CHAPTER TWO
REVIEW OF LITERATURE

This chapter reviews the literature in related theories, concepts, and previous research works. The summary of the five main parts is as follows:

2.1 The Theory of Traffic Accident Prevention

2.2 The Theory of Operant Conditioning

2.3 The Theory of Cognitive-Social Learning

2.4 The Concept of Sex Differences

2.5 Relevant Research

2.1 THE THEORY OF TRAFFIC ACCIDENT PREVENTION

The Three E's approaches, engineering, education, and enforcement, of O.W. Wilson and R.C. Mclaren are the basic approaches used as global measures for avoiding traffic accidents and generating public awareness of road safety (เกษียร วรศิริ และคณะ, 2544, น. 9-10).

2.1.1 E- Engineering

It is about the traffic engineering that should provide safety for people using roads. For example, the surface of road is supposed to be smooth and each lane should be equally divided, traffic signs and signals should be applied for traffic convenience and safety, and the roads should be in good condition and regularly maintained.

2.1.2 E- Education

Traffic education should be provided for people of all ages especially from the government section involved in traffic safety. It should regularly provide knowledge for people with traffic regulations, traffic laws, traffic signs, etc.

2.1.3 E- Enforcement

Law enforcement is a need for forcing people to comply with traffic rules and regulations for social discipline. They can also compel people to adjust their traffic behavior. Punishment of violators is also needed to threaten them. If they are aware of the punishment, they are less likely to act against the law. Then,

efficient law enforcement will be one of the most important factors to lessen traffic violators and increase safety not only for other drivers but also pedestrians.

2.2 THE THEORY OF OPERANT CONDITIONING

"Operant conditioning is learning in which a voluntary response is strengthened or weakened, depending on its favorable or unfavorable consequences" (Feldman, 2003, p. 156). The basic understanding of operant conditioning worked with animals conducted by Edward L. Thorndike and another by Burrhus F. Skinner.

2.2.1 Thorndike's Experiment: The Law of Effect

One of the most famous experiments conducted by Thorndike was done with cats in which he placed a hungry cat in a cage and put a piece of food outside. The cage had a paddle that if the cat stepped on it, the door then would be opened. The cat firstly would eagerly search for a way out of the cage. Eventually, the cat happened to step on the paddle, the door was opened, and the cat could eat the food. Next time that he placed the cat in the cage, he noticed that the cat spent less time to step on the paddle and escape. After a few trials, the cat then would intentionally step on the paddle as soon as it was placed in the cage (Feldman, 2003). Thorndike called the relationship between behavior and its consequences 'the law of effect'. The law says that the strength (frequency, durability, etc.) of a behavior depends on the consequences the behavior has had in the past or behavior is a function of its consequences (Chance, 2003). Thorndike summarized that "responses that lead to satisfying consequences are more likely to be repeated, and responses followed by negative outcomes are less likely to be repeated" (Feldman, 2003, p. 157).

2.2.2 Skinner's Experiment: Reinforcement

Thorndike's research inspired Skinner, one of the century's most influential psychologists. He conducted his experiment by using an instrument later called Skinner's box. While Thorndike's goal was to get his cats to learn to obtain food by leaving the box, animals in Skinner's box learned to get food by operating in their environment within the box. Skinner was interested in indicating how behavior varied as a result of alterations in the environment. Skinner placed a hungry pigeon in his box. Firstly, the pigeon walked around the box. However, it then pecked the

key by chance and it got food. The first time this happened, the pigeon did not learn the connection between pecking and receiving food and continued to wander around the box. Finally, it pecked the key again and received food. As such, the frequency of the pecking increased. The pigeon then learned the connection between pecking the key and receiving food by pecking the key continuously to satisfy its hunger (Feldman, 2003).

