CHAPTER 2

LITERATURE REVIEW

This chapter presents a review of literature that is relevant to the present study. The literature review is organized into four sections. The first section is an overview of epilepsy, including the terminology and definitions of epilepsy, classification, epilepsy in adolescents, etiology, precipitating factors, treatments, and prognosis. The second section focuses on the conceptualization of self-care behavior and self-care deficit nursing theory. The third section is about factors related to selfcare behavior, including family support, peer support, family income, age, knowledge, and self-efficacy. In this section, the self-efficacy theory was also reviewed. The last section is the theoretical framework of self-care behavior for adolescents with epilepsy.

Overview of Epilepsy

The Terminology and Definition of Epilepsy

There are several terms that are related to epilepsy such as convulsion, seizure, epilepsy, epileptic seizure, and epileptic syndrome. Some of those are used interchangeably, but others have minor distinctions. Therefore, it is important to have clear concepts and to understand the current definition of each term.

Convulsion is usually used when a patient shows a sudden episode of decerebrate posturing which is followed by clonic jerking (Brown & Minns, 1998).

Seizure is defined as a sudden, involuntary, transient alteration in cerebral function due to abnormal discharge of neurons in CNS (Thiele, Gonzalez-Heydrich, and Riviello, 1999).

As noted by Temkin (1945), *Epilepsy* is derived from the Greek word "epilamvanein" that means "to be seized, to be held on or to be attacked". This terminology is derived from an ancient notion that all diseases were caused by a god or an evil spirit. Epilepsy was initially thought to have been a result of an attack by a god or spirit who seized the soul of the patient. Thus, epilepsy was called "the sacred disease".

The clinical manifestation of epilepsy is varied, so a rigorous definition on the basis of clinical symptoms alone is impossible. Therefore, epilepsy has traditionally been defined in terms of its pathophysiology or mechanisms (Alarcon, 1998). From the World Health Organization's Dictionary of Epilepsy, epilepsy is "a chronic brain disorder of various etiologies characterized by recurrent seizure due to excessive discharge of cerebral neurons" (Gastuat, 1973, p. 22). According to Engel and Pedley (1997), epilepsy is not a specific disease or a single syndrome, but it is a broad category of symptom complexes arising from any number of disordered brain functions that they themselves may be secondary to a variety of pathologic processes.

Epilepsy is different from seizure. Epilepsy is a recurrent unprovoked seizure that is caused by abnormal electric discharges in the brain. Seizures are the indispensable characteristic of epilepsy. However, not all seizures are epilepsy, as some seizures may be provoked by electrolyte imbalance, drug intoxication, or hypoglycemia, all of which can be remitted by treatment of the underlying disturbance. *Epileptic disorder* is "a chronic neurological condition characterized by recurrent epileptic seizure" (Engel, 1989, p. 5). Epileptic disorders comprise epilepsies and epileptic syndromes (Blume & Wolf, 1997).

Epileptic seizure is described as "the clinical manifestation (symptoms and signs) of excess and/or hypersynchronous, usually self-limited, abnormal activity of neurons in the cerebral cortex" (Engel, 1989, p. 3).

Epileptic syndrome is "an epileptic disorder characterized by a cluster of signs and symptoms customarily occurring together. These include such items as types of seizure, etiology, anatomy, precipitating factors, age of onset, severity, chronicity, circadian cycling, and sometime prognosis" (Commission on Classification and Terminology of the International League Against Epilepsy, 1989, p. 389).

A syndrome is a cluster of symptoms and signs that occur together. A syndrome is unlike a disease; it does not have a common etiology or pathology, but it shares common characteristics.

Classification of Epilepsies

Epilepsy has been classified by various nosologies, but the meanings of terms and classification systems are confused and conflicted. In 1981, the International League Against Epilepsy (ILAE) proposed International Classification of Epileptic Seizure (ICES) which is widely accepted and used. The ICES has classified seizures into three main groups according to their onset: (I) partial seizures, (II) generalized seizures, and (III) unclassified epileptic seizures. *Partial (focal, local) seizures* are ones that begin in part of one hemisphere. Subcategories of partial seizures are simple partial, complex partial, and partial seizure with secondary generalization. Partial seizures are classified on the basis of an impairment of consciousness. If the seizure attacks without alteration of consciousness, it is a simple partial seizure. If there is alteration of consciousness, it is a complex partial seizure.

Generalized seizures are ones with initial generalized or bihemispheric involvement. Subcategories are absence/atypical, myoclonic, clonic, tonic, tonic-clonic, clonic-clonic, and atonic seizures.

In 1998, the ILAE revised the classification of epilepsy and classified epilepsies and epileptic syndromes into four categories: (I) localization-related epilepsies and syndromes, (II) generalized epilepsies and syndromes, (III) epilepsies undetermined whether focal or generalized, and (IV) special syndromes. Each category is divided according to etiology in terms of idiopathic, symptomatic, and crytogenic. The term idiopathic in ICES does not mean "origin from itself." Idiopathic epilepsies and syndromes are the disorders in which the underlying cause cannot be detected. This term is synonymous with "cause unknown" (Everitt & Sander, 1999). However, the underlying pathophysiology of idiopathic epilepsy is often presumed to be a genetic predisposition (Alarcon, 1998). If the underlying cause is known, it is symptomatic epilepsies and syndromes. If the cause of the disorder has not been identified but suspected, it is classified as cryptogenic epilepsies and syndromes. Subcategory of ICES are classified as follows:

Localization-related epilepsy and syndromes are divided into (a) idiopathic: benign childhood epilepsy, childhood epilepsy with occipital paroxysms, primary reading epilepsy; (b) symptomatic: chronic progressive epilepsy partialis continua of childhood; (C) crytogenic: syndromes characterized by seizures with specific modes of precipitation, temporal/frontal/and occipital lobe epilepsies (Commission on Classification and Terminology of the International League Against Epilepsy, 1989).

Generalized epilepsies and syndromes are composed of the following: (a) idiopathic: benign myoclonic epilepsy in infancy, childhood absence epilepsy, juvenile absence epilepsy, juvenile myoclonic epilepsy, epilepsy with generalized tonic-clonic seizures on awakening, syndromes characterized by seizures with specific modes of precipitation, other idiopathic generalized epilepsies; (b) cryptogenic or symptomatic: West syndromes (infantile spasms), Lennox-Gastaut Syndrome, epilepsy with myoclonic-astatic seizures, epilepsy with myoclonic absence; (c) symptomatic: non-specific etiology (early myoclonic encephalopathy, early infantile epileptic encephalopathy with suppression burst, other symptomatic generalized epilepsies), and epilepsies due to specific neurological disease" (Commission on Classification and Terminology of the International League Against Epilepsy, 1989).

Epilepsies undetermined with focal or generalized seizures are categorized as (a) with both generalized and focal seizures: neonatal seizures, severe myoclonic epilepsy in infancy, epilepsy with continous spike wave during slow-wave sleep, acquired epileptis aphasia (Landau-Kleffiner Syndrome), other undetermined epilepsies; (b) without unequivocal focal or generalized features.

Special syndromes are situation-related epilepsies that comprise febrile convulsions, isolated seizures or status epilepticus, and seizures due to an acute toxic or metabolic event.

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Although this classification is comprehensive, it is too complicated to use in clinical practice or epidemiological research, and it takes no account of recent developments in neuroimaging and neurogenetics (Bell & Sander, 2001; Engel, 1998; Everitt & Sander, 1999; Mosewich & So, 1996). With a new insight into mechanism, anatomy, and technological advance, Luders et al. (1998) have proposed "Semiological Classification of Seizures". However, this classification does not propose an actual classification system but rather a descriptive terminology for clinical events, and that terminology appears to be particularly well designed for epilepsy surgery (Engle, 1998). Recently, the Executive Committee of the ILAE has revised and updated "a diagnostic scheme" which is the new international classification (Engle, 2002).

Epileptic Seizures and Epilepsy Syndromes in Adolescents

Several epileptic seizures and epilepsy syndromes occur in the adolescent period. Some forms of epilepsy have an onset in childhood and persist into adolescence. The certain specific types of epilepsy which are much more common in the teenage years are juvenile absence, juvenile myoclonic, generalized tonic-clonic seizure upon awakening, and mesial temporal sclerosis (Nordli, 2001).

