know that I will have to pay for it the next night.

Strongly Disagree ——— Strongly agree

17. When I sleep poorly one night, I know it will disturb my sleep schedule for the whole week.

Strongly Disagree ——— Strongly agree

18. Without an adequate night's sleep, I can hardly function the next day.

Strongly Disagree ——— Strongly agree

19. I can't ever predict whether I'll have a good or poor night's sleep.

Strongly Disagree ——— Strongly agree

20. I have little ability to manage the negative consequences of disturbed sleep.

Strongly Disagree ——— Strongly agree

21. When I feel tired, have no energy, or just seem not to function well during the day, it is generally because I did not sleep well the night before.

Strongly Disagree ——— Strongly agree

22. I get overwhelmed by my thoughts at night and often feel I have no control over this racing mind.

Strongly Disagree ——— Strongly agree

23. I can still lead a satisfactory life despite sleep difficulties.

Strongly agree ——— Strongly disagree

24. I believe insomnia is essentially the result of a chemical imbalance.

Strongly Disagree ——— Strongly agree

25. I feel insomnia is ruining my ability to enjoy life and prevents me from doing what I want.

Strongly Disagree ——— Strongly agree

26. My sleep is getting worse all the time and I don't believe anyone can help.

Strongly Disagree ——— Strongly agree

27. A nightcap before bedtime is a good solution to sleep problems.

Strongly Disagree ——— Strongly agree

28. Medication is probably the only solution to sleeplessness.

Strongly Disagree ——— Strongly agree

Adapted from "Dysfunctional beliefs and attitudes about sleep among older adults with and without insomnia complaints", by C. M. Morin, J. Stone, D. Trinkle, J. Mercer, and S. Remsberg, *1993, Psychology and Aging* Vol. 8(3)p463-467. Copyright 1993by American Psychological Association PsycNet.

Appendix M Reminder Letter

Date:...../...../20…

Dear Participant,

About two weeks ago, a research package about sleep was sent to you through your Association. This research is part of my Doctor of Psychology studies and I am very keen to obtain a large enough number of completed questionnaires to make meaningful comparisons. These forms do not take long to complete; the time required by most individuals varies from 30 to 40 minutes.

Your prompt attention and cooperation will be greatly appreciated, as it is a prerequisite for the success of this project. I hope you are going to complete the packages sent to you or if you have already done so please ignore this reminder.

Thank you.

Yours sincerely,

McLytton N. Clever
Doctoral Student/ Researcher

Professor Dorothy Bruck
Principal Researcher

P.S.: If you have misplaced the questionnaires, please contact the secretary of your association who will be able to send you a new package by return mail.

Appendix N Sample and Victorian Population Raw Data

Table 21: Raw data used to calculate observed and expected frequencies for Chi-square comparisons of study sample and Victorian Population.

Variable	Sample N(Total)	Victorian Population '000 N (Total)
Gender		
Male	81	2577
Female	95 (176)	2628 (5205)
Birth Place		
Australia	58	3925
Overseas	118 (176)	1280 (5205)
Employment		
Managers	16	306
Professionals	90	472
Technical/Trades	14	319
Community & Personal Service	-	190
Clerical/Admin/Sales	35	567
Machine Operators & Drivers	4	149
Labourers	7	224
Not Stated	-	44
Unemployed	10 (176)	130 (2404)
Education		
a. High School & below		
Did not go to school	-	43
No education data	1	384
Year 11 and below	5	1800
Year 12 or equivalent	35	1752 (3982)
b. Tertiary education		
Advanced diploma/diploma/Certificates	61	973
University (Bachelors/Postgraduate)	74	610 (2092)

Note. Victorian population data is based on Australian Census 2006.

