THE GATED COMMUNITY:

RESIDENTS' CRIME EXPERIENCE AND PERCEPTION OF SAFETY

BEHIND GATES AND FENCES IN THE URBAN AREA

A Dissertation

by

SUK KYUNG KIM

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2006

Major Subject: Architecture

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Approved by:

Chair of Committee,	Andrew D. Seidel
Committee Members,	Robin F. Abrams
	Charles W. Graham
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ABSTRACT

The Gated Community: Residents' Crime Experience and Perception of Safety behind Gates and Fences in the Urban Area. (August 2006)

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Chair of Advisory Committee: Dr. Andrew D. Seidel

The primary purpose of the study is to explore the connections between residents' perception of safety and their crime experience, and the existence of gates and fences in multi-family housing communities in urban areas. For cultivating discussions regarding the connections between gated community territory, safety, and crime experience, this study classifies apartment communities according to the conditions of their gating and fencing: gated communities, perceived gated communities, and non-gated communities. It investigates residents' perceptions of safety and their opinions and managers' opinions on gated territory and safety.

The major findings from the surveys are: Residents felt safer in gated communities than in non-gated communities. Residents' perceptions of safety in perceived gated communities were similar to those in gated communities. These results reflected the territoriality issue for improving residents' perceived safety in apartment communities. Residents' perceptions of safety in architectural spaces showed that residents' fear of

crime in public and semi-public spaces must first be addressed in order to ease residents' fear of crime in an apartment territory.

The reality of crime in apartment communities differed from residents' perceptions of safety. Gated community residents reported a higher crime rate than non-gated community residents. In addition to gates and fences that define apartment territory, such elements as patrol services, bright lighting, direct emergency buttons, and visual access to the local police were indicated as the important factors for improving residents' perceived safety.

Some architectural factors and demographic factors exhibited statistical correlations with residents' perceptions of safety. Those were types of communities, dwelling floor level, educational attainment, family size, and annual income. For predicting residents' perceptions of safety in their apartment territory, multiple regression models were obtained and residents' neighborhood attachment was also considered in the multiple regression models. The apartment community managers emphasized direct maintenance issues and residents' social contact with neighbors for improving residents' perceived safety.

In conclusion, design and managerial suggestions for safer communities were proposed. For creating safer multi-family housing communities, territoriality and related architectural conditions and managerial considerations and residents' participations are emphasized. The concept of community programming for safer multi-family housing communities is suggested.

To my husband, Jae Choon, and to my son, Jin Wook

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Whenever I had hard times, I thought of someone very special to me and was reminded of what she did and what she told me. Thus, as the last but most important, I would like to said loudly “thank you” to my Mom who may be smiling at me up in the sky. I love you. Your daughter finally did it. I miss you so badly.

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CHAPTER I

INTRODUCTION

1.1 Introduction

In the 1970s, Oscar Newman introduced the concept of *Defensible Space* and its applications for community designs. His works have inspired a number of researchers to devote themselves to either proving or rejecting his design suggestions for creating safe and vandalism free environments in neighborhood settings (e.g. Taylor, Gotterenson, & Brower, 1984; Moran & Dolphin, 1984; Normoyle & Foley, 1988; Brunson, Kuo, & Sullivan, 2001).

One of the contemporary topics related to Newman's works is the issue of gated communities, because the gate is known to provide defensible space for the residents. Literally, a gated community is defined as a subdivision or neighborhood, often surrounded by a barrier, to which entry is restricted to residents and their guests. In other words, a gated community is a residential area with restricted access, making public spaces such as roads privatized (Blakely & Snyder, 1997; Tijerino, 1998). Other terms synonymous with gated communities are gated enclaves, gated environs, walled communities, and fenced neighborhoods (e.g. Tijerino, 1998; Goix, 2003).

According to the analysis of the U.S. Census Bureau's 2001 American Housing Survey (2002), more than 7 million households are secured communities with walls and fences. Initially popular among the wealthy starting around the 1800s in the United

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This dissertation follows the style of *Environment and Behavior*.

States, gated communities are now available to members of nearly every income level. This popularization turns various discussions about gated communities to issues of safety, urban segregation, and community cohesion (e.g. Blakely & Snyder, 1998; Wilson-Doenges, 2000; Atkinson, 2003; Goix, 2003). Among those various issues, safety has been highlighted based on the unique environments of gated communities as created by gates, fences, and privatized public spaces.

1.2 Statement of the Problem

According to Halberg (2001), the primary reason why a person moves into a gated community is the perception of higher security. People's perception of higher security in a gated and fenced territory was also indicated by Newman (1996) when he found that the fenced area in a residential environment was free from vandalism[1]. There have been studies, however, that reject the correlations between the perception of security and gates and fences. Wilson-Doenges (2000) concluded in her study that people's perceived safety in the gated community is not significantly different from non-gated counterparts. Blakely and Snyder (1997) and Fowler and Mangoine (1986) found that there is no relationship between actual crime rates and gates or barricades.

However, previous research has not addressed one important point due to the narrow focus on people's general perception of safety in their communities. Researchers have not examined the relationships between people's perception of safety and the

[1] Newman (1996) created 6-foot-high fencing with tubular steel in the Clason Point, a 400-unit public housing project, to define and secure the rear yard areas.

architectural features of their gated homes and neighborhoods. Nor have they accounted for people's current crime experience in gated or non-gated community boundaries. In other words, researchers have failed to consider the characteristics of the entire architectural surrounding created by gates and fences and its relationship to people's perceptions and crime experience.

Furthermore, previous work considered neither middle- or low-income families living behind gates nor gated multi-family housing in urban areas. Most subjects in previous studies were wealthy and high-income families living in single-family housing developments in suburban areas. Efforts toward creating safe residential environments, however, should be made for low- or middle-income families, because, as the U.S. Department of Justice (2004) found, crime in the United States occurs more often for those living in rented properties and urban areas. In addition, crime prevention may be more important in multi-family housing. In fact, the Crime Free Multi-Housing Program (CFMHP) in the United States has existed since 1992. It was started in Mesa, Arizona, and has since spread throughout the United Sates and Canada. The program has been implemented in 43 U.S. states thus far [2]. However, it is also the case that the program has not been paid attention to by multifamily housing property managers or residents.

On the other hand, it seems that the safety issue in residential environments has not been considered by the public authorities associated with housing. We can infer this problem from the fact that the American Housing Survey, regarded as an overall housing

[2] City of Greensboro (2004). *Crime free multi-family housing program*. Retrieved February 5, 2004 from http://www.greensboro-nc.gov/Departments/Police/citizens/communityresource/crimefreemulti.htm

survey for American housing, does not include the safety issue in any of its items. For example, for "the reasons for choosing the current house" item, the survey lists "job, friends/relatives, leisure activities, public transportation, schools, design, and other public services" as the reasons. There is no information regarding how and when the survey items were constructed. But, considering that housing is fundamental for people and safety is a critical issue for humans, the safety in near-home environments should also be considered in surveys conducted by the public authorities associated with housing.

In addition, gated communities have recently been explored by many researchers from the United States, Europe, South Africa, and Asia. There was an international conference with the theme of gated communities in 2003 and now we have an international organization for exploring gated communities and related research issues in the world. The increasing number of gated communities is a social phenomenon not only in the United States but also in many other countries.

To summarize, previous research studies have focused mainly on the sociological issues of gated communities and no study exists regarding architectural concerns in gated communities, despite the fact that gated communities provide very unique architectural settings such as controlled entrances, fenced territory, and privatized community roads. Thus, exploring gated communities and discussing the related issues should be done in the architectural domain.

Based on the above, this study will focus on the architectural characteristics of gated communities and their effects on residents' perceptions. The condition of gating

and fencing will be considered as the most important characteristic of apartment communities. In this study, there are three types of apartment communities; gated apartment communities having fully controlled gates and fences, gated communities with fences and gates but not fully controlled systems (deemed "perceived gated communities"), and non-gated communities having neither fences nor controlled gates.

This study will explore the relationships between physically gated and fenced residential environments and people's perceptions of safety, as well as the reality of crime in such environments. It considers apartment communities with and without gates and fences in urban areas.

1.3 Purpose of the Study

The primary purpose of the study was to explore the connections between residents' perception of safety and their crime experience, and the existence of gates and fences in multi-family housing communities in urban areas. For cultivating discussions regarding the connections between gated community territory, safety, and crime experience, this study classified apartment communities according to the conditions of their gating and fencing; it investigated apartment community residents' perceptions of safety and their opinions and managers' opinions on gated territory and safety.

Considering the whole aspects of the research results, this study additionally suggested design and managerial considerations needed to improve residents' perceptions of safety in their residential environments. Thus, the proposed study should

be understood as a community programming process for creating safe and crime-free multi-family housing communities.

Five specific research objectives exist for this study. They are:

1) To identify the reason why people live in gated apartment communities,

2) To physically identify and classify three types of communities according to gate control (i.e. gated communities, perceived gated communities, and non-gated communities),

3) To examine the differences in residents' perceptions of safety and crime experiences in these three types of communities,

4) To determine the effects of gating and fencing on residents' perception of safety, and 5) To discuss if gated communities provide defensible spaces to protect their residents.

1.4 Research Hypotheses

Classifying hypotheses provides available information so that researchers can more clearly define their research problem and can decide how to study it further (Zeisel, 1984, p. 23). In order to address the objectives of the study, six preliminary hypotheses were tested. The first hypothesis tested the reason residents live in gated apartment communities. The second through fifth hypotheses tested the differences in residents' perceptions of safety and the reality of crime among the three types of communities. The sixth hypothesis tested the correlation between residents' demographic-socioeconomic characteristics, their perceived safety, and the reality of safety. The hypotheses were:

(1) Residents live in gated communities because of the safe environment.

(2) Residents' general perceptions of safety differ according to the conditions of gating and fencing of communities: their perception of safety is greater in gated communities having fully controlled gates and fences than gated communities with fences and gates but not fully controlled systems, or in non-gated communities having neither fences nor controlled gates.

(3) Residents' perceived safety in public, semi-public, and private areas differs according to the conditions of the gating and fencing of communities: their perception of safety in public, semi-public, and private areas is greater in gated communities having fully controlled gates and fences than in perceived gated communities or in non-gated communities.

(4) Residents' crime experiences differ according to the conditions of gating and fencing in the communities: The residents in gated communities experience less crime than the residents in perceived gated communities or in non-gated communities. The interactions between the type of community and residents' crime experiences are tested.

(5) Residents' perceived safety and crime experiences correlate with the gate and fence status of communities. In order to test this hypothesis, other factors related to security such as night lighting, security patrol service, 24-hour maintenance service, and contact with neighbors will be considered.

(6) Residents' perceived safety and crime experiences correlate with their demographic characteristics, socioeconomic characteristics, and their socialization with neighbors in their housing communities.

1.5 Importance of the Study

Residential environments are fundamental for people, and safe homes and communities have received significant attention from architectural researchers. Within this context, this study investigates whether gated communities affect the reality of crime and people's perceptions of safety. The results of this study thus propose guidelines in community programming for safe and crime-free multi-family housing communities.

In addition, the results of this study encourage residents to pay attention to safety and crime prevention in multi-family housing, i.e. rented residential properties in the United States. Consequently, the results of this study suggest executive considerations for creating safer residential environments. These results are reported to the executive board of the Crime Free Multi-Housing Program (CFMHP).

The results of this study will likewise attract the attention of the executive board of the National Housing Survey. The issue of safety has not been considered thus far in the National Housing Survey in the item of "why do people move into their current homes?" Based on the results from this study, it is suggestible that they do so "because they believe their current home and neighborhood to be safer than the previous one."

As the most significant outcome of this study, design considerations for safer and more inclusive apartment communities are suggested. Gated communities which, having been considered "truly exclusive", brought a lot of arguments to urban planners and housing researchers. Based on the results from this study, alternative design guidelines considering residents' safety are provided. Additionally, the results from this study help managerial members understand residents' safety needs in near-home environments.

Subsequently, managerial considerations in apartment communities for improving their tenants' perceived safety are suggested.

The interest in gated communities has become worldwide in scope. The results of this study can thus be compared with other cultural contexts in the future. The research findings can also be interpreted in other cultural contexts. The proposed study could potentially provide a base for international joint studies.

1.6 Definitions of Terms

The following definitions are used in this study:

Apartment Community: In this study, apartment communities are defined as residential properties consisting of garden style apartments and are managed by professional management companies.

Perception of Safety: Residents' perception of safety (or perceived safety) is defined as how safe residents feel in the designated spaces and in their apartment communities; this is measured by their responses to the questions about safety (refer to 2.4.1 Measuring Perception of Safety).

Crime experience: Residents' crime experience is the frequency and types of property crimes the survey respondents experienced in their apartment territory (refer to Table 3.9).

Gated communities: Generally, gated communities are residential areas that have restricted access and fences. In this study, gated communities were defined as the apartment communities with fully controlled gate systems and fences around the

communities. Thus, gated communities fully control access from outside traffic (see Table 3.1).

Perceived gated communities: Perceived gated communities are the gated apartment communities with fences and gates but not fully controlled systems. Thus, perceived gated communities cannot control the traffic due to the open gates.

Non-gated communities: Non-gated communities are the apartment communities having neither fences nor controlled gates.

Public space: Public spaces (or public areas) include internal roads, parking lots, and communal facilities such as swimming pools, fitness centers, and laundry spaces in apartment communities.

Semi-public space: Semi-public spaces (or semi-public areas) indicate in-between spaces of apartment buildings such as stairs, halls, or patios.

Private space: Private spaces (or private areas) are defined as individual apartment units.

Figure 1.1 shows examples of the public, semi-public, and private spaces in multi-family housing communities.

Public ---------- Semi-public ---------- Private
(Roads, Community Facilities) (Hallways, stairs, lobby) (Individual Apartments)

Figure 1.1: Public, Semi-public, and Private Spaces in Multi-Family Communities

CHAPTER II

THEORETICAL BACKGROUND

The purpose of the study is to explore the connections between residents' perception of safety, their crime experience, and the existence of gates and fences in multi-family housing communities in urban areas; and to suggest design and managerial considerations to improve residents' perceptions of safety in their residential environments. Based on this research purpose, this chapter will propose the conceptual framework for the research and introduce the theoretical background from a review of literature and related studies.

2.1 Safety Issue In Residential Environments

2.1.1 Safety

Safety is considered a fundamental need for humans on the basis of Maslow's *Hierarch of Needs*. Basically, Abram H. Maslow, a humanistic psychologist, believed that people are motivated by the urge to satisfy needs ranging from basic survival to self-fulfillment, and that they don't fill the higher-level needs unless the lower-level ones are satisfied (Simsons, Irwin, & Drinnienm, 1987).

Originally, he introduced five levels of needs in this theory. His theory was modified into six or seven levels later on; but the fundamental frame consisting of five levels of needs was not altered.

The lowest level of need is biological and physiological needs. The needs for air, food, drink, shelter, warmth, and sleep belong to this category. Housing as shelter can be allocated in this category. The second level of need is the safety needs. When the physiological needs are satisfied, humans become aware of their security.

The third level of need is the belongingness and love needs which include human's needs for love, affection, and belongingness. About this level of needs, Maslow stated that people would seek to overcome feelings of loneliness and alienation (Simsons, Irwin, & Drinnienm, 1987), so their needs to belong to and love somebody are natural. The fourth level of needs is the needs for esteem. At this stage, humans seek achievement, status, responsibility, and reputation. The highest level of needs of the five levels is self-actualization. Based on these needs, humans want to achieve personal growth and fulfillment. These five levels of needs and their hierarchy are illustrated in Figure 2.1.

In addition to these five levels of needs, cognitive needs and aesthetic needs were adapted in the 1970s and transcendence needs in the 1990s (Simsons, Irwin, & Drinnienm, 1987). Though a number of researchers applied the model for their studies and explored the model, the *Hierarchy of Needs* model was criticized by other psychologists.

According to Boeree (2006), the most critical concern of Maslow's model is regarding his methodology. Maslow chose a small number of people that he himself declared self-actualizing. The number of subjects Maslow had for his model was limited

and some of the subjects were very intellectual people. Thus, his conclusions about what self-actualisation in the highest level seem not to be scientific.

Most critics were related to the hierarchical order of the needs. The highest level of need, self-actualisation, does not always come after the other four need are satisfied. For example, as Boeree (2006) indicated, many artists have self-actualization even though they are economically depressed or physically unhealthy. Thus, many researchers have criticized the hierarchical orders of the needs and Maslow's assumptions for constructing the *Hierarchy of Needs* model.

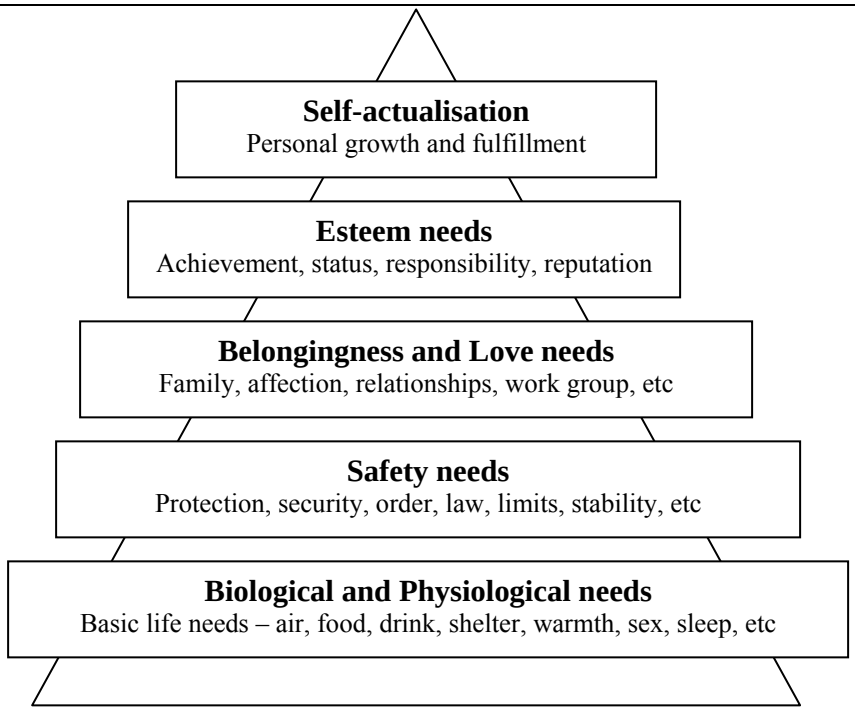

Figure 2.1: Maslow's Hierarchy of Needs[3] (The source was based on Alan Chapman (2002). *Maslow's Hierarchy of Needs - Original Five-stage Model*)

[3] The diagram was modified based on the Maslow's Hierarchy of Needs by Alan Chapman (2002). The original diagram is available at http://www.businessballs.com.

The *Hierarchy of Needs* theory has been applied in nearly every academic discipline, and architecture is no exception. Many architectural researchers explored our built environments in the contexts of those five levels of needs. For example, Ro (1995)[4] focused on the primary function of residential environments considering the role of housing as shelter and fostered her research perspectives to explore residents' fear of crime and the environmental characteristics of an apartment complex based on the safety needs. Kim (1992)[5] examined the housing-identity symbolism of apartment-dwellers and identified the correlations between the various types of housing-identity symbolism and homeowners' personalities. The research study was based on the aesthetic needs from Maslow's model.

Among those five levels of needs, the need for safety is of special concern to this study. This is because safety is essential for residents to step toward the higher levels of needs in their living environments.

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[4] Ro, H.S. (1995). *The residents' fear of crime and the environmental characteristics of an apartment complex*. Unpublished doctoral dissertation, Department of Housing and Interior Design, Yonsei University, Seoul, Korea.

[5] Kim, Y.J. (1992). *Housing-identity symbolism of apartment dwellers*. Unpublished doctoral dissertation, Department of Housing and Interior Design, Yonsei University, Seoul, Korea.

2.1.2 Crime in the United States

Why do we care about safety in residential environments including apartment communities? The following statistical data provides the clues for a reply to this question. The statistical data of crime in the United States raises concerns about the significance of crime in our neighborhoods. Though overall rates have decreased since 1994, 15% of the households in the United States, accounting for about 17 million households, experienced one or more violent or property crimes in 2003. In addition, about 5% of households were vandalized at least once during 2002 [6] .

According to the U.S. Department of Justice (2004), crimes are categorized into two types: violent crime and property crime. Property crime includes robbery, burglary, and larceny. Fortunately, in 2003, all crime rates are sliding downward in the United States. Figure 2.2 shows decreasing crime rates in the United States.

[6] U.S. Department of Justice (2003). *Crime and the nations' households, 2002.* Retrieved February 21, 2004 from http://www.ojp.usdoj.gov/bjs/abstract/cnh02htm

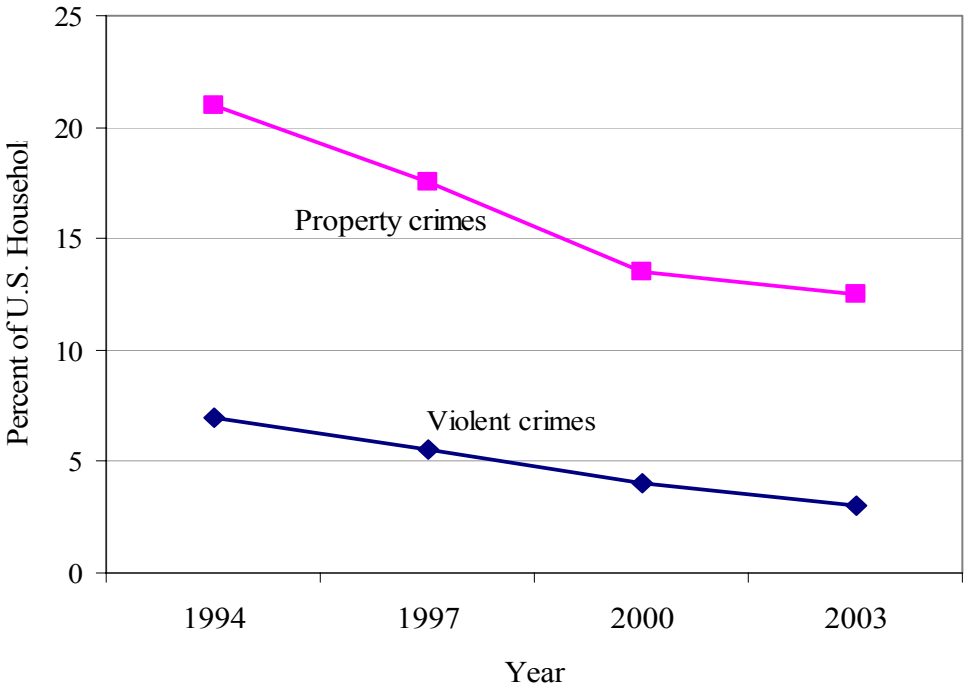

Figure 2.2: Crime in the United States (The source was based on the U.S. Department of Justice (2004)[7] .*Crime and the Nations' Households, 2003*)

However, some interpretations from the crime data lead one to consider the significance of safety in near-home environments and for residents in rented properties. The U.S. Department of Justice (2004) found that about one quarter of incidents of violent crime occurred at or near the victim's home in 2003. Including these, about half of all crimes occurred within a mile from home. The statistics also report that crimes occurred more frequently in urban areas than in suburban areas. Combining the demographic and geographical characteristics of crime victims, the report from the U.S

[7] U.S. Department of Justice (2004). *Crime and the nation's households, 2003*. (NCJ Publication No. 206348). Washington DC: U.S. Department of Justice.

Department of Justice (2004) indicates that black residents in urban areas experienced a higher rate of crime than white residents.

Apart from violent crime, property crime that occurred in near-home environments showed some noticeable characteristics. Property crimes occurred more against urban households than suburban or rural households and occurred more often to those living in rented property. It was found that households in rented property experienced 201, while homeowners experienced 143 overall property crimes per 1,000 households. Considering the correlation between property crime and homeownership, rented households were burglarized at rates 40.6% higher than owned households.

From the crime statistics, the following facts were considered for this study. First, crime in the United States occurred more often to those living in rented properties and urban areas. Second, property crime, including the theft of motor vehicles, occurred more often than violent crime in near-home environments. Thus, crime prevention is important for residents living in rented properties and urban areas.

2.1.3 Safety Issue in Residential Environments

Accompanying the issue of crime in neighborhoods, safety is considered a fundamental need by residents. This fact has naturally led many researchers to conduct related research studies on crime prevention in neighborhoods. With Newman's study at the head, many environmental studies on this topic have been done.

For example, Weidemann and Anderson (1982) explored residents' perceptions of satisfaction and safety in multifamily housing. They proposed factors predicting residential satisfaction and stated that safety in residential environments is a very important indicator predicting residential satisfaction. Since their research, safety has come to be highlighted as a critical indicator measuring residential satisfaction in housing sites.

Taylor, Gotterdson, and Brower (1984) tested effective physical and social factors for reducing crime at the block-level based on Newman's defensible space model. They suggested that such social factors as social ties and citizens' territorial attitudes, as well as physical factors, contribute to the prevention of crime at the block-level in neighborhoods. This idea was adapted for explaining residents' perception of safety in multifamily housing communities in this study (see 4.5.2.Neighborhood Attachment and Residents' Perception of Safety).

Normoyle and Foley (1988) tested a defensible space model with elderly public housing residents. They examined fear and perceptions of the local crime problem in elderly residents living in high-rise public housing sites.

Rohe and Burry (1988) explored factors associated with fear of crime among public housing residents. They set up three models to test their hypotheses. The three models were: victimization model, vulnerability model, and social control model. That they verified diverse factors for safety in residential environments was meaningful.

Holzman, Kudrick, and Voyte (1996) explored the relationships between architectural design and perceptions of crime and disorder with public housing residents.

However, they primarily focused on the size of public housing sites and the type of building, and did not go further into other design considerations. Based on their research findings, this study controlled the size of subject apartment sites and the type of apartment building in order to verify the effects of the gated and fenced territory on residents' perceptions of safety (refer to Chapter III. Methodology).

Blakely and Snyder (1999) brought forth more concrete crime prevention tactics for residential environments in urban areas. Based on the article by Wallis and Ford (1981), they enumerated tactics according to physical designs, managerial plans, police, and social interaction. In crime prevention methods through physical designs, they included increasing outdoor lighting, reducing blind spots, installing guard booths and surveillance cameras, creating territorial space, closing or gating streets, building fences and walls, improving appearance, and personalizing the environment. In managerial methods for preventing crime in neighborhoods, they suggested hiring security guards and using minimum security codes. In social tactics for preventing crime in neighborhoods, they suggested forming block watches and resident patrols, and starting house-sitting programs and safe-home programs. They also suggested residents get to

know neighbors, providing education programs for residents, and encouraging residents to be involved in communities. Table 2.1 summarizes their suggested tactics.