Skinner called the process that the pigeon continued pecking the key 'reinforcement'. "Reinforcement is the process by which a stimulus increases the probability that a preceding behavior will be repeated. In a situation such as this one, the food is called a reinforcer" (Feldman, 2003, p. 158). There are two kinds of reinforcers, the primary and secondary reinforcer. A primary reinforcer satisfies some biological need and works naturally (p. 158). It is not dependent on its association with other reinforcers. For example, food and water for a hungry person or relief from heat and cold will be classified as primary reinforcers (Chance, 2003). "Secondary reinforcers are those that are dependent on their association with other reinforcers. Examples include praise, recognition, smiles, and positive feedback" (p. 149). However, what makes anything a reinforcer depends on individual preferences. "The only way we can know if a stimulus is a reinforcer for a given organism is to observe whether the frequency of a previously occurring behavior increases after the presentation of the stimulus" (Feldman, 2003, p. 159).

2.2.3 Operant Procedures

We can strengthen and weaken behavior by using four operant procedures: positive reinforcer, negative reinforcer, positive punishment and negative punishment (Feldman, 2003). Operant procedures can be summarized in the following figure.

Figure 2. **Types of reinforcement and punishment.**

Procedure	Effect on Behavior	
	Increases	**Decreases**
Presentation of Stimulus	Positive Reinforcement	Positive Punishment
Removal of Stimulus	Negative Reinforcement	Negative Punishment

Modified from Essentials of Understanding Psychology (5th ed., p.160) by R. Feldman, 2003. New York: McGraw-Hill.

2.2.3.1 A positive reinforcer is a stimulus added to the environment that results in an increase of behavior. For example, a dog happens to bark and you give it food; the dog is likely to bark again (Chance, 2003).

2.2.3.2 A negative reinforcer is an unpleasant stimulus that is removed from the environment leading to an increase in the probability that the behavior will happen again in the future. For example, if you get a cold (an unpleasant stimulus) that is relieved by taking a medicine, you are likely to take that medicine again in the future (Feldman, 2003).

2.2.3.3 A positive punishment is a way to weaken a response by adding an unpleasant stimulus. For example, you may scold your children when they behave badly (Feldman, 2003).

2.2.3.4 A negative punishment is a way to weaken a response by the removal of something pleasant. For example, an employee is informed that his salary has been cut because of his poor work performance (Feldman, 2003).

2.3 THE THORY OF COGNITIVE-SOCIAL LEARNING

Some psychologists view learning in terms of thought process which is known as cognitive-social learning theory focusing on the mental process that occurs during learning. The theory proposes that "people -and even animals- develop an expectation that they will receive a reinforcer upon making a response" (Feldman, 2003, p. 167). There is the main aspect supporting this point of view.

2.3.1 Observational Learning: Learning through imitation

According to Albert Bandura's study (as cited in Feldman, 2003, p. 169), observational learning is a process of learning through observing the behavior of another person called a model. He conducted an experiment by letting young children see a film in which an adult wildly hit a doll for a while. After that, unsurprisingly, those children played with the doll imitating the same kind of behavior as the adult in the film. Moreover, it was found that we also learn to imitate others acts by others model. "Observers learn to imitate the behavior of successful models and to avoid imitating the behavior of unsuccessful models" (Chance, 2003, p. 291). According to Bandura (as cited in Feldman, 2003, p. 169), observational learning occurred in four steps which are paying attention and perceiving another person's behavior,

remembering the behavior, reproducing the action, and being motivated to learn and perform the behavior. In addition, "models who are rewarded for behaving in a particular way are more apt to be mimicked than models who receive punishment. Interestingly, though, observing the punishment of a model does not necessarily stop observers from learning behavior. Observers can still describe the model's behavior—they are just less apt to perform it" (p. 169).

2.4 THE CONCEPT OF SEX DIFFERENCES

According to Tavris and Wade (1984), three broad areas of differences between men and women are considered, i.e., physical differences, ability differences, and personality differences.

2.4.1 Physical Difference

Women are considered as being weaker than men especially in terms of physical strength. It was found that most baby boys are larger and heavier than baby girls. During their childhood, the differences are rather slight in size and strength. However, when they are in their puberty, males on the average are stronger, heavier, and taller than females (Tavris & Wade, 1984).

2.4.2 Ability Difference

2.4.2.1 General intelligence

It was once believed that men are more clever than women as they found that men were more apt than women in terms of world affairs and skills in science and industry (Rathus, 1983). However, it has been recently determined from the test of general intelligence that men and women do not show differences in their average Intelligence Quotient (Tavris & Wade, 1984).

