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## The relationship between diet and exercise and the occurrence of headaches in adolescents aged 12 to 15 years

Paula Hahnel  
*Edith Cowan University*

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THE RELATIONSHIP BETWEEN DIET AND EXERCISE  
AND THE OCCURRENCE OF HEADACHES IN ADOLESCENTS  
AGED 12 TO 15 YEARS

BY  
PAULA HAHNEL



A Thesis Submitted to Fulfill the Requirements  
for the Award of

Bachelor of Health Science (Nursing) Honours

at the School of Nursing, Western Australian  
College of Advanced Education.

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## USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.

## ABSTRACT

Headaches in adolescents present school nurses with a challenge. Although separate research has focussed on headaches in children, and on dietary and exercises practices of adolescents, little attention has been paid to the relationship between the two. The purpose of this study was to investigate whether adolescents' dietary and exercise practices affect the occurrence of their headaches. The randomly selected sample consisted of 97 adolescents, aged 12 to 15 years, from a Perth metropolitan high school. Males accounted for 28% of respondents, and females 72%. The average age was 13.5 years. All students taking part in the study were required to complete an 18-item questionnaire, which surveyed frequency of headaches, dietary knowledge and behaviour, and exercise knowledge and behaviour. The data, collected between class times, showed that a large number of students reported headaches; dietary knowledge and behaviour were poor; and exercise knowledge and behaviour were good. All responses were anonymous. The study showed no evidence of a relationship between headaches and diet, or between headaches and exercise. The major implication for nursing practice is that the school nurse should carefully document all assessment data relating to headaches in order to build a comprehensive information base from which to deduce hypotheses for study. Future research which follows from the study

should address the development of headaches as a consequence of varying levels of exercise and dietary intake, as well as the relationship between perceived stress and headaches.

## DECLARATION

"I certify that this thesis does not incorporate, without acknowledgment, any material previously submitted for a degree or diploma in any institution of higher education and that, to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where due reference is made in the text".



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## CHAPTER ONE

### INTRODUCTION

The following study describes an investigation of the relationship between the occurrence of headaches in adolescents, and their dietary and exercise practices. The identification of knowledge and behavioural deficits in these areas will determine future needs for education and counselling. The investigation is based on the expectation that those students surveyed will provide accurate information on the frequency of their headaches, and a useful and valuable insight into their knowledge about diet and exercise and their subsequent behaviour. The study has focussed on adolescents aged 12 to 15 years currently enrolled at a state high school in Perth, Western Australia.

#### 1.2 BACKGROUND

Throughout the world adolescents constitute a large proportion of the population, and, according to Bennett (1984), their absolute numbers are increasing.

Adolescence is a period of rapid physical, mental, emotional, and social change, and is therefore a nutritionally vulnerable time because of the increase in physical growth and the changes in lifestyle and food habits. It is also a time when body image anxiety is a major concern; this includes problems such as obesity, short stature, excessive tallness in girls, and acne (Wolfish, 1987).

Physical activity is necessary in the adolescent for several reasons. These include the following: To support normal growth, especially of bones and muscles; to prevent adult health problems, especially arteriosclerotic heart disease; to motivate lifelong activity involvement; and to enhance learning in the classroom (James and Mott, 1988).

Adolescents spend a large proportion of their time at school, and in many cases, attend the school health clinic for advice and consultation on a variety of health related issues. In Western Australia, there are 170 school nurses who conduct these clinics, serving the needs of 105,562 secondary students in Western Australia (Australian Bureau of Statistics, 1989). The nurse's functions include health assessment and management of the school population through observation, communication, and examination; monitoring the safety of the school environment; co-ordinating screening programmes; and providing health education, case-finding, counselling, referral and follow-up. Other functions include liaison, leadership,

management, and programme planning (Withrow, 1987).

A study by Henzell (1979) revealed that the major reasons for attendance at the school health clinics in Western Australia included trauma, headache, physical illness, and dietary and menstrual problems. According to the present researcher's clinic attendance records at the school under study, these issues remain the major reasons for clinic visits.

### 1.3 STATEMENT OF THE PROBLEM

Because adolescence is often a turbulent time, the general effect of diet and exercise on the physical and mental health of adolescents is a question of utmost importance to school nurses who daily assess the condition of students in their care. Of the total number of student self-referrals to the present investigator's school health centre, approximately 70% of students present with headaches. Over 50% of these students describe symptoms of hypoglycaemia. This condition is preventable through healthy lifestyle practices. However, the majority of these students give a history of poor dietary and/or exercise practices.

An audit of students' health records undertaken by the present investigator revealed that headaches are often routinely recorded without proper identification of possible causative factors and subsequent initiation of

appropriate follow-up care. To provide quality nursing care to students, it is vital that possible causes of headaches are identified, appropriate treatment is commenced, and persistent occurrences are referred.

#### **1.4 NEED FOR THE STUDY**

Despite the fact that nutritional problems in adolescence are recognized and well described (Caghan, 1975; Young, 1982; Bennett, 1984; Story & Resnik, 1986; Wolfish, 1987; James & Mott, 1988; Rees & Mahan, 1988), there exists very little documented evidence correlating the existence of headaches with nutrition and exercise practices. There is also a paucity of available evidence linking nutrition and exercise habits with adult headache sufferers.

#### **1.5 PURPOSE OF THE STUDY**

It is the purpose of this study to correlate the frequency of students' headaches with the same students' knowledge and self-reported behaviours related to diet and exercise. Identification and interpretation of this information will enable the nurse to develop appropriate health education programmes. The potential benefits such programmes would have for the adolescent include improved health, a reduction in time spent away from class, an increase in self-esteem and self-worth as a result of



improved self-care, and a lower rate of absenteeism. This lower absenteeism rate would effect a resultant decrease in cost to the tax-payer, brought about by a reduction in parent-time away from work, fewer referrals to doctors, and less expenses for medication, telephone calls and travelling.

#### 1.6 RESEARCH QUESTION

Is there a relationship between the occurrence of headaches in adolescents aged 12 to 15 years and their knowledge and behaviour related to diet and exercise?

#### 1.7 RESEARCH OBJECTIVES

In order to answer the research question, the study will address the following objectives:

1. To identify the prevalence of headaches in a sample of adolescents aged 12 to 15 years at a north-eastern metropolitan high school.
2. To identify existing levels of knowledge regarding diet and exercise.
3. To analyse self-reported behaviours regarding diet and exercise.
4. To determine whether there is a relationship between knowledge of dietary and exercise

principles, and subsequent behaviour.

5. To determine whether there is a relationship between diet and exercise behaviours, and the occurrence, or non-occurrence, of headaches.

## 1.8 HYPOTHESES

This study investigates whether headaches are related to dietary and exercise practices. It is expected that the survey data will provide sufficient information to show that:

1. Students with frequent headaches display lower levels of exercise knowledge than those with non-frequent headaches.
2. Students with frequent headaches display poorer exercise practices than those with non-frequent headaches.
3. Students with frequent headaches display lower levels of dietary knowledge than those with non-frequent headaches.
4. Students with frequent headaches display poorer dietary practices than those with non-frequent headaches.

## 1.9 OPERATIONAL DEFINITIONS OF VARIABLES

Balanced diet--a daily food intake which includes adequate servings from each of the Five Food Groups (as outlined in Dietary Guidelines for Australians, in Appendix A) on an average of at least five days out of seven each week.

Adolescent--a person growing up from childhood to adulthood, usually from 12 to 15 years of age.

School nurse--a Registered General Nurse who works in a school-based health centre and whose duties include first-aid, counselling, health education, and screening for abnormalities of vision, hearing, posture, growth and development in normal and handicapped students.

Headache--a disorder characterized by pain on one or both sides of the head, with or without nausea, abdominal discomfort, throbbing or disturbance of vision.

Frequent headache--a headache which occurs at least twice a month.

Hypoglycaemia--lowered blood glucose levels, resulting in headache, tremor, nausea and abdominal discomfort.

Regular exercise--aerobic exercise (exercise emphasizing increased oxygen consumption without muscle strain) performed at least three times a week.

## 1.10 SIGNIFICANCE OF THE STUDY

Students presenting with headache at the investigator's school-based health centre frequently ask for analgesia, or to be sent home from school. Informal discussion with other school nurses reveals that they are confronted with a similar situation. In many cases, it is unclear whether the students' headaches are related to specific factors such as poor nutrition, or over-exercise. Systematic investigation of the relationship between these variables may provide information for school nurses which will help in their assessment of students' headaches.

Other professionals, such as educators, guidance officers, social workers, chaplains, and policing officers, who are also involved in the care of adolescents at school, will benefit from the results of this study, as headaches related to disorders of nutrition and/or physical activity may be related to behaviour, discipline, and learning problems (Nealis & Miller, 1984).

Parents may also benefit from the findings of this study. Adolescents rarely discuss their eating habits with their parents; fewer meals are eaten at home with the family during adolescence than during childhood, meals are eaten in a hurry, and often with peers (Wolfish, 1987; Court, 1988; Rees & Mahan, 1988). Communication of the study's findings to parents would provide them with an insight into adolescent nutrition and activity behaviours,

and the possibility of a relationship between these behaviours, illness or school-related problems.

Finally, adolescents themselves may benefit from this study. As mentioned earlier, advantages may include improved health, less time spent away from class, and increased responsibility for self-health care.

### 1.11 ASSUMPTIONS

The study is based on the following assumptions:

1. Health is a priority for most people.
2. Adolescents want to assume control of their own health problems.
3. Increased knowledge about an event may lead to a change in behaviour.
4. Students responded to the research questionnaire in a truthful and thoughtful manner.

### 1.12 LIMITATIONS OF THE STUDY

One limitation of this study is the questionnaire, which has not been shown to have reliability and validity. Secondly, ideally, a comprehensive study of headaches in adolescents would include a large number of students from a representative sample of Perth high schools, but the

effort required to analyse the expected response would be beyond the scope of this study.