TABLE 2.1

Crime Prevention Methods for Residential Environment [a]

Tactics	Physical	Managerial	Police	Social
Surveillance				
Increase outdoor lighting	V	·	·	·
Reduce blind spots	V	·	·	·
Install surveillance cameras	V	·	·	·
Hire security guards	·	V	·	·
Form block watches	·	·	·	V
Form resident patrols	·	·	·	V
Arrange for police patrols	·	·	V	·
Create territorial space	V	·	·	·
Start safe-home programs	·	·	·	V
Create community policing	·	·	V	·
Movement control				
Close or gate streets	V	·	·	·
Build fences and walls	V	·	·	·
Get to know neighbors	·	·	·	V
Motivation reinforcement				
Improve appearance	V	·	·	·
Personalize the environment	V	·	·	·
Use minimum security codes	·	V	·	·
Provide education programs	·	·	·	V
Get residents involved	·	·	·	V
Improve police-community relations	·	·	V	·

a. Selected Items based on Blakely and Snyder, 1999, p.164 [8]

[8] The table was modified and reprinted here with permission From *Fortress America- Gated communities in the United States*, By Blakely and Snyder (1999), Washington D.C. Copyright 1999 By Blakely and Snyder.

The contents of the table explain that complicated aspects for crime prevention need to be considered in future studies. It may be true that, in the previous studies on safety in residential environments, simple physical factors such as project size and building types, and some social factors such as social ties and residents' attitudes, were mainly considered. Based on their suggestions, however, other factors, from managerial aspects to police supportive systems, should be considered in future studies. Therefore, their suggestions provide the fundamental research structure for this study.

Based on the previous studies above, this study adapts diverse aspects in exploring the safety issue in communities and neighborhoods. Not only physical settings but also social and other different factors, including managerial factors and residents' social ties, are integrated for this research design.

2.2 Defensible Space Theory

2.2.1 Introduction

It has been claimed that perceptions of safety and crime are fundamentally related to territoriality. Territoriality is defined as the capacity of the physical environment to create perceived zones of territorial influence (Moran & Dolphin, 1986). The territoriality to space users may thus provide strong perceptions of safety and make them feel free from crimes.

The most significant theoretical background verifying the correlations between territoriality and physical environments is the defensible space theory introduced by urban designer Oscar Newman in the 1970s. From the 1970s to the 1990s, he explored the connections between territoriality and crime rates in various types of neighborhood settings in urban areas (Newman, 1973; Newman 1996).

In the 1970s, he paid attention to territoriality and inhabitants' surveillance and vandalism in public housing in metropolitan areas such as New York and Chicago. According to Newman (1996), his inquiry regarding correlations between territoriality and crime rates was motivated by a historically notorious housing project, Prutt-Igoe in St. Louis. The failure of this high-rise public housing project brought about many arguments and led housing planners to explore housing projects and housing communities that provide better residential environments for low-income families. Most of all, many architectural designers and community planners emphasized the reason the project became a slum – ignorance of residents' control of the semi-public and public

areas and their social interactions with neighbors - and tried to explain why the housing project went to ruin. Among the researchers exploring the failure of high-rise public housing projects, Oscar Newman made great efforts to verify the reasons of the failure and to propose better design recommendations for existing and future public housing design projects.

In his book titled "*Defensible Space: Crime Prevention through Urban Desig*n (1973)", Newman suggested the defensible space concept and explored the actual locations of crimes and vandalism in public housing. Newman's basic concept of defensible space is illustrated in Figure 2.3.

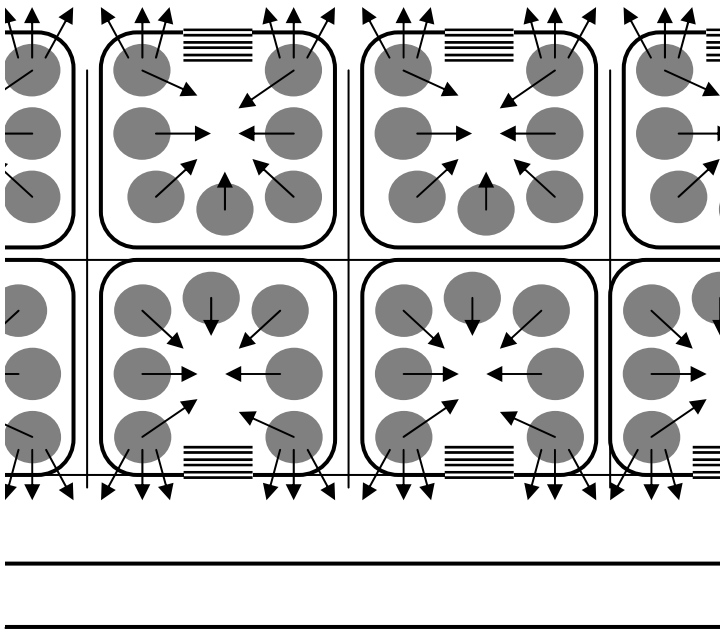

Figure 2.3: Defensible Space (The source was based on Newman, 1973, p. 9)

According to his book, his concept of defensible space explained how to create safe residential environments which would stop crimes. Defensible space was defined by Newman (1973, p. 3) as "a model for residential environments which inhibits crime by creating the physical expression of a social fabric that defends itself." As a social fabric, Newman (1973) emphasized residents' surveillance opportunities in residential environments.

Through a thorough review of many case studies, he additionally proposed design recommendations for creating defensible space in residential environments. He also indicated that all the elements for creating defensible space can be translated into responsibility for making a safe, productive, and well-maintained living space. At the end of his book, he set six goals [9] for creating defensible space in public housing projects. Those were: 1) to intensify residents surveillance of the grounds, 2) to reduce the public areas of the public housing site by unambiguous differentiation between grounds and paths, 3) to increase the sense of community, or community coherence, felt by residents, 4) to reduce the stigma of public housing and allow residents to relate better to the neighborhood community, 5) to reduce intergenerational conflict among residents within the public housing site, and 6) to intensify the use of the more semi-public grounds of the housing site in predictable and socially beneficial ways, all to encourage and extend the areas of responsibility felt by residents. (Newman, 1973, p. 167)

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[9] The six goals for creating defensible space were rephrased based on his original ideas. For example, he used the term 'the public housing project' in his book. But, it was replaced with 'the public housing site" in this page.

Though these goals brought channeled arguments from many researchers later on, they provide essential ideas for this proposed study. The first idea is regarding the hierarchy of defensible space. Newman indicated that there are four categories of space in a public housing project: public space, semi-public space, semi-private space and private areas. His hierarchy of space is applied to this study to explore residents' perception of safety in public space, semi-public space, and private space in gated multi-family housing communities. The following diagram in Figure 2.4 based on Newman's hierarchy of space in housing projects illustrates the hierarchy of space in gated apartment communities.

Public ---------- Semi-public ---------- Private
(Roads, Community Facilities) (Hallways, stairs, lobby) (Individual Apartments)

Figure 2.4: Hierarchy of Space in Gated Communities (Illustrated based on Newman, 1973, p. 9)

The second idea from his study is regarding the important roles of sense of community for creating safe collective housing projects. The importance of social interactions and community coherence among residents was also indicated by Skjæveland et al. (1996)[10]. Newman's suggestion of neighborhood attachment from significant case studies indicated that the social fabrics among residents should be considered for creating the safe communities.

[10] Skjæveland,O., Garling, T., & Mæland, J. (1996). A multidimensional measure of neighboring. *American Journal of Community Psychology, 24(3),* 413-435.

His notion of importance of territoriality in residential environments has persistently developed since then. His efforts for creating safe residential environments have been shown in various research and design projects under the support of the U.S. Department of Housing and Urban Development. The research report published in 1996, *Creating Defensible Space*, brought more concrete design recommendations for creating safe communities using his design modifications and recommendations in various actual housing settings.

In the report, he introduced his exploration to verify the correlations between territoriality and crimes, including vandalism, in various neighborhood settings. While having focused on high-rise public housing projects in the 1970s, he extended his research subjects to single family housing neighborhoods, low-rise apartment projects, and high-rise apartment settings during this time. He explored not only the correlations between territoriality and crime rate but also between crime rates and other factors such as housing forms, building types, and demographic factors.

To identify the correlations between housing forms and crime rates, he compared single family housing neighbors and collective housing neighbors including low-rise apartment projects and high-rise apartment projects. He found that residents did not feel the right to control the communal spaces where a lot of crimes occurred in public housing projects if many residents share the spaces. Thus, he suggested that small size housing projects with low-rise buildings would be better for providing defensible space in collective housing projects. From his point of view, the following factors were

verified as correlated with crime rates: project size (the number of residents) and building heights (the number of units per entry) (Newman, 1996).

Regarding demographic factors related to crime rates in housing projects, Newman (1996) described the percentage of families on AFDC (Aid to Families with Dependent Children) and the ratio of teenagers to adults.

2.2.2 Defensible Space Theory and Gated Communities

To prevent crimes in housing projects and small neighborhoods, consisting of five or six single family houses, Newman (1996) suggested the establishment of gates on the entrance of the neighborhoods to block unwanted traffic passing through the site. In his project for the mini-neighborhood in the Five Oaks community, Dayton, Ohio, he proposed gates for the entrances of each neighborhood. Gates were planned on the roads to control the vehicles which wanted to enter the neighborhoods and on the pedestrian roads, but the pedestrian gates remained open.

He also proposed a fence that extended pedestrian gates to the adjacent physical buildings. The gates and the fence he suggested for the neighborhoods in Five Oaks were applied by the city government, though they simplified Newman's original designs. Consequently, the gates and the fence added to the neighborhoods brought positive effects to the residents. They came to control the internal streets and roads, and the children in the neighborhoods began to play inside the gated territory.

In addition, as an important element for eliminating crime in the neighborhood in Dayton, Newman (1996) proposed lights on the pillars to illuminate the entrance.

Though the city executives of Dayton did not apply the lights on the entrance, the idea of lights in housing projects provided an important suggestion for this study. Figure 2.5 showed his suggestions of gates and fences in Five Oaks.

Figure 2.5: Proposed Gates for the Entrances of Small Neighborhoods in Five Oaks (The source was based on Newman, 1996, p. 51)[11]

In his project in Clason Point, a public housing project consisting of 400 units, he also tested the effects of fenced territory on decreasing crimes in near home environments (Newman, 1996, pp. 48-76).

[11] The figure was reprinted here with permission From *Creating Defensible Space*, By Oscar Newman, US Department of Housing and Urban Development, and Office of Policy Development and Research, Washington D.C. Copyright 1996 By U.S. Department of Housing and Urban Development and Office of Policy Development and Research. The complete text can be found and downloaded for free at http://www.huduser.org/publications/

He created 6-foot-high fencing with tubular steel to define and secure the rear yard areas. The results were successful. Many residents felt ownerships of the rear yards of their homes and came to control their backyard space while demonstrating their individuality in the space.

He also indicated and verified the important roles of lights on public space in reducing crimes in the project. In his project in Clason Point, he brought another essential issue for preventing crimes, including vandalism, within housing project boundaries – residents' responsibility for their near-home environment. This issue was closely related to the sense of community among residents. His efforts to encourage residents to control their near home environments were consequently effective on reducing crimes in the public housing project.

2.2.3 Discussion for This Study

Based on the literature on the defensible space concept, the important research issue in multi-family housing projects and considerations in exploring this issue are inferred. Crimes and vandalism in public housing projects exhibited the importance of the safety issue in multi-family housing projects. The hierarchy of defensible space introduced by Newman (1973) incited the need for an elaborate approach with an architectural point of view in exploring the safety issue in multi-family housing projects.

In addition, his verification on correlations between crime rate in housing projects and related factors provides the basic conceptual background in controlling variables for this study. The two physical factors, project size and building heights, and the two

demographic factors, income of households and the ratio of teenagers to adults, are considered when exploring the relationship between social factors and crime rates in housing projects.

According to the results from his experimental studies, the gated and fenced neighborhoods were effective on reducing crime rates and motivating residents to express ownership of their near home environments. Also, as a small but essential element for safety in housing projects, lighting was highlighted.

However, there were several limitations of Newman's studies. His research findings were not consistent in some studies (Brunson, Kuo, & Sullivan, 2001). The defensible space interventions did not reduce crime rates nor improve community cohesiveness in Cisnero's study (1995). Additional factors considering architectural factors, demographic, and socioeconomic factors have rarely been known for promoting the success of defensible space.

The residential settings of Newman's studies were mainly public housing projects or economically depressed neighborhoods located in the cities. He did not consider the multi-family housing communities that are privately owned and managed by professional management companies. Therefore, it will be necessary to see the effectiveness of defensible space interventions in different research setting and to find more factors that can amplify the success of defensible space. In addition to architectural factors, this study will consider demographic and socioeconomic factors. This study will have different residential settings from Newman's studies – privately owned multi-family housing communities and managed by professional management companies.

In summary, the claims for this study explained in Table 2.2 are drawn from the literature regarding the defensible space theory and Newman's work.

TABLE 2.2

Claims for This Study Based on the Literature

Category	Subcategory	→	Claims for this study
Research issue	Issues in housing projects	Crimes and vandalism, Residents' surveillance of communal spaces	Safety is an important issue in collective housing projects.
Research considerations	Subject	Public housing projects, Mini-neighborhoods Gated and fenced neighborhoods	Safety is regarded as more important in collective housing than in single family housing projects. Gated and fenced territory can reduce crime rates.
Variables to be considered	Physical factors	Project size, Building heights (housing forms)	Project size and building heights should be considered in sampling for this study.
	Social factors	Percentage of families on AFDC, Ratio of teenagers to adults, Residents' ownership of their near-home environments	Household income, number of family members, and composition of family should be considered in this study. Residents' social fabric and their sense of community should be considered in this study.

2.3 Gated Communities and Related Issues

2.3.1 Gated Communities

1) Definition and Current Status

From the 1800s when the first gated community in the United States, Tuxedo Park and the private streets of St. Louis, appeared[12], gated communities have been paid attention to by many housing researchers, planners, and developers.

Since then, the number of gated communities has constantly increased. From the beginning of the 1980s, as much literature indicates[13] and the U.S. Census reported, gated communities increased noticeably. According to the Census Bureau's 2001 American Housing Survey for the United States (2002), more than 7 million households, among 106 million households, were recognized as secured communities with walls or fences. This number represented 6.6% of the total of national households (see Figure 2.6).

Approximately 4 million households were in the communities with special entry systems. The increasing number naturally led many urban researchers and planners to pay attention to those secured communities.

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[12] The source was based on the book of Blakely and Snyder (1999). *Fortress America – Gated Communities in the United States* in page 4.

[13] The literature includes "Macionis, J.J. & Parrillo, V. N. (2004*). Cities and Urban Life*, Upper Saddle River, NJ: Pearson Education Inc." and "Blakely, E. & Snyder, M. (1999). Fortress America - Gated Communities in the United States. Washington D.C.: Brookings Institution Press."

[14] Pickett, J.P. et al. (2000). *American Heritage Dictionary of the English Language*. Boston, MA: Houghton Mifflin Company.

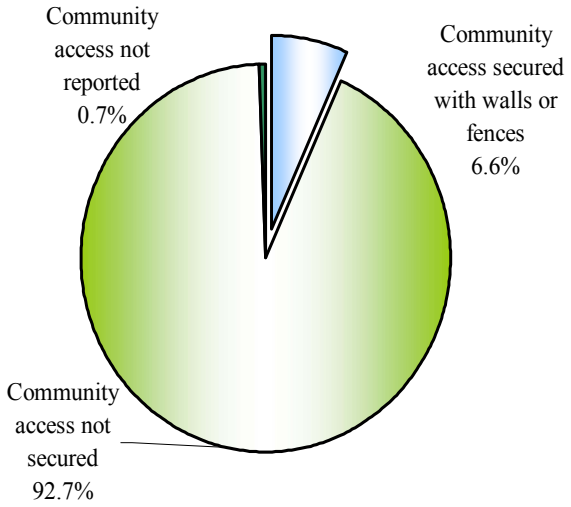


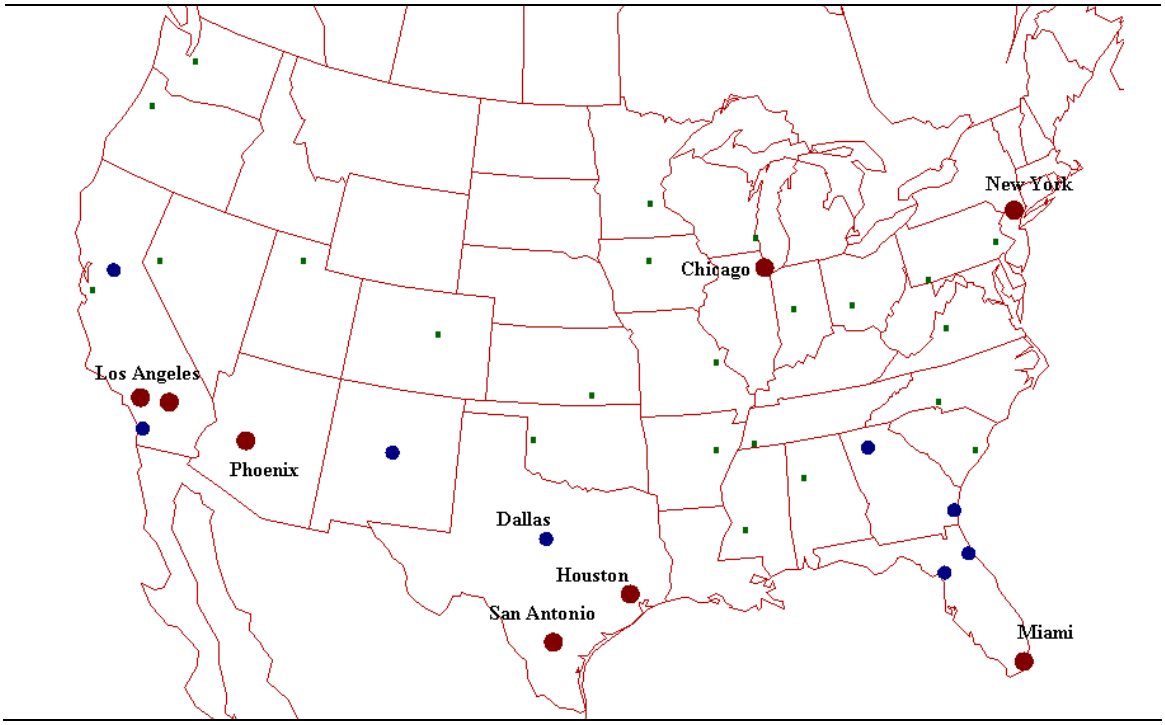
Figure 2.6: Percentage of Gated Communities (The source was based on American Housing Survey for the United States: 2001)

The secured communities with special entry systems and walls or fences are called gated communities. The terminology of a gated community is defined as a subdivision or neighborhood often surrounded by a barrier, to which entry is restricted to residents and their guests[14]. Blakely and Snyder (1999), the authors of *Fortress America*, also define gated communities as residential areas with restricted access in which normally public spaces are privatized.

Low (2003)[15] reported that gated communities first appeared in California, Texas, and Arizona, drawing retirees attracted to the weather. She declared that about one-third of all new communities currently developed in southern California are gated, and the

[15] Low, Setha (2003). *Behind the Gates – Life, Security, and the Pursuit of Happiness in Fortress America*. New York, NY: Taylor & Francis Books, Inc.

percentage is similar around Phoenix, Arizona, and the suburbs of Washington D.C. Initially popular among upper-income families and in the bay areas of the United States, gated communities are found nearly everywhere now. Figure 2.7 shows the areas where gated communities are concentrated.



NOTE: Red –High concentration; Blue- Medium concentration; Green- Low concentration

Figure 2.7: Areas where Gated Communities Concentrate (The source based on Blakely & Snyder, 1999, p.6)[16]

[16] The figure was modified and reprinted here with permission From *Fortress America-Gated communities in the United States*, By Blakely and Snyder (1999), Washington D.C. Copyright 1999 By Blakely and Snyder.

The size of gated communities is not limited. Some gated communities include parks, beaches, and even golf courses in their boundaries. Others include residential buildings, sidewalks, roads, and common facilities.

From the general definitions of gated communities, their physical characteristics can be summarized into four points: controlled entrance, walled territory, internal community roads blocked from outsiders, and communal spaces in the gated territory which can be shared among residents. Due to these characteristics, gated communities are regarded as a proper solution that controls unwanted visitors and traffic to residential developments. As mentioned in the previous chapter, Newman suggested gated and fenced neighborhoods for reducing crimes within neighborhood boundaries. In the same nexus, gated communities have been recognized as a safer type of community for wealthy people than non-gated communities.

2) Typology and Characteristics of Gated Communities

Typically, gated communities are categorized into the three types: lifestyle communities, prestige communities, and security-zone communities (Blakely & Snyder, 1999). These three types are not truly exclusive. For example, many retirement communities have characteristics of golf and leisure communities, and newly planned communities usually include golf and leisure facilities in their town center.

Life style communities can be defined as leisure-oriented communities. Life style communities thus emphasize outdoor amenities for residents' leisure activities and include retirement communities, golf and leisure communities, and suburban new towns.

General characteristics of life style communities can be exemplified by the following two developments. A community trip was scheduled in November 2005 so as to understand one representative type of gated communities.

The first case is a retirement community located in Palm Springs, California. The community construction began in the 1970s and the first group of homeowners moved to this community in 1976. Currently, the community contains 386 households. As a retirement community with characteristics of the golf and leisure community, the community includes an 18-hole golf course, clubhouses, pools, spas, saunas, tennis courts, libraries, and game rooms. The community also provides social activities managed by an activity director. In this community, residents are required to pay monthly for the leisure facilities. The following pictures exhibit the general characteristics of a retirement community; gates and fenced entrance, privatized streets and roads in the community, community facilities such as a club house, a theater, a library, a game room, an outdoor swimming pool, and golf courses for the residents (see Figure 2.8-11).

Figure 2.8: Community Entrance

Figure 2.9: Community Gate

Figure 2.10: Gate and Guard House

Figure 2.11: Privatized Streets

Figure 2.12: Social Space for Residents

Figure 2.13: Community Theater

Figure 2.14: Golf course in the Community

Figure 2.15: The Residents

Figure 2.16: Library and Game Room

Figure 2.17: Swimming Pool

Date Palm Country, Palm Springs (Photos by author)

As previously mentioned, planned suburban new towns are also gated communities. A new town, as shown below in Rancho Santa Margarita, could also be regarded as a life style community. This new town would be considered as a mega-size gated community including residential and commercial districts, office buildings, and leisure facilities. The reason this community should be regarded as a large gated community falls on the fact that it has privatized public roads which penetrate the

community. In other words, all visitors have to pay some fees when they enter this community. In the center of this community, there exists a lake and various leisure facilities around it offering outdoor amenities for the community residents. The pictures below exhibit the characteristics of the life-style community which considers residents' leisure activities in the community. The leisure facilities planned around the lake are benches, pedestrian roads, bike lanes, an open theater, fishing decks, and an artificial sand beach (see Figure 2.18-23).

Figure 2.18: A Planned New Town

Figure 2.19: The Lake in the Community

Figure 2.20: Pedestrian Road

Figure 2.21: Open Theater

Figure 2.22: Fishing Decks

Figure 2.23: Artificial Sand Beach

Rancho Santa Margarita, California (Photos by author)

Prestige communities, the second type of gated communities, are status-oriented communities where wealthy people live. Thus, the gates and entrance of prestige communities represent residents' social status. Due to this characteristic, prestige communities have brought about the issue of socioeconomic segregation. Blakely and Snyder (1999) also indicated the highly exclusive nature of this type of gated community.

Prestige communities are observed to grow faster than the other two types of gated communities. Not only single family gated communities, but also many apartment gated communities are currently developed as prestige communities. This fact can be found by a review of an internet website for apartment finders, http://www.apartments.com. Thus, many researchers are warning of the acceleration of social segregation derived from the increasing number of prestige communities.

The third type of gated communities is security-zone communities. Though Blakely and Snyder (1999) contained the city perch, the suburban perch, and the barricade perch in the security-zone communities, this type is not defined as a

community because people in some areas just install walls or gates such as barricades for improving security in their boundaries. In these gated communities, gates and fences do not symbolize any socioeconomic status of residents. Instead, the gates and fences are essential for releasing their fear of crimes in their residential environments. Thus, security-zone communities appear nearly every place.

Though this chapter categorized gated communities into the three groups based on Blakely and Snyder's work in 1999, these three types are not exclusively developed. In general, as explained before, many gated communities reflect diverse characteristics from more than one type.

2.3.2 Gated Communities and Previous Research Studies

There have been various research issues associated with gated communities. The following combinations of four values that urban sociologists Macionis and Parrillo (2004) introduced in their book [17] briefly summarize the related research issues with gated communities. Those are the sense of community (preservation and strengthening of relations with neighborhoods), exclusion (segregation and protection from the outside), privatization (the desire to privatize and internally control public services), and stability (homogeneity and predictability of residents) (Macionis & Parrillo, 2004, p. 127). The four values also imply that gates and fences around residential environments would have more meanings than just simple physical barriers.

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[17] Macionis, J.J. & Parrillo, V. N. (2004), Cities and Urban Life, Upper Saddle River, NJ: Pearson Education Inc.

The researchers who stirred up the research studies on gated communities were Blakely and Snyder. They published multiple monographs and articles regarding gated communities and emphasized research problems and social issues in gated communities. Thanks to their efforts, many researchers came to pay attention to this unique type of community and explore various issues in and outside of it.

In 2003, an international conference was held in Glasgow, Scotland, with the theme of "Gated Communities: Building Social Division or Safer Communities?" This conference was the first international conference with a focus on gated communities. More than 25 researchers in urban planning, architecture, and sociology attended the conference with diverse issues from various countries. Their issues included people's preference and attitude to gated communities as new developments (e.g. Manzi & Smith-Bowers, 2003), socioeconomic segregation due to the gated communities (e.g. Atkinson, 2003; Goix, 2003; Roitman, 2003; Omenya, 2003), civic participation in ruling gated communities in urban areas (e.g. Glasze, 2003; Dixon, 2003), transformation of urban patterns due to gated communities (e.g. MacLeod, 2003; Moobela, 2003; MaKenzie, 2003), planning alternatives to gated communities (e.g. Grant, 2003; Thuillier, 2003), territoriality in gated communities (e.g. Landman, 2003; Moura, 2003), and safety in gated communities (e.g. Chao, Oc, & Heath, 2003).

Though the researchers brought diverse topics on their disciplines, the safety issue in gated communities was found in most papers presented in the conference. This shows that the issue of safety is indispensable when exploring gated communities.

Likewise, the safety issue in gated communities has been explored by many researchers from the 1980s on. Some researchers agreed that gated communities are safe communities while others denied the hypothesis. However, the numerated studies below indicated that safety in gated communities is an important research issue for future studies.

Halberg (2001) found from his survey that the primary reason why a person moved into a gated community was the perception of higher security. And popular media source *USA Today* (2002), reported that many people, even in low-income areas, moved or intended to move to gated communities to stay safe[18].

Alternately, Fowler & Mangoine (1986) explored the correlations between territories with gates and barricades, and crime rates. They concluded that no correlation existed between the two factors. Blakely & Snyder (1997) also examined the correlations between gates and fences and actual crime rates in gated communities. They conducted surveys regarding this issue, but rejected correlations between gates and fences and the decrease of crime rates, too. Wilson-Doenges (2000) also supported the results from the previous two studies. She explored residents' sense of community and their fear of crime in gated and non-gated communities and ultimately rejected the correlation between a perceived community's safety and a community's gates and fences.