The clinical manifestations of epilepsy vary. Epilepsy is caused by sudden, usually brief, excessive electrical discharges in brain cells. The characteristics of epilepsy depend on the particular brain cells involved. If the electrical discharges are widespread over most of the brain, seizures will affect the whole body and these seizures are called tonic-clonic seizures. If the discharges affect a focal area of the brain, these are known as partial seizures and the patients may be subjected to experiences of involuntary motor activity with or without loss of consciousness. However, a seizure can begin from excessive discharge in a small part of the brain and then spread to the whole brain (International League Against Epilepsy, 2002).

Etiology of Epilepsies

Any factor disrupting normal brain electrical activities can potentially cause epilepsy. Therefore, epilepsy can come from any brain lesion resulting from birth injuries, brain injury, vascular disease, brain tumors, parasites (e.g., cysticercosis), intracranial infections, genetic predisposition, and maturation phenomena that increases excitability in the area of the brain during the period of brain development (Dulac, 2001; International League Against Epilepsy, 2002). The etiology can be single or multiple; however, it is frequently multifactorial, and exact attribution of cause is often unknown. Around 60% of epilepsies have no clear cause (Bell & Sander, 2001).

According to the study of Hauser, Annegers, and Kurland (1991), the etiology of epilepsy varies with age. Across all age groups, the causes include idiopathic or cryptogenic (67%), congenital (8%), head trauma (6%), cerebrovascular (12%), tumor (4%), infection (2%), or others (1%). In children less than 15 years of ,age, the causes are idiopathic or cryptogenic (67%), congenital causes (20%), head trauma (5%), infection (4%), tumor (2%), cerebrovascular (1%), or degenerative (1%). In those aged 15-34 years, the causes are idiopathic or cryptogenic (85%), head injury (5%), congenital (3%), or tumor (3%). However, in recent years, idiopathic epilepsy has been considered as etiology from genetics. Several forms of epilepsy are

determined by genetic factors. For example, juvenile myoclonic epilepsy has been linked to chromosome 6 (Thiele et al., 1999).

Precipitating Factors

Several factors may provoke seizures in persons with epilepsy. Loiseau (1997) has organized precipitating factors into three groups including common seizure precipitants, specific stimuli, and modulators of seizure occurrence as follows:

Common precipitating factors are sleep deprivation, sudden awakening, fatigue, exercise, alcohol, missed antiepileptic medication, drugs lowering seizure threshold (anti-depressants, antipsychotics, CNS stimulants, hypoglycemic agent, antimicrobial agents, aminophylline, antihistamine, ephedrine, steroids and a wide variety of other drugs), metabolic factors (hypernatremia, hyponatremia, hypocalcemia, and hypoglycemia), hyperventilation, and fever.

Specific stimuli that trigger epilepsy are visual stimuli (intermittent change in the intensity of light, such as flashes, rotation of blade fans or revolving wheels, watching television or video games, reflection of light); auditory stimuli (sudden loud noises), somatosensory stimuli (touching hot water, brushing teeth); complex stimuli (reading, specific musical sounds), other stimuli such as cognitive activity (solving arithmetic problems, playing cards or chess); and self-induced seizure such as waving own hand in front of own eyes while looking at the sun or blinking rapidly.

Moderators of seizure occurrence are sleep, hormone, and emotional disturbance. For example, many persons with epilepsy have seizures during sleep. Catamenial seizures occur around the time of menstrual periods and pregnancy, as

well as emotional stress (such as worry, anxiety, frustration, and anger) (Mattson, 1991).

In addition, common seizure triggers in adolescents are sleep deprivation, photosensitivity, alcohol withdrawal, and major stress such as school examination (Brodie & French, 2000).

Treatment

Once epilepsy is diagnosed, it should be treated as soon as possiblel (National Institute of Neurological Disorder and Stroke, 2000). The mainstream medical treatments of epilepsy are drug therapy, surgery, and ketogenic diets.

Drug therapy. Antiepileptic drugs are the most common approach to control epilepsy. The drug treatment should be started with a single dose of antiepileptic medication (monotherapy) because it can limit drug interaction and has fewer side effects, lower cost, and greater compliance. If the first drug is not effective, then a second drug will be considered (Thiele et al., 1999).

The major antiepileptic drugs that are commonly used are Phenobarbital, Phenyltoin (Dilantin), Valproic acid (Depakote or Depakene), and carbamazepine (Tegretol). The newer antiepileptic drugs are Oxcarbamazepine, Vigabatrin, Lamotrigine, Gabapentin, Felbamate (Felbatol), Tiagabine, and Topiramate.

The common side-effects of the standard antiepileptic drugs include headache, dizziness, diplopia, fatigue, and ataxia. Other specific side-effects include hyponatraemia and benign neutropenia with Carbamazepine; gingival hyperplasia and hirsuitism with Phenytoin; weight gain and hair loss with Sodium valprorate; gastrointestinal intolerance with Ethosuximide; and hyperactivity, irritability, and sedation with Phenobarbital and Primidone. A special concern is that Phenobarbital, Phenytoin, Carbamazepine, Ethosuximide, and Primidone can cause hypersensitivity reactions including rash, fever, a full-blown Stevens-Johnson syndrome, eosinophilia, and lymphadenopathy. Also, Sodium valprorate can produce hepatotoxicity and pancreatitis (Brodie & French, 2000). In addition, antiepileptic drug may affect cognition. The common cognitive side effects include psychomotor slowing, reduced vigilance, and impairments in memory. The most pronounced cognitive side effects are seen with Phenobarbital and benzodiazepineds. Small effects are seen in Carbamazepine, Phenytoin, and Sodium valprorate. Of the newer antiepileptic drugs, Topiramate appears to have the greatest cognitive side effect, including somnolence, psychomotor slowing, language problems, and difficulty with memory, but slow titration during drug initiation reduces these effects. The cognitive side-effects of antiepileptic drugs are modest when used in monotheraphy with antiepileptic drugs blood level within the standard therapeutic ranges. (Loring & Meader, 2001) and it also depend on each antiepileptic drug

Surgical therapy. Persons with epilepsy which cannot be controlled with medical therapy are considered for surgery. The post-operative control is most successful in the patients with temporal lobe epilepsy. Up to 90% of people with temporal lobectomy may have a significant improvement in their seizure control, and 68% become seizure free (Shafer, 1999). Seizures that respond well to surgery include those that originated from a specific zone of the brain, rather than from multiple areas. However, the long-term risks of surgical removal of major brain structures need to be weighed against the actual risks of ongoing intractable epilepsy. Thus, a comprehensive pre-surgical evaluation is necessary. Surgery for

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extratemporal epilepsy that is associated with an identifiable lesion is often successful; however, surgery in the patients with non-lesional extratemporal epilepsy is less successful (Benbadis, Chelune, Stanford, & Vale, 2001).

When epilepsy surgery is not feasible or effective, people with refractory epilepsy may benefit from vagus nerve stimulation (VNS). The vagus nerve stimulator has been used since 1988. The U.S. Food and Drug Administration (FDA) approved this device in 1997 for use in people with epilepsy older than 12 years old whose seizures are not well controlled by medicine (National Institute of Neurological Disorder and Stroke, 2000; Shafer, 1999).

The vagus nerve stimulator is a small, battery-powered electrical device that is surgically implanted below the skin of the chest, like a pacemaker. It is attached to the vagus nerve in the lower neck and delivers intermittent electrical signals to the brain via the vagus nerve. An attractive feature of the stimulator is that users can control seizures by swiping a magnet across the implant site if they sense the onset of a seizure. Although the mechanism is not clear, the stimulator has been shown to reduce seizure frequency in some individuals with epilepsy. However, it is usually intended only as adjunct therapy and not as a replacement for anticonvulsant medications although some studies showed that it could reduce antiepileptic drug use (McBrien & Bonthius, 2000). It also has side effects including ear pain, a sore throat, chest pain, horseness of voice chest tightness (National Institute of Neurological Disorder and Stroke, 2000).