This study is further limited due to time constraints, and resources. Findings from this study will have limited generalizability because the research will only be conducted in one high school, in a specific geographical location, in a particular socioeconomic area, with a limited number of students in the age-range 12 to 15 years. The intent of the present study is to investigate selected variables (diet and exercise); thus it will not provide a complete understanding of the causes of headaches in adolescents.

### 1.13 CONCEPTUAL FRAMEWORK

The concept of people helping themselves in health matters is not new. Goepfinger and Labuhn (1987) suggest that the practice of self-health care probably began before recorded history, and note that early references appear in ancient Greek, Chinese, and Hebrew writings. With the later development of a scientific and biological orientation toward disease, self-health care was gradually de-emphasized. A new focus on treatment and cure replaced the original goals of health protection and illness prevention. This new focus encouraged growing dependence on persons with specialized training--health professionals.

Currently, self-health care is re-emerging as an important factor in health care. Goeppinger and Labuhn (1987) are of the opinion that self-health care is competing with, if not supplanting, professional care. They report that professional roles are being renegotiated, and the structure of the existing health care system is changing to allow more emphasis on prevention and self-health care.

The re-emergence of the self-health care movement has also been influenced by the political climate of the last two decades. During the 1970's and 1980's, authority in general was challenged. Racial minorities demanded their rights in the 70's and women, patients, and the elderly made their demands public in the 80's. "A challenge to the professional health care system, which many believe exemplifies elite rather than democratic control, is illustrated clearly in the ideology of self-health care" (Goeppinger & Labuhn, 1987).

According to Goeppinger and Labuhn (1987), nurses have always emphasized peoples' natural self-health care capabilities. Drem (1980) uses the term self-care to describe activities that individuals initiate and perform on their own behalf to maintain life, health, and well-being. According to Drem the nursing professional is essential because individuals are not always self-sufficient. Consequently, although self-health care is a lay responsibility, professional contributions may also be required.

Orem's model of nursing practice (Orem, 1980) is the conceptual framework selected for this study because it describes the major dimensions of nursing care. Individuals (including adolescents) generally know how to take care of themselves (self-care). If a handicap, for example, renders them dependent in some way, other responsible family members take on this responsibility (dependent care). If adolescents are ill or suffer from a defect such as cystic fibrosis, diabetes mellitus, or a colostomy, they or their family members acquire special skills to provide that care (therapeutic self-care). Figure 1 illustrates Orem's framework for nursing.



OREM'S CONCEPTUAL FRAMEWORK FOR NURSING

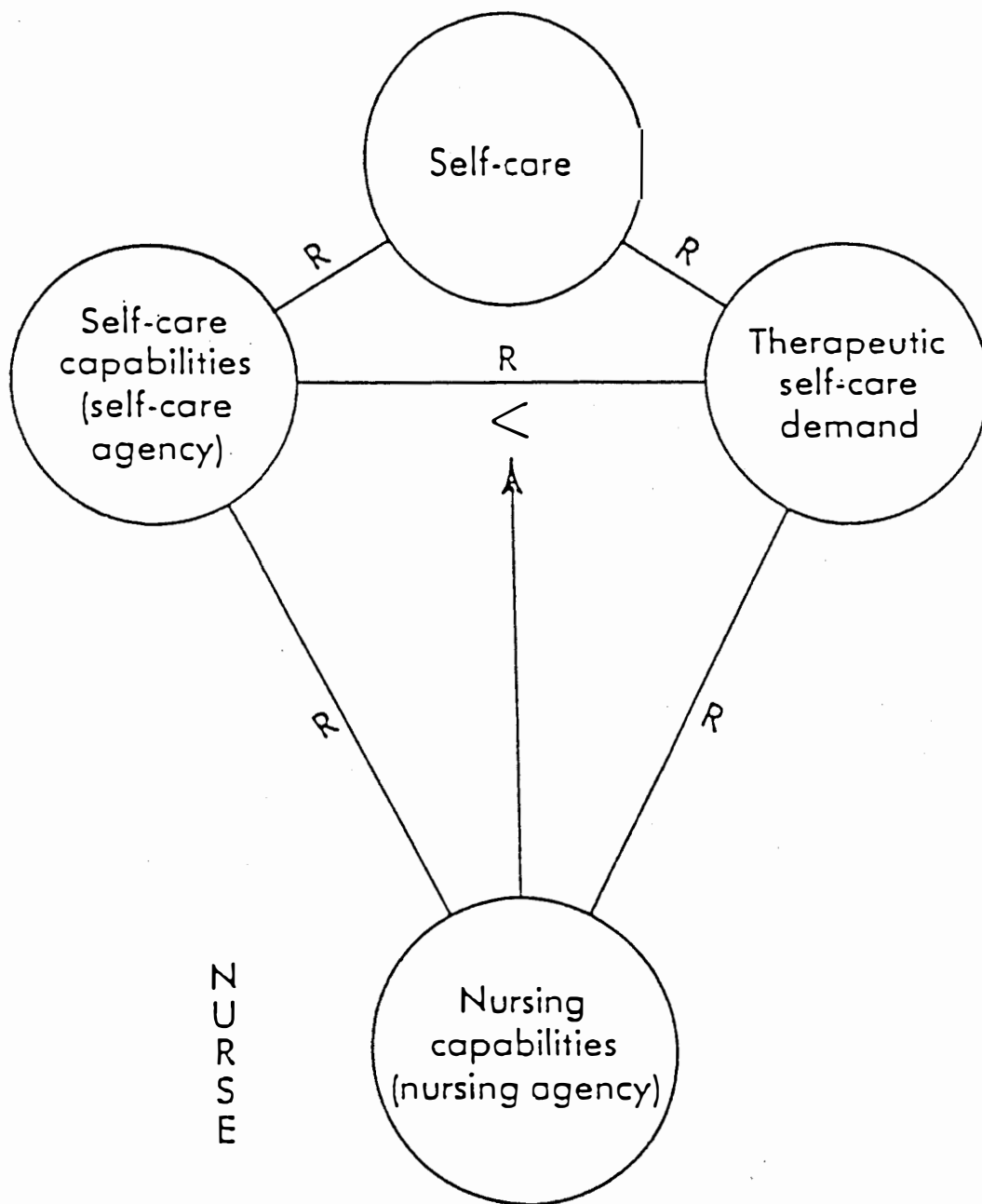


Figure 1. Conceptual framework for nursing.  
R, relationship; <, deficit relationship, current or projected.

Used with permission from Orem, D.E. (1980). *Nursing: Concepts of practice*. New York: McGraw-Hill.

Nursing care is provided when there is a deficit in the self-care or the dependent self-care that the adolescent or the family cannot provide (self-care deficit). The nurse develops an appropriate nursing system, which involves prescribing, designing, and providing the needed care. Orem designed three nursing systems--the wholly compensatory system (the patient has no active role in the performance of care); the partly compensatory system (both patient and nurse share the care); and the supportive/educative system (the nurse acts as a consultant, helping the patient by guiding, supporting, teaching or providing a developmental environment.) It is this last system that has the greatest potential for school nursing. Major areas of education for self-care that are important in maintaining or improving health include nutrition, exercise and physical fitness, weight control, stress management, management of support systems, and environmental control (Pender, 1987).

In this study, identification of self-care deficits in exercise and nutrition will allow for the formation of a needs-specific health education programme. The goal of such a programme is to facilitate resumption of self-care by the adolescent and/or family. This concept of nursing provided the basis for the study.

#### 1.14      REMAINDER OF THE THESIS

Chapter 2 of the thesis is a review of the literature related to the investigation. Studies exploring adolescent health needs and problems, and the implications of these problems for nutrition and exercise, are described. Reports on the implementation of nutrition and exercise programmes in schools, the relationship between knowledge and behaviour, and the role of the school nurse are reviewed, and previous papers relating to the causes and treatment of adolescent headache are described. The chapter concludes with a brief summary. In chapter 3, the methodology involved in the study is presented. Results of the study are reported in chapter 4, and in chapter 5, findings are discussed, conclusions are presented, and recommendations for further research are offered.

## CHAPTER TWO

### LITERATURE REVIEW

This chapter focuses on literature which provides an insight into the need for the study. In the first section, the relationship between the process of adolescence and its resulting conflicts with health is presented. Section two explores the implications for nutrition and exercise. Thirdly, studies addressing education needs for the improvement of dietary and exercise practices are described. Fourthly, reasons for adolescent attendance at school health centres, and the role of the school nurse, are detailed. In the final section, studies regarding the prevalence, causes, and treatment of headaches are related.

## 2.1 ADOLESCENCE AND ITS EFFECT ON HEALTH

Results of studies conducted in different parts of the world indicate that health problems and concerns cited by adolescents are common to all adolescent populations. Giblin and Poland (1985) identified the health care needs and information concerns of high school students in Detroit, North America, as eating proper foods, school problems, acne, depression, headaches, and health information needs, while Mayer and Bauman (1986) found that adolescents on the island of Saipan, Micronesia, were concerned about headaches, abdominal pain, dental caries, parents, suicide prevention, school, suicidal thoughts, and health information.

Students in Ontario, Canada, cited menstrual problems, acne, and headaches as common problems (Hodgson, Feldman, Corber, & Quinn, 1985), whilst their counterparts in Perth, Western Australia, attended school health centres with trauma, headaches, physical illness, menstrual problems, and dietary problems (Henzell, 1979), and those in Sydney, Australia, listed depression, getting along with parents and siblings, nervousness, acne, obesity, and developing into an adult, among their concerns (Bennett, 1984).

Areas of concern in adolescent health can, according to Cohen and Litt (1974), be categorized into three main groups:

1. Conditions which primarily affect the adolescent--for example, delayed puberty, scoliosis, acne, headaches, dietary and menstrual problems;
2. Problems made worse by adolescence--for example, motor vehicle accident trauma, diabetes mellitus, dental caries;
3. Problems originating in adolescence but which become clinically manifest with increasing morbidity and mortality during adult life--for example, hypertension, obesity, migraine, schizophrenia.