Beyond the ongoing debate whether the correlation exists or not, previous studies regarding people's perception of safety and gates and fences in communities have limitations in their research settings. In their studies, the researchers just asked about

[18] Nasser, H. E. (2002). *Gated communities more popular, and not just for the rich. USA Today, December 15.* Retrieved February 14, 2004 from http://www.usatoday.com.

residents' perceptions of safety in gated residential boundaries, or compared residents' opinions in the two community types, i.e. gated communities and non-gated communities. In other words, they did not consider the exact conditions of gated or fenced residential boundaries. They simplified the architectural conditions of the subject sites and defined their subject sites as either gated communities or non-gated communities.

These limitations should be overcome so as to get more reliable research findings by exploring correlations between gated and fenced residential territory, and occupants' perceptions of safety and their real crime experiences. Thus, in order to explore research questions for this study, more intricate research settings considering architectural spaces and characteristics created by gates and fences and research methods should be applied. Regarding the research settings, further discussions are made in Chapter III.

2.4 Literature Review for Methodology

2.4.1 Measuring Perception of Safety

Perception is literally defined as 1) an awareness of the elements of environment through physical sensation, 2) physical sensations interpreted in light of experience, 3) quick, acute, and intuitive cognition, or 4) a capacity for comprehension[19]. Saarinen (1984) stated that perception depends on more than the stimulus present and the capabilities of the sense organs. He indicated that perception varies with the individual's past experiences and present set, or attitude, acting through values, needs, memories, moods, circumstances, and expectations. Based on these definitions, the primary method to measure residents' perception was to ask for their feeling and opinion about their environment with standardized questions in the previous studies. Some studies have shown examples for measuring residents' perception of safety in communities.

In her research that explored gated communities and residents' perceived safety, Wilson-Doenges (2000) developed several questions to measure residents' perception of safety and employed mailed surveys to collect data. She categorized safety into the three levels: personal perceived safety, perceived comparative community safety, and actual crime data. She measured residents' perceived safety by applying some questions such as, "How safe would you feel being out alone in your community during the day?", or,

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[19] Merriam-Webster Online Dictionary (2004). Merriam-Webster Online Dictionary. Retrieved April 1, 2004 from http://www.m-w.com.

"How safe would you feel being out alone in your community at night?" For answering that question, she used a 4 point Likert-type scale. In addition, she measured the comparative perception of safety by asking, "How safe do you feel your community is compared to other communities?" For that question, she applied 5- point scales. To compare residents' perception and the real condition of crime, she collected crime data from the police departments in charge of the subject communities.

As the primary tactic to measure residents' perceptions of safety in their residential environments, Brunson, Kuo, and Sullivan (2001), Normoyle and Foley (1988), and Fisher and Nasar (1992) employed face-to-face interviews using a standardized questionnaire. Brunson, Kuo, and Sullivan (2001) interviewed 94 public housing residents. They employed two resident investigators whose roles were to examine the constructed questionnaire and verify the language and content of measurement tools. In their research, residents' feelings of safety were measured by such questions as, "How safe do you feel in near-home space in the front and the back of your building during the day and at night?" They also adopted 4-point Likert-type scales, from 0 = "not at all safe" to 4 = "very safe".

Fisher and Nasar (1992) adapted an on-site survey with a standardized questionnaire. They set the subject sites, gave site maps to the participants, and directly asked about their perception of safety. The researchers also conducted an on-site survey at night with the participants. The participants were asked to provide their feelings of safety on the sites. Respondents' perceptions of safety were measured by asking the

feelings of safety in each of the subject areas during the day and at night. They used 7-point bipolar scales.

Rohe and Burry (1988) measured residents' fear of crime by indexes of four items on the adequacy of locks and lighting. For example, the researchers asked if the residents agreed or disagreed with the two statements, "I am often worried that I will be the victim of a crime in this development", and, "I often stay in at night because I am fearful of crime." When ranking the fear of crime, they used five-point scales.

In their study with elderly public housing residents, Normoyle and Foley (1988) used four items to measure residents' fear of crime. They assessed respondents' fear of crime by asking, "In general, how safe do you feel here?", and, "Would you say you feel very safe, safe, or unsafe?" They also assessed residents' anxiety about being victimized in the site.

Weidemann and Anderson (1982) examined overall residential satisfaction among public housing residents. As mentioned before, they employed the safety issue, as an important variable for evaluating residential satisfaction. They measured residents' perceptions of safety by asking the questions, "How safe are you from being the victim of a crime while outdoors at Longview Place?", "How safe are you from being the victim of a crime while in your home?", and, "How safe are your possessions from crime or vandalism?" These items were measured on a five-point scale.

Table 2.3 summarizes the methods adapted by previous studies to measure residents' perception of safety in the residential environment or space users' perceptions of safety in other types of built environments.

TABLE 2.3

Methodology to Measure Residents' Perception of Safety

Name of researchers	Methodology to measure residents' perception of safety	Methodology to collect data	Sample cases
Brunson, Kuo, & Sullivan (2001)	Direct questions to ask near-home safety Example questions) "How safe do you feel in near-home spaces in the front and the back of your building during the day and at night"	Focus groups Resident investigators 4-point Likert type scale	94
Wilson-Doenges (2000)	1) Categories of safety: Personal perceived safety, Perceived comparative community safety 2) Actual crime data Example questions of Personal Perceived Safety) "How safe would you feel being out alone in your community during the day?" "How safe would you feel being out alone in your community at night?" Example questions of Perceived Comparative Community) "How safe do you feel your community comparing to other communities?"	A mailed survey with 29% response rate 1) 4-point Likert type scale 2) 5-point Likert type scale	800 (232 for analysis)
Fisher & Nasar (1992)	1) Direct questions by asking respondents' feelings of safety in each of the subject sites during the day and at night 2) Direct questions at night on the subject sites	1) Interviews with site plans of subject areas 2) On-site survey with a questionnaire 7-point bipolar scale	1)166 2) 27
Taylor et al. (1984)	By checking the physical conditions of respondents and analyzing the characteristics	Participants interviewed by field workers Color-slide showing the site conditions of respondents' houses taken	687

TABLE 2.3 (Continued)

Name of researchers	Methodology to measure residents' perception of safety	Methodology to collect data	Sample cases
Rohe & Burry (1988)	With indexes of four items on the adequacy of locks and lighting Example of questions) Do you agree or disagree that "I am often worried that I will be the victim of a crime in this development." "I often stay in at night because I am fearful of crime."	Participants interviewed 5-point scales	267 as a total. Considering the size of housing sites, 20 were interviewed in smaller developments while 30 were interviewed in larger projects.
Normoyle & Foley (1988)	By asking four items Example of questions) "In general, how safe do you feel here?" "Would you say you feel very safe, safe, unsafe?"	Participants interviewed	945 public housing residents being older than 60
Weidemann & Anderson (1982)	By asking items Example of questions) "How safe are you from being the victim of a crime while outdoors at Longview Place?", "How safe are you from being the victim of a crime while in your home?" "How safe are your possessions from crime or vandalism?"	Direct distribution of survey by researchers and a mailed survey for 50 households whose residents could not be reached 5-point scales	230
Perkins & Taylor (1996)	By asking items Example of questions) "How safe would you feel being out alone on your block during the day?" "How safe would you feel being out alone elsewhere in your neighborhood during the day?" "How safe would you feel being out alone on your block at night?"	Participants Interviewed	575

The review of previous studies showed that the most valid and prevalent method to measure residents' perceptions of safety is to ask direct questions regarding their feelings of safety. To collect data regarding participants' perceptions of safety, some researchers employed mailed surveys while others used face-to-face interviews. Considering the diverse applications of research methodology in the previous studies, surveys with a standardized questionnaire consisting of direct questions for measuring residents' perceptions of safety are recommended for this study

There was a recently published article that indicated the perceptional differences between self-reported and actual physical features in large-scale environments. Kweon, Ellis, Lee, and Rogers (2006) examined the differences between the respondents' self-reported environment and GIS environmental data. Consequently, they found statistical differences between self-reported and objective environments. Therefore, in addition to the surveys, the objective physical data describing the general characteristics of the environments of subject communities should be acquired for improving the explanatory power of survey results. Their conclusions support the needs of site visits for investigating objective physical features of subject communities in this study (see 2.5 Theoretical Implications).

2.4.2 Variables Verified by Literature

This chapter provides theoretical background in constructing the instrumentation for investigation and the design of the analysis plan for this study. When constructing the survey instrumentation, research variables should be fully considered and properly selected. The very significant variables in exploring residents' perceptions of safety in residential environments are their demographic and socioeconomic characteristics, and the physical characteristics of subject housing.

Regarding the demographic characteristics of respondents as associated with perceptions of safety in near-home environments, previous studies indicated residents' age, gender, and length of residence. For instance, Taylor, Gottfredson, and Brower (1984) found that length of residence had negative effects on residents' feelings of safety. Along with the length of residence, the age variable also showed negative effects on residents' feelings of safety. From this result, they concluded that elderly residents have a higher fear of crime.

Regarding socioeconomic factors strongly associated with residents' perceptions of safety, economic levels such as the percentage of population receiving welfare in the housing site (Newman, 1996), and community cohesiveness (Brunson et al., 2001) have been verified.

Considering physical factors, many researchers verified that the following factors would be strongly associated with residents' perceived safety: building height, the density per apartment building, layout of apartment buildings, amount of traffic through

the housing site, lighting, gates and fences (Newman, 1973; Blakely & Snyder, 1999; Fisher & Nasar, 1992).

Regarding theoretical approaches to the defensible space concept, Moran and Dolphin (1986) listed the three important variables; territoriality, surveillance, and milieu. In the territoriality domain, the two sub-variables – zone of influence and hierarchy of zone – were arranged. Surveillance was mentioned with quality of surveillance, distance of nearest street light, quality of light, daytime exposure/ visibility, and level of traffic. Milieu included diverse aspects of physical environments surrounding subject sites.

In the research study done by Perkins and Taylor (1996), information regarding crime or disorder in residents' neighborhoods was verified as an explanatory variable for assessing residents' fear of crime. This was the first verification regarding the informational influence on residents' fear of crime in their environments.

The significant variables verified in other previous studies are tabulated in Table 2.4 as follows.

TABLE 2.4

Variables Associated with Residents' Perception of Safety

Name of researchers	Variables associated with residents' perception of safety	Relations to residents' perception of safety
Brunson, Kuo, & Sullivan (2001)	· Physical incivilities: Levels of vandalism, graffiti, and trash in near-home space · Social incivilities: Levels of noise, strangers, and illegal activity · Age, physical appropriation	Feeling safe significantly related to physical incivilities. Physical incivilities significantly related to social incivilities
Wilson-Doenges (2000)	· Gates and fences: Gated vs. Nongated · Number of children · Length of residence	The more children and the longer the length of residence, the community was perceived to be safer.
Perkins & Taylor (1996)	· Demographic characteristics: Gender, Race · Home physical disorder · Nonresidential property physical disorder · Young men outdoors · Social disorder · Physical disorder · Serious crime news · Disorder crime news · Disorder news	The factors were associated with fear of crime. Information from news was indicated as an explanatory variable to assess residents' fear of crime.
Holzman, Kudrick, & Voytek(1996)	· Size of housing projects · Police · Private security guard · Fence around the housing project · Intercom for visitors · Video cameras in public areas · Visitors required to show ID	Different from other studies, this study denied the negative correlations between building height of public housing and resident's fear of crime. They indicated the disorder as the more important managerial issue and crime in public housing projects.
Fisher & Nasar (1992)	· Component of prospect and refuge · Lighting (and darkness)	High prospect and moderate refuge, and lights of the areas provide the high sense of safety
Rohe & Burry (1988)	· Victimization and crime level · Personal and social vulnerability · Social attachment and perceived social physical incivilities · Physical, and social characteristics of the development · Security measures · Project management	The variables such as individual victimization and crime level, age, race, social attachment and incivilities, number of units, density, and distance to downtown were significantly associated with fear of crime.

TABLE 2.4 (Continued)

Name of researchers	Variables associated with residents' perception of safety	Relations to residents' perception of safety
Normoyle & Foley (1988)	7 independent variables to assess fear of crime and the judged severity of the on-site crime problem · Respondent's residence in a high- or low-rise building · Respondent's segregation status · Percentage of elderly residing within each public housing site · Interactions of segregation and relative group size with building height · Recent victimization experience · Local crime rate · Background factors	"High fear of crime was associated with high fear, perception of crime, residence in a high-rise dwelling, segregated housing, a high percentage of elderly on housing site, recent direct victimization, knowing other crime victims, an increased incidence of crime on housing site, and those who were female, older, black, longer-term residents, tenants in highly populated sites, or respondents of the short form of the survey.(p.62)
Moran & Dolphin (1986)	· Territoriality: Zone of influence and hierarchy of zone · Surveillance: Quality of surveillance, distance of nearest street light, quality of light, and daytime exposure/ visibility, and level of traffic · Milieu	Correlations existed between the three variables and creating safety for public kiosks
Taylor et al. (1984)	· Design features of blocks · Crime at the site · Street · Neighborhood level · Length of residence ·Age · Gender ·Income	These factors correlated to residents' feelings of safety in block levels.
Weidemann & Anderson (1982)	· Concern for children/stranger/noise · Friends nearby/ social interaction · Surveillance/ loitering · Crime/ vandalism/ litter · Likelihood of being a victim · Satisfaction of privacy/ control · Yard space/ security hardware/ neighborhood watch · Crime reporting/ police/ appearance/ way finding	The nine factors were associated with safety

2.5 Theoretical Implications

This section introduces the conceptual framework for this research study. The purpose of the study is to explore the connections between residents' perception of safety and their crime experience, and the existence of gates and fences in multi-family housing communities in urban areas; and to suggest design and managerial considerations to improve residents' perceptions of safety in their residential environments.

From the review of literature and previous studies on residents' perceptions of safety and crime experience in the residential environment, the conceptual framework for the research plan is proposed in Figure 2.4.

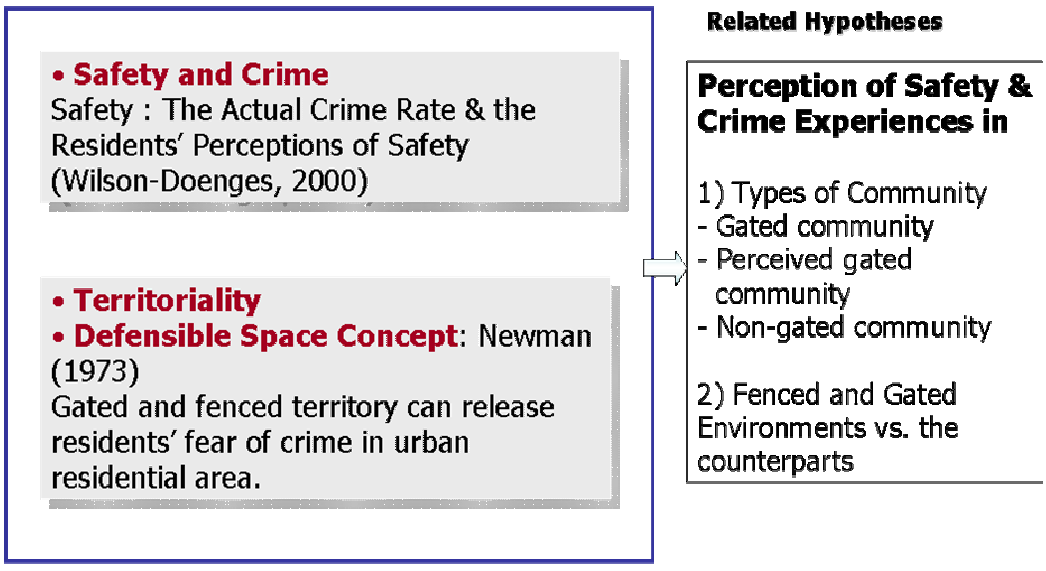


Figure 2.24: Conceptual Frame (Copyright by Author)

2.5.1 Fundamental Descriptions of the Conceptual Framework

The research issue is the safety in residential environments. The research subject is gated communities, based on discussions using Newman's defensible space theory and territoriality. From the interpretation of crime statistics by the U.S. Department of Justice, the research sites are rented properties in urban areas. Thus, considering the physical conditions created by gates and fences, gated apartment communities and non-gated apartment communities in urban areas are considered as research subjects. At this point, gated communities are categorized as the gated communities having fully controlled gates and fences, and the perceived gated communities as those that have fences and open gates.

This research focuses on exploring residents' perceptions of safety and reality of crime in gated communities, perceived gated communities, and non-gated communities. To measure residents' perceptions of safety, both subjective and objective information on perceived safety are considered. Residents' subjective perceptions of safety are investigated by individual surveys. The objective information regarding residents' safety in communities is obtained by the site visit and managers' opinions on the community safety.

Architectural characteristics of apartment communities are considered. The hierarchy of defensible space in apartment communities is considered when understanding residents' perceptions of safety in the community territory. The spaces in apartment community territory were divided into the three categories: public space, semi-public space, and private space.

The following diagram summarizes the research issue, subjects, and the proposed methodology as drawn from the review of literature (see Figure 2.25).

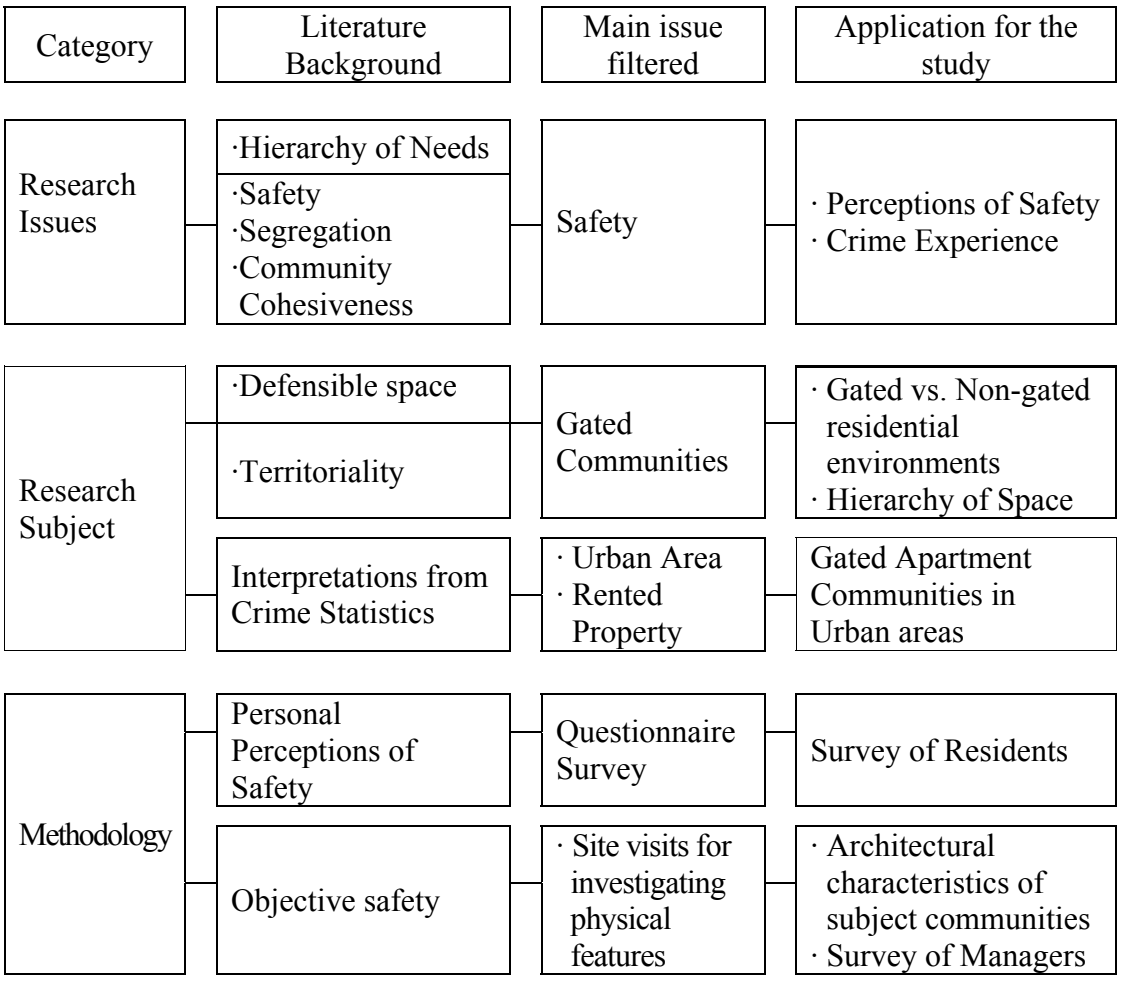


Figure 2.25: Conceptual Diagram of the Research Design

2.5.2 Conceptual Framework of the Study

The conceptual framework for the research instrumentation, analysis of results and expected outcomes of this research is organized as Figure 2.26. Independent variables

and dependent variables were constructed. Then, the general research process was conceptually constructed. The conceptual framework for this study thus shows the relationships among variables and their contributions to this study, and the scientific approaches adapted to reach the purpose and conclusions of the study.

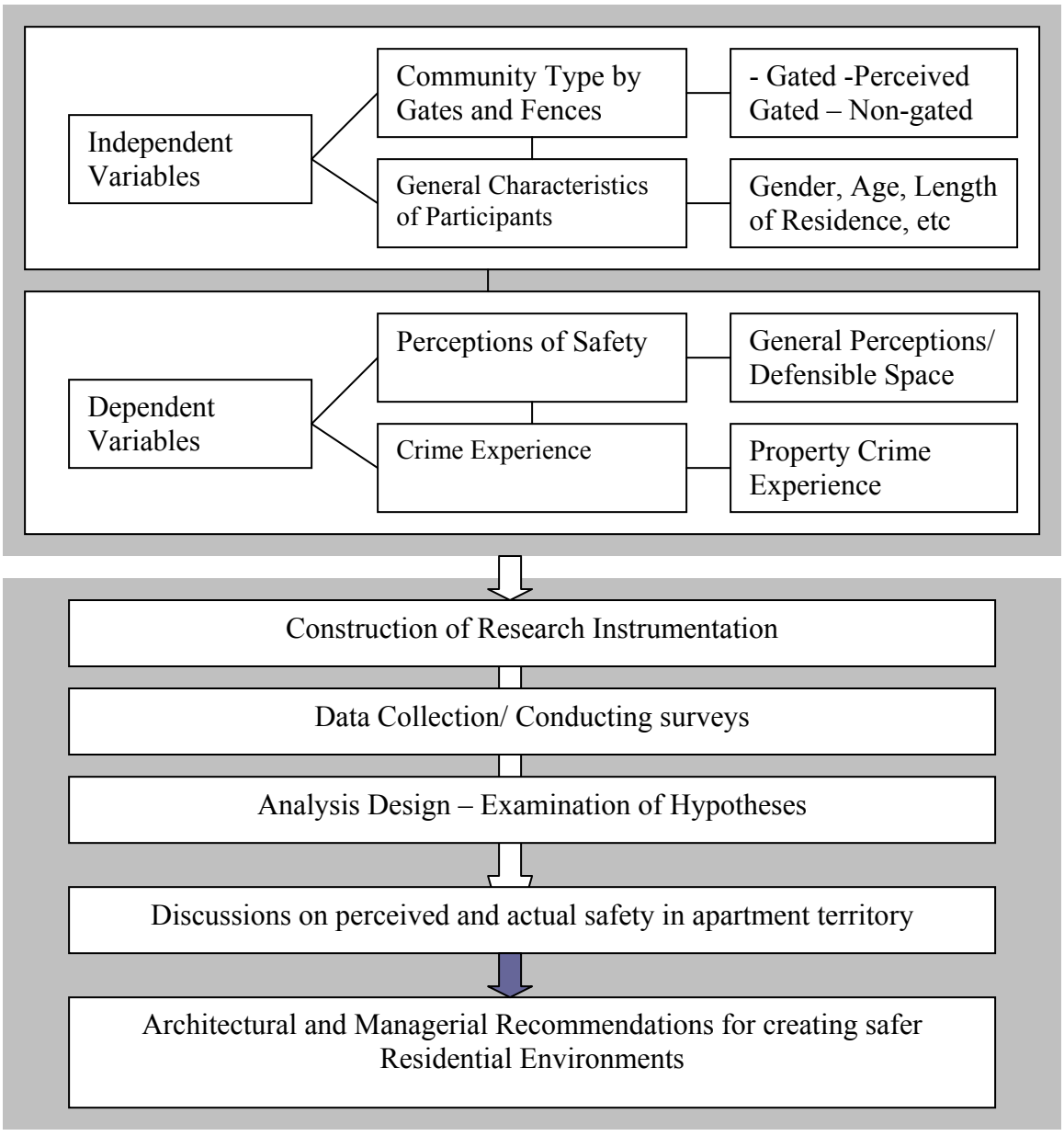


Figure 2.26: Conceptual Framework of the Study

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This research design is both quantitative and qualitative. To enhance the quantitative aspect, questionnaire surveys of residents were conducted. An additional survey of property managers was conducted to complement the power of interpretation from the survey. Data collection and analysis followed the procedure proposed in Figure 3.1.

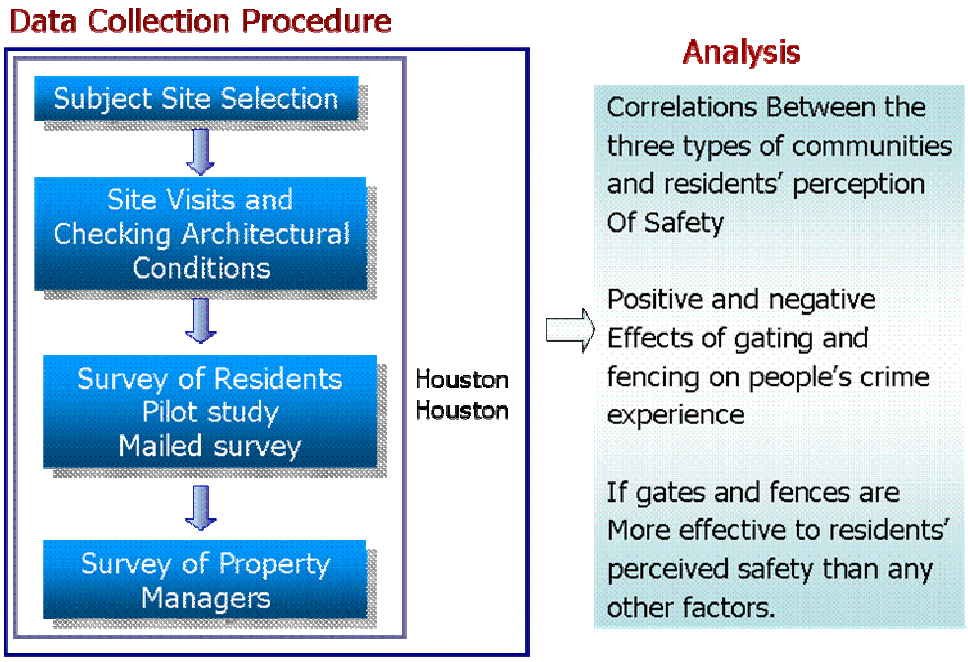


Figure 3.1: Process of Data Collection and Analysis

A mailed survey of residents was conducted. In order to choose subject sites and samples, site selection, site visits, and a pilot study were conducted. Second, a survey of managers was conducted to cultivate the discussions of the results from the survey of residents. This survey combined a mailing survey and telephone interviews. The collected data was statistically analyzed to find: 1) correlations between the three types of communities and residents' perceptions of safety, 2) the effects of gating and fencing on residents' crime experience, and 3) if gates and fences are more effective for residents' perceived safety than other elements. The statistical analysis included from the descriptive statistics to the multiple regression analysis. Based on the results from the statistical analyses, research hypotheses were tested and the related theories of this study were restated. As the conclusion, design and managerial considerations for making safe multi-family housing communities were suggested.