2.4.2.2 Cognitive ability

According to Maccoby and Jackin's study (as cited in Lips, Myers, & Colwill, 1978, p. 154), there is some evidence of sex differences in three types of cognitive abilities, which are verbal skills, mathematical or quantitative abilities, and spatial abilities. They found that women are somewhat better than men in their verbal skills while men are much better than women for their quantitative and spatial abilities.

For verbal skills, there is evidence that boys and girls respond differently when materials are presented visually and verbally. According to an experiment conducted by May and Hut (as cited in Lips, Myers, & Colwill, 1978, p. 155), lists of nouns were presented to nine-year old children. They found that "boys learned the list better when it was presented visually but girls did better with oral presentation"

Moreover, according to Maccoby and Jackin (as cited in Lips, Myers, & Colwill, 1978, p. 155), "both sexes and development stage seem to be related to quantitative ability. Until early adolescence, the majority of studies show no differences in quantitative skills, but males move ahead after this point and show consistently superior performance". Boys, in their adolescence, do better than girls on tests of mathematical reasoning while both sexes' score about the same on tests of algebra and basic mathematical knowledge (Tavris & Wade, 1984).

Finally, for spatial abilities, including finding your way around town or a building, recognizing upside-down objects, playing chess, map-reading, solving mazes, and doing jigsaw puzzles, males are considered superior in these tasks from adolescence onwards (Singleton, 1986, p. 66).

2.4.3 Personality Difference

2.4.3.1 Self-esteem and confidence

"Self-esteem is a global quality, and difficult to measure. However, when psychologists study people's self-confidence on a particular task-which can contribute to general self-esteem-a sex difference does emerge, with males usually the more confident sex" (Tavris & Wade, 1984, p. 67).

For example, when you ask students to estimate their grade for the following semester, males usually expect to do at least as well as they used to while females expect to do worse. In studies conducted by Crandall and Deaux (as cited in Tavris & Wade, 1984, p. 67), female college students predicted lower grades than males did when their grades were slightly higher than those of males. In addition, "women's self-confidence seems especially vulnerable when their work is to be evaluated by others who are highly competent" (p. 67).

2.4.3.2 Aggressiveness

According to Johnson's study (as cited in Josephson and Colwill, 1978, p. 198), all over the animal kingdom, males are considered more aggressive than females with no exception for humans. The origins of sex difference in aggression are partly cultural and partly biological. For example, the greater size and strength of a male is certainly one factor, and the sex hormone is another. According to many studies on nursery and preschool children conducted by Hattwick, Muste, and Terman (as cited in Anastasi, 1958, pp. 486-487), using both teachers' reports and observations, it was revealed that boys display more anger, aggression, and destructive and quarrelsome behaviors than girls. This is also in line with a study of Maccoby and Jacklin (as cited in Tavris & Wade, 1984, p. 71) in which they said "the biggest difference is most obvious in childhood, when boys show more physical aggression, fantasy aggression, verbal aggression, and play aggression than girls do". Aggression is not only found in children but also in adolescents. As disclosed by The Social Issues Research Center (2004), males are more aggressive, and also display aggression in different ways when compared with females. "The greatest differences are seen from puberty to early adulthood although differences are evident from the age of two years" (p. 8). Baker's study (as cited in The Social Issues Research Center, 2004, p. 8) found that murder rates are between 5 and 10 times higher for males than females and the differences between the sexes were the greatest among the ages of 15-19 and 20-34.

2.5 RELEVANT RESEARCH

Yinon and Levian (1995) conducted a research on *Presence of Other Drivers as Determinant of Traffic Violations*. Nine hundred sixty drivers in two Isaraeli cities, Jerusalem and Tel Aviv, at six and four intersections respectively were observed. Half of the drivers were women. The drivers were always first in line, waiting for the traffic light to turn green in the following four situations:

a. no other cars were waiting at the intersection (solitary drivers)
b. at least two cars were waiting behind the target driver
c. one or two cars were waiting to the side(s) of the target driver
d. at least two cars were waiting behind each car in the first row

They found that when comparing the behavior of solitary drivers with others in various conditions, the solitary drivers broke the law less often. Most of the violations would involve the presence of others drivers. Moreover, the difference in the frequencies of traffic violations among the various conditions created a different gradation of pressure that was experienced by the target drivers. Among those drivers, women tended to be less affected by the presence of other drivers than men did.