According to Bennett (1984) and Friedman (1986), health risk factors should be identified and discussed with adolescents. Friedman (1986) adds that despite the belief that adolescence is a period of good health, an increasing number of studies are documenting the "unmet" health needs of young people.

In a Melbourne community survey in 1970, conducted by Krupinski, Stoller, Baikie and Graves, the prevalence of physical illness in adolescents was 25% compared to the adult prevalence of 33%. A projection from that figure, based on an approximate adolescent population of 2.5

million, is that on any given day, about 625,000 would have a demonstrable physical illness. According to an Australian health survey in 1977-78, a recent significant "illness" was reported by 56.4% of the 12 to 18 year age group (Bennett, 1984).

Thus, it would seem that most adolescent health problems result from the rapid physiological changes taking place at this time, the individual's reaction to these changes, and the stress, conflict and confusion that characterizes adolescence.

## 2.2 IMPLICATIONS FOR NUTRITION AND EXERCISE

Diet and exercise are often addressed together because they are (a) prominent life-style risk factors for numerous health problems and (b) the two modifiable components in energy balance (Simons-Morton, O'Hara & Simons-Morton, 1986). Diet and exercise are similar in that they are complex behaviours composed of several steps in a behaviour chain. Thus, changes in either may require major adjustments to routine. Diet and exercise behaviours differ in important ways, however. The urgent physiological requirement for nutrients makes food-related activities a major endeavour.

In Australia, where the supply of food is abundant, healthful eating practices compete with less healthful ones. The competition is intensified by the attempts of

commercial food sources to influence taste preferences and eating practices, as indicated in the Stass report on television advertising to children (United States Federal Trade Commission, 1978).

There is no such physiologic urgency for exercise. Exercising regularly is an elective practice that requires planning. Consequently, it largely competes with other leisure pursuits, which are often sedentary.

## 2.21 Nutrition

Adolescence is a critical stage of childhood development from a nutritional viewpoint. It is a time of growth acceleration and rapid body change, which render adolescents more vulnerable to nutritional deficits. Court (1988, p. S3) adds that this is a time when "the precursors of nutritionally-related adult diseases are established." Dwyer (1980) and Penninger (1986) conducted surveys of adolescent nutrient intake that have shown that adolescents are less likely than any other group to be obtaining vitamin A, thiamin, iron, and calcium, and are, in fact, ingesting more sugar, fat, protein, and sodium than currently thought to be optimal. It may be that similar problems exist in Western Australia.

Young (1982) argues that nutritional status is influenced by many forms of stress. She explains that the adolescent's assumption of increased responsibility may be



stressful, resulting in favourable or unfavourable effects on nutrition, depending on the choices made during this period. The search for independence and identity may also affect nutritional intake and nutritional needs, and the need to develop an identity may cause the adolescent to go to extremes in dietary habits.

The eating practices of young people are widely documented. According to Rees and Mahan (1988), adolescent food habits reflect many influences and conditions, including family eating practices, emotional environment, socioeconomic circumstances, education, and personal adjustment. They list growing independence, increased participation in social life, busy lifestyles, buying and preparing more food for themselves, often eating rapidly and away from home, advertising, and the ease of obtaining ready-to-eat foods as some of the factors influencing eating behaviour. Eating habits are also influenced by origin, cultural heritage, ethnic background, and religious affiliation (Galli, Greenberg, & Tobin, 1987).

Many studies have frequently found adolescents to have poor dietary habits (McCoy, Kenney & Kirby, 1984; Ezell, Skinner & Penfield, 1985; Skinner, Salvetti, Ezell, Penfield & Costello, 1985; Crawford & Selwood, 1989). Several studies assessing adolescents' level of nutrition knowledge, dietary habits, and various factors contributing to poor dietary habits (Schwartz, 1975; Howe

& Vaden, 1980; Singleton & Rhoads, 1984; Skinner & Woodburn, 1984) have also been reported, all of which have supported the literature mentioned earlier.

A study by Young (1982) describes reports from adolescents that they are often not hungry, don't have time to eat, want to sleep late, breakfast is not prepared for them, fewer meals than in childhood are eaten with the family and an increasing number of meals are eaten with their peers. In a study of adolescents in Europe, North America, and Australia, Truswell and Darnton-Hill (1981) reported that eating habits were characterized by missed meals, snacking, fondness for fast and take-away foods, the eating of unconventional meals, the questioning of parents' nutritional values, and the consumption of alcohol and soft drinks.

A 1983 review from Canada (Nutrition Committee, Canadian Pediatric Society) found that 30% of adolescents do not eat breakfast. Truswell and Darnton-Hill (1981) noted that lunch was also missed by many young people. Both studies suggested that missed meals were compensated for in the form of snacks later in the day--on average, 25 substantial snacks a week--which may account for 20-25% of energy intake in boys and girls. Many of these snacks are taken as fast or take-away foods. Fast-food outlets are informal, and provide a place for teenagers where food is cheap, familiar, and accessible. Eating in this way is, for many, an important part of social development.

Kolbe (1985) reports that dietary habits influence short-term attention, memory, emotional affect, and social functioning. He states that diets deficient in iron, in particular, have been shown to reduce attention, concentration, memory, and achievement, while fasting (skipping meals) reduces reflective and analytical abilities. This finding has major implications for school nurses, and other educators involved in caring for adolescents.

Adolescents have a notoriously bad reputation on the subject of eating patterns and food habits. Although some adolescents do experience difficulty in adopting sound nutritional habits, Caghan (1975) believes many of them actually know a great deal about nutritional requirements and food values. She argues that the problem is not a lack of information, but of putting into practice what they know. Story and Resnick (1986) agree: They found that adolescents were well informed about good health and nutrition practices, but they did not translate this knowledge into food behaviour. Adolescents in this study felt that there were many barriers to changing their dietary behaviours--specifically, lack of time, lack of discipline, and a lack of a sense of urgency. From the present researcher's experience, adolescents do not appear to know a great deal about nutrition, or to exhibit sound nutrition practices.

## 2.22 Exercise

Physical activity is also necessary to support normal growth, especially of bones and muscles; to prevent adult health problems; to motivate lifelong activity involvement; and to enhance learning in the classroom. Regular habits of exercise yield short- and long-term physical and psychological benefits, according to James and Mott (1988).

Other benefits of regular physical activity include maintenance of optimal body composition; increased efficacy of hormones in the regulation of energy metabolism; strengthening of the heart, lungs, and circulatory system; aiding in control of appetite; increased efficiency of energy use by muscle fibres; and increased rate of basal metabolism (Rees & Mahan, 1988), increased cerebral blood flow; increased glucose uptake; improved brain function; and consequently a possible improvement in cognitive performance (Kolbe, 1985).

Results from a variety of studies support the contention that regular participation in physical activity is important in maintaining good health (Haskell, 1984). Physical activity is associated with long life (Paffenbarger & Hale, 1975), and has been associated with delays in the onset of, and reductions in the severity of heart disease (Haskell, 1984). There is growing consensus that the most desirable form of physical activity is aerobic exercise. Haskell and Superko (1984, p. 85)

describe this as "large muscle exercise, especially activity requiring the transport of body weight over distance or against gravity", to be performed 3-5 days a week, for at least 20 minutes' duration.

Ferguson, Yesalis, Pomrehn and Kirkpatrick (1989) studied adolescents' attitudes toward physical education, knowledge about the benefits of exercise, and beliefs about their abilities, in order to determine their influence on exercise intent and current exercise behaviour. They found that early development of positive attitudes toward exercise may play an important role in an individual's inclination to maintain an active lifestyle. Students who perceived exercise as beneficial, who exhibited positive attitudes about physical education, who had good self-esteem, and who perceived themselves as able to maintain commitments, were more likely to intend to exercise in the future than those who did not.

In 1985, the National Children and Fitness Study (McGinnis, 1985; Ross and Gilbert, 1985) revealed that only 58.9% of all American children and youth participate in appropriate physical exercise all year round, and 46.9% engage in one or more lifetime physical activities. A North American study by Tappe, Duda, and Ehrnwald (1989), found that high school students identified the following as barriers to exercise: time constraints, lack of desire, unsuitable weather, inaccessible facilities, lack of support, cost, schoolwork, job responsibilities, lack of

equipment or facilities, sickness, or injury.

It is possible that physical education may not be a compulsory unit of study in North American schools, but in Western Australia, most government high school exercise programmes include either a 45-minute or a 65-minute session of physical activity each week, in Years 8 to 12. Additional time may be spent during optional subjects such as dance, physical recreation, and physical education studies. This may vary, however, from school to school.

A study in Adelaide, Australia, conducted between the Education Department and the Commonwealth Scientific and Industrial Research Organization's Division of Human Nutrition, began in 1978 with a control trial of a daily fitness programme in seven primary schools. It found that intensive physical activity programmes produced a reduction in body fat, together with an improved fitness that was not achievable with the existing programme. After further studies over a two-year period, it was noted that there was a fall in some diastolic blood pressure levels, and some parents reported improved activity in their children.

It can be seen from the discussion thus far that adolescence has a major influence on health, and that during this period of turbulence, physical activity and nutritional status may be compromised. Young people want to be fit. Court (1988) reports that one of the most

frequent questions asked by adolescents is "How do I get fit?". His answer is to address the issue of good nutrition, along the lines of "What is a dietary or nutritional programme that will help me to be fit?".

### 2.3 IMPLICATIONS FOR HEALTH EDUCATION

According to Simons-Morton, O'Hara, and Simons-Morton (1986), a national awareness of the potential health benefits of a good diet and regular exercise is emerging in North America. This trend is also apparent in Australia, particularly in Western Australia, where the government has identified diet and exercise as two of its health promotion priority areas in the recently introduced Plan for Health (Health Department of Western Australia, 1990).

Simons-Morton, O'Hara and Simons-Morton (1986) argue that to address the public health importance of healthful diet and exercise behaviours, intervention must not only be directed toward influencing large changes in the small minority of people at high risk, but must also be directed toward influencing small changes in the vast majority of people at moderate to low risk. The nurse's role in health education and health promotion includes the fostering of self-care concepts to encourage these students, as emerging adults, to take responsibility for their own health care.