Ketogenic diet. The ketogenic diet was originally developed in the 1920s. It has been less utilized since the advance of antiepileptic drugs. Presently, there has been a resurgence of interest. This diet is composed of high fat, low carbohydrate food. The typical fat-to-carbohydrate ratio is 4:1 or 3:1. A recent popular modification of fat is the medium chain triglyceride. The diet is typically maintained for two years (Benbadis & Tatum Iv, 2001). However, it is hard to maintain as it requires strict adherence to unusual foods. It is not suitable for adolescents. Ketogenic diet commonly uses in intellectual disability patents. Although the mechanism of action is still unknown, research findings have shown that it reduces seizures in children with difficult to control seizures (Thiele et al., 1999). Side effects include nutritional deficiency, weight loss, dehydration, abdominal pain, acidosis, and lethargy (National Institute of Neurological Disorder and Stroke, 2000; Thile et al., 1999).

Prognosis

The overall prognosis is that 70-80% of persons with epilepsy will experience remission within the first five years (Bell & Sander, 2001). After two to five years of such successful treatment, the medicines can be withdrawn in 60-70% of the cases. Others may have to continue their medication regularly for the rest of their lives, and, in many cases, they are likely to remain seizure-free, while in others, the frequency or severity of seizures can be reduced (International League Against Epilepsy, 2002). Most relapses will occur during withdrawal of therapy or in the first one to two years after the treatment is discontinued (Brown & Minns, 1998). Prognosis of epilepsy depends on several factors, such as etiology, age of onset, number of seizures at presentation, natural history of the condition, and the influence of treatment (Bell & Sander, 2001).

Self-Care Behavior

Definition of Self-Care

The term "self-care" is widely used in several disciplines, such as medicine, nursing, psychology, health education, sociology, and public health. The perspective of self-care in each discipline is presented as following:.

In medicine, the definitions of self-care have shown variation. Vickery (1986, as cited in Gantz, 1990, p.4) defines self-care as "all those actions taken by an individual with respect to a medical problem...It includes those actions taken by layman with respect to major emergencies....care of chronic disease...by the individual but not necessarily related to a current problem (such as screening tests)". Levin (1976, as cited in Gantz, 1990, p.4) states that "self-care is a process whereby a layperson functions on his or her own behalf in health promotion and prevention and in disease detection and treatment at the level of a primary resource in the health care system". From these definitions, medical self-care can be an action or a process that one performs by oneself and is driven by health problems.

âc Coj A In the field of psychology, self-care has been explored in the context of health belief, locus of control, value clarification, and as a component of "self" (such as self-efficacy) (Gantz, 1990). Barofsky, a psychologist, defines self-care as purposeful actions which are undertaken by individuals for reasons related to health (Gantz, 1990). Gantz (1990) concludes that the literature in psychology has models that describe the relationship of component factors but do not view self-care as a system of beliefs or behavior. Within the field of health education, a health educator defines self-care as "any activities undertaken by an individual, who considers himself to be ill, for the purpose of getting well" (Gantz, 1990, p. 4). The National Center for Health Service Research Conference in 1976 adopted a definition of self-care as follows: "self-care and self-help are part of a matrix in the health care process whereby lay persons can actively function for themselves and/or others to (1) prevent, detect, or treat diseases and (2) promote health so as to supplement or substitute for other resources." In addition, the Health Education Center in Pittsburgh defines self-care as "a process whereby a lay person functions effectively on his or her own behalf in health promotion, minor illness detection and treatment, and prevention of the consequences of disease and disability" (Gantz, 1990, p. 4).

From the sociological perspective, self-care does not emphasize individual actions, but rather it emphasizes social, legal, political, and organizational factors that affect self-care. De Friese (1982, as cited in Gantz, 1990, p. 9), a sociologist, views self-care as a movement that seeks to build and enhance the abilities of persons to do things for themselves. Moreover, Dean (1981, as cited in Gantz, 1990, p. 9) defines self-care as follows:

Self-care is the basic level of health care in all societies. It can be preventive, curative, and rehabilitative, but it is neither contemporary nor reactionary. It involves the range of individual health behaviors, health maintenance/life style, utilization of preventive health services, symptom evaluation, self-treatment, and interaction with the professional sector (Gantz, 1990, p. 9).

For public health, self-care focuses on systems that support and guide actions of society. Self-care is affected by public health interventions at two levels: providing a safe environment (e.g., clean air, safe water, and waste disposal), and providing access to services that protect both the individual and groups (e.g., family planning, venereal disease control). Epp (1986, as cited in Gantz, 1990, p.9) points out that self-care refers to "the decisions taken and practices adopted by an individual specifically for the preservation of his health."

In nursing science, there have been several definitions of self-care. Norris (1979) defines self-care as "the process that permits people and families to take initiative, to take responsibility, and to function effectively in developing their own potential for health" (p. 486). Spradley (1981, as cited in Gantz, 1990, p. 6) describes self-care as "the process of taking responsibility for developing one's own health potential." Moreover, Orem (1995) defines self-care as "the practice of activities that individuals initiate and perform on their own behalf in maintaining life, health, and well-being" (p. 43). According to Orem (1995), self-care has purpose, pattern, and sequence. When self-care is performed effectively, it contributes to human structural integrity, human functioning, and human development.

According to the meeting of the interdisciplinary panel convened by the Self-care Institution, all academic disciplines agreed that the common themes of selfcare are situation and culture specific; involve the capacity to act and to make choices; are influenced by knowledge, skill, values, motivation, locus of control, and efficacy; and focus on aspects of health care that are under individual control (Gantz, 1990).

Although self-care was defined by many authors, only one theory related self-care was proposed in nursing discipline. That is the self-care deficit nursing

theory which was used as the theoretical framework for this study. The following section is the review of the self-care deficit nursing theory.

The Self-Care Deficit Nursing Theory

The Self-Care Deficit Nursing Theory was developed by Orem. In this theory, human beings require continuous self-maintenance and self-regulation through the action named self-care. The term self-care means care that is performed by oneself for oneself when one has reached a state of maturity. The goal of self-care is to maintain life, health, and well-being (Orem, 2001).

Self-care is a learned, purposeful, and deliberate action. The deliberate action process consists of 3 phases (a) investigative phase: to investigate conditions and factors for purpose of knowing and understanding what is, what can, and what should be brought for self-care, (b) transitional phase: to make judgments and decisions about self-care, and (c) productive phase: production of self-care action.

According to Orem (2001), there are three types of self-care requirements which individuals need to perform. Those requirements comprise "universal self-care requisites", "developmental self-care requisites", and "health deviation self-care requisites". Universal self-care requisites are actions that are needed for maintaining and promoting health or well-being throughout the life span. These are common requirements for all human beings, include intake of air, water, and food; elimination; activities and rest; solitude and social interaction; prevention of hazard; promotion of normalcy. Developmental self-care requisites are actions that are required in the event of developmental state which vary in each states of the human life cycle. Health deviation self-care requisites are actions that are required in the event of functional disorders such as illness, injury, disabilities, psychological disorder, etc. Health deviation self-care requisites are composed of six categories: (1) seeking and securing appropriate medical assistance, (2) being aware of and attending to the effects and results of pathologic conditions and states, (3) effectively carrying out medically prescribed diagnostic, therapeutic, and rehabilitative measure, (4) being aware of and attending to or regulating the discomforting or deleterious effects of the medical care measures, (5) modifying the self-concept in accepting oneself as being in a particular state of health and in need of specific forms of self-care, (6) learning to live with the effects of pathologic conditions and states, and the effects of medical diagnosis as well as treatment.

Each individual will perform the three types of self-care requisites differently. The amount and kind of self-care that each person must perform is called "therapeutic self-care demand". Therapeutic self-care demands are specific to individuals in their time and place. These demands vary from one time to another. When an individuals' therapeutic self-care demands are met through self-care action, the goal of self-care is accomplished.

âð Coj A In order to perform self-care actions, individuals need the ability called self-care agency. Self-care agency is "the complex acquired capability to meet one's continuing requirements for care of self that regulates life processes, maintains or promotes integrity of human structure and functioning and human development, and promotes well-being" (Orem, 2001, p. 254). Self-care agency can be developed by intellectual curiosity, by instruction and supervision from others, and by experience in performing self-care measures (Orem, 1995). Self-care agency consists of three parts:

(1) foundation capabilities and dispositions for action, or abilities; (2) power of components enabling self-care operations, and (3) capabilities for self-care operations.