3.2 Survey of Residents

3.2.1 Site Selection

1) Subject City Selection

Literature indicates that gated communities were created for protecting residents from crime. Considering the rate of property crime in Texas, this study set the city of Houston in Texas as a subject city because it has a medium property crime rate among the four representative cities in Texas (see Figure 3.2).

In addition, the northwestern area of Houston was designated as the target population of this study considering the distribution of multifamily housing in Houston.

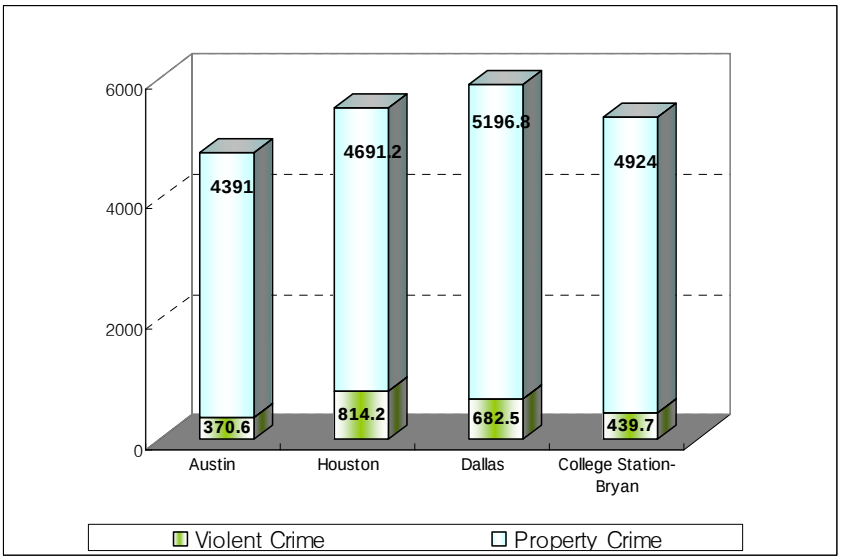


Figure 3.2: Crime Rates in Houston, Texas (The source was based on Crime Statistics of the U.S. Department of Justice, 2004)

2) Three Types of Apartment Communities Based on Gating and Fencing

This step identified the types of apartment communities based on fences and the level of gate control. To identify apartment communities according to the level of territoriality, the building type and homeownership of apartments were controlled. Three-story walk-ups – garden apartments – were the major building type for this study. Because Newman (1996) indicated the building type as a critical variable in investigating residents' perceptions of safety in neighborhoods, in this study, the

building type was controlled. Additionally, the subject communities were limited to privately-owned multi-family housing in Houston, Texas.

To identify the types of apartment communities considering the level of territoriality, a complete list of multifamily housing communities in the subject area was created first. A list with 72 apartment communities in the northwestern area of Houston was constructed based on a thorough review of a popular website for advertising rental units,ApartmentGuide.com[20].

According to the presence of fences and the level of gate control in apartment communities, three categories of apartment communities were proposed in this study as follows: (1) gated communities with fully controlled gate systems, (2) gated communities with fences and gates but not fully controlled systems (deemed "perceived gated communities"), and (3) non-gated communities having neither fences nor controlled gates.

In terms of traffic control, gated communities fully control access from outside traffic. Perceived gated communities cannot fully control the traffic due to the open gates. Non-gated communities do not control outside traffic at all. Their differences are tabulated in Table 3.1, and Figure 3.3 illustrates the levels of traffic controls for people and vehicles.

[20] The list of 72 apartment communities in Houston was created in September 2004 based on ApartmentGuide.com (2004). http://www.apartmentguide.com

TABLE 3.1

Three Types of Communities Considering Gating and Fencing

Types of communities	Gates	Fences
Gated community	Yes	Yes
Perceived gated community	Exist but not be controlled	Yes
Non-gated community	No	No

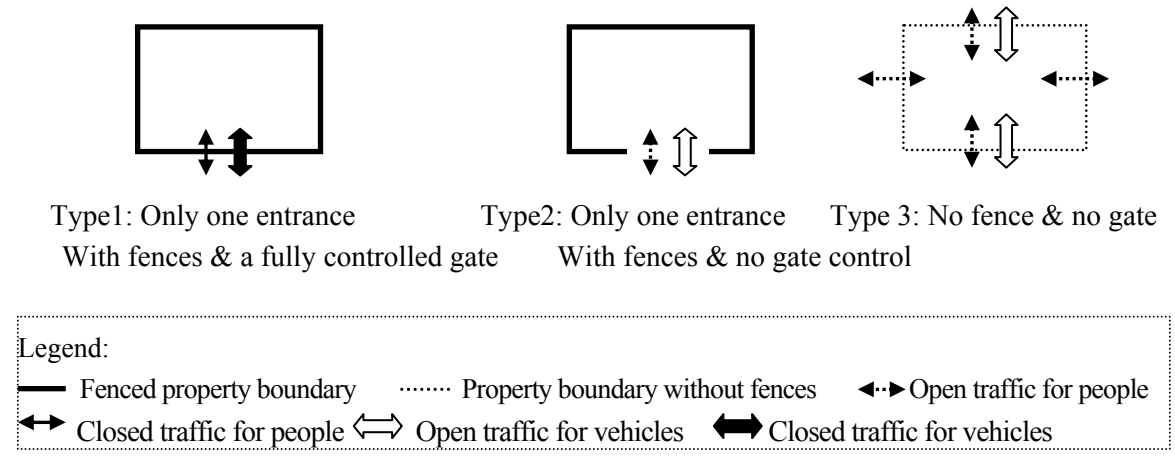


Figure 3.3: Three Types of Communities Considering Territory and Traffic Control

The following pictures represent images of gated communities, perceived gated communities, and non-gated communities. Gated communities have fully controlled gates and fences (see Figure 3.4 and 3.5).

Figure 3.4: Fully Controlled Gates

Figure 3.5: Closed Gate for Pedestrians

Perceived gated communities have gates and fences around the communities, but the gates are not closed. Thus, traffic to the communities is not controlled in perceived gated communities as follows (see Figure 3.6 and 3.7).

Figure 3.6: Perceived Gated Community

Figure 3.7: Opened Gate for Pedestrians

Non-gated communities do not have any gates or fences (see Figure 3.8 and 3.9). Non-gated communities thus do not control any traffic.

Figure 3.8: Non-gated Community

Figure 3.9: No Gates and No Fences

3) Subject Site Selection

This step selected the subject sites for the surveys. At first, the 72 apartment communities in the northwestern area of Houston identified from the website review were categorized into two types: gated communities and non-gated communities. Because there was no information regarding the condition of the gates and fences around the communities, it was impossible to identify whether the apartment communities are gated communities or perceived gated communities. The classification of gated communities into the "real" gated communities and the perceived gated communities was done after selecting reliable subject communities.

The next step was to order the 72 apartment communities according to their monthly rental fees for 2-bedroom apartment units and the total number of apartment

units in each community. The following descriptive statistics demonstrated the range of the rental prices for the 2-bedroom apartments in the 72 communities. The mean rental price for a 2-bedroom apartment unit was $805. The 25th percentile of the rental price was $685 and the 75th percentile was $977.50. Table 3.2 exhibits the rental prices of 2 bedroom apartments in gated communities and non-gated communities.

TABLE 3.2

Average Rental Price for a 2bedroom Unit in the 72 Apartment Communities

N	Valid	72
	Missing	0
Std. Deviation		171.5
Variance		29427.2
Range		697.0
Minimum		525.0
Maximum		1222.0
Percentiles	25	685.0
	50	805.0
	75	977.5

The total number of apartment units in each community was also investigated. The mean of the total number of apartment units in each community was 273 units (see Table 3.3). There was no statistical difference between the mean number of total apartment units in gated communities and non-gated communities (see Figure 3.10).

TABLE 3.3

Means of the Total Number of Apartment Units in a Community

Type	Mean	N	Std. Deviation
Non-gated	276.7	13	111.1
Gated	273.1	59	89.8
Total	273.5	72	91.9

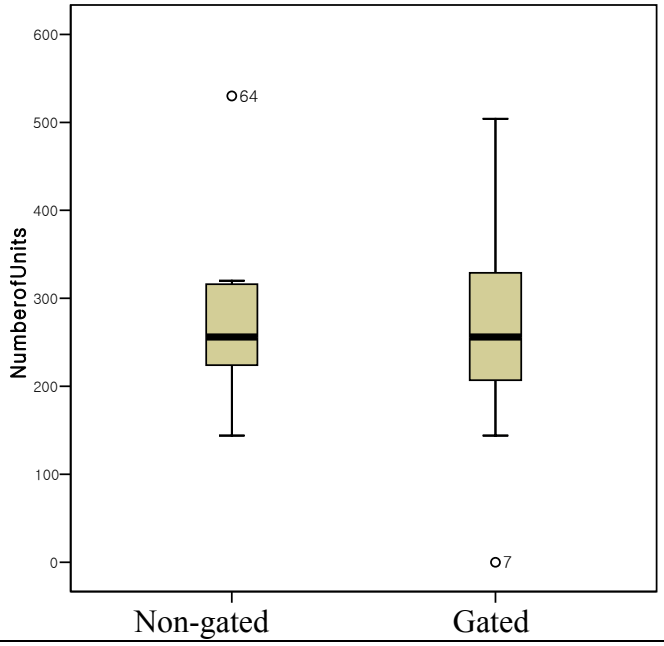


Figure 3.10: Box Plots for the Mean Total Number of Apartment Units

The above descriptive statistical results set the standard for selecting subject communities for the survey. Thirty communities were randomly selected from the original 72. Twenty were drawn from the gated communities, and ten from the non-gated communities. The total number of apartment units in each of the 30 communities was

examined. Considering the size of the apartment communities, 12 gated and 6 non-gated communities between the 25th percentile and the 75th percentile of the total number of apartment units in a community were selected. The kinds of community facilities were also considered.

However, the price range between the gated and non-gated communities was so different that the gated communities for which rental prices were higher than the 75th percentile of the rental price range and the non-gated communities for which rental prices were lower than the 25th percentile of the rental price range were eliminated in selecting the research sites (see Figure 3.11).

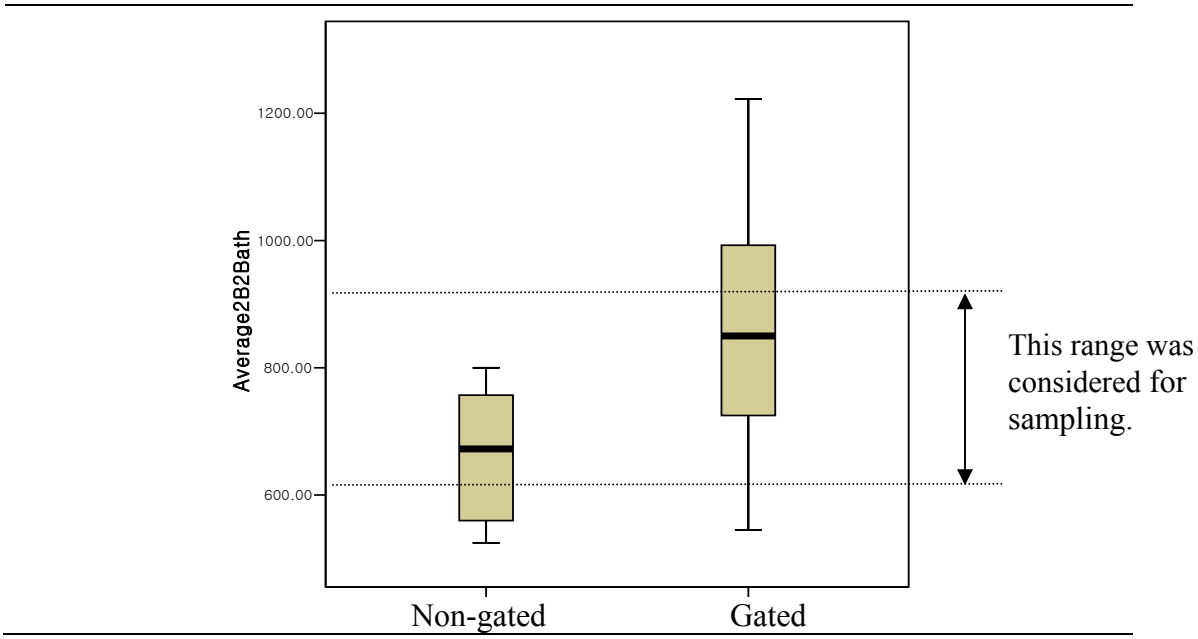


Figure 3.11: Box Plots for the Rental Prices of 2-bedroom Apartments

The condition of the gates and fences of the 12 gated communities was identified by contacting the property managers of the communities with questions regarding the

conditions of the level of gate controls. This step was to verify the gated communities as either “real” gated communities or “perceived” gated communities. The questions for checking the conditions of the level of gated control are in Table 3.4.

TABLE 3.4

Questions for Checking the Conditions of Gate Control Systems

Question	Items
Your property was identified as a Gated Community. Which access system was applied in the gate control in your property? Please select all that apply.	□ Card Key (Similar to or smaller than a credit card) □ Password Input system with buttons □ Badge (round shape) □ Remote control panel with buttons (smaller than 2×2 inches) □ Bar-code stickers in front of vehicles □ Other (explain)
Which one below describes best about the condition of the gate control of your apartment property? Please select only one.	□ The gate of our property is fully controlled by residents day at night. So it is opened only when residents or their vehicles are passing. □ We have a gate control system. But, the gate is usually opened day at night □ Other (explain)

Among the 12 gated communities, 7 communities were identified as having fully controlled gated communities and 5 were identified as perceived gated communities. One community from the 7 communities was removed to balance the number of subject communities, and another perceived gated community was added.

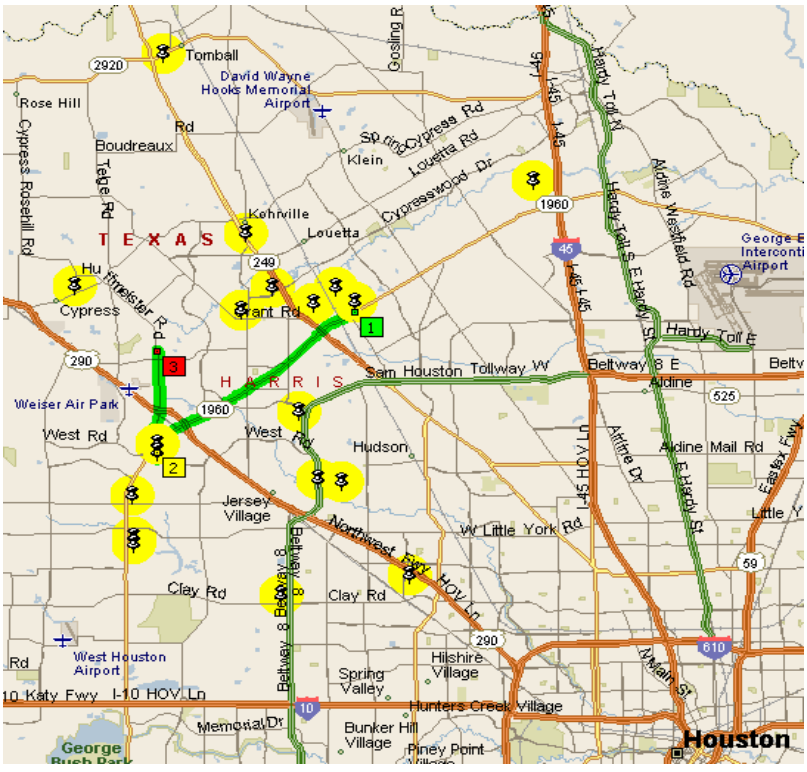
Finally, the 18 subject communities were selected including 6 gated communities, 6 perceived gated communities, and 6 non-gated communities. The initials of the subject

communities are demonstrated in Table 3.5. And the locations of the subject communities are exhibited in Figure 3.12.

TABLE 3.5

Subject Communities [21]

Community Type	Property Name
Gated	Arch MH, ChamPC, Park at WL, PinER, Post OP, ShaDC
Non-gated	Clear B, CovTS, GarDC, OneCL, PepMP, VilIW
Perceived gated	BreTM, RanCS, BelGT, TimBW, WooGV, BrodCC



Note: Yellow-nail symbols demonstrate the subject communities

Figure 3.12: Locations of Subject Communities

[21] The full names of the subject sites are not provided to ensure privacy.

3.2.2 Site Visits

General information regarding the selected 18 communities was collected through site visits. General information included property maps, floor plans, and gating characteristics of the communities. A check-list was devised for site visits. Physical factors such as lighting, security patrol service, 24-hour maintenance service, and community facilities were recorded with the check list. Also, community pictures were taken where permitted. The items of the checklist are tabulated in Table 3.6.

TABLE 3.6
Contents of the Checklist for Site Visits

Category	Items	Current Status/Descriptions
General Information	·Name of the property ·Visit Date / Time ·Contact Person ·Number of units ·Built year ·Address of the property	Just describe the status
Architectural Features	3 Story walk-up	Yes / No
	Gates	Fully controlled / Opened
	Gate control system	Card, password, remote control Bar-code, etc.
	Gate open method	Sliding doors/ Open doors
	Fences	Fully fenced / Partly fenced / No fence
	Materials of fences	Wood / Iron/ others
	Condition of lighting	Best/ Good/ Neutral/ Bad/ Worst
	Site map, Floor Plans	Collected from the leasing office

Site visits were done between February 1 and 15 in 2005. After that, the collected information was arranged as in Figure 3.13.

Name of the site: XXXXX
Visit date/ time: 02-14-2005 11:00 a.m.-11:30 a.m
Contact person: Mr. Williams
Number of Units: 350
Architectural features to be remembered: 3 floor walkups

	Number	Location	Conditions
Gates	2	See the map	Fully controlled
Fences	X	Around the site	Fully controlled
Facilities	5	Swimming pool (2), Laundry(2), Tennis Court, Fitness (1)	Newly remodeled
Lighting	10 more	Good	Front lighting for buildings

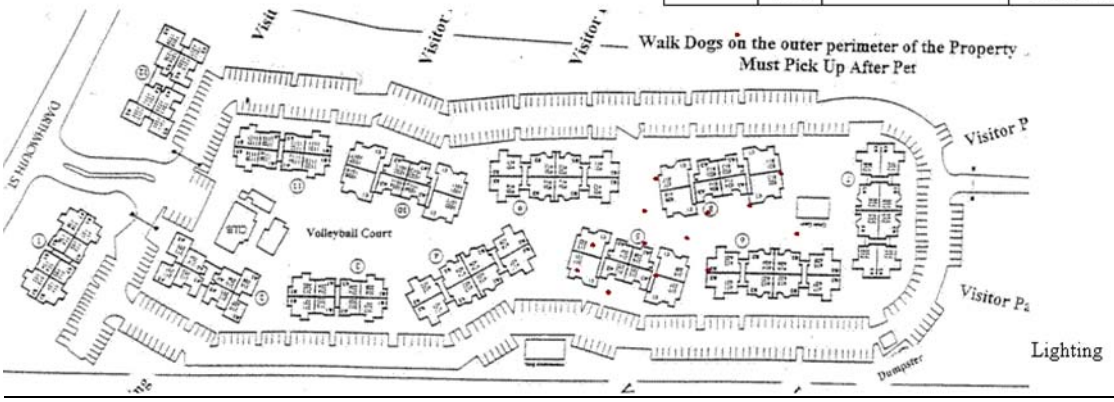


Figure 3.13: An Example of the Checklist and Collected information

3.2.3 Sampling

1) Sampling Methods

In selecting the subject sites, this study purposively selected the northwestern part of Houston, Texas as mentioned earlier. In selecting the survey participants, stratified random sampling was provided.

According to Schutt (2001), in stratified sampling, the population is divided into groups called strata. In this study, the type of communities is a stratum and the samples for this study were drawn from the three types of communities based on the stratified sampling. The advantage of stratified sampling in this study was that the samples from each stratum – the gated community resident group, the perceived gated community

resident group, and the non-gated community resident group- could represent the characteristics of the population in each stratum.

In the sampling process for the questionnaire surveys, this study had a premise that sampling errors would be minimized. Because errors in survey research may influence the final results of a study, this premise should be guaranteed. Touliatos and Compton (1988, pp. 279-280) indicated that there are two types of errors associated with sampling: random sampling errors and systematic sampling errors. Random sampling errors are caused by chance variation in different samples drawn from the same population. These errors can be minimized by drawing a sufficiently large sample. Systematic sampling errors occur due to inadequate sampling procedures. To avoid sampling bias, randomized samples should be selected.

2) Sampling Process

A mailed survey with a standardized questionnaire was employed in order to achieve the primary goal of this study. The residents living in the selected 18 communities were the potential subjects of the survey.

Questionnaires were distributed to randomly selected residents from the whole population in the 18 communities. Based on the assumption that statistical analysis would be valid with 60 cases each from the three types of communities, the minimum sample size for the analysis was set to be 180. Because previous research studies showed the usual response rate of mailing surveys to be 16-20%[22] this study sent more than 900 questionnaires in order to achieve the desire 180 responses.

To have 900 samples, fifty residents from each community were randomly selected. The whole addresses of each community were verified and same number of blank cards was prepared. Each card had only one mailing address. The whole cards with the addresses were mixed and fifty cards were randomly selected from each community. This process was repeated for 18 subject communities.

The apartment addresses were acquired from site visits and the website of the United States Postal Service. Three hundred residents from each type of community were asked to participate in the survey, thus a total of 900 residents were selected to be subjects for the survey.

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[22] Chao, T., Oc, T., & Heath, T. (2003) sent out 1205 questionnaires and had 144 returned. The total response rate was about 12%. The other study done by Wilson-Doenges (2000) had 16-20% return rate of mailed surveys.

3.2.4 Instrumentation

1) General Guidelines

The questionnaire was constructed based on the review of literature. Questions were developed primarily based on Newman's studies in 1973 and 1996, Brunson, Kuo, and Sullivan's study in 2001, and Wilson-Doenges' study in 2000. The summary of those studies was provided in Chapter II.

Questionnaire design and forms followed the Total Design Method (TDM) which was proposed by Dillman (1978). He has developed a standard set of procedures for questionnaire design and implementation called the Total Design Method (TDM). He suggested guidelines for questionnaire preparation (Touliatos & Compton, 1988: 273). Some of the guidelines are described below[23]. Considering Dillman's suggestions as follows, the questionnaire was designed.

"1. Type the questionnaire on 8½"×11″ paper and photo-reduce it to fit the smaller, less imposing questionnaire booklet format. 2. On the cover of the booklet, include the title of the project so that is stated in a way to promote interest. 3. Do not include questions on the front cover or the back cover. 4. Arrange questionnaire items so that the initial question is interesting and applied to all subjects. 5. On each page of the questionnaire booklet, use capital and lower case letters for questions and uppercase letters only for answers, ask only one question at a time, arrange items vertically, use appropriate transitions, avoid overlapping individual items form one page to the next." (Touliatos & Compton, 1983, pp. 273-275).

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[23] The guidelines above were excerpted from *Research Methods in Human Ecology/ Home Economics*, by Touliatos, J. and Compton, N.H. (1983, pp. 273-275).

The format and contents of the constructed questionnaire were reviewed by the Institutional Review Board of Texas A&M University. The Institutional Review Board also reviewed the data collection procedure. The questionnaire and related data collection procedure were approved on January 12, 2005. The approval number is 2004-0659.

2) Contents of the Questionnaire

The contents of the questionnaire were developed into six major sections. In order to reliably measure people's perceptions of safety in their communities, the questionnaire consisted of direct and indirect questions to ask their perceptions and opinions.

The first section contained information on apartment communities where the participants are living. The questions included the name of apartments, types of apartment units, the floor level the residents live on, length of residence, reasons they chose the current apartment, the previous housing type, moving-out plan, and the reason they don't want to move out. For these questions, categorical scales were used (see Table 3.7).

TABLE 3.7

Questions in Section I. Apartment Information

Section I.	Questions	Scale
Apartment information	Name of apartment community	Open-end
	Type of apartment units	Number of bedrooms and bathrooms
	Dwelling floor	1st floor, 2nd floor, 3rd floor
	Length of residence	Number of months
	Reason they chose the current apartment	· Close to job · Convenient to friends or relatives · Safety from violence or property crimes · Convenient to leisure activities · Convenient to public transportation · Convenient to school · Good schools for my kids · Good design of the apartment property (site amenities) · Good interior design of my apartment · Good maintenance services · Appropriate price to live in · Other public services · Other
	Reason they don't want to move out	
	Previous housing type	· Condominium · Rental apartment with gate access system(s) · Rental apartment without gate access system(s) · Single-Family Housing · Duplex · Other
	Future housing type they want to move to	
	Moving out plan	· I don't want to move out · within 1 year · after 1 year · after 2 years · after 3 years · after 4 years · after 5 years · I don't know · Other

The second section consisted of questions to measure residents' perception of safety in private, semi-public, and public areas in their communities during both day and night. To measure residents' perceptions of safety, 5-point bipolar scales (1= strongly disagree, 2= disagree, 3= neutral, 4= agree, and 5= strongly agree) were adapted. Private areas included their individual unit. The semi-public areas included hallways and

stairways of apartment buildings. The public areas included internal roads in the communities, parking lots, mail boxes, and common places in communities such as swimming pools and fitness centers. Table 3.8 shows the contents in this section.

TABLE 3.8

Questions in Section II. Residents' Perception of Safety

Section II.	Questions	Scale
Residents' Perception of Safety in Private, Semi-public, and Public areas in their Communities	Do you feel safe when you walk alone through the parking lot during the day? / at night?	From "Not at all safe" to "Very safe" 1= Not at all safe 2= Unsafe 3= Neutral 4= Safe 5= Very safe
	Do you feel safe when you are alone in the laundry room during the day? / at night?	
	Do you feel safe when you use alone the swimming pool during the day? / at night?	
	Do you feel safe when you exercise alone in the fitness center during the day? / at night?	
	Do you feel safe when you walk through the stairs in your apartment building during the day? / at night?	
	Do you feel safe when you go to the mail box at night?	
	Do you feel safe when you are alone at home at night?	

These common places were chosen based on descriptive analysis with 126 apartment communities in the United States. Representative common places in apartment communities were investigated with the randomly selected 126 apartment

[24] The analysis results of common facilities in apartment communities which support residents' leisure activities were published as an article in the Journal of the Korean Housing Association, 16(1), 81-88 by Suk-Kyung Kim and Hwa-Kyung Shin (2005).

communities at the initial step of this study. 87.3% among the 126 communities had outdoor swimming pools, and 83.3% provided indoor fitness facilities for their residents[24]. Thus, residents' perceptions of safety in common places were measured in their perceived safety in swimming pools and fitness centers.