## 2.4 HEADACHES IN ADOLESCENCE

According to researchers Vahlqvist (1955), Bille (1962), Oster (1972), Egermark-Erickson (1982), and Sillanpaa (1983), headache in childhood is a frequent complaint, steadily increasing throughout adolescence, particularly in girls. Bille's classic study (1962) found that 75% of school children experienced a headache by age 15.

Several authors--Rothner (1979), Bille (1981), and Williamson (1981)--have suggested that various types of psychological stressors in adolescents, such as excessive school demands, conflicts with parents or peers, or ineffective coping skills in dealing with these stressors, might elicit headaches. Novak (1984) found that headaches were caused by weather changes, psychological stress, nutrition (cheese, chocolate, red wine, etc), and menstruation (the latter confirmed by Solbach, Sargent, Coyne, Malone, and Simons (1988)). Galli, Ciccarone, Venuta, and Ferrari (1985) reported that food allergies seem to play an important part in headaches. In addition, Guidetti, Ottaviani, Pagliarini, Paoletta, and Seri (1983) identified the following headache triggers--feelings of being excluded from the family group, insecurity, and suppressed hostility towards important figures.

Numerous studies have concentrated on the treatment of headaches. Waranch and Keenan (1985), and Larsson, Melin, Lamminen and Ullstedt (1987) studied the effects of



relaxation training; Richter, McGrath, Humphreys, Goodman, Firestone and Keene (1986) look at stress reduction training; Larsson and Melin (1988) experimented with self-help relaxation versus problem discussion, while Andrasik, Blanchard, Edlund and Rosenblum (1982), and Labbe and Williamson (1984), used successful feedback treatment.

Despite all these findings, very few studies related diet and exercise practices to the occurrence of headaches in adolescents. An extensive search of the literature failed to locate more than two such studies. It is for this reason that this study will explore the relationship between the occurrence of headaches in adolescents, and their dietary and exercise practices.

## 2.5 SUMMARY

In summary, headaches in adolescents present school nurses with a challenge. By the very nature of the adolescence process itself, young people are vulnerable to health deficits, especially in the areas of nutrition and exercise. This has important implications for school nurses, in particular, and health education in general.

The literature describes in detail the characteristics of adolescence, implications for nutrition and exercise, causes and treatment of headaches in young people, the need for health education in these areas, the

role of the school nurse in detection and treatment of deficits in self-health care, and the recognition that increased knowledge may not necessarily affect a change in behaviour. There is, however, very little published evidence relating to the relationship between adolescent headaches and dietary and exercise practices.

## CHAPTER THREE

### METHOD

This chapter describes the design and procedures of the study under the following headings:

1. Development of the Instrument
2. Selection of the Population Sample
3. Collection of the Data

### 3.1 DEVELOPMENT OF THE INSTRUMENT

In order to devise an instrument which accurately reflected the content and scope of the research questions, literature describing research methods and instrument development was reviewed. Articles discussing adolescent headaches, dietary and exercise principles, and expected levels of knowledge of diet and exercise for students in Years 8, 9 and 10 were studied. Items measuring knowledge about nutrition and exercise were developed to correspond with each component of the health education curriculum used in Western Australian schools.

To establish content validity, a series of interviews with school health nurses, nurse educators, physical education teachers, and researchers was undertaken, and the proposed questionnaire was presented to these experts for their evaluation and comment. The questionnaire was refined on the basis of these comments, and presented back to them for their final appraisal, which was subsequently gained.

A four-part questionnaire comprising eighteen items, was devised for the purpose of this cross-sectional survey. (This is shown in Appendix B). An introductory letter included instructions for completing the questionnaire. (This is also included in Appendix B).

In part one of the questionnaire, respondents were asked to classify frequency of headache according to six

time-frames. Next, respondents were asked to nominate the following: a relationship between headaches and nine identified variables; duration of headache with and without treatment; who provided the most effective treatment; and self-administered treatment according to eleven descriptive categories. An open-ended question provided participants with the opportunity to describe other feelings experienced during a headache.

Part two was designed to assess knowledge of exercise principles, and subsequent exercise behaviour. In part three, students were questioned on dietary knowledge, and subsequent dietary behaviour. Part four was intended to elicit demographic information relating to age, gender, year group, and cultural background.

All questions, with the exception of the two open-ended questions, were designed so that responses could be coded for computer analysis. To maintain accurate records of the response rate, the number of returned consent letters was tallied, and the questionnaires were numbered and checked off against a copy of the class roll obtained from the teachers.

To pilot-test the study, ten students from each Year 11 and 12 were randomly selected from class rolls, using a table of random numbers. Three days prior to the pilot study, an announcement describing the purpose of the study was placed in the school daily news sheet.

Students were called to the health centre during recess or lunchtime, and invited to take part in the pilot study. Those who agreed were given an information letter containing a form inviting parental consent and student participation. (This letter is included in Appendix C). Names were randomly selected until 20 questionnaires had been completed.

Twenty questionnaires given to the pilot survey group were returned completed (100%, N=20). Respondents consisted of 10 students from Year 11 (six females, four males), and 10 students from Year 12 (eight females, two males). The mean age of the students was 16.2 years.

As a result of the pre-test, several questions were rephrased to improve understanding, and to reduce the incidence of ambiguity and misinterpretation. Questions not reflecting content validity were restructured.

### 3.2 SELECTION OF THE POPULATION SAMPLE

The setting for the study was a senior high school in a north-eastern suburb of Perth. Permission to conduct the study was obtained from the Ethics committee, Western Australian College of Advanced Education, and from the principal of the high school (Appendix D).

Using the stratification plan, the lower school population was divided into three strata: students in Year 8, Year 9, and Year 10. The sample was drawn from

the class lists of these students. From these lists, it was ascertained that the current lower school enrolment was 572. Of this number, 188 were in Year 8; 185 were in Year 9; and 199 were in Year 10.

Students in each stratum were selected using a table of random numbers, and were called to the health centre via the daily news sheet during recess or lunchtime. The method of selection and purpose of the study were explained to the students and voluntary participation was invited. It was stressed that all replies would be anonymous, and confidential. Those who consented to take part were given an information letter containing a form inviting parental consent and student participation. A copy of these documents is included in Appendix C. Names were randomly selected until 30 consent forms from each stratum had been returned. Several students returned consent forms later than anticipated, consequently there were more than 30 respondents in two strata.

### 3.3 COLLECTION OF THE DATA

On return of the consent form, students were given the questionnaire, and instructed to read the introductory letter before proceeding. To prevent collaboration, students were separated from each other while filling in the forms.

To reduce the incidence of non-usable questionnaires,

forms were scanned for completeness before being placed in a "ballot" box. Several instances of incompleteness involved questions at the bottom of a page which had simply been overlooked. Reasons given by the students related generally to hastiness. These omissions were rectified by the student at the time of identification.

Coding difficulties became apparent from the inconsistent answers for "duration of headache". Several respondents answered "until I go to sleep", instead of quantifying a time period. In all instances, this response was detected by the investigator during perusal of the form in the presence of the student, and was thus able to be rectified.



## CHAPTER FOUR

### RESULTS

Results of the study are presented in this chapter. In the first section, the respondents are described, and in the second section, the findings of the study are presented. The findings are presented in five subsections, which correspond to the five objectives addressed by the study. In the first subsection, the prevalence of headaches is described. Existing levels of dietary and exercise knowledge are reported in subsection 2. In subsection 3, self-reported dietary and exercise behaviours are recorded. Subsection 4 explores the relationship between knowledge of dietary and exercise principles, and subsequent behaviour. Lastly, in subsection 5, the relationship between dietary and exercise behaviours, and the occurrence of headaches is determined.

#### 4.1 THE RESPONDENTS

Of 162 students selected to assist with the study, 19 (11.7%) declined on the basis of lack of interest, or lack of time. Of the remaining 143, 97 returned their consent letters. A total of 97 questionnaires were completed: 35 (36%) from students in Year 8, 32 (33%) from those in Year 9, and 30 (31%) from students in Year 10. There were 27 (27.8%) male respondents, 70 (72.2%) female respondents, and the mean age was 13.5 years.

Frequencies of responses to the questionnaire are presented in Table 1 according to year level.

Table 1.

Frequency of Responses from Students, According to  
Year Level

Year 8		Year 9		Year 10	
N	%	N	%	N	%
35	36.1%	32	33.0%	30	30.97%

## 4.2 RESULTS OF THE STUDY

### 4.21 OBJECTIVE ONE

To identify the prevalence of headaches in a sample of adolescents aged 12 to 15 years at a metropolitan senior high school.

#### 4.211 Prevalence of Headaches

Data from Question 1 on the questionnaire answer the first objective. A total of 91.8% (N=89) of respondents suffered with headaches. Frequent headaches (those which occur at least twice a month) were reported by 51.6%, non-frequent headaches (those which occur less than twice a month) by 40.2%, and no headaches by 8.2% of students.

Percentage distribution of headaches into the categories: frequent, non-frequent, and never, according to year level, is illustrated in Figure 2.