Foundational capabilities and dispositions are abilities that come into play when individuals perform any type of activities, not just self-care action (Gast et al., 1989; Orem, 1995). They consist of five sets: (1) conditioning factors and states, such as genetics and constitutional factors; (2) selected basic capabilities, such as sensation, learning, attention, perception, memory; (3) knowing and doing capabilities, such as rational agency, operational knowing, learned skills (e.g., reading, counting, writing); (4) dispositions affecting goals sought, such as selfunderstanding, self-awareness, self-concept; (5) significant orientative capabilities and dispositions, such as orientation to time, health, other persons, events, and objects.

The power of components enabling self-care operations are specific abilities for performing self-care operations. They are the human abilities that empower engagement in self-care. The power of components are composed of the following ten abilities: (1) ability to maintain attention and exercise requisite vigilance, (2) controlled use of physical energy, (3) ability to control the position of body in the execution of movements, (4) ability to reason within a self-care frame of reference (5) motivation for self-care, (6) ability to make decisions about care for self, (7) ability to acquire, to retain, and to operationalize knowledge about self-care (8) a repertoire of cognitive, perceptual, manipulative communication, and interpersonal skill adapted to perform self-care, (9) ability to order discrete self-care actions, and (10) ability to consistently perform self-care and integrate it with relevant aspects of living. The capabilities for self-care operations are the most immediate abilities that are necessary to perform self-care operations. They include abilities to perform estimative self-care operations (to know self-care requisites and means of meeting them), transitional self-care operations (to make judgments and decisions about selfcare), and productive self-care operations (to perform action to meet self-care requisites).

In the self-care deficit nursing theory, nurses have to calculate the therapeutic self-care demand and access self-care agency of patients. When self-care agency is less than therapeutic self-care demands, there is a "self-care deficit". Then, the nursing system becomes a legitimate service.

In addition, Orem (2001) describes basic factors that influence self-care agency and can modify the kind and amount of self-care required. These factors are called basic conditioning factors which include age, gender, developmental state, health state, sociocultural factors (e.g., education, occupation), health care system factors, family system, patterns of living, environment factors, and availability and adequacy of resources.

In summary, human beings need self-care in order to maintain life, health, and well-being. Self-care must be learned, and it must also be deliberately performed continuously. There are three types of self-care requisites that individuals need to perform: universal, developmental, and health deviation type. Therapeutic self-care demands are specific self-care that individuals should have. In addition, self-care agency is the ability to engage in self-care. It comprises three parts: foundation capabilities and dispositions, power components, and capabilities for self-care operation. Self-care will operate through three processes (1) estimative operations, (2) transitive operations of reflecting, critical judgment, decision making, and (3) productive operations. Therapeutic self-care demand and self-care agency are affected by basic conditioning factors.

Self-Care in Persons with Epilepsy

The terms "self-care" and "self-management" have been used in persons with epilepsy. An attempt has been made to clarify the concept of self-care for epilepsy. Buelow (1996) analyzed the concept of self-care for epilepsy and concluded that the term "self-care" and the term "self-management" can be used interchangeably. According to her analysis, self-care refers to (a) a behavior or an act in which patients involve themselves; (b) enacting behaviors of knowledge gained from healthcare workers, from interactions with the environment, or from trial and error; and (c) behaviors which are completed if patients believe in their ability to perform them. Self-care also involves decision-making in not only behaviors that are prescribed by health care workers, but also behaviors that patients feel will be beneficial.

Dilorio et al., (1992) use the term self-management in their study and define this term as "activities that an individual can perform alone and that are known to either control frequency of seizures or promote the well-being of the person with seizures" (p.295). This definition mentions the behaviors that individuals undertake by themselves, the goal of which is health and well-being. It is relevant to the self-care concept in Orem's nursing theory.

Self-care in persons with epilepsy has been examined in several studies. For instance, Dilorio and Henry (1995) studied self-management in 195 persons with epilepsy aged 18-77 years, with a mean age of 35.8 years. The subjects were asked about self-management in three aspects: (1) medication management, (2) safety management, and (3) general lifestyle management. The most common management was medical management (e.g., managing medication as prescribed, obtaining blood tests to monitor drug levels, keeping doctor's appointments, calling the doctor when seizures were more frequent), while safety management (e.g., avoiding using electric sharp tools, not swimming alone) and lifestyle management (e.g., eating regular meals in order to prevent hypoglycemia, staying out of situations that trigger seizures) were performed in moderately high levels. This study showed that persons with epilepsy cared for themselves in all three aspects and medication regimens were the primary focus. In addition, self-management strategies using behavioral and psychological methods such as relaxation, self-hypnosis, and stress management strategies were performed at a low level.

Buelow (2001) explored the perception of self-management in adults with epilepsy by a qualitative methodology. The findings have revealed two major themes: (1) management issues, which were situations that required strategies for control such as issues in daily life, issues of employment, relationships, seizure consequences and medication; and (2) management techniques, which were the means used to manage those situations. Management techniques included four types of self-management, which comprised positive and negative self-management: (a) management of employment and social situations such as planning disclosure or nondisclosure of their seizures, finding ways to make work life and social life better, avoiding work and school completely; (b) management of seizures such as preventing seizures by controlling stress and avoiding fatigue, using techniques to abort seizure (e.g.,

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concentrating on something else), no plan about seizure management, or self-blame; (c) management of seizure consequences, such as continuing to work even though they did not feel well, planning for safety during seizure attacks, no plan about management of seizure consequences ; and (d) management of medical techniques such as planning compliance, noncompliance, or no plan about compliance/non compliance. In Buelow's study, all participants reported medication management as an important part of self-management. Nevertheless, some participants did not always take medication as prescribed, while others planned to stop the drug because of side effects and over-all mismatch with their lifestyle. This finding was consistent with other studies, which found that persons with epilepsy purposely did not take drugs because they had side effects, and the drug regimens interfered with their lifestyles (Buck, et al., 1997). These studies showed that epilepsy affects all areas of life, and persons with epilepsy need to take care of themselves in all aspects. They must manage not only medical regimens, but also lifestyles and social interactions. This study provides a unique insight into the self-care of persons with epilepsy.

Maskasame (1985) studied Thai adults' ability to take care of themselves and self-care performance in 100 Thai adults with epilepsy. Self-care performance of all the participants was low. This suggested that self-care performance in Thai adults with epilepsy should be promoted. However, since this study was conducted in 1985, it should be replicated to obtain updated findings.

Niyomkar (2001) studied health promoting behaviors of adolescents with epilepsy based on the theory of Pender's health promoting model The results showed that adolescents with epilepsy had good health promoting behavior in all aspects, including health responsibility, physical activities, nutrition, interpersonal relationship, stress management, and spiritual growth.

Sooktip (2002) examined self-care operation capabilities, which was the ability to perform self-care, in 100 Thai school-aged children with epilepsy (aged 8-12 years). The Self-Care Deficit Nursing Theory was used as framework. Self-care operation capabilities were rather high with a mean of 76.46 and SD of 4.94 (total scores = 100). However, this finding cannot be generalized to self-care behavior of adolescents with epilepsy.

In conclusion, the literature review shows that few studies examined characteristics of self-care behaviors among persons with epilepsy. One study examined health promoting behaviors among adolescents with epilepsy. Although the behaviors for promoting health are relevant to self-care behaviors, the concepts of health promoting behavior and self-care behavior are based on different theory. Therefore, the explanation of factors influencing health promoting behavior and selfcare behavior are different.

Factors Related to Self-Care Behavior

On the basis of the self-care deficit nursing theory (Orem, 2001) and selfefficacy theory (Bendura, 1997); basic conditioning factors, self-care agency and selfefficacy are posited as the factor affecting self-care behavior. Of basic conditioning factors, age, family income, family support, and peer support are included in this study. Of self-care agency, epilepsy knowledge was selected to study. In addition, self-efficacy from the self-efficacy theory (Bendura, 1997) was also included in the study. These variables were included to the study because: (1) the self-care deficit nursing theory and the self-efficacy theory states that those variable affects self-care behavior; (2) there is evidence from previous studies supporting the relationships between those variables and self-care behavior; and (3) those variables can be enable nurses to assist patients with epilepsy in engaging in self-care behavior by increasing family support peer support, epilepsy knowledge, and epilepsy self-efficacy.

Family Support and Peer support

Social support is an important issue in nursing and nursing research (Hutchison, 1999). Social support may come from various sources such as profession, system, friends, relatives, family, God or social network of the church, and community members (Fink, 1995; Rose, 1997). In this study, family support and peer support is considered as social support that is offered by family members and friends, respectively.