The third section includes the questions for investigating residents' crime experience in their communities. Table 3.9 shows the questions in this section.

TABLE 3.9

Questions in Section III. Residents' Crime Experience in Their Communities

Section III	Questions	Scale : Categorical
Residents' Crime Experience	Participants' property crime experience since they moved to the current community	· Not at all · Bicycle or parts · Part of motor vehicles · Clothing, luggage · Toys or recreation equipment · Cash · Purse or Wallet · Electronics (Camera, Audio system, or TV) · Cell phone(s) or PDA · Computers or related equipment · Jewelry, watch, keys · Part of plants · Other
	Damages of neighbor's crime experience	
	Frequency of neighbors' crime experience	· Never ·1 time · 2 times · 3 times · 4 times ·More than 5 times

According to the U.S. Department of Justice (2004), crime has two categories, violent crime and property crime. In the case of violent crime, it is difficult to ask about participants' crime experience because violent crime includes several items that could affect participants' emotional state such as rape/sexual assault. Thus, this questionnaire did not consider residents' violent crime experience. Respondents were asked if they experienced property crime such as theft, motor vehicle theft, and household burglary.

The lists of property crime were drawn from the U.S. Department of Justice (2004). Motor vehicle theft was specified as 'bicycle or parts', and 'parts of motor vehicles'. Theft was specified as 'clothing or luggage', 'other personal objects', 'other items', 'cash', 'electronic or photo gear', 'toys or recreation equipment', 'purse or wallet', and 'jewelry, watch, or keys'.

The fourth section measured residents' opinions on the correlations between gating and their perceived safety. This section also included questions to measure residents' general perceptions of safety in their communities and to ask their personal opinions on gating and fencing. In addition, the fourth section measured residents' life behaviors related to safety. For instance, the questions asking if they always lock the windows while they go out or while they stay inside at night were included (see Table 3.10).

The fifth section investigated residents' perceptions of safety and other factors such as neighborhood attachment and residential satisfaction. This section aimed to cultivate discussions regarding perceived safety by residents and their recognition of their neighborhoods and community coherence (see Table 3.11).

TABLE 3.10

Questions in Section IV. Residents' Opinions on Gates and Fences

Section IV	Questions	Scale
Residents' Opinions on Gates and Fences	Factors for easing residents' fear of crime at night	· 24 hours maintenance service · Gate control system · Fences around the apartment property · Bright lighting at night · Patrol service by a private patrol company · Direct emergency button(s) on the phone/ wall ·Visual access to the local police · Open visual access to every space in the property · Other
	More effective element for easing residents fear of crime	· Gate control systems are more effective than fences. · Fences are more effective · Both are very effective · Neither gates nor fences can ease residents' fear of crime.
General perceptions of safety	I feel safe being out alone in my apartment property during the day / at night.	5-point bipolar scale From "Strongly disagree" to "Strongly agree" 1= Strongly disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly agree
	Our apartment property is free from crime and very safe.	
	Our apartment property is a safe place for children to play in.	
	Our apartment property is safe for parking residents' cars.	
	Our apartment property has no vandalism such as graffiti, trash, and damages.	
	I think that the gate control system in our property gate improves residents' safety from crime.	
	I think that the fences around our property improve residents' safety from crime.	
	I think that gates or fences of our apartment property make our residents feel that we are segregated from the neighboring area.	

TABLE 3.10 (Continued)

Section IV	Questions	Scale
Residents' behaviors related to safety	I usually lock the windows while I go out.	5-point bipolar scale From "Strongly disagree" to "Strongly agree" 1= Strongly disagree 2= Disagree, 3= Neutral 4= Agree, 5= Strongly agree
	I usually lock the windows while I stay inside at night.	

TABLE 3.11

Questions in Section V. Residents' Perception of Safety and Other Factors

Section V	Questions		Scale
Residents' Perception of Safety and other Factors	Perception of safety and Community coherence	I would be willing to work together with others on something to improve something about our apartment property.	From "Strongly disagree" to "Strongly agree" 1=Strongly disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly agree
		I get a sense of community from living on this apartment property.	
	Residential Satisfaction	If one of my friends is looking for a new apartment, I would recommend our property to him/her.	

The sixth section investigates the individual demographic characteristics and socioeconomic characteristics of the respondents. Demographic characteristics include gender, age, ethnic group, nationality, household type, gender of the head of household, family size, and number of kids in families. Socioeconomic characteristics included educational attainment, employment status, and family's annual income (see Table 3.12).

TABLE 3.12

Questions in Section VI. Demographic and Socioeconomic Characteristics

Questions	Scale
Race, Gender, Age (range), Employment, Educational attainment (range), Family's annual income (range), Family size, Head of household, Nationality , Number of kids	Categorical indicators

3.2.5 Reliability and Validity

In the scientific research, the reliability and validity of research should be considered. The term reliability means "repeatability" or "consistency." A measure is considered reliable if it would provide the same result over and over again (Trochim, 2004). To increase measurement reliability, Schutt (2001) recommended inter-item reliability to confirm internal consistency when researchers use multiple items to measure a single concept. Based on his recommendation, the instrumentation of this study adopted similar questions measuring residents' perceptions of safety, and allocated those questions in different sections of the questionnaire. To ensure the reliability of the measurement procedure, residents' responses to the questions should be associated with one another. The following questions in Table 3.13 were to measure residents' perceptions of safety by using different expressions.

The reliability test in the SPSS program was applied to the results and Cronbach's alpha values were obtained in order to assess the reliability of participants' responses.

TABLE 3.13

Representative Questions Considering Reliability of Measurement

Category	Questions
Residents' opinions on gates and fences	Factors for easing residents' fear of crime at night
	More effective element for easing residents fear of crime 1) Gate control systems are more effective than fence, 2) Fences are more effective, 3) Both are very effective, 4) Neither gates nor fences can ease residents' fear of crime.
	I think that the gate control system in our property gate improves residents' safety from crime.
	I think that the fences around our property improve residents' safety from crime.
General perceptions of safety (from strongly disagree to strongly agree)	I feel safe being out alone in my apartment property during the day / at night.
	Our apartment property is free from crime and very safe.
	Our apartment property is a safe place for children to play in.
	Our apartment property is safe for parking residents' cars.
	Our apartment property has no vandalism such as graffiti, trash, and damages.

The validity of research findings indicates the trustworthiness of results or the soundness of answers yielded by a study (Touliatos & Compton, 1988). Two primary forms of validity associated with scientific research are internal validity and external validity. Internal validity refers to the internal procedures of an investigation. External validity refers to the representativeness and generalizability of the research findings.

In discussing the validity of measurement, Schutt (2001) also indicated the timing of the survey. Schutt (2001, p. 99) also stated that the reliability and validity of measures in any study must be tested after the fact to assess the quality of the information obtained. Therefore, considering the validity of measurement, the survey distributions were done

at the same day. For the first distribution, 900 survey packages were prepared for a week and distributed on February 23, 2005. For the second distribution, 330 survey packages were prepared for five days and distributed on November 25, 2005. For the third distribution, 200 survey packages were prepared for four days and distributed on January 25, 2006 (see Table 3.16).

After collecting the responses, the consistency of the research results were verified. According to the statistical analyses, the results from the three distributions showed consistency and no critical differences in the statistical results threatening the validity of the measurement procedure were not found. Thus, no critical problem associated with the external validity was found in the data collection procedure.

In addition, survey errors associated with sampling and data collection were minimized as best as possible in this study. In data collection process, non-response errors were minimized in order to maximize the quality of data. The importance of minimizing the survey related errors was indicated by Touliatos and Compton (1988) and Zeisel (1984). According to them, these non-response errors fall into two types: total non-response and item non-response. In mailing surveys, total non-response is a major problem and cannot be solved easily. Though the modified Dillman's method was applied to this study, total non-response errors were not avoided. However, item non-response errors did not seriously occur according to the results of the reliability test, and this supports the validity of research findings.

3.2.6 Analysis Design

1) Variables

Based on the results of the questionnaire surveys, the correlations between the three types of communities and people's perceptions of safety were examined. The positive and negative effects of gating and fencing on people's crime experiences and their perceptions of safety were analyzed. The results from the analysis determined if gates and fences are more effective in influencing residents' perceived safety than other elements.

Considering the comprehensive results of this study, independent variables in analysis were (1) the three types of apartment communities, and (2) the existence of gates and fences. In addition to these gate-related variables, demographic factors such as gender, family type, family's annual income, educational attainment, length of residence, and gender of the head of households were designated as independent variables to explain residents' perception of safety in their apartment territory. The statistically significant independent variables were selected through the results from the correlation coefficient in the next chapter.

The questions for investigating people's perceptions and opinions were the dependent variables. The representative dependent variables were (1) resident's general perception of safety in their communities, (2) residents' perception of safety in private, semi-public, and public spaces in communities, (3) their crime experience in communities, (4) their opinions on the relationships between safety and gates and fences, and (5) their neighborhood attachment and community coherence.

2) Quantitative Analysis Plan

The quantitative analytical approach for this study is primarily correlational research (Groat & Wang, 2002). At first, descriptive statistics, including frequency and percentage, were applied to sort out the general characteristics of responses. Second, to examine and select effective independent variables and their relationships with people's perceptions and opinions, correlation coefficients and regression models were employed.

The correlations between the types of communities and residents' perceptions of safety and between the types of communities and crime experience were analyzed using both chi-squared tests and one-way ANOVA. The differences in residents' perceptions of safety were tested by one-way ANOVA and Tukey's post-hoc tests.

To determine the predictors of residents' perceptions of safety during the day and at night, stepwise multiple regression analysis procedure was applied for the territoriality related factor (i.e. types of community), demographic factors (i.e. gender, educational attainment), architectural factors (i.e. perception of safety in private, semi-public, and public spaces), and social factors of residents (i.e. neighborhood attachment).

According to Field (2005), when the collected data have the continuous type of outcome with more than two predictor variables, both continuous and categorical variables, and meet assumptions for parametric tests, ANOVA and multiple regression can be employed for the data analysis.

This study had the residents' perceived safety during the day and at night as the dependent variables and several predictors including architectural variables and demographic variables as the independent variables, and met assumptions for parametric

tests. Thus, multiple regression models were employed to verify the linear relationships between residents' perceived safety and the chosen independent variables.

Analysis methods applied to responses to the research hypotheses were tabulated in Table 3.14. As summarized in Table 3.14, for the first hypothesis, descriptive statistics including frequency, crosstab analyses, and chi-square tests were applied. For the second and the third hypotheses assessing residents' perceived safety according to the three types of communities, one-way ANOVA and Tukey's post hoc tests were used. For the fourth hypothesis assessing residents' crime experiences according to the three types of communities, one-was ANOVA and Tukey's post hoc tests were applied. For the fifth hypothesis testing the differences of residents' perceived safety and their crime experiences according to the three types of communities, one-way ANOVA and Tukey's post hoc test were applied. Additionally, in order to verify the statistical relationships between independent variables and residents' perceived safety, multiple regression analyses were applied. For the sixth hypothesis testing correlations between demographic and socioeconomic variables and residents' perceived safety and verifying and explaining statistical relationships between the variables and residents' perceived safety, correlations coefficients and multiple regression analyses were applied.

TABLE 3.14

Analysis Plan with Response to the Research Hypotheses

Research Hypothesis	Variables		Statistical analysis
	Independent	Dependent	
Residents live in gated communities because of the safe environment	·Demographic ·Types of Communities	Reason they chose the current apartments	Descriptive Frequency, Crosstab, Chi-square test
Residents' general perceptions of safety differ according to the conditions of gating and fencing of communities	Types of Communities	General perceptions of safety	One-way ANOVA Tukey's post hoc test
Residents' perceived safety in private, semi-public, and public areas differs according to the conditions of gating and fencing of communities.	Types of Communities	Residents' perceived safety in the areas	One-way ANOVA Tukey's post hoc test
Residents' crime experiences differ according to the conditions of gating and fencing of the communities.	Types of Communities	Residents' crime experiences	One-way ANOVA Tukey's post hoc test
Residents' perceived safety and crime experiences are correlated with gates and fences of their communities.	Types of Communities	Residents' perceived safety and crime experiences	One-way ANOVA Tukey's post hoc test Multiple regression analysis
Residents' perceived safety and crime experiences differ according to their demographic and socioeconomic characteristics.	Gender, family type, annual income, length of residence, educational attainment	Residents' perceived safety and crime experiences	Chi-square test Correlation coefficient, Multiple regression analysis

3.2.7 Pilot Study

After the Institutional Review Board of Texas A&M University approved the research tools and procedure, the pilot study was conducted between January 20 and February 12, 2005. The pilot study aimed to ensure the appropriateness of the mail survey and its procedure.

Zeisel (1984) explained the usefulness of pilot studies. He suggested that survey investigators should carry out diagnostic explorations before settling on final data-collection instruments so as to examine whether they are understandable and whether any essential topics have been omitted. Based on this recommendation, the pilot study also aimed to examine whether the questions in the questionnaire were understandable.

Twenty residents were selected from each type of community and were mailed out a cover letter, an information sheet, a questionnaire, and a return envelope with prepaid postage. The follow-up letters were sent twice after the questionnaires were mailed out, and the final return rate was checked. The final return rate was 22%.

The results from the reliability test, Cronbach-alpha = 0.998, demonstrated that the contents of the questionnaire were understandable to the respondents.

3.2.8 Questionnaire Survey Procedure and Data Collection

Data collection was done by mailing surveys with the standardized questionnaire as approved by the Institutional Review Board of Texas A&M University.

The first mailing was done on February 23, 2005. Nine hundred survey packages were prepared. Each survey package included an information sheet, a questionnaire, and a return envelope with prepaid postage. The 900 survey packets were mailed out to the randomly selected 900 residents. Follow-up letters were sent on March 10, 2005. Among the 900, 112 survey packets were returned due to invalid addresses. For the first mailing, 101 residents responded and 28 residents responded after the follow-up letters were sent. The results with these 129 responses were presented in the 2005 EDRA (Environmental Design Research Association) Conference in April, 2005.

The second mailing was done on November 25, 2005. A total of 330 new samples were chosen from the 18 subject communities. Three hundred and thirty survey packets were mailed out to the participants. Follow-up letters were sent on December 10, 2005. Among them, 24 survey packets were returned due to invalid addresses and 38 filled out questionnaires were returned. By the second mailing, 167 responses were acquired.

To overcome the low return rate of mailing surveys, Dillman's recommendations were applied at the third mailing. He outlined specific Total Design Method (TDM) implication procedures (Toulilatos and Compton, 1988, pp. 273-274). This study applied a modified Dillman's method to raise the return rate. The guidelines applied for this study were as follows: 1) Type a one-page cover letter on the sponsoring institution's letterhead explaining the significance of the research and the importance of the subject's participation, 2) The researcher signs each letter individually with a blue ballpoint pen, 3) The survey packet, including the cover letter, questionnaire, and a stamped return envelope, is sent first class on which subject's address has been typed, 4) One week

following the first mailing, postcard follow-ups were sent to remind all subjects. Exactly 3 weeks after the first mailing, a second cover letter and questionnaire were mailed to subjects who had not responded. Though Dillman recommended a fourth mailing in the seventh week of the initial mailing, this study did not conduct a fourth mailing.

Based on the recommendations, the initial mailing of the third distribution was done on January 25, 2006. Among the 659 non-respondents (= 788-129 in Table 3.15) who received the survey packages on the first or second distribution but did not respond to the survey, 200 were randomly selected. Survey packages were prepared and sent to the subjects. After one week, postcards were sent to remind them of the survey participation. Three weeks after the original mailing, survey packages, including a second cover letter and questionnaire, were mailed out. Among the 200, 13 were returned since the residents refused to have the packages and 40 questionnaires were responded to. The response rate was 21.4%. Therefore, the total number of responses from the surveys was 207 by March 1st, 2006. The survey procedure and dates are summarized in Table 3.15.

TABLE 3.15
Questionnaire Survey Schedule

Mailing survey	Survey period	Number mailed	Returned with invalid addresses	Valid distribution	No. of Reliable Response	Response rate
1st mailing	Feb. 23 – April 1, 2005	900	112	788	129	16.4%
2nd mailing	Nov. 25- Dec. 31, 2005	330	24	306	38	12.4%
3rd mailing	Jan. 25- March 1, 2006	200	13	187	40	21.4%
Total	-	1430	149	1281	207	16.2%

3.3 Survey of Community Managers

This step is to cultivate discussion about gated communities and residents' perceptions of safety. The purpose of this survey is to investigate the managerial point of view on gates and fences in apartment communities.

3.3.1 Sampling and Procedure

Managers of the subject communities were asked to participate in the survey. Among the property managers from the 18 subject communities, 5 mangers accepted the invitation to participate in the survey. The standardized survey instrument was sent via mail and their responses were acquired. After their responses were obtained, their responses were reviewed and they were asked directly by telephone regarding their answers for several items.

To get more data on managers' opinions, the property managers of the 54 apartment communities which were initially selected for the study, but were not included in the 18 subject communities, were contacted and asked to participate in the survey. Among the 54 managers, 8 managers agreed to participate and provided their opinions regarding the gates and fences and the correlations between gated territory and residents' safety. Beginning with the initial contact to the managers, the survey ran from January 3 to March 1, 2006.

3.3.2 Instrumentation

The instrumentation consisted of questions as follows: 1) if they think that crime prevention is related with gates or fences, 2) if gates and fences are effective in improving residents' perceptions of safety in apartment communities, 3) if their residents use the common facilities (e.g. clubhouse, swimming pools, or fitness centers) at night, and 4) if they received reports from their residents about property crimes or related occurrences.

In addition to the multiple choice questions, open ended questions were administered to reach managers' personal opinions on improving residents' safety and crime prevention in apartment communities. The contents of the instrumentation and the survey procedure were reviewed by the Institutional Review Board of Texas A&M University and were gotten the notice of exemption on November 7, 2005. The approval number is 2005-0570. The contents of the instrumentation are summarized in Table 3.16.

TABLE 3.16

Contents of the Survey of Property Managers

Section	Questions	Scale
Respondents' demographic information	Race, Gender, Age, Educational attainment(range), Work Position, Work experience	Categorical indicators
Managers' opinions on the Property	Factors for easing residents' fear of crime at night	· 24 hours maintenance service · Main gate control system · Fences around the apartment property · Bright lighting at night · Patrol service · Direct emergency button(s) on the phone/ wall · Visual access to the local police · Open visual access to every space in the property · Other
Crime in property territory	Reality of Crime in Property Territory: Frequency	· Not at all · 1 -5 times · 6-10 times · 11-15 times · 16-20 times · More than 20 times a year
Managers' opinions on gates and fences	More effective element for easing residents fear of crime	· Gate control systems are more effective than fences. · Fences are more effective · Both are very effective · Neither gates nor fences can ease residents' fear of crime.
	Do you agree that gated apartment communities do have less crime than non-gated communities	From "Strongly disagree" to "Strongly agree" 1=Strongly disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly agree
	Do you agree that gates and fences are needed for providing safe communities for residents in the city of Houston?	
	I think that the gate control systems in apartment gates improve residents' safety from crime.	
	I think that the fences around apartment properties improve residents' safety from crime.	
	I think that gates or fences of apartment properties are efficient to block the unwanted traffic from outside.	

TABLE 3.16 (Continued)

Section	Questions	Scale
Safety in the community	Our apartment property has no crime and very safe.	From "Strongly disagree" to "Strongly agree" 1=Strongly disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly agree
	Our apartment property has no vandalism such as graffiti, trash, and damages.	
	Residents usually prefer to gated communities if their rental prices are similar to those of non-gated communities.	
Residents' usage of common spaces	Many of our residents are using the fitness center at night.	
	Many of our residents are using the club house at night.	
Others	24 hours maintenance service, Residents' participation in the community issue and their sense of community	

3.3.3 Analysis Design

As mentioned above, this survey investigated managerial perspectives on gates and fences in apartment communities. The results of the survey were analyzed with descriptive statistics and a qualitative approach is adapted in exploring their recommendations for improving residents' perceived safety and reducing property crimes in apartment communities.

The results of the survey were combined with those from the surveys of residents in order to suggest efficient tactics for improving residents' perceived safety. These results were also expected to provide significant managerial points of view for designing more inclusive and safe communities.

CHAPTER IV

ANALYSIS AND FINDINGS FROM THE RESIDENT SURVEY

4.1 General Characteristics of Respondents

4.1.1 Housing Characteristics

The total number of respondents to the resident survey was 207. As illustrated in Figure 4.1, among the 207 respondents, 30.4% (n=63) were living in gated communities, 24.6% (n=51) were living in perceived gated communities, and 44.9% (n=93) were living in non-gated communities.

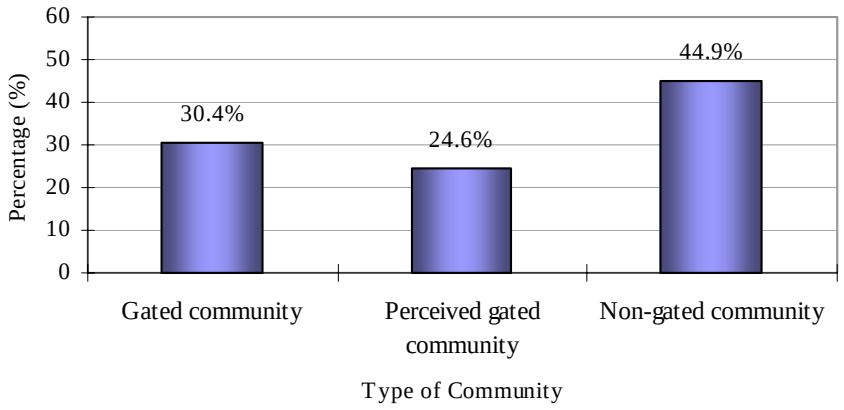

Figure 4.1: Respondents and Types of Communities (N=207)

1) Gate Control Methods

Before conducting the survey, communities were identified by the property managers as either gated communities or perceived gated communities. Based on the

information from the property managers, six gated communities and six perceived gated communities were selected as mentioned in Chapter III.

Survey participants living in the gated communities and perceived gated communities were also asked to identify the gate control systems and methods. Thus, residents' responses confirmed the gate related characteristics of the subject communities. Table 4.1 demonstrates the gate control methods and level of gate control in each subject community.

TABLE 4.1

General Characteristics of Subject Communities

Type of community	Name of the property	Gate control methods	Level of gate control
Gated community	Archs MH	Card key/ Password input system/ Remote control panel with buttons	The gate of the property is fully controlled by residents day and night. It is opened only when residents or their vehicles are passing.
	ChamPC	Card key Password input system	
	Park at WL	Remote control panel with buttons	
	PinER	Card key	
	Post OP	Password input system Remote control panel with buttons	
	ShaDC	Card key Password input system	
Perceived gated community	BreTM	Password input system Remote control panel with buttons	The gate control system exists, but the gate is usually open during the day and at night.
	RanCS	Password input system Remote control panel with buttons	
	BelGT	Password input system Remote control panel with buttons	
	TimBW	Remote control panel with buttons	
	WooGV	Card key	
	Brod CC	Remote control panel with buttons	

2) Housing Characteristics

Housing characteristics in the study included the apartment type, dwelling floor level, and length of residence. Table 4.2 shows the various apartment types in which the respondents were living. In general, 47.5% of the respondents were living in two-bedroom apartments and 45.1% were living in one-bedroom apartments. While more than half of the non-gated community residents were living in two-bedroom apartments, 54.0% of gated community residents and 56.9% of perceived gated community residents were living in one-bedroom apartments. However, these differences were not statistically significant.

TABLE 4.2

Housing Characteristics of Respondents [frequency (%)]

Demographic characteristics		Type of community			Total
		Gated community	Perceived gated community	Non-gated community	
Apartment type	1 bedroom type	34 (54.0)	29 (56.9)	30 (32.6)	93 (45.1)
	2 bedroom type	24 (38.1)	21 (41.2)	53 (57.6)	98 (47.5)
	3 bedroom type	4 (6.3)	1 (2.0)	8 (8.7)	13 (6.3)
	4-5 bedroom type	1 (1.6)	0 (0.0)	1 (1.1)	2 (1.0)
	Total	63 (100.0)	51 (100.0)	92 (100.0)	206 (100.0)
Dwelling floor level	1st floor	28 (44.4)	32 (64.0)	50 (54.9)	110 (53.9)
	2nd floor	23 (36.5)	11 (22.0)	39 (42.9)	73 (35.8)
	3rd floor	12 (19.0)	7 (14.0)	2 (2.2)	21 (10.3)
	Total	63 (100.0)	50 (100.0)	91 (100.0)	204 (100.0)

NOTE: Non-responses were excluded from the analysis.

Dwelling floor level was indicated by Newman (1973) as an important factor which affects residents' perceptions of safety. Based on his suggestion, information on

residents' dwelling floor level was investigated in this study. The subject communities in this study were limited to garden apartments, so dwelling floor levels were similarly limited to 1st, 2nd, and 3rd floor levels. Generally, more than half of the respondents were living on the first floor, 35.8% were living on the second floor, and 10.3% on the third floor.

The gated community residents' average length of residence was analyzed. The average length of residence for all respondents was 26.1 months. The average length of residence for non-gated community residents was higher than any other resident groups. The original data had two outliers; 302 months and 304 months. These two outliers were removed before analysis (see Table 4.3).

TABLE 4.3

Average Length of Residence[25]

Type of community	N	Mean	Std. Dev.	Min.	Max	F-value
Gated community	63	20.4	18.5	1	84	4.406 *
Perceived gated community	51	19.5	21.8	1	124	
Non-gated community	89	34.0	45.1	1	212*	
Total	201	26.1	43.4	1	212*	

NOTE: In the original data, the maximum length of residence among non-gated community respondents was 304 months.

* $p<.05$

[25] The average values of length of residence were tested by the Tukey's post hoc test. The three community types were divided into the two subsets: Perceived gated & Gated vs.Non-gated.

Even after removing the outliers, the average length of residence for non-gated communities was still the highest at 34 months, while the mean length of residence in perceived gated communities was 19.5 months. The differences between the three types of communities were statistically significant based on a one-way ANOVA test (F-value of 4.406 significant at the level of 0.05). In addition, residents' previous housing type and moving plan were investigated in order to understand the broader residential experiences of the respondents.

TABLE 4.4

Previous Housing Type and Moving Plan [frequency (%)]

Housing characteristics		Type of community			Total
		Gated community	Perceived gated community	Non-gated community	
Previous housing type	Condominium	1 (1.6)	0 (0.0)	2 (2.3)	3 (1.5)
	Rental apartment with gate access system	24 (38.7)	21 (42.2)	20 (22.7)	65 (32.3)
	Rental apartment without gate access system	14 (22.6)	6 (11.8)	29 (33.0)	49 (24.4)
	Single family housing	20 (32.3)	22 (43.1)	25 (28.4)	67 (33.3)
	Duplex or other	3 (4.8)	2 (3.9)	12 (13.6)	17 (8.5)
	Total	62 (100.0)	51 (100.0)	88 (100.0)	201 (100.0)
Moving out plan	I don't want to move out	4 (6.3)	1 (2.0)	15 (16.5)	20 (9.8)
	Within 1 year	22 (34.9)	30 (58.8)	31 (34.1)	83 (40.5)
	After 1 year	10 (15.9)	9 (17.6)	12 (13.2)	31 (15.1)
	After 2 years	7 (11.1)	2 (3.9)	2 (2.2)	11 (5.4)
	After 3 years	1 (2.6)	2 (3.9)	5 (5.5)	8 (3.9)
	I don't know	18 (28.6)	7 (13.7)	25 (27.5)	50 (24.4)
	Other	1 (1.6)	0 (0.0)	1 (1.1)	2 (1.0)
	Total	63 (100.0)	51 (100.0)	91 (100.0)	205 (100.0)

NOTE: Non-responses were excluded from the analysis.