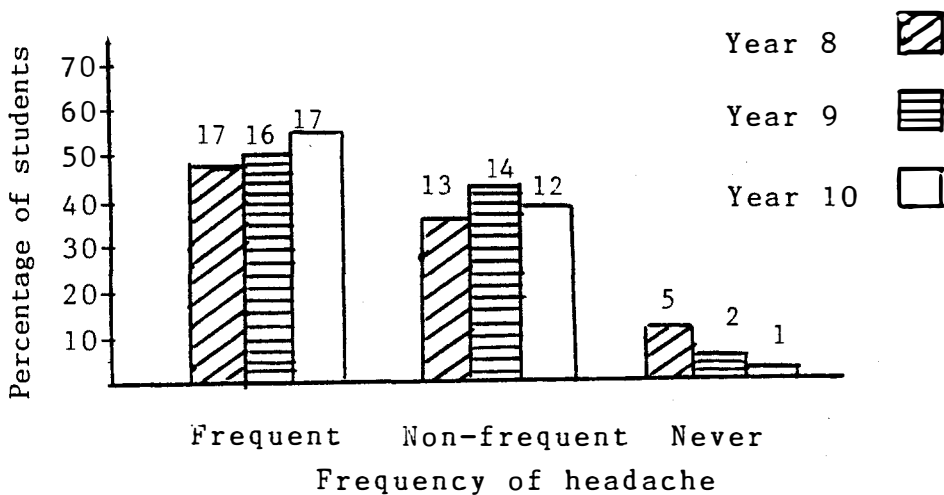


Figure 2. A comparison of headache frequency in students in Years 8, 9, and 10

To enable closer examination of intergroup differences in frequency of headaches, headache categories were collapsed into three groups: frequent, non-frequent, and never. Due to the small number of observations in the group "never", findings from initial Chi-square analysis of differences across the Years 8, 9, and 10 based on frequency of headache were limited. To ensure validity of the Chi-square analysis, observations in the groups "non-frequent" and "never" were added together to form the category "non-frequent". This resulted in two categories: "frequent", and "non-frequent". Chi-square analysis showed no significant differences in headache frequency according to year level, ( $\chi^2(2, N = 97) = .470, p > .05$ ).

#### 4.212 Other Factors Relating to Headache

It is not enough for the nurse to merely determine the prevalence of headaches in adolescents. In order to provide holistic nursing care to these students, it is important to consider other factors relating to headaches; for example, the identification of perceived causes of headaches, and the most effective self-reported treatment. This information was collected via the questionnaire, and while it does not relate directly to the first objective, it is presented below because of its importance in the understanding of headaches in adolescents.

##### Cause of Headaches

In the questionnaire, a number of factors possibly

related to the cause of headaches were listed. Students were allowed to list more than one factor. A comparison of these factors revealed that studying and sport/exercise were the most frequently cited factors, whereas overeating was the factor least related to headache.

These factors are shown in Table 2, along with a comparison between the responses of students from each year level. In considering the findings of Solbach, Sargent, Coyne, Malone, and Simons (1988), who reported a 30% incidence of headache during the menstrual cycle, it is interesting to note the differences across the year levels in Table 2.

Table 2

Percentage Distribution of Factors Relating to Headache, According to Year Level (N=97)

Factor	Year 8	Year 9	Year 10
Studying	31.4	31.2	30.0
Watching TV	17.1	50.0	13.3
Missed meals	14.2	25.0	33.3
Sport/exercise	20.0	21.8	20.0
Conflict	17.1	18.7	20.0
Trouble at school	5.7	12.5	13.3
Menstrual periods	5.7	9.3	16.6
Overeating	0.0	6.2	6.6
Other	34.2	21.8	23.3

Other factors relating to headache were cited by 26.8% (N=26) students. These included "the effect of the sun", "the noise and smell of the car", "staying inside too long", "feeling sick", "crying", "headache comes out of nowhere", "result of banging my head", "eye strain", "pains in my bones", "stress", "back problems", "lack of sleep", "sitting around doing nothing", "being closed up in a stuffy, smoky room", "low blood sugar", "not eating", "not wearing glasses", "dieting", "science experiments", "type of food eaten", and "cigarette smoking".

#### Length of Headache

Thirty six (37.1%) respondents reported headaches of less than two hours' duration if untreated, 22 respondents (22.7%) reported two to six hours' duration, 9 respondents (9.3%) reported 6 to 12 hours' duration, and headaches lasting longer than 12 hours were reported by 21 (21.6%) respondents.

Following treatment of headache, duration of less than 30 minutes was noted by 38 (39.2%) respondents, and duration of less than four hours was noted by 42 (43.3%) respondents. Headaches which continued after four hours, despite treatment, were reported by six (6.2%) respondents.

Provider of Most Effective Treatment for Headache

In response to the question, "Who helps you the most when you have a headache?", 60.8% (N=59) of students cited a parent, usually the mother. Effective self-treatment was reported by 29.8% (N=29), whereas only 2.1% (N=2) saw the school nurse as the person who helps the most. Students also reported that sisters, friends, and keeping themselves occupied helped to treat their headaches. Table 3 shows the distribution of perceived effective source of help.

Table 3

Percentage Distribution of Perceived Effective Source of Help for Students with Headache, According to Year Level, Ordered by Rank

Source	Year 8	Year 9	Year 10
Parent	68.5	59.3	53.3
Self	20.0	28.1	43.3
Nurse	2.8	3.1	0.0
Doctor	2.8	0.0	0.0
Other	0.0	0.0	3.3
Nil	0.0	0.0	3.3

### Self-Reported Treatment of Headache.

Table 4 sets out the frequency distribution of self-reported treatment of headache. In this question, respondents were allowed to list more than one type of treatment. There were 218 responses to this question. The majority of respondents (72.2%) cited medication as a preferred treatment of headache. The drug paracetamol was taken by 41.2% of respondents, 38.1% took aspirin, while 8.2% took a compound medication. Over half (59.8%) reported rest as a preferred method of treatment, and 23.7% cited having a drink of water as effective treatment. Exercise was avoided by 13.4%, 10.3% visited the school nurse, and 6.2% preferred no treatment. Foods avoided by students included cheese, fatty foods, cold foods, junk food, milk, lollies, and Chinese food.



Table 4.

Frequency of Treatment of Headache as Reported by Respondents, Ordered by Rank (N=218)

Treatment	Year 8	Year 9	Year 10	% of Total
Medication	21	25	24	72.2%
Rest	19	22	17	59.8%
Drink water	10	9	4	23.7%
Avoid exercise	3	7	3	13.4%
Eat	2	3	5	10.3%
Visit Nurse	2	4	4	10.3%
Avoid foods	4	2	3	9.3%
Time off school	2	1	4	7.2%
Relaxation exercises	2	3	1	6.2%
Nothing	3	0	3	6.2%
Visit Doctor	3	0	1	4.1%

Other Feelings Associated with Headache.

Open-ended comment regarding other feelings experienced with headaches attracted 81 responses. Symptoms of hypoglycaemia (related to poor dietary intake) were reported by 47% (N=39) of respondents, and are classified in Table 5. Dizziness was reported by 22.7%, nausea by 9.3%, and abdominal pain by 8.2%.

Table 5.

Responses Identifying Hypoglycaemia Associated with  
Headache, Ordered by Rank (N=39).

Symptom	Year 8		Year 9		Year 10	
	N	%	N	%	N	%
Dizziness	7	20.0	8	25.0	7	23.3
Nausea	1	2.8	4	12.5	4	13.3
Abdominal pain	2	5.7	2	6.2	4	13.3
Tremor	0	0.0	0	0.0	0	0.0

Table 6 delineates other symptoms reported by respondents, which accounted for 48.5% of responses.

Table 6.

Other Symptoms Associated with Headache Identified by Respondents (N=71)

Year 8	N	Year 9	N	Year 10	N
Tired	11	Tired	6	Tired	6
Eye strain	2	Eyes ache	2	Sore eyes	1
Poor concentration	1	Dyspnoea	1	Poor concentration	1
Confusion	1	Confusion	2	Sore chest	1
Depression	1	Depression	1	Hot flushes	1
Stress	2	Sleepy	1	Stress	1
Sore head	3	Toothache	1	Head will explode	1
Weak	1	Weak	2	Happy if no school	1
Head crushed	1	Head pumps	1	Numb shoulders	1
Sadness	3	Miserable	1		
Anger	3	Tension	1		
Thirsty	1	Sore throat	1		
Want to kill	1	Pain near heart	1		
Want to die	1	Lethargy	2		
Need scalp massage	1				
Crying	1				

## 4.2 OBJECTIVE TWO

To identify existing levels of knowledge regarding dietary and exercise principles.

### 4.21 Knowledge of Dietary Principles

In Questions 11 and 12 on the questionnaire, respondents' knowledge regarding dietary principles was surveyed. Existing levels of dietary knowledge were found to be poor.

The majority of students (73.3%, N=74) correctly identified three or more food groups, but three or more correct *servings* were nominated by only 7.5%.

The bread and cereals food group was correctly indicated by 56 respondents; fruit and vegetables by 68; fats by 27; meat and its substitutes by 72; and the milk group by 62 students.

Other nominations for the five food groups included the following: "drinks", "chocolate", "sugar", "sweets", "lollies", "eggs", "water", "protein", "vitamins", "minerals", "carbohydrates", "fibre", "body building", "breakfast", "morning tea", "lunch", "afternoon tea", "tea", "breast-feeding", "fast foods", "seeds", and "pasta".

Respondents were also asked to nominate the food group to which listed foods belonged. Cakes and coca-cola

were identified fewer times than other foods. In addition to those groups listed above, the following food groups were reported: "junk food", "salt", "good/bad", "spices", "healthy", and "bland".

The total score of 17 points for diet knowledge was composed of the scores for food groups (five points), daily servings (five points), and placement of listed foods into groups (seven points). Mean scores according to year level are shown in Table 7.

Table 7.

Diet Knowledge Scores, According to Year Level

Year	Mean score	SD
8 (N=35)	5.91	4.26
9 (N=32)	7.44	4.20
10 (N=30)	7.74	3.82

An analysis of variance for diet knowledge scores revealed no significant differences in dietary knowledge across the Years 8, 9, and 10,  $F(2, 91) = .72, p > .05$ .

#### 4.22 Knowledge of Exercise Principles

Question 8 on the questionnaire surveyed students' knowledge of exercise principles. On the whole, respondents' knowledge of the exercise items which were included in the questionnaire appeared to be good.

Of eight questions regarding principles of exercise, 82.6% of respondents gave five or more correct answers (out of a possible total of eight). The mean knowledge score for Year 8 students was  $\bar{M} = 5.83$ , for Year 9 students it was  $\bar{M} = 6.18$ , and for Year 10 students it was  $\bar{M} = 6.29$ . However, an analysis of variance found no significant differences in exercise knowledge across the Years 8, 9, and 10,  $F(2, 91) = .82, p > .05$ .