Definition of social support, parent support, and peer support. The concept of social support has been used extensively in both the theoretical and research literature. However, the concept of social support is a subjective and complex phenomenon. Social support has been defined in numerous constructs as follows.

Caplan (1974) defines social support as support provisions from the primary group in which people participate. There are three kinds of support: (1) helping the individual to mobilize their psychological recourses; (2) sharing her/his task; and (3) providing money, material, tool, skills, and cognitive guidance to improve his/her handling of situations.

Cobb (1976) conceptualizes social support as information leading one to believe that he or she belongs to one or more of the following: (1) to be cared for or loved, (2) to be esteemed and valued, and (3) to belong to a network of communication and mutual obligation. This concept focuses on emotional support and social network, but does not address material support.

Kahn and Antonucci (1980) view social support as an "interpersonal transaction" (p. 267) that includes one or more of the following key elements: (1) affection (the expression of liking, admiration, respect, or love); (2) affirmation (expression of agreement) or acknowledgement of another person's ideas and/or behaviors; and (3) aid (the provision of things, money, information, time, and entitlements). This view includes emotional support, interpersonal relationships, and it is extended to material support.

House (1981) describes social support as four broad types of support, including emotional, instrumental, informational, and appraisal support. Emotional support involves the provision of empathy, love, trust, and caring. Instrumental support is the provision of tangible material aid or service. Informational support is the provision of advice, suggestions, and information for problem solving. Finally, appraisal support is the provision of information for self-evaluation, such as feedback, affirmation, and social comparison. This definition seems to cover all aspects of support.

Langford, Bowsher, Maloney, and Lillis (1997) and Murray (2000) analyze the concept of social support. The defining attributes of social support are emotional support, instrumental support, informational support, and appraisal support. It can be seen that these attributes are similar to the four broad types in House's social support concept.

According to Weiss (1974), social support is relational provisions that require relationships. The supportive relational provisions include six dimensions: (1) provision for attachment/intimacy, which provides people with a sense of security and place, (2) social integration, which provides people with a way to share concerns and exchange services, (3) opportunity for nurturance, through which people have the responsibility to aid others in need and consequently develop a sense of being needed; (4) reassurance of worth, which provides people with a sense of being valued as both individuals and in their social roles, (5) sense of reliable alliance, through which people rely on assistance from others regardless of reciprocity of affection or support, and (6) obtained guidance, which provides emotional support.

Based on Weiss's concept, Brandt and Weinert (1981) revise social support in a comprehensive fashion as composed of five dimensions: (1) provision for attachment/ intimacy, (2) social integration (being an integral part of a group), (3) opportunity for nurturant behavior, (4) reassurance of worth as an individual and in role accomplishment, and (5) availability of informational, emotional, and material help.

In addition, Tilden and Weinert (1987) offer a definition of social support as the psychosocial and tangible aid provided by a social network and received by a person. They view social support as reciprocal and mutual; that is, it is returned by the persons to their social network. Furthermore, Vaux (1988) states that social support has been conceptualized as a complex, dynamic transaction process between an individual and his or her environment. Based on these definitions, social support can be described in three dimensions. (1) The structural dimension of the support which refers to the providers of supportive actions or social network such as families, friends, co-workers, or group members. (2) Functional dimension of support which refers to social relationships performed by significant persons in social network. Functional social support includes various types of support such as emotional support, tangible support, and information support. (3) The final facet of social support is the nature of support. It is the perception of support held by the support recipient regarding the nature and quality of the interaction between the provider and recipient. This includes whether the support is desired and appropriate in nature and length of time (Gleeson-Kreig, Bernal, & Woolley, 2002; Lynch, 1998; Norwood, 1996; Vrabec, 1997).

Although social support has been defined in a variety of ways, those definitions of social support do not take sources of support into account. In the present study, social support involves family support and peer support. The following definitions which emphasize support from family and peers were found.

Brillhart (1998) defines family support as the perceived social support from family that encompasses four aspects: physical care, economic support, emotional support, and social support including communication, response, and sense of belonging.

According to Procidano and Heller (1983), family support is the perceived needs for moral and emotional support as well as the need for information and feedback fulfilled by family.

Smilkstein (1987) defines family support as an individual's perception of the provision of assistance given by family members in various categories, including five aspects of adaptation, partnership, growth, affection, and resolve/commitment. Adaptation is the utilization of intra and extra familial resources for problem solving when the family equilibrium is stress during a crisis. Partnership is the sharing of decision making and nurturing responsibility y family member. Growth is physical and emotional maturation and self-fulfillment that is achieved by the family members through mutual support and guidance. Affection is the caring or loving relationship that exist among family members. Resolve/commitment is the commitment to devote time to others family members for physical and emotional nurturing. It also usually involves a decision to share wealth and space.

Similarly, peer support is defined as an individual's perception of the provision of assistance given by friends in five aspects including adaptation, partnership, growth, affection, and resolve/commitment (Smilkstein, 1987).

The definitions of family support and peer support provided by Smilkstein (1987) were used in this study because they covered aspects of growth and affection which were crucial needs of adolescents. Moreover, Smilkstein also provided the Family APGAR Questionnaire and the Friend APGAR Questionnaire which were the instruments used to measure family support and peer support separately.

Social support and self-care behavior. A lot of studies regarding chronic diseases have examined the relationship between social support and self-care behavior. Wang and Fenske (1996) report that adults with non-insulin dependent diabetes mellitus who received support from friends and family members reported higher universal and health deviation self-care behaviors than did those without support. The support system accounted for 23% and 17% of the variance in universal self-care and health-deviation self-care, respectively. Moreover, Wang and Laffery (2001) found positive relationship between social support and self-care behavior (r = .60, p < .001). They also discovered that social support could directly predict self-care behavior in rural elderly women in Taiwan (β = .13, p < .01).

In Thailand, social support and self-care behavior have been studied in various populations. Most of the studies have indicated that social support is a predictor of self-care behavior in cancer patients (Hanucharurnkul, 1998), diabetic patients (Skulpant, 1992), continuos ambulatory peritoneal dialysis patients (Duang-Pang, 1988), amputees (Vichitvatee, 1991), elderly patients (Watcharakitti, 1992), pregnant adolescents (Wayuhuerd, 1993), adolescent mothers (Sriumporn, 2000; Suwanvala, 1994), and patients undergoing coronary artery bypass grafting (Pringpurd, 1995). The findings from an integrative review and meta-analysis of self-care research in Thailand indicated that social support and self-care agency were positively correlated and the effect size ranged from .16 to 1.62 with the mean effect size of .40 + .31 (Hanucharuernkul, Leucha, Wittaya-Sooporn, & Manusriwongul, 2001).

In contrast, the results of a study conducted in 50 chronic obstructive pulmonary disease (COPD) patients in Thailand (Chaitiamwong, 1992) and in 80 adults with epilepsy in the U.S. (Dilorio et al., 1994) were different from those previously mentioned studies. Social support was not associated with self-care behavior. However, the interpretation and generalization of those studies may be limited. The sample size in the study of COPD patients was small and the instrument measuring self-care practice had low reliability ($\alpha = 0.62$). Besides, studies in adults with epilepsy that existed were conducted in a Western country which has social network and family system different from those in Thailand. Thus, social support in Western cultures might be different from that in the Thai culture.

Family support, peer support, and self-care behavior. Family support is regarded as a crucial factor in the compliance with medical regimen of chronically ill adolescents. Parents continue to play the role of primary care givers and provide tangible support while friends offer companionship and provide emotional support (Kyngäs, Kroll, & Duffy, 2000).

In the study of compliance with heath regimens of adolescents with epilepsy, Kyngäs (2000) found that support from parents and support from friends explained good compliance. Moreover, adolescents with epilepsy who received support from parents complied with their health regimens with 10.47-fold likelihood compared with the adolescents with epilepsy who did not receive support from parents. Additionally, adolescents with chronic diseases who received support from parents were 2.69 times more likely to show good compliance with health regimens than those who did not receive support (Kyngäs & Rissanen, 2001). Besides, the likelihood of adolescents with chronic diseases supported by friends complying with health regimens was 2.11-fold compared with those who did not receive support from friends (Kyngäs & Rissanen, 2001). Finally, La Greca et al. (1995) found that friends' support was related to adherence in adolescents with diabetes.