Respondents were asked about their previous housing type. For this question, 201 residents out of the 207 respondents answered. Approximately 57% of respondents indicated that their previous housing type was rental apartments, either gated or non-gated. Among the 201 respondents, 33.3% responded that their previous housing was a single family housing unit (see Table 4.4).

Residents were asked if they had plans to move out. Including responses such as "I don't want to move out" and "I don't know", 34.2% of the all respondents indicated that they did not have a moving out plan. Over 40% responded that they would move out within one year (see Table 4.4).

The survey participants were also asked to indicate three reasons why they chose their current housing. Their responses are illustrated in Figure 4.2

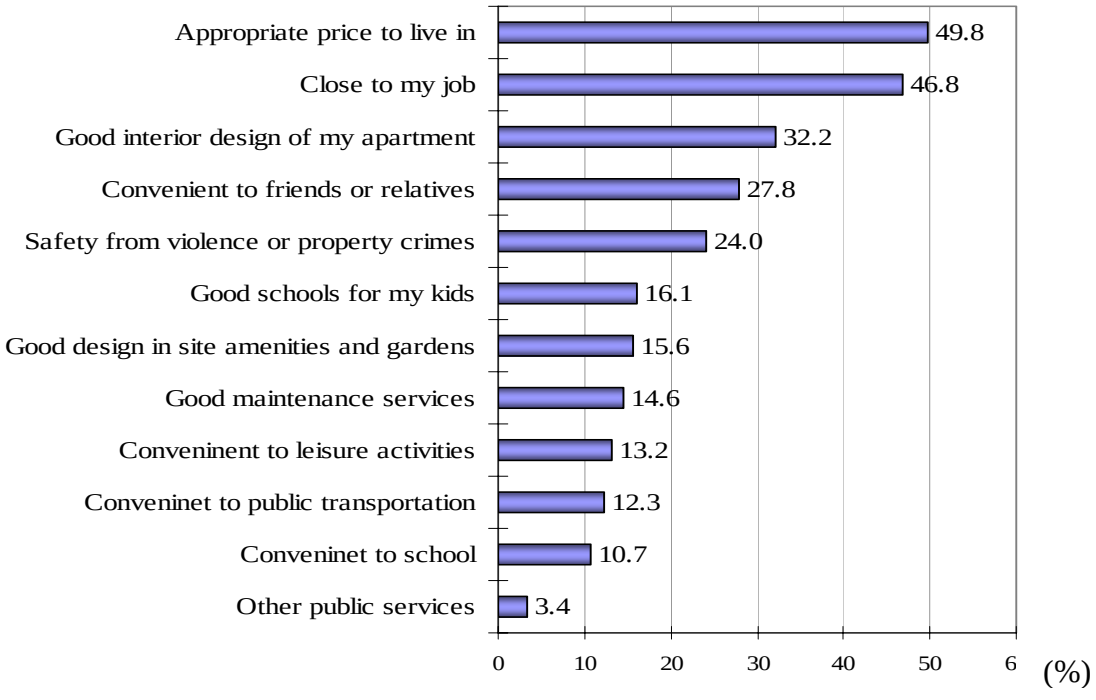

Figure 4.2: Reasons Respondents Chose their Current Apartments (N = 207)

The three major reasons respondents chose their current apartment were: 1) it is an appropriate price to live (49.8%), 2) it is close to their jobs (46.8%), and 3) it has a good interior design (32.2%). The fourth reason was convenient access to friends and relatives (27.8%), and the fifth reason was safety from violence or property crimes (24.0%). This showed that residents of rental apartments consider the price first, then their jobs, and then convenient living environments. In addition, their consideration of the safety issue in the residential environment was also verified.

The reasons for the current apartment choice were analyzed according to the three types of community. As shown in Table 4.5, “safety from violence or property crimes” was a more important reason for residents in gated and perceived gated communities than for those in non-gated communities. It should also be noted that rental prices were a more significant consideration for non-gated community residents than for gated or perceived gated community residents.

Based on the responses to the reasons why residents chose their current apartments, it can be inferred that safety in residential environments is one of the important issues that people consider in choosing their homes. As mentioned earlier, the issue has not been previously considered in the National Housing Survey; to improve the relevance and accuracy of the survey, the issue of safety should be considered in future editions.

TABLE 4.5

Reasons Respondents Chose their Current Apartments [frequency (%)]

Reasons	Type of community			Total (N=207)
	Gated community (n=63)	Perceived gated community (n=51)	Non-gated community (n=91)	
Appropriate price to live in	28 (44.4)	18 (35.3)	56 (61.5)	102 (49.8)
Close to my job	38 (60.3)	26 (51.0)	32 (35.1)	96 (46.8)
Good interior design of my apartment	23 (36.5)	17 (33.3)	26 (28.6)	66 (32.2)
Convenient to friends or relatives	12 (19.0)	19 (37.3)	26 (28.6)	57 (27.8)
Safety from violence or property crimes	18 (29.0)	17 (33.3)	14 (15.4)	49 (24.0)
Good schools for my kids	6 (9.5)	8 (15.7)	19 (20.9)	33 (16.1)
Good design in site amenities and gardens	14 (22.2)	11 (21.6)	7 (7.7)	32 (15.6)
Good maintenance services	9 (14.3)	6 (11.8)	15 (16.5)	30 (14.6)
Convenient to leisure activities	16 (25.4)	7 (13.7)	4 (4.4)	27 (13.2)
Convenient to public transportation	1 (1.6)	6 (11.8)	18 (19.8)	25 (12.3)
Convenient to school	2 (3.2)	6 (11.8)	14 (15.4)	22 (10.7)
Other public services	1 (1.6)	1 (2.0)	5 (5.5)	7 (3.4)

NOTE: Non-responses were excluded from the analysis.
Three items were chose by each respondent.

4.1.2 Demographic and Socioeconomic Characteristics

The general characteristics of respondents included: 1) demographic characteristics such as gender, age, ethnicity, nationality, household type, gender of the head of household, number of family, and number of children; and 2) socioeconomic characteristics such as educational attainment, employment status, and family annual income.

1) Demographic Characteristics

As mentioned in the previous chapter, the total number of responses to the resident survey was 207. Among them, 36.4% were male and 63.6% were female. The age of the respondents was categorized into five groups; 32.2% were in their 20's, 29.3% were in their 30's, 18.0% were in their 40's, 15.1% were in their 50's, and 5.3% were in their 60's or over. The majority of respondents were in their 20's. The gender and age groups of respondents were also investigated according to the three types of communities. The results are tabulated in Table 4.6

There were differences in gender according to the types of communities. More female respondents existed in non-gated communities than in gated or perceived gated communities. The gender difference in respondents was statistically significant according to the types of communities at the 0.01 level.

TABLE 4.6

Gender and Age of Respondents [frequency (%)]

Demographic characteristics		Type of community			Total
		Gated community	Perceived gated community	Non-gated community	
Gender**	Female	31 (49.2)	32 (62.7)	68 (73.9)	131 (63.6)
	Male	32 (50.8)	19 (37.3)	24 (26.1)	75 (36.4)
	Total	63 (100.0)	51 (100.0)	92 (100.0)	206 (100.0)
Age*	20's	25 (39.7)	19 (37.3)	22 (24.2)	66 (32.2)
	30's	19 (30.2)	19 (37.3)	22 (24.2)	60 (29.3)
	40's	6 (9.5)	5 (9.8)	26 (28.6)	37 (18.0)
	50's	10 (15.9)	6 (11.8)	15 (16.5)	31 (15.1)
	60's or over	3 (4.8)	2 (3.9)	6 (6.6)	11(5.3)
	Total	63 (100.0)	51 (100.0)	91 (100.0)	205 (100.0)

NOTE: Non-responses were excluded from the analysis.

* Not statistically significant

** Chi-square value: 9.880, $p<.01$

Respondents were divided into five ethnic groups; 48.0% were Caucasian, 29.4% were African American, 11.3% were Hispanic, 9.3% were Asian, and 2% were "other" including categories of American Indian or Alaska Native. Examined according to the types of community, more African American respondents lived in non-gated communities while 66.7% of the respondents in gated communities were white. There was no statistical difference in the nationality of the respondents in each type of community (see Table 4.7).

TABLE 4.7

Ethnic Groups and Nationality [frequency (%)]

Demographic characteristics		Type of community			Total
		Gated community	Perceived gated community	Non-gated community	
Ethnic group**	African American	9 (14.3)	12 (23.5)	39 (43.3)	60 (29.4)
	Caucasian or White	42 (66.7)	29 (56.9)	27 (30.0)	98 (48.0)
	Asian	1 (1.6)	5 (9.8)	13 (14.4)	19 (9.3)
	Hispanic	10 (15.9)	4 (7.8)	9 (10.0)	23 (11.3)
	American Indian or other	1 (1.6)	1 (2.0)	2 (2.2)	4 (2.0)
	Total	63 (100.0)	51 (100.0)	90 (100.0)	204 (100.0)
Nationality*	US	55 (87.3)	40 (78,4)	72 (77.4)	167 (80.7)
	Others	8 (12.7)	11 (21.6)	21 (22.6)	40 (19.3)
	Total	63 (100.0)	51 (100.0)	93 (100.0)	207 (100.0)

NOTE: Non-responses were excluded from the analysis.
* Not statistically significant
** Chi-square value: 35.496, p<.01

To further understand the demographic characteristics of the respondents, their household types, the gender of the head of the household, number of family members living together with the respondents, and number of children were investigated.

Table 4.8 demonstrates the various household types. Among the 207 respondents, 41.5% were non-family households living alone, 24.2% were female householders with children, and 27.1% were married-couple families. Household types were statistically different according to the types of community at the 0.005 level. Among the gated community respondents, 58.7% were non-family households living alone. This

percentage was higher than in perceived gated or non-gated communities. Also of interest is that more female householders existed in non-gated communities (see Table 4.8).

TABLE 4.8

Household Characteristics [frequency (%)]

Household types [26] ***	Type of community			Total
	Gated community	Perceived gated community	Non-gated community	
Married-couple family, no children	8 (12.7)	13 (25.5)	10 (10.8)	31 (15.0)
Married-couple family, with children	4 (6.3)	5 (9.8)	16 (17.2)	25 (12.1)
Female householder, no husband present	8 (12.7)	11 (21.6)	31 (33.3)	50 (24.2)
Non-family households, with friends or others	6 (9.5)	3 (5.9)	6 (6.5)	15 (7.2)
Non-family households, living alone	37 (58.7)	19 (37.3)	30 (32.3)	86 (41.5)
Total	63 (100.0)	51 (100.0)	93 (100.0)	207 (100.0)

*** Chi-square value = 23.150, p<.005

The genders of the heads of households were also recorded; 50.4% were female headed households and 49.8% were male headed households. There were more male headed households in gated communities and perceived gated communities, and more

[26] Household types in this study followed the types demonstrated by the US Census Bureau (2000). It has four types of households; family households, non-family households, households with individuals under 18 years, and households with individuals 65 years and over. Family households included “married-couple family” and “female householder.” Non-family households are householders living alone.

female headed households in non-gated communities. These differences, however, were not statistically significant (see Table 4.9).

Table 4.9 also demonstrates family size and the percentages of families with children. Over 38% of the respondents (or n=78) indicated that they had more than one child in their families, whereas 61.8% of the survey respondents had no children. Almost half of the respondents (44.4%) were single-person households, and more gated community respondents were single-person households than the other two resident groups.

TABLE 4.9

Head of Households, Family Size, & Number of Children [frequency (%)]

Demographic characteristics		Type of community			Total
		Gated community	Perceived gated community	Non-gated community	
Head of household gender	Female	28 (44.4)	22 (43.1)	53 (58.2)	103 (50.4)
	Male	35 (55.6)	29 (56.9)	38 (41.8)	102 (49.8)
	Total	63 (100.0)	51 (100.0)	91 (100.0)	205 (100.0)
Family size	1	39(61.9)	22 (43.1)	30 (32.3)	91 (44.4)
	2	12 (19.0)	17 (33.3)	33 (35.5)	62 (30.0)
	3	6 (9.5)	7 (13.7)	17 (18.3)	30 (14.5)
	4	3 (4.8)	3 (5.9)	9 (9.7)	15 (7.2)
	5 or more	3 (4.8)	2 (3.9)	4 (4.3)	7 (4.3)
	Total	63 (100.0)	51 (100.0)	93 (100.0)	207 (100.0)
Number of children	No children	47 (74.6)	37 (72.5)	42 (46.7)	126 (61.8)
	1 or more	16 (25.4)	14 (27.5)	48 (53.3)	78 (38.2)
	Total	63 (100.0)	51 (100.0)	90 (100.0)	204 (100.0)

NOTE: Non-responses were excluded from the analysis.

2) Socioeconomic Characteristics

The socioeconomic characteristics of respondents, their educational attainment, employment status, and annual income were recorded. The results are summarized in Table 4.10.

TABLE 4.10

Socioeconomic Characteristics [frequency (%)]

Socioeconomic characteristics		Type of community			Total
		Gated community	Perceived gated community	Non-gated community	
Educational attainment	Grade school	1 (5.6)	0 (0.0)	5 (5.6)	6 (2.9)
	High school	13 (20.6)	11 (21.6)	38 (42.2)	62 (30.4)
	College graduate/ Bachelor's	38 (60.3)	28 (54.9)	34 (37.8)	100 (49.0)
	College degree/ Master's or higher	11 (17.5)	12 (23.5)	11 (12.2)	34 (16.7)
	Other	0 (0.0)	0 (0.0)	2 (2.2)	2 (1.0)
	Total	63 (100.0)	51 (100.0)	90 (100.0)	204 (100.0)
Employment status	Employed full time	48 (76.2)	35 (70.0)	36 (39.6)	119 (58.3)
	Employed part time	5 (7.9)	6 (12.0)	12 (13.2)	23 (11.3)
	Retired	3 (4.8)	2 (4.0)	13 (14.3)	18 (8.8)
	Not employed	5 (7.9)	6 (12.0)	22 (24.2)	33 (16.2)
	Other	2 (3.2)	1 (2.0)	8 (8.8)	11 (5.4)
	Total	63 (100.0)	50 (100.0)	91 (100.0)	204 (100.0)
Family's annual income [a]	Under $ 20,000	4 (7.7)	9 (18.8)	30 (42.3)	43 (25.1)
	$ 20,000 to $ 29,999	13 (25.0)	10 (20.8)	20 (28.2)	43 (25.1)
	$ 30,000 to $ 59,999	17 (32.7)	12 (25.0)	11 (15.5)	40 (23.4)
	$ 60,000 to $ 79,999	10 (19.2)	4 (8.3)	3 (4.2)	17 (9.9)
	$ 80,000 more	8 (15.4)	13 (27.1)	2 (2.8)	23 (13.5)
	Students with no income	0 (0.0)	0 (0.0)	5 (7.0)	5 (2.9)
	Total	52 (100.0)	48 (100.0)	71 (100.0)	171 (100.0)

a. For this item, 106 participants did not respond.

Approximately 97% of respondent had at least high school education; additionally, more than 65% of respondents among them were college graduates or held higher degrees. Based on these results, it is inferred that most of the respondents had the ability to read and fully understand the questionnaire items and answered them without any problems.

Compared with the socioeconomic characteristics of the U.S. population on a basis of the census statistics, the respondents' educational attainment was higher than the census data. According to the 2004 American Community Survey (2006), 83.9% of the U.S. population were high school graduates or higher and 27.0% of the U.S. population had bachelor's degree or higher[27] in 2004.

Regarding employment status, 58.3% responded that they were full-time employees and 11.3% were part-time employees. Over 5% of the total respondents were in the "other" category which included self-employed. The employment rate of the respondents is similar to the census data (65.9%) based on the 2004 American Community Survey (2006)[28].

[27] U.S. Census Bureau (2004), *2004 American community survey*. Retrieved February 1, 2006 from http://www.census.gov.

Educational attainment	Houston, TX	US
High school graduate or higher	71.8%	83.9%
Bachelor's degree or higher	27.1%	27.0%

[28] U.S. Census Bureau (2005). *2004 American community survey*. Retrieved February 1, 2006 from http://www.census.gov.

Annual income was divided into six groups in this study. The lowest level was categorized as “under 20,000 dollars per year” and the highest level was categorized as “80,000 dollars or more per year”. As an additional case, the “student group with no income” was included in the six income groups.

Among the 207 respondents, 36 respondents did not disclose their income; among the 171 who responded to this question, 50.2% reported an annual income under $30,000, while 13.5% reported earning more than $80,000. The median annual income of the respondents was lower than the national median. The respondents’ median income was estimated as approximately $40,000 which was lower than the national median income (= $50,046 [29]) according to the Census Bureau.

In summary, the employment status of the survey participants was similar to the census data, while their educational attainment was higher than the national average and their median income was lower than the national average.

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[29] According to the Census 2000 Demographic Profile Highlights, the national median family income was 50,046 dollars in 1999. The source was based on http://www.census.gov.

4.2 Residents' Perception of Safety

4.2.1 Assumptions and Prerequisite Tests for Statistical Analysis

1) Assumptions of Parametric Tests

The statistical procedures applied in this study are parametric tests based on normal distribution. According to Field (2005, p.64), most parametric tests based on normal distribution have four fundamental assumptions. Those are normally distributed data, homogeneity of variance, interval data, and independence.

For checking the normal distribution of the data in this study, normality tests were applied before each parametric test was conducted. The second assumption, homogeneity of variance, means that the variances should be the same throughout the data. In this study, this assumption means that each group of survey participants comes from populations with equal variance. The third assumption, interval data, is related to the measurement. For having interval data, this study employed 5 point bipolar scales having equal intervals for measuring respondents' perceptions of safety and the related opinions. The fourth assumption, independence, is that data from different participants are independent. This study assumed that the perception and opinion of one participant did not influence the perception and opinion of other participants. With satisfying these four assumptions, the parametric tests were applied for analyzing the data from the surveys.

2) Reliability Test

Residents' perception of safety was assessed from three groups of questions. The first group of questions tested residents' perception of safety in private, semi-public, and public spaces during the day. The second group of questions tested residents' perception of safety in those spaces at night. The third group of questions aimed to test residents' general perception of safety in their apartment communities.

The reliability of the survey was verified by Cronbach's-alpha values[30]. The values were acquired for each group of questions. The Cronbach's-alpha value for the respondents' perception of safety during the day was 0.90, and the value for their perception of safety at night was 0.96. For the items regarding residents' general perception of safety in their current apartment communities, the Cronbach's-alpha value was 0.91. These values were satisfactory for verifying the reliability of this study. Table 4.11 shows the items from the questionnaire and the Cronbach's-alpha values for each category of the items.

[30] According to Santos (1999), Cronbach's-alpha is a tool for assessing the reliability of scales. It assesses how well a set of items (or variables) measures a single unidimensional latent construct. Cronbach's alpha is not a statistical test, but a coefficient of reliability.

TABLE 4.11

Items related to Residents' Perception of Safety and Reliability Test Results

	Items	Mean	Cronbach's alpha value
Perception of safety during the day	Perception of safety when they walk alone through the parking lot during the day	4.19	0.90
	Perception of safety when they are alone in the laundry room during the day	3.96	
	Perception of safety when they use alone the swimming pool during the day	4.04	
	Perception of safety when they exercise alone in the fitness center during the day	3.92	
	Perception of safety when they walk through the stairs in their apartment building during the day	4.05	
Perception of safety at night	Perception of safety when they are alone at home at night	4.00	0.96
	Perception of safety when they walk through the parking lot at night alone	3.67	
	Perception of safety when they alone in the laundry room during the day	3.38	
	Perception of safety when they use the swimming pool of your property alone at night	3.36	
	Perception of safety when they exercise alone in the fitness center at night	3.34	
	Perception of safety when they walk through the stairs in your apartment building at night	3.57	
	Perception of safety when they go to the mail box at night	3.57	
General perception of Safety in their apartment territory	General perception of safety: I feel safe being out alone in my apartment property during the day	4.10	0.91
	General perception of safety : I feel safe being out alone in my apartment property at night	3.46	
	Our apartment property is free from crime and very safe	2.80	
	Our apartment property is a safe place for children to play in	3.19	
	Our apartment property is a safe place to park our cars	3.31	
	Our apartment property has no vandalism such as graffiti, trash, or other damage	3.40	

NOTE: 1= Not at all safe, 2= Unsafe, 3=Neutral, 4=Safe, 5=Very safe.

2) Correlated Variables with Perceptions of Safety

Based on the review of literature, independent variables were divided into the two groups of architectural variables and demographic variables. Architectural variables include the type of community, dwelling floor level, and unit type. Demographic variables included length of residence, age, gender, educational attainment, annual income, and family size.

To validate the conceptualization of residents' perception of safety and the conditions of gating and fencing of apartment communities, Pearson's correlation coefficients between independent variables and respondents' perception of safety were assessed.

Table 4.12 demonstrates the correlations between residents' general perception of safety in the current apartment communities and the independent variables. Among the independent variables, the type of community significantly correlated with residents' perception of safety. Pearson's correlation coefficient was 0.354 between the types of community (1 = non-gated community, 2 = perceived gated community, and 3 = gated community) and respondents' perception of safety during the day, and 0.326 between the types of community and respondents' perception of safety at night. This means that respondents feel safer in gated communities during the day or at night than in non-gated communities.

Additionally, the dwelling floor level correlated with respondents' perception of safety during the day. It is inferred from the coefficient values that residents feel safer on the 3rd floor than on the 1st floor in garden apartments. However, there was no

statistically effective correlation between the dwelling floor level and residents' perception of safety at night.

In the demographic variables, respondents' annual income exhibited statistically significant correlations with their perceptions of safety. In addition, educational attainment and family size showed statistically significant correlations with the perception of safety.

Consequently, the correlation coefficients in Table 4.12 support the research hypothesis that residents' perceptions of safety are related to their apartment's gating conditions and the level of gate control – types of community. Table 4.12 reports the results of correlations between respondents' perceptions and the independent variables.

TABLE 4.12

Correlations between Perception of Safety and Independent Variables

Variables	Independent variables	Pearson's Correlation Coefficient	
		During the day	At night
Architectural	Types of community	.354**	.326**
	Dwelling floor level	.149*	.020
	Unit type	-.109	-.083
Demographic	Length of residence	-.114	-.069
	Age	-.131	-.050
	Educational attainment	.147*	.091
	Annual income	.286**	.346**
	Family size	-.160*	.290*

* Correlation is significant at the 0.05 level ** Correlation is significant at the .01 level.

Based on the correlation test results, a subsequent analysis was conducted comparing residents' perception of safety according to the three types of communities.

4.2.2 Perceptions of Safety

There are two hypotheses associated with this chapter: 1) Residents' general perceptions of safety differ according to the conditions of the gating and fencing of their communities - their perception of safety is greater in gated and fenced communities than in fenced communities without gates, or in non-gated communities; 2) Residents' perceived safety in private, semi-public, and public areas differs according to the conditions of the gating and fencing of communities.

1) Perceived Safety during the Day

Respondents' perceptions of safety in their near home environments were analyzed. Their near home environments included their individual apartments, semi-public areas such as the stairs of their apartment buildings, and public areas such as swimming pools, fitness centers, parking lots, and mail box sites. Respondents' perceptions of safety in these spaces were analyzed according to the three types of communities in order to verify the differences related to gating and fencing. In addition, the connections between residents' perceptions of safety in public, semi-public, and private spaces and their general perceived safety in their apartment territory were also verified to discuss the role of defensible space for improving residents' perceived safety.

Table 4.13 demonstrates respondents' perceptions of safety during the day in designated spaces. The statistical differences were tested by one-way ANOVA tests and Tukey's post hoc tests.

TABLE 4.13

Perceptions of Safety in Near-home Environments during the Day

Results from One-way ANOVA

Perceptions	Types of community	N	Mean	F-value
Perception of safety when they walk alone through the parking lot during the day	Gated	63	4.43	11.18*****
	Perceived gated	51	4.27	
	Non-gated	92	3.77	
	Total	206	4.10	
Perception of safety when they are alone in the laundry room during the day	Gated	50	4.28	8.13*****
	Perceived gated	34	3.76	
	Non-gated	82	3.59	
	Total	166	3.83	
Perception of safety when they use alone the swimming pool during the day	Gated	60	4.40	9.14*****
	Perceived gated	47	4.09	
	Non-gated	71	3.75	
	Total	178	4.06	
Perception of safety when they exercise alone in the fitness center during the day	Gated	55	4.51	18.36*****
	Perceived gated	45	4.07	
	Non-gated	58	3.47	
	Total	158	4.00	
Perception of safety when they walk through the stairs in their apartment building during the day	Gated	60	4.35	9.66*****
	Perceived gated	45	4.07	
	Non-gated	86	3.71	
	Total	191	3.99	

NOTE: 1= Not at all safe, 2= Unsafe, 3=Neutral, 4=Safe, 5=Very safe.

***** F-value is significant at the .001 level.

The results in Table 4.13 show that gated community respondents feel safer than non-gated community respondent when they walk alone through the parking lot during

the day; their perceptions were different according to the type of community at the 0.001 level. Gated community respondents feel safer than perceived gated community respondents and non-gated community respondents when they are alone in the laundry room during the day; again, the differences were statistically significant at the 0.001 level.

Likewise, respondents' perceptions of safety in gated communities were higher than in perceived gated communities and non-gated communities when they use the swimming pool or fitness center alone, or walk through the stairs in the apartment building during the day; similarly, the perception differences in the three types of communities were statistically significant based on the one-way ANOVA tests at the 0.001 level.

For a more elaborate analysis of the differences in respondents' perceptions of safety during the day according to the types of communities, Tukey's post hoc test was applied. The results from Tukey's test verified that significant differences exit among the three types of communities. The results from Tukey's test for the item asking about the perception of safety in the parking lot during the day verified the mean differences between gated community respondents' perceptions and non-gated community respondents' perceptions, and between perceived gated community respondents' perceptions and non-gated community respondents' perceptions.

Table 4.14 summarizes the mean differences in respondents' perceptions of safety between gated and non-gated communities, gated and perceived gated communities, and perceived gated and non-gated communities.