### 4.3 OBJECTIVE THREE

To analyse self-reported behaviours regarding diet and exercise.

#### 4.31 Dietary Behaviour

Reported dietary behaviour was assessed by responses to Questions 13 and 14 on the questionnaire. The major finding in this section of the study was that most students exhibited poor dietary practices.

Seventy-four (76.3%) respondents regularly ate breakfast, 83 (85.6%) respondents regularly ate lunch, and 95 (97.9%) respondents regularly ate tea.

#### Missed Meals

Although the majority of students regularly ate breakfast, lunch, and tea, 40.2% of respondents tended to miss meals. Previous researchers Lee (1978), and Greger, Divilbiss, and Aschenbeck (1979) have found similar habits.

Table 8 sets out the percentage distribution for self-reported dietary behaviour of respondents not regularly eating breakfast, lunch, and tea, according to year level. The evening meal appeared to be the most regularly eaten meal of the day, a similar finding to that shared by Rees and Mahan (1988).

Table 8

Percentage of Respondents Not Regularly Eating  
Breakfast, Lunch, and Tea, According to Year Level

	Year 8		Year 9		Year 10	
	N	%	N	%	N	%
Breakfast	6	17.1	6	18.7	11	36.7
Lunch	6	17.1	3	9.4	5	16.7
Tea	1	2.8	0	0.0	1	3.3

Self-reported reasons for missing meals were categorized into the following groups: "no time", "not prepared for me", "not hungry", and "can't be bothered". The frequency distribution of responses is shown below in Table 9.

A large number (N=19) reported missing meals because of lack of hunger. Time was also nominated as a major factor for missed breakfast (N=12), and missed lunch (N=3).



Table 9

Frequency Distribution of Self-Reported Reasons for Missed Meals (N=37)

Meal	No time	Not prepared	Not hungry	Can't be bothered
Breakfast	10	0	10	1
Lunch	3	3	7	1
Tea	0	0	2	0

Dietary Intake

When self-recorded dietary intake diaries were analysed according to the Dietary Guidelines for Australians (Appendix A), only 28.9% (N=28) of students were shown to be eating a balanced diet. Of all subjects, 74% (N=26) of Year 8 students, 69% (N=22) of Year 9 students, and 70% (N=21) of Year 10 students were not eating the recommended number of minimal daily servings from each food group. Dietary status of respondents, according to year level, is shown below in Table 10.

Table 10.

Frequency Distribution of Dietary Status of Respondents,  
According to Year Level (N=97).

Status	Year 8		Year 9		Year 10	
	N	%	N	%	N	%
Balanced diet	9	25.7	8	25.0	8	26.7
No balanced diet	26	74.3	22	68.7	21	70.0
Balanced diet No breakfast	0	0.0	1	3.1	1	3.3
Balanced diet No lunch	0	0.0	1	3.1	0	0.0
Balanced diet No tea	0	0.0	0	0.0	0	0.0
TOTAL	35		32		30	
Snacking	19	54.3	18	56.2	16	53.3

Respondents consuming an inadequate diet reported a deficiency in the recommended daily serves of bread and cereals, fruit and vegetables, and milk. All respondents consumed adequate daily servings of protein and fats. The numbers in each group were spread evenly across each year.

Toast appeared to be the most popular food for breakfast, and cereal the second most popular food. Almost all respondents ate a meat and salad or

vegemite/peanut paste roll for lunch, and a prepared meal consisting of meat and vegetables for tea. On the weekends, lunch and tea often consisted of fast food, namely pies, sausage rolls, hot dogs, pizzas, take-away chicken, and burgers. These findings support the results found by other researchers who have studied the food likes and dislikes of teenagers (Huenemann, Shapiro, Hampton and Mitchell, 1968; Schorr, Sanjur, and Erickson, 1972; McGanity, 1976; and Greenwood and Richardson, 1979).

Over half the students (54.6%) regularly snacked between meals. Types of snacks and frequency of consumption reported by respondents are shown in Table 11. While foods such as potato chips, cheezels, burger rings, chocolate, sandwiches, icecream, and fast foods featured high on the list, it was noted that fruit was eaten by most students.

Table 11.

Frequency Distribution of Types of Snacks Consumed by Respondents, According to Year, and Ordered by Rank.

Snack	Year 8	Year 9	Year 10
Chips, cheezels	20	21	16
Fruit	25	25	24
Biscuits/cakes	24	25	27
Chocolates/lollies	21	13	6
Sandwiches	19	17	21
Muesli bars	8	3	4
Icecream	6	14	2
Toast/crumpets	7	6	1
Fast food	9	4	12
Soup	3	1	0
Yoghurt	3	2	0
Noodles	2	0	2
Cereal	1	2	1
Eggs	1	0	0
Leftover meals	3	1	1
Vegetables	0	6	2
Milo bars	0	4	0
Milkshakes	0	2	9

The most common time for snacking was after school just before tea (Table 12), a habit also found by Huenemann, Shapiro, Hampton, and Mitchell (1968), Lee

(1978), and Greger, Divilbiss, and Aschenbeck (1979). It is evident that the traditional meals sometimes omitted are often made up for with snacks. The findings also reveal that, although rare, it is possible to eat a balanced diet despite the omission of breakfast, lunch, or tea. Flint (1986) states that it is not necessary to consume three meals each day in order to eat a balanced diet.

Table 12

Most Frequently Reported Times for Snack Consumption

Time	Year 8	Year 9	Year 10
Recess	24	28	26
After school	30	28	26
After tea	14	14	13

4.32 Exercise Behaviour

All respondents exercised more than the suggested minimal aerobic fitness rate of three sessions per week. No respondents reported less than three sessions.

Responses for the variable exercise behaviour were classified into the following groups: three sessions per week, more than three sessions per week, less than three

sessions per week, and no exercise at all. The first group comprised 4% of responses, and the second group comprised 96% of responses. There were no responses for the remaining two groups.

Not surprisingly, an analysis of variance showed that exercise behaviour did not differ significantly between students in Years 8, 9, and 10,  $F(2, 91) = .87, p > .05$ . It was interesting to note that 25.8% (88% of whom were female) did not believe they exercised sufficiently. Of this 25.8%, 22.7% (N=23) stated they would like to increase their exercise programmes, and two respondents (2.1%) stated they were happy with their present exercise levels and did not want to change.

#### 4.4 OBJECTIVE FOUR

To determine whether there is a relationship between knowledge of dietary and exercise principles, and subsequent behaviour.

##### 4.41 The relationship between knowledge of dietary principles, and dietary behaviour.

Knowledge of dietary principles, and subsequent dietary behaviour were found to be poor. The t-test procedure was used to determine whether the dietary knowledge of students who ate a balanced diet differed significantly from the dietary knowledge of students who did not eat a balanced diet.

The mean score for dietary knowledge of students eating a balanced diet was  $\bar{M} = 4.2$ , and the mean score for dietary knowledge of those students not eating a balanced diet was  $\bar{M} = 4.1$ . This result shows virtually no difference between the two groups ( $t = 1.58$ ,  $p = 0.116$ ). It can therefore be concluded from the findings in this section of the study that there is no evidence to support a relationship between what students know about dietary principles, and their dietary habits.

4.42 The relationship between knowledge of exercise principles, and exercise behaviour.

For the variable exercise behaviour, there were four responses in the first group (three sessions per week), 93 responses in the second group (more than three sessions per week), and no responses in the third group (less than three sessions per week), or the fourth group (no exercise). An analysis of variance was not a reliable indicator because of the insufficient range of scores.

Instead, the mean scores for exercise knowledge of both groups were compared. The mean score for exercise knowledge of students who exercised three times per week was  $\bar{M} = 6.0$ , and the mean score for exercise knowledge of students who exercised more than three times per week was  $\bar{M} = 5.9$ .

This result shows very little difference between the two groups. Therefore, the study showed no evidence of a relationship between what students know about exercise principles, and their exercise behaviour.



#### 4.5 OBJECTIVE FIVE

To determine whether there is a relationship between dietary and exercise behaviours, and the occurrence or non-occurrence of headaches.

##### 4.51 The relationship between dietary behaviour and the occurrence or non-occurrence of headaches.

Chi-square analysis of diet behaviour and the frequency of headaches revealed no evidence of a relationship between the two variables,  $\chi^2(2, N = 97) = 4.67, p > .05$ . This means that the type of diet consumed by the respondents had no effect on the frequency or occurrence of their headaches. Those students eating a balanced diet suffered the same frequency of headaches as those students who were nutritionally deficient.

##### 4.52 The relationship between exercise behaviour and the occurrence or non-occurrence of headaches.

As discussed previously, there was not sufficient range in the scores for exercise behaviour to conduct a valid analysis of variance procedure. It can be concluded that the respondents' exercise levels had no effect on the frequency of their headaches. Table 13 sets out the frequency distribution of exercise behaviour, according to the occurrence of headaches.

Table 13

Frequency Distribution of Exercise Behaviour According to Occurrence of Headaches

Occurrence of headaches	Exercise Behaviour			Total
	<3/week	3/week	>3/week	
Frequent	0	1	49	50
Non-frequent	0	3	36	39
None	0	0	8	8
Total	0	4	93	97

A discussion of the major findings of this study is presented in the following chapter.

## CHAPTER FIVE

### DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this descriptive study is to investigate the relationship between headaches in adolescents, and their dietary and exercise practices. This chapter is presented in three sections. The first section contains a discussion of the major findings of the study, in the context of each of the study's objectives. In the second section, conclusions of the study are reported, and in the third section, recommendations for further study are presented.