In adults with chronic diseases, family support was found to have a positive relationship with self-care behavior among cancer patients in Beijing (r = .29, p < .01) (Haiyan, 1997), as well as chronic obstructive pulmonary disease patients in China (r = .26, p < .05) (Xiaolian, 1999).

In short, a number studies have yielded evidence that social support, family support, and peer support have a positive influence on self-care behavior. However, there have been no studies regarding the relationship between family support, peer support and self-care behavior among Thai adolescents with epilepsy.

Age

A large number of studies have revealed the relationship between age and self-care. Buck et al. (1997) examined factors influencing compliance with antiepileptic drug regimens in 769 persons with epilepsy aged 16 or over. The results showed that age was related to compliance. Being a teenager was the strong predictors of non-compliance. In addition, Dilorio et al., (1994) studied selfmanagement in 80 persons with epilepsy and found that age was positively correlated with, and could predict self-management. Similarly, Tantisak (1992) found a positive correlation between age and self-care behavior (r = .243, p < .01) among 160 systemic lupus erythematosus (SLE) patients. However, those findings were contradictory to the findings of several studies. Vichitvatee (1991) reported a negative relationship between age and self-care behavior (r = -.17, p < .05) in 100 amputees who came for a follow-up at the prosthetic clinic. In addition, Limpanavas (1987) studied physical and psychological changes and self-care behavior in patients aged 18-81 years with head and neck cancer, and found that the patients who were different in age had different self-care behavior (p < .01). Also, the patients who were aged below 36 years performed self-care better than those aged over 36 years.

The literature regarding the relationship between age and self-care in each age group was inconsistent. A meta-analysis of self-care research in Thailand (Hanucharuernkul et al., 2001) shed some light on these relationships. The results of the meta-analysis revealed that effect sizes of age on self-care agency are either negative or positive, ranging from -.72 to .77. The mean of the effect size was $.19 \pm .39$. The study implies that self-care increases from childhood to adulthood and then declines with aging (Hanucharuernkul et al., 2001). Therefore, in children and adolescents, age should be positively related to self-care behavior.

Considerable evidence supports the positive relationship between age and self-care in children and adolescents. Arayapitaya (1990) examined the relationship among self-concept, selected factors, and self-care in 103 thalassemic Thai children aged 8 to 14 years. A positive correlation between age and self-care (r = .26, p < .01) was found. Those findings were congruent with the findings of Pacort (1994) who studied self-care behaviors for hepatitis B protection in 100 Thai nursing students aged 17-25 years. The results showed that nursing students aged 20 to 22 years undertook greater self-care behavior than those aged 17 to 19 years (p < .05).

a Co A Although several studies have shown an association between age and selfcare, several research studies have presented a non-relationship between those factors. Frey and Denys (1989) studied self-care in a sample of 36 adolescents with diabetes aged 11-19 years. They found that age was correlated negatively with universal selfcare (r = -.38, p = .02), but age was not correlated with health deviation self-care. However, this finding was limited by the very small sample size. Thus, the conclusion should be done with caution. Non-relationship between age and self-care behavior was also found in Thai school-aged children, adults, and elderly patients (Hanucharurnkul, 1988; Homsapaya, 1995; Lakekhum, 1992; Prasarnpran, 1992; Sirivongvilaichart, 1994; Skulpant, 1992; Sutasha, 1987). Nevertheless, it is worth noting here that the limitation of those studies was the homogeneity of age in the sample because statistical analysis could not detect differences in self-care among similar age levels.

In conclusion, the empirical evidence of the relationship between age and self-care is inconsistent. Many studies have indicated that age is associated with selfcare behavior. Either a positive or a negative relationship is found due to the trend that self-care increases from childhood to adulthood and then decreases with aging. However, no study has been conducted in Thai adolescents with epilepsy.

Family Income

According to the study of Maskasame (1985), self-care performance was positively related to economic status of adults with epilepsy. Similarly, Asawavichienjinda, Sitthi-amorn, and Tanyanont (2003) found that economic status has a positive relationship with compliance with treatment of adults with epilepsy. In other chronic disease, Lakekhum (1992) found a positive relationship between family income and self-care (r = .33, p < .05) in 146 school age children with heart disease; Hongtrakul (1989) reported a positive relationship between those two factors in 100 essential hypertensive patients; and Chantapet (1993) discovered that family income was negatively associated with self-care deficit (r = ..30, p < .01) in chronic renal failure patients. Furthermore, from meta-analysis of self-care research in Thailand, the effect size of income on self-care agency is .06 to 1.29 with a mean of .48 ± .26 (Hanucharuernkul et al., 2001). On the other hand, there was no statistically significant relationship between family income and self-care behavior in school-aged children with leukemia (Pinsakol, 1990), adults with leukemia (Sirivongavilaichart, 1994), SLE patients (Tantisak, 1992), and diabetic patients (Skulpant, 1992). The sample in those studies had the similar levels of economic status with most of the subjects having good economic status or reporting sufficient income. Thus, the homogeneity of economic status in those samples prevented the determination of influence of income on selfcare behavior.

In conclusion, much evidence has suggested that family income is positively related to self-care. On the other hand, several studies have revealed that those two factors do not have any relationship due to the homogeneity of the sample contributing to the non-relationship. Although those studies were not conducted in adolescents with epilepsy, the results are similar in various populations.

Knowledge

Legion (1991) proposed that knowledge was important in epilepsy selfcare. Nurses should provide health education to patients with epilepsy. Many studies support this suggestion. Chantapet (1993) examined the relationship between selfcare knowledge, selected basic conditioning factors, and the self-care deficit in 100 chronic renal failure patients. There was a negative correlation between self-care knowledge and self-care deficit (r = -.46, p < .001). This means that patients who have more knowledge will have fewer deficits in self-care behavior. Similarly, Watanasin (1991) found a negative correlation between self-care knowledge and selfcare deficit in 100 post-cardiac valvular replacement patients (r = -.22, p < .01). Duang-Pang (1998) investigated the relationship between knowledge, spouse support and self-care in 70 ambulatory peritoneal dialysis patients. A positive relationship between knowledge and self-care was revealed (r = .21, p < .05). In addition, from an integrative review and meta-analysis of self-care research in Thailand from 1988-1999, knowledge is positively related to self-care agency which was the ability to perform self-care. The effect size of this relationship ranges from 0.42 to 1.27 with a mean of $.59 \pm .39$. (Hanucharuernkul et al., 2001).

In brief, several studies in chronic disease showed a positive relationship between knowledge and self-care behavior. No study examined the relationship between knowledge and self-care behavior among adolescents with epilepsy.

Self-Efficacy

The concept of self-efficacy has been primarily developed in the discipline of social psychology. Albert Bandura predominated in developing this concept into a self-efficacy theory.

Self-efficacy theory. Bandura (1997) defines self-efficacy as "the beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). If individuals believe they have power to produce results, they will attempt to make things happen. Thus, self-efficacy is not concerned with the skill which they have, but concerned with judgments of what they can do. Individuals who have the same ability may have different behavior, if they have different self-efficacy. Self-efficacy, therefore, is a major basis of action.

Self-efficacy also helps determine how much effort individuals will expend on activity, how long they will persevere when confronting obstacles, and how resilient they will be in the face of adverse situations. The higher self-efficacy, the greater the effort, persistence, and resilience individuals have. Individuals who have strong self-efficacy approach difficult tasks as challenges rather than as threats to be avoided (Pajares, 2002).

According to the self-efficacy theory, behavior is a function of efficacy beliefs and outcome expectations. Therefore, if individuals are confident in their ability to engage in the behaviors and they expect that those behaviors will lead to desirable results, they will perform those activities. However, both self-efficacy and outcome expectation are a person's "beliefs" about capabilities and outcomes. Thus, they are perceptions, and not necessarily empirical "truths" (Strecher, DeVelli, Becker, & Rosenstock, 1986).

Both outcome expectancies and self-efficacy beliefs play influential roles in adopting health behaviors, eliminating detrimental habits, and maintaining change. In adopting a desired behavior, individuals first form an intention and then attempt to execute the action. Outcome expectancies are important determinants in the formation of intentions, but are less so in action control. Self-efficacy, on the other hand, seems to be crucial in both stages of the self-regulation of health behavior. Positive outcome expectancies encourage the decision to change one's behavior. Thereafter, outcome expectancies may be dispensable because a new problem occurs, such as the actual performance of the behavior and its maintenance. At this stage, perceived self-efficacy continues to operate as controlling influence (Schwarzer & Fuchs, 1995).