TABLE 4.14
Perceptions of Safety in Near-home Environments during the Day
Results from Tukey's Post Hoc Test

Dependent variable	(I) Type of community	(J) Type of community	Mean difference (I-J)	p-value
Perception of safety when they walk alone through the parking lot during the day	Gated	Perceived gated	.154	.638
		Non-gated	.657*	.000
	Perceived gated	Gated	-.154	.638
		Non-gated	.504*	.005
	Significant difference between gated and non-gated Significant difference between perceived gated and non-gated Grouping: Gated and Perceived vs. Non-gated			
Perception of safety when they are alone in the laundry room during the day	Gated	Perceived gated	.515*	.046
		Non-gated	.695*	.000
	Perceived gated	Gated	-.515*	.046
		Non-gated	.179	.635
	Significant difference between gated and perceived gated Significant difference between gated and non-gated Grouping: Gated vs. Perceived and Non-gated			
Perception of safety when they use alone the swimming pool during the day	Gated	Perceived gated	.315	.156
		Non-gated	.654*	.000
	Perceived gated	Gated	-.315	.156
		Non-gated	.339	.101
	Significant difference between gated and non-gated Grouping: Perceived gated group exists in the middle of the two groups			
Perception of safety when they exercise alone in the fitness center during the day	Gated	Perceived gated	.442*	.047
		Non-gated	1.044*	.000
	Perceived gated	Gated	-.442*	.047
		Non-gated	.601*	.004
	Significant difference between gated and perceived gated Significant difference between gated and non-gated Significant difference between perceived gated and non-gated Grouping: Gated vs. Perceived vs. Non-gated			
Perception of safety when they walk through the stairs in your apartment building during the day	Gated	Perceived gated	.283	.231
		Non-gated	.641*	.000
	Perceived gated	Gated	-.283	.231
		Non-gated	.357	.071
	Significant difference between gated and non-gated No significant difference between gated and perceived gated, between perceived gated and non-gated Grouping: Perceived gated group exists in the middle of the two groups			

NOTE: P-values smaller than 0.05 presented statistically significant differences between the two groups.

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

Among the daytime perceptions of safety in the five designated spaces, the perception in the laundry room and in the fitness center showed clear differences among the three types of community. The perceptions in the other two public spaces such as parking lots and swimming pools and the semi-public space such as the stairs in the apartment buildings did not demonstrate clear differences among the three groups. In other words, the perceptions of perceived gated community respondents did not differ from those of gated community respondents except when asked about their perception of safety in the laundry room and in fitness center during the day.

The "grouping" results in Table 4.14 show how the three community groups are divided based on the Tukey's tests. The results demonstrate that there are significant differences in residents' perceptions of safety between in gated communities and non-gated communities. However, residents' perceptions of safety in perceived gated communities are not critically different from the perceptions in gated communities. The results were associated with the results of residents' perceptions of safety at night.

2) Perceived Safety at Night

Respondents' perceptions of safety at night in the designated spaces were analyzed by one-way ANOVA tests and Tukey's post hoc tests.

The results in Table 4.15 show that respondents' perceptions of safety in designated spaces at night were different according to the types of community. For example, gated community respondents feel safer than non-gated community respondents when they are home alone at night. Respondents' perceived safety at home

at night was statistically different according to the three types of community at the 0.001 level.

TABLE 4.15

Perceptions of Safety in Near-home Environments at Night

Results from One-way ANOVA

Perceptions	Types of community	N	Mean	F-value
Perception of safety when they are home alone at night	Gated	63	4.30	10.74****
	Perceived gated	51	3.98	
	Non-gated	92	3.54	
	Total	206	3.88	
Perception of safety when they walk through the parking lot at night alone	Gated	62	4.00	10.41****
	Perceived gated	50	3.42	
	Non-gated	92	3.16	
	Total	204	3.48	
Perception of safety when they are alone in the laundry room at night	Gated	48	3.92	11.68****
	Perceived gated	35	3.00	
	Non-gated	80	2.89	
	Total	163	3.21	
Perception of safety when they use the swimming pool of your property alone at night	Gated	57	3.86	9.11****
	Perceived gated	46	3.22	
	Non-gated	66	3.02	
	Total	169	3.36	
Perception of safety when they exercise alone in the fitness center at night	Gated	55	3.91	13.19****
	Perceived gated	48	3.19	
	Non-gated	54	2.87	
	Total	157	3.33	
Perception of safety when they walk through the stairs in your apartment building at night	Gated	58	3.95	9.61****
	Perceived gated	45	3.47	
	Non-gated	88	3.15	
	Total	191	3.47	
Perception of safety when they go to the mail box at night	Gated	61	3.87	8.93****
	Perceived gated	50	3.34	
	Non-gated	91	3.02	
	Total	202	3.36	

NOTE: 1= Not at all safe, 2= Unsafe, 3=Neutral, 4=Safe, 5=Very safe.

**** F-value is significant at the .001 level.

For the seven items that verified residents' perceptions of safety at night, the results from the one-way ANOVA indicate that there were mean differences in their perceptions of safety at night according to the three types of communities. Their differences were also statistically significant at the level of 0.001 (see Table 4.15).

Tukey's post hoc test was applied for verifying the differences in respondents' perceptions of safety at night according to the three types of community. Table 4.16 summarizes the mean differences in respondents' perception of safety at night between in gated and non-gated communities, gated and perceived gated communities, and perceived gated and non-gated communities.

Compared with the results from respondents' perceptions of safety during the day, the results of their perceptions of safety at night in Table 4.15 show greater differences in the mean values among the types of communities. Tukey's post hoc test results in Table 4.16 also supports these differences among the types of communities. Based on these results, it is inferable that respondents' perceptions of safety at night are more influenced by the gating and fencing conditions of their apartment communities. Residents seem to feel safer in the fully controlled gated communities than in the perceived gated communities or non-gated communities.

The biggest difference in respondents' perception of safety appeared in the item asking about their perceived safety when they were exercising in the fitness center at night. The mean difference between gated and non-gated communities was 1.039. In addition, the mean difference between gated and non-gated communities was as much as 1.030. Both differences were statistically significant at the 0.001 level (see Table 4.16).

TABLE 4.16
Perceptions of Safety in Near-home Environments at Night
Results from Tukey's Post Hoc Test

Dependent variable	(I) Type of community	(J) Type of community	Mean difference (I-J)	p-value
Perception of safety when they are home alone at night	Gated	Perceived gated	.321	.215
		Non-gated	.758****	.000
	Perceived gated	Gated	-.321	.215
		Non-gated	.437*	.038
	Significant difference between gated and non-gated Significant difference between perceived gated and non-gated Grouping: Gated and Perceived gated vs. Non-gated			
Perception of safety when they walk through the parking lot at night alone	Gated	Perceived gated	.580*	.019
		Non-gated	.837****	.000
	Perceived gated	Gated	-.580*	.019
		Non-gated	.257	.394
	Significant difference between gated and non-gated Significant difference between gated and perceived gated Grouping: Gated vs. Perceived gated and Non-gated			
Perception of safety when they are alone in the laundry room at night	Gated	Perceived gated	.917**	.002
		Non-gated	1.030****	.000
	Perceived gated	Gated	-.917*	.002
		Non-gated	.113	.889
	Significant difference between gated and perceived gated Significant difference between gated and non-gated No significant difference between perceived gated and non-gated Grouping: Gated vs. Perceived gated and Non-gated			
Perception of safety when they use the swimming pool of your property alone at night	Gated	Perceived gated	.642*	.012
		Non-gated	.845*	.000
	Perceived gated	Gated	-.642*	.012
		Non-gated	.202	.618
	Significant difference between gated and perceived gated Significant difference between gated and non-gated No significant difference between perceived and non-gated Grouping: Gated vs. Perceived gated and Non-gated			
Perception of safety when they exercise alone in the fitness center at night	Gated	Perceived gated	.722*	.003
		Non-gated	1.039****	.000
	Perceived gated	Gated	-.722*	.003
		Non-gated	.317	.304
	Significant difference between gated and perceived gated Significant difference between gated and non-gated No significant difference between perceived gated and non-gated Grouping: Gated vs. Perceived Gated and Non-gated			

TABLE 4.16 (Continued)

Dependent variable	(I) Type of community	(J) Type of community	Mean difference (I-J)	p-value
Perception of safety when they walk through the stairs in your apartment building at night	Gated	Perceived gated	.482	.066
		Non-gated	.801*	.000
	Perceived gated	Gated	-.482	.066
		Non-gated	.319	.243
	Significant difference between gated and non-gated No significant difference between gated and perceived gated No significant difference between perceived gated and non-gated Grouping: Perceived gated group exists in the middle of the two groups			
Perception of safety when they go to the mail box at night	Gated	Perceived gated	.529	.060
		Non-gated	.847*	.000
	Perceived gated	Gated	-.529	.060
		Non-gated	.318	.297
	Significant difference between gated and non-gated No significant difference between gated and perceived gated No significant difference between perceived gated and non-gated Grouping: Perceived gated group exists in the middle of the two groups			

* The mean difference is significant at the .05 level.
** The mean difference is significant at the .01 level
**** The mean difference is significant at the .001 level.

The "grouping" results in Table 4.16 shows how the three community groups are divided based on the Tukey's tests. The results explained that the perceptions of safety of gated community residents in the communal spaces such as parking lots, laundry rooms, swimming pools, and fitness centers differed from the residents' perceived safety in perceived gated communities and non-gated communities. In semi-public spaces such as the stairs in apartment buildings and in private spaces, the gated community residents' perceptions were not different from the perceived gated community residents' perceptions. From these results, it was inferred that the guaranteed territoriality would improve residents' perceived safety in communal spaces in apartment properties.

3) General Perception of Safety in Apartment Territory

Respondents' general perceptions of safety in their apartment property were assessed. The results of the analyses in Table 4.17 presents that general perceptions of safety are different according to the types of community. Respondents' perceived safety during the day and at night differed according to the types of community at the 0.001 level. These results support the previously discussed results of respondents' perceptions of safety in designated spaces during the day and at night. Therefore, the statistically significant differences of respondents' perceived safety in their apartment properties support that territoriality in their residential environments provided by gates and fences affect their perceptions of safety.

In both the general perceptions of safety and the safety related questions, the three groups of residents showed statistically significant differences. Their responses were verified to be statistically different for those items such as, "Our apartment property is a safe place for children to play in (safe place for kids)", "Our apartment property is a safe place for parking our cars (free from crime)", and "Our apartment property has no vandalism such as graffiti, trash, or other damage (free from vandalism)."

TABLE 4.17

General Perceptions of Safety in Apartment Territory

Results from One-way ANOVA

Perceptions	Types of community	N	Mean	F-value
General perception of safety in the apartment community during the day	Gated	60	4.57	14.23****
	Perceived gated	51	4.18	
	Non-gated	90	3.72	
	Total	201	4.09	
General perception of safety in the apartment community at night	Gated	61	4.08	12.82****
	Perceived gated	51	3.33	
	Non-gated	90	3.10	
	Total	202	3.46	
Free from crime: Our apartment property is free from crime and very safe	Gated	63	3.21	8.02****
	Perceived gated	51	2.92	
	Non-gated	90	2.44	
	Total	204	2.80	
Safe place for kids: Our apartment property is a safe place for children to play in	Gated	62	3.55	6.32**
	Perceived gated	51	3.31	
	Non-gated	90	2.89	
	Total	203	3.20	
Free from crime: Our apartment property is a safe place for parking our cars	Gated	61	3.67	5.97**
	Perceived gated	51	3.37	
	Non-gated	86	3.02	
	Total	198	3.31	
Free from vandalism: Our apartment property has no vandalism such as graffiti, trash, or other damage	Gated	63	3.90	15.37****
	Perceived gated	50	3.70	
	Non-gated	90	2.87	
	Total	203	3.39	

** The mean difference is significant at the .01 level

**** The mean difference is significant at the .001 level.

Subsequently, Tukey's post hoc tests were applied in order to verify the differences among the three types of communities. Table 4.18 shows the mean differences in respondents' general perceived safety between gated and perceived gated, gated and non-gated, and perceived gated and non-gated communities.

In general, for perceptions of safety during the day, there was a statistically significant difference between gated and non-gated community's respondents. However, there was no statistically significant difference between gated community respondents' perceived safety and that of gated community respondents. Respondents' general perceptions of safety at night also showed similar characteristics to the perceptions during the day.

For the other four items to assess residents' opinions on the "free from crime" items, the "safe place for children" item, the "free from vandalism" item, respondents' responses were not statistically different according to the three types of communities. There were statistically significant differences in survey participants' responses between two community groups; the gated community group vs. the non-gated community group (see Table 4.18).

Based on these results, it is inferred that respondents feel safer in apartment communities which provide territoriality and control the entry of external traffic, but truly exclusive control is not essential for their perceived safety.

TABLE 4.18

General Perceptions of Safety in Apartment Territory

Results from Tukey's Post Hoc Test

Dependent variable	(I) Type of community	(J) Type of community	Mean difference (I-J)	P-value
General perception of safety in their apartment community during the day	Gated	Perceived gated	.390	.085
		Non-gated	.844***	.000
	Perceived gated	Gated	-.390	.085
		Non-gated	.454*	.020
	Significant difference between gated and non-gated Significant difference between perceived gated and non-gated Grouping: Gated and Perceived gated vs. Non-gated			
General perception of safety in their apartment community at night	Gated	Perceived gated	.749**	.003
		Non-gated	.982***	.000
	Perceived gated	Gated	-.749**	.003
		Non-gated	.233	.501
	Significant difference between gated and perceived gated Significant difference between gated and non-gated Grouping: Gated and Perceived gated vs. Non-gated			
Free from crime: Our apartment property is free from crime and very safe	Gated	Perceived gated	.285	.410
		Non-gated	.762***	.000
	Perceived gated	Gated	-.285	.410
		Non-gated	.477	.058
	Significant difference between gated and non-gated Grouping: Perceived gated group exists in the middle of the two groups			
Safe place for kids: Our apartment property is a safe place for children to play in	Gated	Perceived gated	.235	.531
		Non-gated	.660**	.002
	Perceived gated	Gated	-.235	.531
		Non-gated	.425	.093
	Significant difference between gated and non-gated Grouping: Perceived gated group exists in the middle of the two groups			
Free from crime: Our apartment property is safe for parking residents' cars	Gated	Perceived gated	.299	.345
		Non-gated	.649**	.002
	Perceived gated	Gated	-.299	.345
		Non-gated	.349	.190
	Significant difference between gated and non-gated Grouping: Perceived gated group exists in the middle of the two groups			

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

** The mean difference is significant at the .01 level

*** The mean difference is significant at the .001 level.

TABLE 4.18 (Continued)

Dependent variable	(I) Type of community	(J) Type of community	Mean difference (I-J)	P-value
Free from vandalism: Our apartment property has no vandalism such as graffiti trash, and damage	Gated	Perceived gated	.205	.652
		Non-gated	1.038***	.000
	Perceived gated	Gated	-.205	.652
		Non-gated	.833***	.000
	Significant difference between gated and non-gated Grouping: Gated and Perceived gated vs. Non-gated			

* The mean difference is significant at the .05 level.
** The mean difference is significant at the .01 level
*** The mean difference is significant at the .001 level.

4.2.3 Perceived Safety in Architectural Spaces and in the Apartment Territory

1) Correlations between Residents' Perceptions of Safety

This section verifies the connections between residents' perceptions of safety in public, semi-public, and private spaces, and their general perceived safety in their apartment territory. This section also discusses the role of defensible space for improving residents' perceived safety.

Generally speaking, both the one-way ANOVA and the Tukey's post hoc test are efficient methods for verifying differences in residents' responses according to the three types of communities. However, in order to more precisely discuss residents' perceived safety in near-home environments and to define residents' perceptions of safety in each space as well as their general perceptions of safety in their apartment communities, correlations and linear relationships between the perceptions can be assessed by Pearson's Correlation Coefficients and simple or multiple regression models.

Table 4.19 shows that residents' perceptions of safety in apartment spaces are significantly correlated with each other. For example, the perceptions in parking lots are correlated with the perceptions in laundry rooms and in swimming pools. Likewise, the perceptions in parking lots are also correlated with the perceptions in the stairs of apartment buildings – semipublic spaces- and the general perceptions of safety in apartment territory. These results support the conclusion that residents' perceptions of safety in public and semi-public areas are correlated with each other and thereby influence their general perceptions of safety in their apartment territory.

TABLE 4.19

Correlation Coefficients between Residents' Perceptions of Safety during the Day

Perceptions during the day	In parking lots	In the laundry room	In the swimming pool	In the fitness center	In the stairs in	General perception
Perception of safety in parking lots	1	.607**	.613**	.534**	.752**	.715**
Perception of safety in the laundry room	.607**	1	.661**	.688**	.684**	.582**
Perception of safety in the swimming pool	.613**	.661**	1	.793**	.619**	.593**
Perception of safety in the fitness center	.534**	.688**	.793**	1	.601**	.522**
Perception of safety in the stairs in apartment buildings	.752**	.684**	.619**	.601**	1	.734**
General Perception of safety in apartment territory	.715**	.582**	.593**	.522**	.734**	1

** Correlation is significant at the 0.01 level.

Residents' perceptions of safety in architectural spaces at night showed similar characteristics to the perceptions of safety during the day. Table 4.20 shows the correlations of residents' perceptions of safety in architectural spaces and their general perceptions of safety in the apartment territory.

TABLE 4.20

Correlation Coefficients between Residents' Perceptions of Safety at Night

Perceptions of safety at night	At home	In parking lots	In the laundry room	In the swimming pool	In the fitness center	In the stairs	To the mail box	In apartment territory
Perception of safety at home	1	.758**	.698**	.680**	.656**	.764**	.761**	.662**
Perception of safety in parking lots	.758**	1	.803**	.724**	.706**	.862**	.853**	.759**
Perception of safety in the laundry room	.698**	.803**	1	.836**	.836**	.809**	.820**	.716**
Perception of safety in the swimming pool	.680**	.724**	.836**	1	.864**	.732**	.797**	.727**
Perception of safety in the fitness center	.656**	.706	.836**	.864**	1	.757**	.767**	.728**
Perception of safety in the stairs in apartment buildings	.764**	.862**	.809**	.732**	.757**	1	.849**	.700**
Perception of safety to the mail box	.761**	.853**	.820**	.797**	.767**	.849**	1	.766**
Perception of safety in apartment territory	.662**	.759**	.716**	.727**	.728**	.700**	.766**	1

** Correlation is significant at the 0.01 level.

The perceptions of safety in public spaces such as the laundry room and the swimming pool, in the semi-public spaces such as the stairs in the apartment buildings, and in private spaces such as the home were correlated with each other. Residents' perceptions of safety in each space were also correlated with their general perceived safety in their apartment territory. In particular, residents' perceptions of safety when they go to the mail box at night were strongly correlated with the perceptions of safety in the other spaces as well as their general perceptions of safety in their apartment territory.

2) Regression Models with the Perceptions of Safety in Architectural Spaces

To develop the discussions between residents' perceptions of safety in each space and their general perceived safety, simple linear regression models were also applied to the data. Simple linear regression models are more elaborate models than correlation coefficients; this is because the models propose linear equations to explain the linear relationships between independent variables and dependent variables. For that reason, simple linear regression models were used for explaining the relationships between the suggested independent variables in this study and residents' perceptions of safety (Field, 2005).

Table 4.21 exhibits simple linear regression models presenting the relationships between each independent variable and residents' perceived safety in their apartment territory during the day. The normality and independence of the data were verified in applying the regression models. The data were normally distributed and independent (see Appendix 1).

TABLE 4.21
Simple Linear Regression Models
for Explaining Residents' Perception of Safety

Dependent variable (Y)	Independent variable (X)	Simple Linear Regression Model	R-square
Perception of safety during the day	Perception in the parking lot****	Y = 0.954 + (0.765)X	0.511
	Perception in the laundry room****	Y = 1.806 + (0.593)X	0.339
	Perception in the swimming pool****	Y = 1.628 + (0.626)X	0.351
	Perception in the fitness center****	Y = 2.312 + (0.476)X	0.271
	Perception in the stairs****	Y = 0.822+ (0.816)X	0.539
Perception of safety at night	Perception at home****	Y = 0.451 + (0.774)X	0.430
	Perception in the parking lot****	Y = 0.644 + (0.809)X	0.576
	Perception in the laundry room****	Y = 1.214 + (0.703)X	0.513
	Perception in the swimming pool****	Y = 1.074 + (0.740)X	0.528
	Perception in the fitness center****	Y = 1.223 + (0.712)X	0.530
	Perception in the stairs****	Y = 0.813 + (0.770)X	0.491
	Perception to the mail box****	Y = 0.893 + (0.764)X	0.587

**** This regression model is significant at the .001 level.

The simple linear regression models in Table 4.21 showed that residents' perceived safety in parking lots and stairs in their apartment buildings has strong linear relationships with their general perceptions of safety in their apartment territory during the day. These results imply that residents' perceived safety can be improved by safe and crime-free public and semi-public spaces in apartment territory.

The relationships between residents' perceived safety and defensible space were also indicated by Newman (1973) and Brunson, Kuo, and Sullivan (2001). For improving residents' general perception of safety in their apartment territory, their perceptions of safety in public, semi-public, and private areas should be addressed. For

improving their perceived safety in their apartment territory during the day, the safety in semi-public and public areas should be considered first. For guaranteeing their perceived safety at night, the safety in public areas should be considered first.

Table 4.22 also presents the importance of the perceived safety in public and semi-public areas for improving residents' general perceived safety in their apartment territory using stepwise multiple regression analyses. These results provide greater explanatory power in the independent variables for predicting residents' perceived safety in their apartment territory

Generally, at Step 1 of stepwise multiple regression models, the most significant independent variable is selected for the regression models and the first and second independent variables are selected at Step 2. For predicting the perceived safety in the apartment territory during the day, residents' perceived safety in the stairs – the semi-public space, and in the swimming pool and the parking lots – public areas were selected as the explanatory independent variables. For predicting the perceived safety in the apartment territory at night, residents' perceived safety when they go to the mail box and in the fitness center were selected as the significant predictors.

TABLE 4.22

Stepwise Multiple Regression Analyses Predicting Residents' General Perceived Safety in their Apartment Territory

Dependent variable	Model	B	SE B	β
General perceived safety in apartment territory during the day	Step 1			
	Constant	1.117	260	
	Perceptions in the stairs	.764	.063	.742*****
	Step 2			
	Constant	.749	.281	
	Perceptions in the stairs	.624	.077	.606*****
	Perceptions in the swimming pool	.231	.077	.222****
	Step 3			
	Constant	.516	.294	
	Perceptions in the stairs	.513	.090	.498****
	Perceptions in the swimming pool	.182	.079	.175**
	Perceptions in the parking lot	.210	.092	.194**
General perceived safety in apartment territory at night	Step 1			
	Constant	.722	.205	
	Perception when going to the mail box	.818	.055	.808****
	Step 2			
	Constant	.558	.197	
	Perception when going to the mail box	.562	.081	.554****
	Perception in the fitness center	.323	.079	.328****

NOTE 1: B = Unstandardized Coefficients B, SE B= Standard Error for B, β = Standardized Coefficients Beta

NOTE 2: During the day - R^2 = .550 for Step 1; R^2 = .581 for step 2; R^2 = .599 for step 3. At night - R^2 = .652 for Step 1; R^2 = .696 for step 2.

** p<.05 *** p<.005 **** p<.001

Normality and assumptions for multiple regression analyses were assessed. The statistical tables and graphs related to Table 4.22 are included in Appendix 2.

4.2.4 Perceived Safety in the Apartment Territory and Residents' Demographic and Socioeconomic Characteristics

1) Correlated variables

As mentioned in 2) Correlated Variables with Perceptions of Safety, the five independent variables were verified to be correlated with respondents' perceived safety. The five variables were the two architectural variables including the type of community and the dwelling floor level and the three demographic variables including educational attainment, annual income, and family size.

TABLE 4.23

Perceptions of Safety and the Correlated Variables

Variables	Independent variables	Pearson's Correlation Coefficient	
		During the day	At night
Architectural	Types of community	.354**	.326**
	Dwelling floor level	.149*	.020
Demographic & Socioeconomic	Educational attainment	.147*	.091
	Annual income	.286**	.346**
	Family size	-.160*	.290*

* Correlation is significant at the 0.05 level ** Correlation is significant at the .01

2) Multiple Regression Models of Residents' Perception of Safety

Generally, the purpose of the multiple regression model is to learn more about the relationship between several independent or predictor variables and a dependent variables (Ott & Longnecker, 2001). In this study, the multiple regression models were employed in order to statistically explain the relationships between the independent

variables selected from the correlation coefficient test and the dependent variables, i.e. residents' perceived safety during the day and at night.

These models are also expected to predict residents' perceptions of safety in near-home environments. In order to obtain significant multiple regression models, multicollinearity among variables were verified. As literature indicates, if strong collinearity exists between two variables, the estimation of their individual regression coefficient is difficult (Filed, 2005, p. 174).

Table 4.24 shows correlation coefficients between the independent variables. Family size correlates with the other four variables at the 0.05 level, and the family's annual income correlates with all the other six variables at the 0.01 level. The five variables show collinearity among them, but it is not strong, because the correlation coefficients are smaller than 0.5.

TABLE 4.24

Correlation Coefficients between the Independent Variables

Independent variables	Type of community	Dwelling floor level	Educational attainment	Family's annual income	Family size
Type of community	1	.168*	.180*	.411**	-.183**
Dwelling floor level	.168*	1	.035	.031	-.164*
Educational attainment	.180*	.035	1	.381**	-.149*
Family's annual income	.411**	.031	.381**	1	-.192*
Family size	-.183**	-.164*	-.149*	-.192*	1

NOTE: Type of community – 1= non-gated, 2= perceived gated, 3= gated community.
* Correlation is significant at the 0.05 level.
** Correlation is significant at the 0.01 level.

For predicting residents' perceived safety in their apartment territory, stepwise multiple regression analyses were conducted with the five independent variables. Among the five independent variables, the type of community and family's annual income were verified as the significant predictors for predicting residents' perceived safety in their apartment territory. Table 4.25 shows the multiple regression models that predict residents' perceived safety in their apartment territory with the selected demographic and socioeconomic variables.

TABLE 4.25

Stepwise Multiple Regression Analyses Predicting Residents' General Perceived Safety in their Apartment Territory – Socioeconomic Variables

Dependent variable	Model	B	SE B	β
General perceived safety in apartment territory during the day	Step 1			
	Constant	3.423	.181	
	Types of community	.396	.088	.333****
	Step 2			
	Constant	3.205	.194	
	Types of community	.291	.094	.244***
	Family's annual income	.162	.059	.216*
General perceived safety in apartment territory at night	Step 1			
	Constant	2.625	.223	.320****
	Types of community	.467	.108	
	Step 2			
	Constant	2.405	.241	
	Types of community	.357	.117	.244***
	Family's annual income	.166	.073	.182**

NOTE1: Type of community – 1= non-gated, 2= perceived gated, 3= gated community.
NOTE2: B = Unstandardized Coefficients B, SE B= Standard Error for B,
β = Standardized Coefficients Beta
NOTE 3: During the day: R^2 = .111 for Step 1; R^2 = .150 for Step 2
At night: R^2 = .102 for Step 1; R^2 = .130 for Step 2
*p<.01 ** p<.05 *** p<.005 **** p<.001

3) Discussions of Demographic Characteristics and the Perceived Safety

There are several discussions from the statistical analyses. The results from the correlation coefficient and multiple regression analyses in this study brought different conclusions from the previous studies introduced in the review of literature.

Newman (1996) indicated that gender and dwelling floor level are significant variables to influence residents' perceived safety in their residential environments. Perkins and Taylor (1996) also defined gender and race as the important variables that affect people's fear of crime.

In this study, those variables such as gender and dwelling floor level were statistically correlated with residents' perceptions of safety, but were not explanatory predictors in multiple regression models proposed for predicting residents' perceived safety. The race variable was not statistically significant in this study and was not an explanatory predictor for predicting residents' perceived safety.