## 5.1 DISCUSSION OF THE FINDINGS

The major findings of the study are as follows:

1. A large number of students (91.8%) suffer from headaches.
2. Existing levels of knowledge regarding dietary principles are poor. However, respondents displayed good levels of knowledge regarding the principles of exercise.
3. Although the majority of students eat breakfast, lunch, and tea, almost half regularly miss meals. Few students (28.9%) eat a balanced diet. Between-meal snacks are consumed by over half the respondents. However, all students exercise at recommended aerobic fitness levels of at least three sessions per week.
4. No relationship was found to exist between knowledge of diet and dietary behaviour, or between knowledge of exercise and exercise behaviour.
5. The study found no evidence that dietary behaviour was associated with headaches, neither was exercise behaviour found to be associated with headaches.

Each of these findings will now be presented in the order described previously.

#### 5.12 Headaches

The high percentage of headache sufferers (91.8%) does not reflect the number of students who consult the present researcher at the health centre. This discrepancy may come about as the result of several factors. Successful treatment is often thwarted by students' inclination to self-medicate and a reluctance to try other basic but often successful forms of treatment. Students' demands for analgesic medication are often refused by the nurse: However, for those who do present at the nurse's clinic, rest is the most often prescribed treatment. This is reflected in Table 4, which illustrates rest as the second most frequent headache treatment overall. When questioned about headache treatment at home, many students report, "Mum gives me a Panadol." Data which may be of value for further study on this topic could include the frequency of headaches on week-end days as well as school-days, and the type of treatment selected.

#### 5.13 Dietary and Exercise Knowledge

Most students correctly identified three or more of the Five Food Groups. Very few (7.5%) correctly identified three or more of the recommended minimal daily

servings in each group.

It is surprising that so few students (15.5%) could identify five of the food groups, as this approach has been taught from Year 4, but previous research has produced similar results (Jeffries, 1978; Heywood, 1979; and Crawford and Selwood, 1983). While the Five Food Group approach is used in health education and home economics courses, in science classes the nutrients approach is emphasized. The fact that some students named "protein", "vitamins", "minerals", "fats", and "carbohydrates" suggests that students have confused the nutrient approach used by science teachers with the Five Food Group approach used by others. It is also acknowledged that the knowledge test may not accurately reflect the true state of students' knowledge, as validity of the instrument has not been proven.

The fact that the study found no evidence of a relationship between dietary knowledge scores and year level was contrary to expectations. It was assumed that Year 10 students, having been exposed to nutrition education programmes for a longer period of time than those students in Year 8, would have better knowledge of dietary principles.

These findings have major implications for school nurses and others involved in the teaching of nutrition. There may be a need to look at the reasons for current

nutrition knowledge, current dietary practices, and existing misconceptions. These current misconceptions may need to be unlearned before accurate information will be received by adolescents.

Because of their preoccupation with body image (Wolfish, 1987), adolescents may be more receptive to nutrition knowledge if it relates to their physical development, attractiveness, and performance in sports. However, it must also be recognized by health professionals and others involved in nutrition education, that some adolescents, particularly females, may view the "healthy body image" proposed by these educators as contrary to their own concept of slimness.

An additional implication for school nurses is the opportunity to influence not only adolescents, but the community as a whole. Recent studies have shown a lack of nutrition knowledge in the Australian community (Jeffries, 1978; Heywood, 1979). An efficient way of enabling the community to gain access to nutrition could be through the school system. At present, there is a comprehensive nutrition education programme in Western Australian schools. This provides a valuable opportunity for the nurse to identify knowledge deficits and develop teaching strategies which may positively influence adolescents and, in turn, their families, and ultimately the community at large.

Knowledge of exercise principles was found to be

good. The fact that five or more correct answers out of eight were given by a large percentage of students may be attributed to three factors: Principles of exercise and fitness are introduced in Year 2 of primary school, and covered in greater detail in Years 6, 7, 8, and 9; increased interest in fitness over recent years with the introduction of programmes such as the *Life - Be In It* campaign; and portrayal of thinness as the "ideal" male and female image, especially by the media.

No evidence to support a relationship between the subjects' knowledge of exercise principles, and their year level was found. This result was anticipated due to the extensive coverage of exercise principles in Years 6, 7, 8, and 9. These findings do not imply that there may never be the same problems with exercise knowledge as there appears with nutrition knowledge, but that it may be more profitable in terms of knowledge needs for students if nurses concentrated more on promoting the principles of nutrition.

#### 5.14 Dietary and Exercise Behaviours

It is evident from literature mentioned previously that reasons given for missed meals ("no time", "not hungry", "meal was not prepared for me", "can't be bothered") are typical reflections of the adolescent process. Not being hungry at traditional meal-times may



be a result of eating patterns which include "brunch", or midnight feasts, common in adolescence.

The practice of meal missing can be a problem with adolescents if they fill up on non-nutritious snacks such as soft drinks, potato chips, and cakes. These foods, which are readily available at most school canteens, are high in energy, fat, sugar, and salt. School nurses may be able to exert some influence over the type of food served in the school canteen. These findings also have implications for teachers and other educators who spend an increasing amount of time each day dealing with students with learning and behaviour problems that may be attributed to poor dietary habits.

Just under half the respondents reported headaches associated with symptoms of hypoglycaemia. This finding, in conjunction with the low number of students eating a balanced diet is of major importance. The implications these findings have for nursing practice are clear. Firstly, school nurses should be aware of the signs of poor dietary intake, especially when exacerbated by the effects of exercise. Secondly, students may require assistance in formulating and adhering to a reasonable nutrition programme, in light of some individuals' tendency to exercise despite lack of food. With a view to enhancing students' self-health care abilities, nurses may consider Drem's (1980) supportive/educative nursing system. Students' identification of self-care deficits in

nutrition and exercise will allow for the formation of a needs-specific health education programme.

Nutrient analysis on food consumed by respondents was not determined, as this was considered beyond the scope of the present study. It is suggested that nutrient analysis of dietary intake be the subject of future research, as this may present a valuable and more accurate picture of the dietary habits of adolescents.

Over half the respondents regularly snacked between meals. Despite the large proportion of meals made up of snacks, very few were shown to be eating a balanced diet. It is apparent that missed meals are compensated for in the form of snacks later in the day. Getting sufficient food for energy does not seem to be a problem for most of the respondents. However, their daily food patterns appear to be inappropriate for their bodies' needs. It is important, therefore, to teach students to examine the foods that their bodies need, and to identify those that do not maintain or promote their health. They need to know how energy needs can be met in a nutritional way.

As snacks become more and more a part of the adolescent's habitual eating pattern, it is important that they contribute something beside calories. The school nurse can teach the adolescent how to select nutritionally well-balanced meals when using fast food outlets, and the school canteen. The addition of milk, fruit, and other nutritious snacks to vending machines is

a suggestion well worth considering.

The study found that all respondents regularly exercised for the recommended minimal aerobic fitness rate of three sessions per week. Most respondents undertook physical activity outside of school hours, particularly on the weekend. As mentioned previously, students may now be more aware of the benefits of exercise because of the extensive coverage of the subject at school. In addition, public fitness campaigns which have been launched have been given a high profile by the media.

Perhaps partly because body image is important to teenagers, and partly because of the challenge and excitement of team sports, adolescents now appear to recognize that regular participation in physical activity is important in developing exercise patterns they can maintain into adult lives. The findings from this study did not support those of researchers Tappe, Duda, and Ehrnwald (1989), who concluded that only 58.9% of all children and youth exercise adequately. This may be due to the fact that students in Western Australian schools have no control over the amount of exercise they do in school hours. Physical education in lower school is a compulsory unit of study.

Nurses have a responsibility to encourage young people to participate in regular physical activity. Teenagers need to know that the good habits they forge now

will stand them in good stead in their adult lives, and in the maintenance of optimum health.

5.15 The relationship between knowledge of dietary and exercise principles, and subsequent behaviour.

No relationship was found to exist between knowledge of diet and dietary behaviour, or between knowledge of exercise and exercise behaviour. Students with poorer knowledge levels did not necessarily have poorer dietary or exercise habits. This finding may not be an accurate reflection of the relationship between knowledge and exercise; rather it may be attributable to the fact that the instrument used to gather the data has no documented validity to date.

The lack of correlation between knowledge and behaviour may also highlight the fact that increased levels of knowledge do not automatically lead to an improvement in behaviour.

Adolescents have little choice over the amount of exercise they do at school, or over the type of diet they consume, as most of their main meals are prepared by their mothers. Adults, on the other hand, have more control over choice of dietary intake, and frequency of exercise. Therefore, these findings may differ in a study using adults.

It is suggested that future research in this area may include the study of a sample of people who have more control over diet and exercise. An additional study could include a sample of people who exercise over the full range suggested in this study. The problem encountered in this study--that of no respondents in two of the groups--would not eventuate, and would enable a more accurate assessment of whether knowledge varied across the four groups.

#### 5.16 The relationship between dietary and exercise behaviours, and the occurrence of headaches.

The study found no evidence that dietary behaviour or exercise behaviour was associated with headaches, and, as a result, the proposed hypotheses were not supported. These findings contrast markedly with the expectations of the present investigator, and with documented reports of symptoms of poor dietary intake.

It is possible that students not eating a balanced diet (in relation to consumption of food from the Five Food Groups) are obtaining sufficient nutrients from snack foods. In addition to this, it may also be suggested that there may not be pathological hypoglycaemia accompanying poor dietary intake.

In addition, stress may have been a contaminating factor in this study. Young (1982) reports that

socioeconomic status can influence an individual's level of knowledge about nutrition, and can also cause stress. Stress, in turn, can influence an individual's nutritional status, and may also be a precipitating factor in headaches. Future research involving stress, headaches, and nutritional status is desirable to investigate the reasons for poor dietary knowledge and poor dietary practices in adolescents, and to increase the knowledge base for nursing practice.

It is recognized that replication of this study using different samples, and with the addition of variables mentioned previously, may produce different results. These results may well indicate a relationship between diet and headaches, and between exercise and headaches.

The value of self-health care cannot be underestimated. The economical benefits of self-health care are well recognized (Health Department of Western Australia, 1989). Because adolescents are not always self-sufficient, nurses have an essential role to play in the promotion and implementation of self-health care.