Individuals form their self-efficacy by interpreting information from four sources: (1) enactive mastery experiences (performance accomplishments), (2) vicarious experiences, (3) verbal persuasion, and (4) physiological and affective state Bandura (1997) points out that "mastery experiences are the (Bandura, 1997). strongest sources to build self-efficacy because they provide the most authentic evidence of whether one can master whatever it takes to succeed" (p. 80). Successful task performance increases self-efficacy, but failure in task performance decreases self-efficacy (Moore, 1990). Vicarious experience is the observation of an event or of other people as a "model". Individuals can improve their own performance by learning from what they have observed. Self-efficacy will be enhanced if the model is a peer and has similarities to the individuals' characteristics and past performance (Moore, 1990). Persuasions can involve exposure to the verbal judgments that others provide. Effective persuaders must cultivate individuals' beliefs in their capabilities while at the same time ensuring that the envisioned success is attainable. A sense of efficacy is easier to sustain if verbal persuasion comes from significant others who express faith in one's capabilities, especially when one is struggling with difficulties (Bandura, 1997). Physiological and affective states, such as anxiety, stress, and fear, can diminish perceived efficacy. This is because individuals partly judge their abilities by their physical state and emotions.

In conclusion, self-efficacy is the belief in one's ability to undertake action. It is a central factor for deliberate behavior. Individuals will perform action if they have self-efficacy. Self-efficacy comes from four sources: successful past experience, modeling, verbal persuasion, and physiological and emotional states. Self-efficacy in adolescents with epilepsy. There is only one study regarding self-efficacy in adolescents with epilepsy. Niyomkar (2001) explored selfefficacy in 105 Thai adolescents with epilepsy in three aspects; that is, self-efficacy in seizure control, self-efficacy in general management, and self-efficacy in medication management. She found that Thai adolescents with epilepsy had a high level of perceived self-efficacy. As for each aspect, self-efficacy in seizure control and selfefficacy in general management were at a high level, but self-efficacy in medicationtaking was at a moderate level.

Self-efficacy and self-care. Based on literature review, relationships between self-efficacy and self- care were supported by the studies in persons with epilepsy and with other chronic diseases. Dilorio et al., (1992) studied self-efficacy, social support, and self-management in 98 persons with epilepsy aged 17-66 years. The results showed that self-efficacy had a positive relationship with selfmanagement (r = .50, p <. 001). Moreover, among predictor variables (such as employment, gender, race, education, age, seizure, and medication related variables; social support; and self- efficacy), self-efficacy was the most powerful variable in the prediction of self-management and explained 25% of the variance in self-management (p < .001). Such findings were is consistent with the study findings of by Dilorio et al., (1994) which revealed that among 80 persons with epilepsy ranging in age from 18-67 years (with a mean of 38.2 years), self-efficacy was positively correlated with self-management (r = .44, p <.01) and self-efficacy had a positive direct effect on selfmanagement ($\beta = .42$, p < .001). Similarly, Johnston-Brooks, Lewis, and Garg (2002) reported that self-efficacy was an important predictor for the self-care practice of 88 young adults with Type 1 diabetes (β = .63, p < .005) and accounted for 35% of the variance in self-care practice.

In Thailand, Charoenwongwiwat (1995) studied perceived self-efficacy and self-care behavior in 60 myocardial infarction patients. A significant positive relationship was noted between self-efficacy and self-care behavior (r = .76, p < .001). Furthermore, Homnan's study (1996) also found a positive correlation between self-efficacy and self-care behavior in 150 elderly people (r = .22, p < .01). Wongsonton (2000) found a high correlation between self-efficacy and self-care behavior in 150 elderly people (r = .22, p < .01). Wongsonton (2000) found a high correlation between self-efficacy and self-care behavior in 150 pulmonary tuberculosis patients (r = .81, p < .001). Moreover, Piasue, Schepp, and Balza (2002) tested a model of exercise and calcium intake behavior for osteoporosis prevention in young women and found that self-efficacy directly to health behavior in terms of calcium intake behavior ($\beta = .38$, p < .05) and exercise behavior ($\beta = .36$, p < .01).

In brief, empirical evidence has shown that self-efficacy has a positive relationship with and can also predict self-care behavior in adults with epilepsy and other populations. However, no study of the relationship between self-efficacy and self-care behavior in adolescents with epilepsy was found.

Knowledge and self-efficacy. Existing studies have demonstrated the relationship between knowledge and self-efficacy. Lindberg (2000) tested a causal relationships among condom use knowledge, self-efficacy for condom use, coping, and condom use in a sample of 100 urban women. The findings revealed that condom use knowledge had a direct effect on self-efficacy, and self-efficacy was a mediator between condom use knowledge and condom use behavior. Likewise, Piasue et al. (2002) studied osteoporosis prevention among 100 Thai young women and found that

knowledge had a positive direct effect on self-efficacy ($\beta = .31$, p < .05). These findings were consistent with the evidence from the following experimental studies which confirmed that knowledge enhances self-efficacy. Phumleng (2002) and Plodnaimuang (1999) studied the effectiveness of an educative-supportive program in improving perceived self-care efficacy and diabetic control in uncontrolled type 2 diabetic patients in the South and the North-East of Thailand. The findings indicated that after entering the program, diabetes-related self-care efficacy increased significantly (p < 0.01). Similarly, Anderson et al. (1995) studied the effects of an educational health program on self-efficacy in diabetes patients. They found that the program resulted in significant improvement in self-efficacy. In contrast, among 55 Taiwanese women, knowledge of pelvic muscle exercise did not predict self-efficacy in pelvic muscle exercise (Shu-Yueh Chen, 2001). However, it is worth noting that this study had a very small sample size of 55 subjects while six variables were investigated.

In summary, the relationship between knowledge and self-efficacy has not yet been studied in adolescents with epilepsy. However, the existing studies have provided strong inferential evidence that knowledge improves self-efficacy.

Social support and self-efficacy. Several research findings have demonstrated that social support has a positive relationship with self-efficacy. Amir, Roziner, Knoll, and Neufeld (1999) found that social support was positively related to self-efficacy in 89 adults with epilepsy (r = .53, p < .001). Similarly, Dilorio et al. (1994) examined the association between social support and cognitive variables in 80 adults with epilepsy. Social support and self-efficacy were found to be positively correlated with each other (r = .38, p < .001). In conclusion, social support is positively correlated with self-efficacy in adults with epilepsy. No study regarding the relationship between social support and self-efficacy among adolescents with epilepsy is found.

Age and self-efficacy. Several studies have shown the relationship between age and self-efficacy in patients with chronic diseases. Methakanjanasak (2005) found that age had a positive direct effect on self-efficacy among 110 end-stage renal disease patients receiving hemodialysis. However, Charoenkij (2000) found that age was negatively correlated with perceived self-efficacy in 160 elderly patients with primary hypertension (r = -.18, p < .05). Also, Wongsonton (2000) found this negative relationship in 150 pulmonary tuberculosis adult patients (r = -.35, p < .001).

The direction of the relationship between age and self-efficacy in adults and the elderly is inconsistent. There have been studies regarding this relationship in adults and the elderly with chronic diseases, but there is no study regarding this relationship in adolescents with epilepsy.

In conclusion, a number of existing research in various populations support the relationship among self-care behavior, social support, family support, peer support, knowledge, family income, and age and self-efficacy. However, those previous studies have limited generalization to Thai adolescents with epilepsy because those studies conducted in other chronic diseases which have different nature of diseases and different self-care behavior. Although some studies have been conducted in adults with epilepsy, those studies cannot be generalized to adolescents with epilepsy because developmental state, knowledge, and life experience of adults are different from those of adolescents. The adults' decision making to engage in self-care behavior might differ from that of adolescents. Also, some studies were conducted in adolescents with epilepsy but those studies were conducted in Western countries which are different in culture, social context and family system from Thai society. No evidence supports whether factors affecting self-care behavior among the Western adolescents with epilepsy are generalized to Thai adolescents with epilepsy.