Özkan and Lajunen (2005) carried out their research about *Why Are There Sex Differences in Risky Driving?: The Relationship between Sex and Gender-Role on Aggressive Driving, Traffic Offences, and Accident Involvement Among Young Turkish Drivers*, aimed to investigate how sex (male and female) and gender-role (masculinity and femininity) and their interaction were associated with risky driving behaviors, traffic offences, and accident involvement among young Turkish drivers. They conducted their research by asking the subjects (221 males and 133 females) to fill in a form including the short form of Bem Sex-Role Inventory (BERI), the Driver Behavior Questionnaire (DBQ), questions about the driver's accident history, and background information. They found that sex predicted only the ordinary violations. Male drivers were involved in highway code ("ordinary") violations more frequently than female drivers. The number of offences and aggressive and ordinary violations increased as a function of masculinity, while the number of accidents, offences, aggressive and ordinary violations, and errors decreased as a function of femininity. In addition, a relatively short driving history of samples might have caused the lack of relationship between accidents and masculinity. Moreover, a significant negative relationship between accidents and aggressive violations were found. They found that 'Caring of others' seems to lead to more careful driving and fewer errors. However, no significant interaction effects of sex and gender role on offences, ordinary violations, and errors were found.

Moreover, Laapotti and Keskinen (2004) with a research on *Has the difference in Accident Patterns Between Male and Female Drivers Changed Between 1984 and 2000?*, conducted the research by using two sets of traffic accident data. The first set of data covered all motorcar accidents for which damages were paid between 1987 and 2000, totaling 140,802 accidents. The second set of data covered all fatal motor

vehicle accidents in Finland for the period of time between 1984 and 2000, totaling 2,401 accidents. They found that female drivers had more accidents that were connected to vehicle maneuvering and control of traffic situations. On the other hand, male drivers, especially young male drivers, had proportionally more accidents connected to higher levels of driving behavior like motive for driving and attitudes. Factors that characterized these accidents were speeding and alcohol consumption. The study concluded that the difference in accident patterns between male and female drivers has remained constant for 16 years.

C. Sigelman and L. Sigelman (1976), in their research about *Authority and Conformity: Violation of a Traffic Regulation*, tried to find out the personal and situational determinants of law violation. Seven hundred and twenty six male and female drivers were observed about the rates of prohibited right turns at red lights at four intersections in Lubbock, Texas. Drivers were either alone, or behind a violating model, or alone in the presence of a uniformed authority figure standing at the corner. They found that males and drivers under 30 were more likely to turn than females and drivers over 30. Females and older drivers were more hesitant to turn in the presence of a uniformed authority figure than were males and younger drivers. Females were particularly vulnerable to the effects of a violating model's defiance of authority.

Veevers (1982) revealed in *Women in the Driver's Seat: Trends in Sex Differences in Driving and Death* that the proportion of women licensed to drive has increased markedly, a difference especially pronounced among the younger age groups. Male drivers log more miles than female drivers, and male accident rates have traditionally been higher than female rates. He found that female mortality from traffic accidents has increased distinctly. The needs of the two groups for driving training may not be identical. Young men may need to be encouraged towards increased caution while young women may need to be encouraged towards increased confidence.

Finally, Bergdahl (2005) conducted a survey about *Sex Differences in Attitude towards Driving*. A survey was done with 198 students at the University of Texas at El Paso. He revealed in his study that males were likely to have more accidents than female drivers. Females seemed to be more compliance with traffic regulations, such as using turning signals and obeying the speed limit, than males. In general, he found

out that males have more confidence in their driving skill than women which in turn also reflecting more risk involvement in driving motor vehicles as well.

In summary, this chapter, review of literature, consisted of theories involved with the study. The theory of traffic accident prevention was presented in the beginning of the chapter. Psychological theories, the theory of operant conditioning and the theory of cognitive-social learning, concept about sex differences, and relevant previous research were presented respectively in this chapter. In the next chapter, the methodology of the research will be presented.