Orem's (1980) concept of self-care can be utilised by nurses to help students achieve self-health care. Working within the framework of Orem's (1980) model, (see Figure 1), nurses should view their role as the major component in a supportive/educative nursing system which would guide, support, and teach students about headaches, nutrition, and exercise, as part of a programme of health

education. It is hoped that by teaching students how to care for themselves, they may develop health-enhancing knowledge, attitudes and skills, and ultimately take more responsibility for their own self-care. This self-care capability, according to Orem's model, decreases the need for nursing intervention, except within a supportive/educative context.

## 5.2 CONCLUSIONS

Since few studies of this nature have been conducted, it is difficult to compare the results with previous research. Whilst it is encouraging to note the findings regarding exercise, this study raises an important issue regarding the teaching of nutrition principles. It is obvious that future attention needs to be given to the reasons why students' knowledge of dietary principles is so poor. The students in this study have been learning about nutrition since Year 2.

### 5.3 RECOMMENDATIONS

Further evaluation on the effect of diet and exercise on headaches in adolescents can be accomplished in the future by replication of this study in other settings. A valuable addition to any further replication would be to include a measure of the students' perceived stress in order to investigate its influence on headaches, exercise, and nutrition.

It is suggested that the design of this study may be repeated, using a larger sample of adolescents in several schools. Recommended future research may include a *short-term* study (for example, over one school day) on the relationship between headaches, diet and exercise. The study could consist of two groups--those who ate breakfast, and those who did not. Students would be asked to record the times when they had exercised during the day, and whether or not they developed a headache. Frequency of headache relating to dietary intake, and subject to exercise, could be studied.

Future studies could also include the use of a headache diary, and/or a dietary intake diary. Research on the effect of Orem's (1980) supportive/educative nursing system on knowledge levels and behaviour would be a valuable addition to nursing knowledge and practice.

As previously acknowledged, the instrument may have been subject to respondent misinterpretation or bias.



Perhaps future studies could investigate the reliability and validity of the questionnaire, which haven't yet been tested.

Changes are occurring in school nursing in Western Australia at the present time. Nurses now, more than ever before, have the opportunity to present their ideas, and to investigate the problems of adolescents who present at school-based health centres. It is critical that school nurses instigate research activities as the basis for programme planning.

## APPENDIX A

### DIETARY GUIDELINES FOR AUSTRALIANS

1. Promote breast feeding.
2. Choose a nutritious diet from a variety of foods.
3. Control your weight.
4. Avoid eating too much fat.
5. Avoid eating too much sugar.
6. Eat more breads, cereals, vegetables and fruits.
7. Limit alcohol consumption.
8. Use less salt.

### THE FIVE FOOD GROUPS

**GROUP 1: BREAD & CEREALS** **4 SERVINGS/DAY**

Bread, cereals, rice, macaroni, spaghetti  
Wholegrain if possible

**GROUP 2: VEGETABLES & FRUIT** **4 SERVINGS/DAY**

1 dark green, yellow or orange  
1 citrus, tropical, or tomato  
2 others

**GROUP 3: MEAT & MEAT ALTERNATIVES** **1 SERVING/DAY**

Meat, chicken, eggs, fish, nuts  
Dried peas, beans, lentils

**GROUP 4: MILK & MILK PRODUCTS**

300mL/day adults  
600mL/day children, nursing mothers  
Milk, yoghurt, cheeses

**GROUP 5: BUTTER OR TABLE MARGARINE** **1 TABLESPOON/DAY**

1 tablespoon butter  
2 tablespoons cream

Adapted from Dietary Guidelines for Australians (1982).

## APPENDIX B

### HEADACHES IN ADOLESCENTS

#### QUESTIONNAIRE

Dear Student,

As part of my nursing studies at the Western Australian College of Advanced Education, I am conducting a study on headaches in school children in Years 8, 9 and 10. The results of this study will assist all of us in the school to better meet the needs of students who suffer from headaches.

Most of the questions can be answered simply by circling or ticking the response that best describes YOU, or by writing down the information requested.

You do not have to put your name on this questionnaire. The information that you give me will be used for statistical purposes only.

Participation in this study is voluntary. If you are willing to take part, please answer the following questions which should not take any longer than 15 minutes. Please note - this is not a test!

If you would like to know the results of the study, they will be available from the Health Centre in approximately four weeks.

Thank you for your co-operation,

A large black rectangular redaction box covering the signature of the school health nurse.

SCHOOL HEALTH NURSE





8. Please tick TRUE or FALSE for each statement.

	TRUE	FALSE
a) Physical activity can be Nature's way of helping to relax and unwind	<input type="checkbox"/>	<input type="checkbox"/>
b) Physical exercise is harmful to older people	<input type="checkbox"/>	<input type="checkbox"/>
c) Aerobic exercise means exercise designed to promote the supply and use of oxygen by the body	<input type="checkbox"/>	<input type="checkbox"/>
d) Jogging is always the best form of exercise	<input type="checkbox"/>	<input type="checkbox"/>
e) Regular exercise can help a person cope with stress and tension	<input type="checkbox"/>	<input type="checkbox"/>
f) Exercise should be performed for at least twenty minutes three times a week	<input type="checkbox"/>	<input type="checkbox"/>
g) Lack of exercise can lead to diseases such as diabetes, heart disease and strokes.	<input type="checkbox"/>	<input type="checkbox"/>
h) Exercise always increases appetite	<input type="checkbox"/>	<input type="checkbox"/>

9. In your opinion, do you do enough exercise each week?

YES \_\_\_\_\_ NO \_\_\_\_\_

10. If you answered NO, would you like to increase the amount of exercise that you do each week?

\_\_\_\_\_

**PART 3 YOUR FOOD INTAKE**

11. Can you name the Five Food Groups?

Write alongside each group how many servings per DAY you should have from each group.

Group 1 is \_\_\_\_\_ servings per day

Group 2 is \_\_\_\_\_ servings per day

Group 3 is \_\_\_\_\_ servings per day

Group 4 is \_\_\_\_\_ servings per day

Group 5 is \_\_\_\_\_ servings per day

12. To which GROUP do these foods belong?

- a) fish \_\_\_\_\_ e) cottage cheese \_\_\_\_\_
- b) cakes \_\_\_\_\_ f) tomatoes \_\_\_\_\_
- c) rice \_\_\_\_\_ g) chicken \_\_\_\_\_
- d) coca cola \_\_\_\_\_

13. a) Do you usually eat breakfast? YES  NO

If NO, why not? \_\_\_\_\_

b) Do you usually eat lunch? YES  NO

If NO, why not? \_\_\_\_\_

c) Do you usually eat tea? YES  NO

If NO, why not? \_\_\_\_\_

14. Please write down a list of the kinds of foods that you USUALLY ATE over the past MONTH at the following times. Please include FLUIDS that you DRINK.

Use one horizontal line for each day of the week.

<u>BREAKFAST</u>	<u>RECESS</u>	<u>LUNCH</u>	<u>AFTER SCHOOL</u>	<u>TEA</u>	<u>AFTER TEA</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

**PART 4**

15. How old were you on your LAST birthday? \_\_\_\_\_ years

16. Are you Male

Female

17. What Year are you in? Year 8

Year 9

Year 10

18. What is the country of BIRTH of:

Your father \_\_\_\_\_

Your mother \_\_\_\_\_

Your self \_\_\_\_\_

Thank you for taking the time to fill in this questionnaire. Your help will be very valuable. Please come and see me in the Health Centre in four weeks' time if you would like to know the results of this study.



APPENDIX C

\_\_\_\_\_ Senior High School,  
\_\_\_\_\_,  
\_\_\_\_\_ W.A. 6061

Dear Parent/Guardian,

I am currently studying towards a Bachelor of Health Science (Nursing) Honours degree at the Churchlands campus of the Western Australian College of Advanced Education. The course involves a research Thesis, for which I am investigating headaches in teenagers.

Your child's name has been randomly selected from the class roll as a possible participant in this study. I would be most grateful for your child's assistance in my research.

Please read the attached information sheet.

Sincerely,



Paula Hahnel  
School Health Nurse

INVESTIGATOR: Paula Hahnel Telephone 349.1711

SUPERVISOR: Anne McMurray Lecturer, Post-graduate  
Studies, W.A.C.A.E., Churchlands, Telephone 383.8333

The purpose of this study is to determine whether there is a relationship between teenagers' headaches, and their exercise and dietary practices. As yet there is no data of this type on Western Australian teenagers who suffer with headaches. Participation in this survey provides the opportunity to contribute to an original study about headaches in teenagers. The information can then be used by nurses to develop more effective counselling and education programmes suited to teenagers.

Students will be required to answer a questionnaire consisting of 18 questions about their headaches, and exercise and dietary practices. It should take no longer than 15 minutes to complete.

All personal information is strictly confidential and will be destroyed once the study is completed. Your child is free to withdraw from the study at any time. Please sign the attached consent form and return it to Sister Paula Hahnel at the School Health Centre as soon as possible.

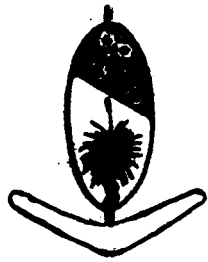
THANK YOU FOR YOUR CO-OPERATION

I, \_\_\_\_\_ give permission for my  
child \_\_\_\_\_ to participate in the  
study on headaches.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date





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*Senior High School*  
WESTERN AUSTRALIA

Principal: B. J. Dennis B.A. M.A.C.E.

12th March, 1990

Mrs. P. Hahnel  
21 Taylor Way  
HILLARYS 6025

Dear Mrs. Hahnel,

Thank you for your letter requesting permission to conduct a research study into the relationship between headaches in adolescents, and their diet and exercise practices.

I have studied your proposal and I am happy to give my approval.

Following the conclusion of your study, I would appreciate a report on your findings as suggested in your letter.

Yours sincerely,

A solid black rectangular box redacting the signature of the principal.

B. J. Dennis  
PRINCIPAL

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