Furthermore, the majority of the studies have examined the simple correlation between two variables. A few studies have investigated causal relationships between some predictor variables and self-care behavior. However, there is no a causal model of self-care behavior for Thai adolescents with epilepsy which explains the direct and indirect effect of age, family income, family support, peer support, epilepsy knowledge, and epilepsy self-efficacy on self-care behavior. Therefore, we cannot compare the magnitude of effect of those variables on self-care behavior. Consequently, the best predictor variable cannot be selected to promote self-care behavior among adolescents with epilepsy.

Therefore, a model of self-care behavior for adolescents with epilepsy which demonstrates the causal relationship of predictor variables, including age, family income, family support, peer support, epilepsy knowledge, and epilepsy selfefficacy was developed and tested with empirical data. This causal model is expected to serve as important information which can be used to guide research development and interventions to promote self-care behavior of Thai adolescents with epilepsy.

Theoretical Framework

The theoretical Framework for this study is based on the Self-Care Deficit Nursing Theory (Orem, 2001) and the Self-Efficacy Theory (Bandura, 1997). The self-care deficit nursing theory was used because it views a person as an active agent who has ability to perform self-care, and the theory provides a conceptual model and directions of concepts which can explain self-care behavior and factor affecting selfcare behavior among adolescents with epilepsy. In the self-care deficit nursing theory, Orem (2001) did not mention about the belief in one's ability which influence the decision to perform behavior. Thus, self-efficacy theory was added into the theoretical framework to explain more about factors influencing self-care behavior. The conceptual-theoretical-empirical structure which displays the hierarchy of theory deduction (Fawcett, 1999) for this study is shown in Figure 1.

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121 adolescents with epilepsy, cross-sectional and correlational research design, path analysis

Figure 1. A conceptual-theoretical-empirical structure

The conceptual model concepts of this study are composed of three major constructs of the self-care deficit nursing theory: basic conditioning factors, self-care agency, and self-care; together with the self-efficacy based on the self-efficacy theory. Age, family income, family support, and peer support are deducted from basic conditioning factors while epilepsy knowledge is deducted from self-care agency. In addition, epilepsy self-efficacy is deducted from self-care behavior is deducted from self-care. According to the self-care deficit nursing theory, self-care behavior is activities that individual perform by themselves in order to maintain health and well being. Generally, healthy adolescents perform self-care behavior to serve universal self-care requisites and developmental self-care requisites. When adolescents have a chronic disorder as epilepsy, they will perform not only universal self-care and developmental self-care, but also health deviation self-care to control epilepsy and prevent/reduce the impacts of epilepsy.

Self-care behavior of an individual is conditioned by his/her abilities to perform self-care behavior, which is called self-care agency. Since the concept of self-care agency is complex and abstract, and since it includes many components, it is difficult to measure total self-care agency. In this study, only certain knowledge which is a part of the power component of self-care agency was selected to study because self-care is a learned and deliberated action. Without knowledge, the individual cannot perform self-care behavior.

Knowledge is required for health deviation self-care (Orem, 2001). Knowledge will encourage the individual to understand and learn about the disease and treatment, and to be able to choose the self-care activity (Orem, 1985). Therefore, adolescents with epilepsy who have more epilepsy knowledge will have better self-care behavior. Several studies in chronic disease supported the relationship between knowledge and self-care behavior (Chantapet, 1993; Duang-Pang, 1998; Watanasin, 1991). However, knowledge alone does not guarantee behavior change (Moore, 1990). Individuals will decide to perform self-care behavior if they have selfefficacy. Self-efficacy is the belief in ones capacity to perform the behavior, which affects the choices of behavior, the setting, the effort, and persistence in performing a behavior (Moore, 1990). There is evidence to support that epilepsy self-efficacy is a predictor of self-care behavior in persons with epilepsy (Dilorio et al., 1992; Dilorio et al., 1994; Johnston-Brooks et al., 2002)

Although the self-care deficit nursing theory did not mention self-efficacy, several studies which examined the relationship between self-care behavior and selfefficacy conceptualized self-efficacy as motivation or internal strength which is one of ten power components of self-care agency in the self-care deficit nursing theory (Chibsamanboon, 2000; Onchim, 2002; Pichayamongkol, 2002; Tantayotai, 1997; Wongsonton, 2000). However, Geden (personal communication, September, 9, 2004), the Vice President of the International Orem Society for Nursing Science and Scholarship Self-Care Deficit Nursing Theory, points out that self-efficacy cannot be conceptualized as self-care agency. This is because self-efficacy is a belief about self, but self-care agency is capacities and actions in interims of the phases of estimation, transition, and producing self-care. Geden suggests that self-efficacy should be an intervening variable between the therapeutic self-care demands and self-care agency. In the present study, self-care behavior was measured based on therapeutic self-care demands. Hence, self-efficacy is a mediator variable between epilepsy knowledge and self-care behavior. This relationship is relevant to the suggestion of Moore (1990), which addressed that "in the realm of self-care, self-efficacy link knowledge and action" (p. 22).

According to self-efficacy theory, behavior is mediated by a process of cognitive appraisal by which people integrate knowledge, outcome expectations, emotional states, social influence, and past experience to form a judgment of their ability (Bandura, 1986). Therefore, adolescents with epilepsy who have knowledge will have epilepsy self-efficacy. Previous studies provided strong inferential evidence that knowledge improve self-efficacy (Anderson et al., 1995; Lindberg, 2000; Phumleng, 2002; Piasue et al., 2002; Plodnaimuang, 1999)

The development of self-efficacy varies across the life span (Bandura, 1997). Perceived self-efficacy needs cognitive self-reflective capabilities, which increase with age. Thus the late adolescent will have greater self-efficacy than the early adolescent.

Self-efficacy can be developed from verbal persuasion and affective states. One's self-confidence in his or her ability to perform a specific task can be increased or decreased by the encouragement or discouragement of respected persons (Simons-Morton, Green, & Gottlieb 1995). Verbal persuasion from family and friends will enhance self-efficacy. In addition, emotional support enhances positive moods, such as self-esteem and self-worth. A positive mood will create belief in one's ability (Bandura, 1997). Hence, family support and peer support will increase epilepsy selfefficacy. Several study among persons with epilepsy found that social support has a positive relationship with self-efficacy (Amir et al., 1999; Dilorio et al., 1994).

Age is an indicator of maturity and experience (Orem, 1985). Age increases along with growth and development. Older adolescents will have more competencies to evaluate the situation, consider the problem, and make decisions to select activities and perform self-care behaviors than younger adolescents. Additionally, there is the fact that cognitive development of children and adolescents continually increases with age. The abilities of abstract and reasonable thinking enhance during the period of early to late adolescence (Neinstein, Julia, & Shapiro, 1996). Thus, as age increases, the ability to understand and judge information should increase. Older adolescents with epilepsy will have more knowledge than younger adolescents.

Family income is considered as resource the availability and adequacy of resources in Orem's perspective. Money provides materials to serve basic needs and health deviation needs, such as the purchase of epilepsy drugs and transportation costs for follow-ups. Adolescents with high economic status tend to perform self-care behavior better than those of low economic status. Several studies in chronic diseases showed that family income positively related to self-care behavior (Chantapet, 1993; Hongtrakul, 1989; Lakekhum, 1992). In addition, adolescents with high family incomes will be able to seek information from various sources. Thus, adolescents with high family income will have more epilepsy knowledge.

Family support and peer support is also the availability and adequacy of resources. Family support and peer support encourage self-care behavior by providing information and material. In addition, support from family and friends provides the adolescents the perception of belonging, having self-esteem, being accepted, loved, valued and needed. These will enhance motivation to engage in self-care behavior. Moreover, information support from family can be increase epilepsy knowledge of adolescents. There is evidence that family support and peer support predict compliance to epilepsy regimen among adolescents with epilepsy (Kyngäs &

Rissance, 2001). Adolescents who have high family support trend to have more epilepsy knowledge.

Based on the theoretical knowledge of the Self-care Deficit Nursing Theory (Orem, 2001), the Self-Efficacy Theory (Bandura, 1997), and empirical evidence from the literature review; a theoretical model of self-care behavior for adolescents with epilepsy was developed as shown in Figure 2. The order of variables was arranged based on the Self-Care Deficit Nursing Theory and the Self-Efficacy Theory.



Figure 2. The theoretical model of self-care behavior for adolescents with epilepsy