Appendix O DBAS mean scores by ethnicity and gender

Table 22: Mean scores for individual items of the DBAS by ethnicity and gender

	Ethnic group of each participant											
	CAA				BZW				BGH			
	Male		Female		Male		Female		Male		Female	
Item	*M*	SD	*M*	SD	*M*	SD	*M*	SD	*M*	SD	*M*	SD
1	58.22	24.60	71.20	23.67	69.45	25.29	76.57	25.97	70.76	24.58	56.20	27.73
2	38.65	30.32	65.34	26.15	51.66	32.52	64.60	30.47	62.62	31.70	51.60	32.51
3	36.13	24.20	29.63	19.56	25.66	24.11	25.03	24.42	26.48	23.64	33.67	26.12
4	31.35	31.34	28.09	24.07	40.72	33.73	46.50	34.31	41.97	31.95	36.00	31.29
5	52.43	34.08	45.86	35.26	54.10	35.93	75.20	26.23	74.52	17.63	54.90	33.21
6	52.91	25.68	47.86	27.86	69.17	26.08	60.23	30.84	60.59	30.36	52.10	31.33
7	51.30	30.01	34.49	26.31	55.55	26.09	58.13	32.16	47.21	25.74	46.70	27.90
8	33.26	29.81	20.69	24.74	25.66	25.66	27.33	27.03	25.76	21.19	30.83	27.75
9	32.39	28.05	25.60	19.83	33.66	27.44	31.57	27.86	29.86	22.46	33.40	25.03
10	63.39	31.52	66.91	23.85	57.17	30.65	69.63	26.51	68.45	23.89	58.47	27.16
11	19.87	21.43	18.06	23.12	14.93	15.32	15.67	19.21	21.17	20.99	17.43	20.92
12	39.57	29.20	50.51	28.19	37.14	31.34	36.10	31.84	41.03	24.95	41.23	27.82
13	28.52	27.01	28.43	30.59	29.07	31.49	30.30	26.61	37.76	30.08	37.87	27.72
14	18.91	18.98	18.31	16.14	33.97	27.84	35.90	32.88	28.10	24.91	33.43	26.03
15	18.65	24.43	11.11	15.87	20.14	22.92	19.30	22.63	14.79	15.38	25.37	28.40
16	22.17	25.31	14.26	17.21	21.24	24.78	23.53	27.07	22.83	27.49	24.03	25.50
17	26.87	29.70	23.43	19.83	23.69	24.64	15.43	15.42	18.97	18.41	23.07	19.08
18	34.83	23.64	38.77	21.53	30.69	28.02	42.00	30.93	40.69	26.76	25.93	20.58
19	68.57	26.98	49.60	32.90	47.86	31.10	49.30	32.62	38.41	29.83	55.13	29.07
20	50.13	31.09	33.31	21.44	42.14	30.22	36.93	29.92	32.14	21.68	39.83	27.55
21	50.74	28.79	59.00	23.40	37.07	26.73	45.87	30.51	49.41	28.97	44.13	24.66
22	49.13	29.49	52.69	28.93	30.17	27.20	31.50	29.20	35.45	31.95	49.27	30.48
23	41.96	34.51	44.03	26.38	56.31	30.76	54.23	28.71	49.62	30.29	53.40	29.92
24	35.70	23.70	33.71	21.24	44.38	32.23	45.93	31.09	41.55	26.97	46.33	28.54
25	24.17	17.57	22.34	21.99	28.69	26.61	28.40	26.55	30.52	26.90	34.00	26.97
26	23.04	19.50	12.83	13.08	13.21	11.65	15.93	18.96	15.28	16.16	23.13	23.22
27	27.09	27.45	16.20	16.58	24.59	26.58	19.83	22.00	23.66	23.68	29.90	27.20
28	16.83	18.73	9.40	9.25	11.45	11.85	11.70	11.59	14.59	13.69	15.27	18.00

Appendix P SF-36 Health Survey Questionnaire

Your Health and Well-Being

This questionnaire asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. *Thank you for completing this survey!*

For each of the following questions, please mark an ☒ in the one box that best describes your answer.

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

2. <u>Compared to one year ago</u>, how would you rate your health in general <u>now</u>?

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

3 The following questions are about activities you might do during a typical day. Does <u>your health now limit you</u> in these activities? If so, how much?

	Yes, limited a lot	Yes, limited a little	No, not limited at all
a Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports	☐ 1	☐ 2	☐ 3
b Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	☐ 1	☐ 2	☐ 3
c Lifting or carrying groceries	☐ 1	☐ 2	☐ 3
d Climbing several flights of stairs	☐ 1	☐ 2	☐ 3
e Climbing one flight of stairs	☐ 1	☐ 2	☐ 3
f Bending, kneeling, or stooping	☐ 1	☐ 2	☐ 3
g Walking more than a kilometre	☐ 1	☐ 2	☐ 3
h Walking several hundred metres	☐ 1	☐ 2	☐ 3
i Walking one hundred metres	☐ 1	☐ 2	☐ 3
j Bathing or dressing yourself	☐ 1	☐ 2	☐ 3

4. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a Cut down on the amount of time you spent on work or other activities	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b Accomplished less than you would like	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c Were limited in the kind of work or other activities	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d Had difficulty performing the work or other activities (for example, it took extra effort)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

5. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a Cut down on the amount of time you spent on work or other activities	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b Accomplished less than you would like	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c Did work or other activities less carefully than usual	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

6. During the <u>past 4 weeks</u>, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

7. How much <u>bodily</u> pain have you had during the <u>past 4 weeks</u>?

None	Very mild	Mild	Moderate	Severe	Very severe
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

8. During the <u>past 4 weeks</u>, how much did <u>pain</u> interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

9. These questions are about how you feel and how things have been with you <u>during the past 4 weeks</u>. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the <u>past 4 weeks</u>…

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a Did you feel full of life?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b Have you been very nervous?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c Have you felt so down in the dumps that nothing could cheer you up?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d Have you felt calm and peaceful?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
e Did you have a lot of energy?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
f Have you felt downhearted and depressed?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
g Did you feel worn out?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
h Have you been happy?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
i Did you feel tired?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

10. During the <u>past 4 weeks</u>, how much of the time has your <u>physical health or emotional problems</u> interfered with your social activities (like visiting with friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

11. How TRUE or FALSE is <u>each</u> of the following statements for you?

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
a	I seem to get sick a little easier than other people	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b	I am as healthy as anybody I know	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c	I expect my health to get worse	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d	My health is excellent	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Thank you for completing these questions!