Wilson-Doenges (2000) verified number of children and length of residence as the explanatory variables that influence residents' perceived safety in their apartment communities. Taylor et al. (1984) also supported the length of residence, gender, income and age as significant variables for predicting residents' perceived safety. Brunson et al. (2001) indicated age of respondents as an important variable for predicting the perceived safety.

In this study, the family size variable considering number of children was negatively correlated with residents' perceptions of safety during the day and positively correlated with at night. The family size, or number of children, was not strongly

correlated with residents' perceived safety in their apartment communities, because the correlation coefficients were smaller than 0.50 (see Table 4.23).

The three variables including number of children, length of residence, and age did not show explanatory powers as significant variables in multiple regression models for predicting residents' perceived safety in their apartment communities, while those were indicated as significant variables by the previous studies.

Participants' gender and income were correlated with their perceptions of safety. Furthermore, family's annual income was verified as an explanatory predictor for predicting residents' perceived safety in their apartment territory (see Table 4.25).

Territoriality defined by the three types of communities in this study was verified as the most significant predictor for predicting residents' perceived safety in their apartment communities (see Table 4.25). This variable was indicated in the previous studies by Moran and Dolphin (1986), Brunson et al. (2001), and Newman (1973 & 1996).

4.3 Residents' Crime Experience

In addition to residents' perceived safety, the reality of crime was investigated. The related hypothesis of this chapter was that residents' crime experiences differ according to the conditions of gating and fencing in the communities. The interactions between the type of community and residents' crime experiences were tested.

4.3.1 Crime Experience

To protect the survey participants' privacy, information about violent crimes was not recorded – only property crime was included in the survey. Among the 207 respondents of the survey, 40 respondents, 19.4% of the total, indicated that they had property crime experiences in their apartments; 166 respondents did not have any such crime experience. Among the 40 respondents who experienced property crime in their apartment territory, 50% were living in non-gated communities and 50% were living in either gated communities or perceived gated communities. Respondents' crime experiences were not statistically different according to the types of community. Table 4.26 shows respondents' property crime experience in their apartment territory.

Respondents' also indicated what kinds of items were stolen from their apartment properties. The total frequency of property crime experience was 63. Considering that 40 respondents reported their crime experiences, it is inferred that 1.6 crimes per resident happened. Among the 63 stolen items reported by the survey participants, 17.5% were parts of motor vehicles, 12.7% were parts of plants, and 15.9% were "others" (including

vandalism). Respondents' crime experience within their apartment territory and the contents of the stolen items are exhibited in Table 4.26 and Figure 4.3.

Table 4.26

Crime Experience within Apartment Territory [frequency (%)]

Crime experience		Type of community			Total
		Gated community	Perceived gated community	Non-gated community	
Crime experience	Yes	12 (19.0)	8 (15.7)	20 (21.7)	40 (19.4)
	No	51 (81.0)	43 (84.3)	72 (78.3)	166 (80.6)
	Total	63 (100.0)	51 (100.0)	92 (100.0)	206 (100.0)

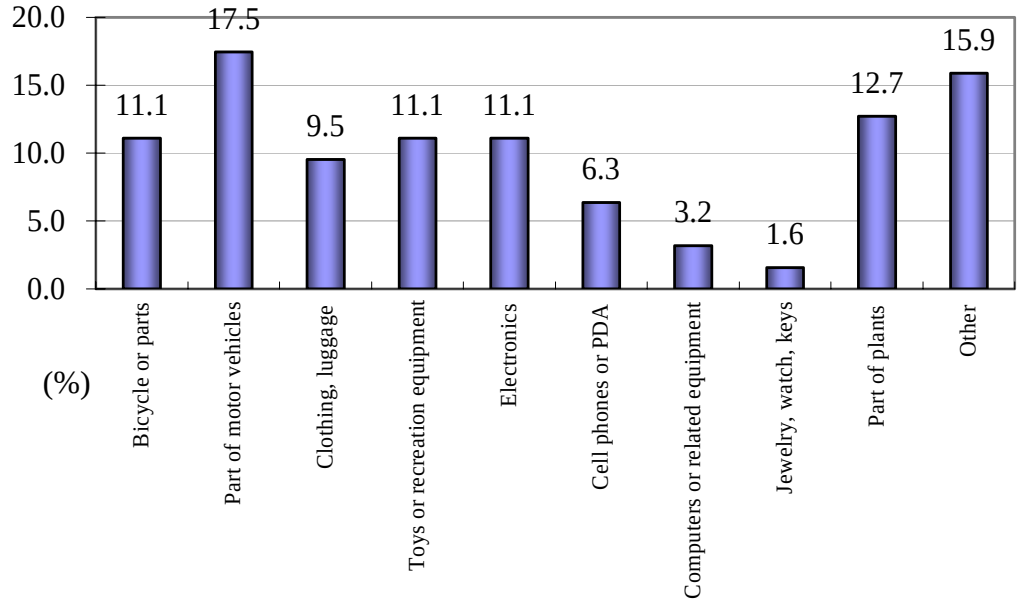

Figure 4.3: Items Stolen by Property Crimes (n=63)

4.3.2 Neighbors' Crime Experience

To know residents' crime experience in their apartment territory, their neighbors' crime experience was also investigated. Among the 206 respondents, 127 responded that they knew of neighbors' crime experience in the apartment properties. Additionally, 20 respondents indicated that they had heard of neighbors' crime experience more than five times.

Neighbors' crime experiences differed according to the types of community at the 0.005 level[31]. The results of crime experience in apartment communities demonstrated that gated community respondents experienced more crimes than perceived gated community respondents and non-gated community respondents (see Table 4.27).

At this point, the fact that more gated community respondents heard about their neighbors' crime experience than perceived gated and non-gated community respondents should be highlighted. Based on the above results, the null hypothesis should be rejected that residents' crime experience does not differ according to the types of community. The assumption should also be rejected that residents' in gated communities experience less crimes than residents living in the other two types of communities.

[31] To apply the Chi-square test, neighbors' crime experiences were categorized into two groups; "I have heard my neighbors' crime experience", and "I have not heard". The Chi-square value with this composition was 11.117 at the 0.005 level.

Chi-Square Test

Items	Value	df	Asymp. Sig.
Pearson Chi-Square	11.117(a)	2	.004
N of valid cases	206		

TABLE 4.27

Neighbors' Crime Experience [frequency (%)]

Neighbors' crime experience	Type of community			Total
	Gated community	Perceived gated community	Non-gated community	
Never	15 (23.8)	18 (35.3)	46 (50.0)	79 (38.3)
1 time	13 (20.6)	8(15.7)	16(17.4)	37 (18.0)
2 times	11 (11.5)	7 (13.7)	11 (12.0)	29 (14.1)
3 times	9 (14.3)	8 (15.7)	6(6.5)	23 (11.2)
4 times	8 (12.7)	7 (13.7)	3 (3.3)	18 (8.7)
More than 5 times	7 (11.1)	3 (5.9)	10 (10.9)	20 (9.7)
Total	63 (100.0)	51 (100.0)	92 (100.0)	206 (100.0)

The contents of neighbors' crime experiences were investigated. One hundred and twenty seven survey participants indicated that they had heard about their neighbors' crime experience. They were asked to mark all stolen items they heard about and the total frequency of their marks was counted as 205. Among the 205 stolen items, 35.1% were parts of motor vehicles or related items. More than 12% were electronics, and 9.3% were bicycles or related parts. The thefts against motor vehicles happened more in gated and perceived gated communities than in non-gated communities. The contents of neighbors' crime experiences were demonstrated in Table 4.28.

Table 4.28

Neighbors' Crime Experience within Apartment Territory [frequency (%)]

Stolen items	Type of community			Total
	Gated community	Perceived gated community	Non-gated community	
Part of motor vehicles	27 (36.0)	21 (39.6)	24 (31.2)	72 (35.1)
Electronics	9 (12.0)	6 (11.3)	10 (13.0)	25 (12.2)
Bicycle or parts	7 (9.3)	2 (3.8)	10 (13.0)	19 (9.3)
Purse or wallet	3 (4.0)	9 (17.0)	5 (6.5)	17 (8.3)
Cash	4 (5.3)	3 (5.7)	4 (5.2)	11 (5.4)
Computers related equipment	2 (2.7)	1 (1.9)	6 (7.8)	9 (4.4)
Jewelry, watch, keys	4 (5.3)	2 (3.8)	3 (3.9)	9 (4.4)
Clothing, luggage	3 (4.0)	2 (3.8)	2 (2.6)	7 (3.4)
Cell phones or PDA	0 (0.0)	0 (0.0)	3 (3.9)	3 (1.5)
Toys or recreation equipment	0 (0.0)	1 (1.9)	0 (0.0)	1 (0.5)
Part of plants	1 (1.3)	0 (0.0)	1 (1.3)	2 (1.0)
Other	15 (20.0)	6 (11.3)	9 (11.7)	30 (14.6)
Total	75 (100.0)	53 (100.0)	77 (100.0)	205(100.0)

4.4 Residents' Opinions on Gates and Fences

How do the residents think about gated and fences around their apartment communities? The answers to this question were found.

4.4.1 Opinions on Gates and Fences in Apartment Communities

That gate control systems provide a perception of safety to residents was assessed. Mean values from investigating residents' perceptions for gates and fences were more than 3.0 (see Table 4.29).

For the items that investigated residents' perceptions of gates, "I think that the gate control system in our property's gate improves resident's safety from crime," and, "I think that the gate control system in our property gate eases residents' fear of crime", the mean values were 3.41 and 3.64 respectively. The mean differences according to the types of communities were not statistically significant.

For the items that investigated residents' perception of fences around their apartment territory, "I think that the fences around our property improve residents' safety from crime," and, "I think that the fences around our property ease residents' fear of crime," the mean values were 3.52 and 3.63 respectively. The mean differences in the opinions that fences around apartment properties would ease residents' fear of crime were statistically significant according to the types of communities at the 0.001 level.

Residents' opinions on segregated apartment territory by gates and fences from their neighboring areas were assessed by asking if they thought that the gates or fences in their apartment property made the residents feel separated from the neighboring areas.

The mean value of the responses was 2.86. Survey respondents generally did not agree that gates and fences in apartment communities separate their properties from the neighboring areas. These results are tabulated in Table 4.29.

TABLE 4.29
Residents' Opinions on Gates and Fences in Apartment Communities
Results from One-way ANOVA

Perceptions		Types of community	N	Mean	F-value
Opinions on gates	I think that the gate control system in our property gate improves resident's safety from crime.	Gated	63	3.51	.852
		Perceived gated	51	3.49	
		Non-gated	86	3.28	
		Total	200	3.41	
	I think that the gate control system in our property gate eases residents' fear of crime.	Gated	63	3.87	2.783
		Perceived gated	51	3.65	
		Non-gated	87	3.46	
		Total	201	3.64	
Opinions on fences	I think that the fences around our property improve residents' safety from crime.	Gated	63	3.65	2.316
		Perceived gated	51	3.69	
		Non-gated	87	3.32	
		Total	201	3.52	
	I think that the fences around our property ease residents' fear of crime.	Gated	63	4.05	9.055*****
		Perceived gated	49	3.63	
		Non-gated	86	3.31	
		Total	198	3.63	
Opinion on gated and fenced territory	I think that gates or fences of our apartment property make our residents feel that we are segregated from the neighboring areas.	Gated	63	2.94	.198
		Perceived gated	50	2.80	
		Non-gated	85	2.84	
		Total	198	2.86	

NOTE: 1= Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5= Strongly agree
***** F-value is significant at the 0.001 level

The results in Table 4.29 can be interpreted that most respondents agree that the gated or fenced territory of apartment properties provide perceived safety to residents because almost all mean values were greater than 3.0. Thus, the results also support the position that residents are aware of territoriality in their residential environments as related to the safety issue. The exclusive community environments, however, are not recommendable based on the results.

As mentioned earlier, for the item asking if residents thought that the fences around their property would ease their fear of crime, there was a statistically significant difference. The mean differences between gated community respondents and non-gated community respondents were significant at level 0.001, as shown in Table 4.30.

TABLE 4.30
Residents' Opinions on Gates and Fences in Apartment Communities
Results from Tukey's Post Hoc Test

Item	(I) Type of Community	(J) Type of Community	Mean Difference (I-J)	p-value
I think that the fences around our property ease residents' fear of crime.	Gated	Perceived gated	.415	.093
		Non-gated	.734*	.000
	Perceived gated	Gated	-.415	.093
		Non-gated	.319	.203

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

4.4.2 Effectiveness of Gates and Fences for Residents' Perceived Safety

Residents' opinions of the effectiveness of gates and fences for easing their fear of crime in apartment properties were investigated. This question was to cross-check the results in Table 4.29.

As Table 4.31 exhibits, the survey respondents agreed that gate control systems are more effective than fences around the apartment boundary for improving perceived safety. Among the 201 responses, 58.7% responded that both gate control systems and fences are effective. Though there was no significant difference in residents' opinions according to the types of communities, more gated and perceived community residents demonstrated the effectiveness of both gates and fences for easing their fear of crime in their apartment properties.

TABLE 4.31

Effective Method for Easing Residents' Fear of Crime in Apartment Properties

[frequency (%)]

Effective methods for easing fear of crime	Type of community			Total
	Gated community	Perceived gated community	Non-gated community	
Gate control system > fences	7 (11.3)	6 (12.0)	12 (13.5)	25 (12.4)
Fences > gate control system	3 (4.8)	1 (2.0)	4 (4.5)	8 (4.0)
Both gate control system & fences	39 (62.9)	34 (68.0)	45 (50.6)	118 (58.7)
None	13 (21.0)	9 (18.0)	28 (31.5)	50 (24.9)
Total	62 (100.0)	50 (100.0)	89 (100.0)	201 (100.0)

However, 24.9% of the respondents indicated that neither gates nor fences could ease residents' fear of crime. Residents living in non-gated community showed higher percentages of crime than residents in gated and in perceived gated communities. Considering that more gated community residents reported higher crime rates than perceived and non-gated communities, the residents' negative opinions on gates and fences should be given attention.

In addition to their direct opinions on the effectiveness of gates and fences, two indirect questions were investigated to assess residents' safety related behaviors in apartment communities. The respondents were asked if they agreed that they would usually lock the windows while they went out and if they usually lock the windows while they stayed inside at night. The mean values of the two questions were 4.15 and 4.10, which supported that survey respondents generally agreed that they would usually lock the windows. There was no statistically significant difference according to the three types of communities (Table 4.32). The results support for the 24.9% respondents' opinions that neither gates nor fences can ease residents' fear of crime in Table 4.31.

TABLE 4.32
Residents' Safety related Behaviors

Behaviors	Type of community	N	Mean	F-value
I usually lock the windows while I go out.	Gated	63	4.30	1.60*
	Perceived gated	51	4.24	
	Non-gated	90	3.99	
	Total	204	4.15	
I usually lock the window while I stay inside at night.	Gated	63	4.13	0.03*
	Perceived gated	51	4.12	
	Non-gated	90	4.08	
	Total	204	4.10	

* The F-value is not statistically significant.

4.5 Factors Related to Residents' Perceived Safety

4.5.1 Important Factors to Ease Residents' Fear of Crime

In the previous subchapters, residents' perceptions of safety and their opinions on the related issues have been explored. Statistical differences were verified in their responses according to the conditions and level of gating and fencing of their apartment communities.

In this subchapter, other factors expected to affect residents' perceived safety were identified. Survey respondents were asked to indicate the three most important factors for easing residents' fear of crime at night in an apartment property. Nine items were provided, including 24 hours maintenance service by the maintenance staff, gate control system of the main entrance, fences around the apartment property, bright lighting at night, patrol service by a private patrol company, direct emergency buttons on the phone /wall, visual access to local police, open visual access to every space in the property, and "other".

Among the 206 respondents, 61.7% marked "patrol services by a private patrol company" as the most important factor for easing residents' fear of crime at night. More than half (= 53.9%) of respondents indicated bright lighting at night, and 37.4% indicated the gate control system. In addition, visual access to local police (25.7%) and direct emergency button on the phone or wall (23.8%) were also regarded to be important. The 24 hours maintenance service by the maintenance staff was indicated as important by 19.9% of the survey respondents. The results are illustrated in Figure 4.4.

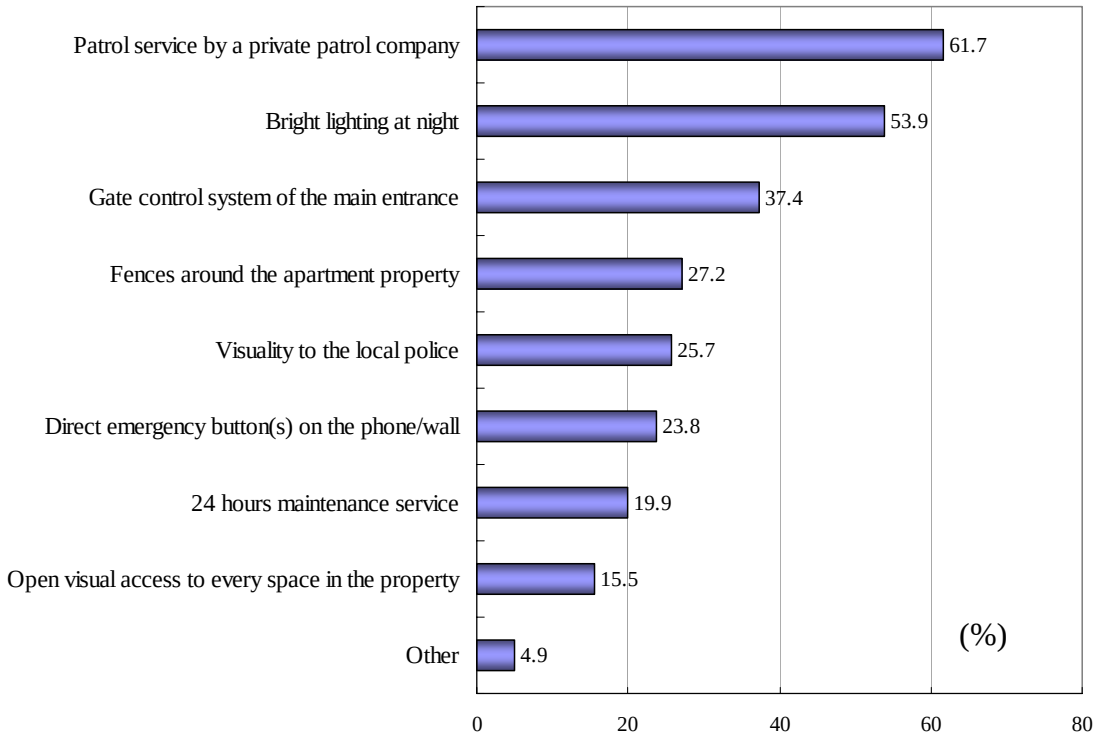

Figure 4.4: Important Factors to Ease Residents' Fear of Crime at Night (N=206)

The differences of residents' opinions for these factors were also examined. Gated community respondents indicated "patrol service by a private patrol company", "bright lighting at night", and "fences around the apartment territory" in that order. Perceived gated community respondents indicated "patrol service by a private patrol company", "bright lighting at night", and "gate control system of the main entrance." Non-gated community respondents indicated "bright lighting at night", "patrol service by a private patrol company", and "gate control system of the main entrance".

Considering the three respondent groups, their responses were significantly different. Non-gated community respondents emphasized more “bright lighting at night” than the other groups of respondents. The responses to the important factors are exhibited in Table 4.33.

TABLE 4.33

Important Factors to Ease Residents’ Fear of Crime at Night [frequency (%)]

Factors for easing residents’ fear of crime at night	Type of community			Total
	Gated community	Perceived gated community	Non-gated community	
Patrol service by a private patrol company	47 (74.6)	32 (62.7)	48 (52.2)	127 (61.7)
Bright lighting at night	26 (41.3)	29 (56.9)	56 (60.9)	111(53.9)
Gate control system of the main entrance	18 (28.6)	23 (45.1)	36 (39.1)	77 (37.4)
Fences around the apartment property	20 (31.7)	14 (27.5)	22 (23.9)	56 (27.2)
Visual access to the local police	15 (23.8)	10 (19.6)	28 (30.4)	53 (25.7)
Direct emergency button(s) on the phone/wall	19 (30.2)	12 (23.5)	18 (19.6)	49 (23.8)
24 hours maintenance service by the maintenance staff	11 (17.5)	12 (23.5)	18 (19.6)	41 (19.9)
Open visual access to every space in the property	8 (12.7)	9 (17.6)	15 (16.3)	32 (15.5)
Other	3 (4.8)	3 (5.9)	4 (4.3)	10 (4.9)
Total	63 (100.0)	51 (100.0)	92 (100.0)	206 (100.0)

4.5.2 Neighborhood Attachment and Residents' Perceptions of Safety

Newman (1973) suggested six goals for creating defensible space in housing territory. He indicated the need to increase the sense of community felt by residents for preventing the fear of crime in public housing projects. Blakely and Snyder (1999) also emphasized the encouragement of residents to get to know their neighbors in order to prevent crime in residential environments. Their works provided enough theoretical background to investigate the correlations between residents' neighborhood attachment and their perception of safety in their residential territory.

Table 4.34 shows the results of residents' neighborhood attachment. In general, the degrees of neighborhood attachment were higher than 3.0. The mean value of the item asking residents' willingness to work together with others on something to improve their apartment properties - neighborhood attachment - was 3.82. For this item, non-gated community residents showed a higher mean value than gated and perceived gated apartment residents.

For the third item asking if they would recommend their current apartments to their friends who are looking for a new apartment, there were statistically significant differences between gated and non-gated community residents. The mean difference between the two groups was significant at the 0.005 level. This item was also used to evaluate residential satisfaction. From the mean value of this item (= 3.58), the overall residential satisfaction was positive in the three community respondents groups. The mean differences among the three groups are exhibited in Table 4.34. The mean

difference between gated and non-gated community respondents was statistically significant at the 0.005 level (see Table 4.35).

TABLE 4.34

Residents' Neighborhood Attachment

Neighborhood attachment	Types of community	N	Mean	F-value
I would be willing to work together with others on something to improve our apartment property: Willingness to work with neighbors	Gated	63	3.75	1.054
	Perceived gated	51	3.71	
	Non-gated	88	3.94	
	Total	202	3.82	
I get a sense of community from living on this apartment property: Sense of community	Gated	63	3.08	.577
	Perceived gated	51	2.92	
	Non-gated	88	3.14	
	Total	202	3.06	
If one of my friends is looking for a new apartment, I would recommend our property to him/her: Preference of the current community or residential satisfaction	Gated	63	4.03	6.915***
	Perceived gated	51	3.57	
	Non-gated	89	3.27	
	Total	203	3.58	

NOTE: 1= Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5= Strongly agree
*** F-value is significant at the .005 level

TABLE 4.35

Residents' Neighborhood Attachment: Results from Tukey's Post Hoc Test

Item	(I) Type of community	(J) Type of community	Mean difference (I-J)	p-value
If one of my friends is looking for a new apartment, I would recommend our property to him/her	Gated	Perceived gated	.463	.121
		Non-gated	.762***	.001
	Perceived gated	Gated	-.463	.121
		Non-gated	.299	.360

*** The mean difference is significant at the .005 level.

To determine correlations between neighborhood attachment and residents' perceptions of safety, correlation coefficient values were examined as in Table 4.36.

TABLE 4.36
Correlations between Neighborhood Attachment and Perceived Safety

Items	Perception of safety during the day	Perception of safety at night	Willingness to work together with neighbors	Sense of community	Preference of the current community
Perception of safety during the day	1	.687**	.115	.190**	.464**
Perception of safety at night	.687**	1	.133	.265**	.491**
Willingness to work together with neighbors	.115	.133	1	.358**	.279**
Sense of community	.190**	.265**	.358**	1	.508**
Preference of the current community	.464**	.491**	.279**	.508**	1

** Correlation is significant at the .01 level.

Among the three items used to assess residents' neighborhood attachment, the item asking about the sense of community and respondents' preferences for their current communities showed statistically significant correlations. In addition, the preference for the current community showed a strong correlation with residents' perception of safety both during the day and at night.

Considered that the sense of community, or community coherence, is more closely related with the neighborhood attachment factor, the second item was selected as a

representative item explaining residents' neighborhood attachment in the multiple regression model proposed in the next section.

4.5.3 Multiple Regression Models including the Neighborhood Attachment Factor

For predicting residents' perceived safety in their apartment territory, stepwise multiple regression analyses were conducted with the five independent variables. Among the five independent variables, the types of community and family's annual income were verified as the significant predictors for predicting residents' perceived safety in their apartment territory (see Table 4.23).

Those analyses, however, did not consider residents' socialization aspects. Thus, the residents' neighborhood attachment factor was included for predicting residents' perceived safety in their apartment territory. The results from the stepwise multiple regression analyses for residents' general perception of safety during the day and at night considering neighborhood attachment were presented in Table 4.37.

The multiple regression model for residents' general perception of safety during the day considering neighborhood attachment was proposed below. The model was statistically significant at the 0.001 level. The R-square of the model was 0.205 and the F-value was 13.803.

Multiple Regression Model .

General Perception of Safety during the day = 2.538 + (0.300) Type of community + (0.208) Neighborhood attachment + (0.163) Family's annual income

Additionally, the multiple regression model for residents' general perception of safety at night considering neighborhood attachment was proposed. This model had 0.194 as the R-square value and 12.887 as the F-value. Though the R-square value was low, the model was significant at the 0.001 level. The multiple regression model considering neighborhood attachment is proposed below.

Multiple Regression Model .

General Perception of Safety at night = 1.525 + (0.374) Type of community +
(0.268) Neighborhood attachment + (0.172) Family's annual income

The results from the stepwise multiple regression analyses are presented in Table 4.37. Among the six independent variables, neighborhood attachment was verified as an important predictor with the types of community variable and the family's annual income variable. The multiple regression models presented that neighborhood attachment had positive functions for improving residents' perception of safety in their apartment territory or their near-home environments both during the day and at night. Therefore, in order to improve residents' perceived safety in their apartment communities, in addition to architectural aspects and demographic aspects, residents' socialization aspects should be considered.

TABLE 4.37

Stepwise Multiple Regression Analyses Predicting Residents' General Perceived Safety in their Apartment Territory – Neighborhood Attachment

Dependent variable	Model	B	SE B	β
General perceived safety in apartment territory during the day	Step 1			
	Constant	3.419	.182	
	Types of community	.397	.088	.333****
	Step 2			
	Constant	2.761	.269	
	Types of community	.405	.086	.339****
	Neighborhood attachment	.208	.064	.233***
	Step 3			
	Constant	2.538	275	
	Types of community	.300	.092	.252***
	Neighborhood attachment	.208	.063	.233***
	Family's annual income	.163	.058	.217*
General perceived safety in apartment territory at night	Step 1			
	Constant	2.606	0.225	
	Types of community	.474	.109	.324****
	Step 2			
	Constant	1.760	.331	
	Types of community	.487	.105	.332****
	Neighborhood attachment	.266	.079	.244***
	Step 3		.	
	Constant	1.525	340	
	Types of community	.374	.114	.255***
	Neighborhood attachment	.268	.077	.245***
	Family's annual income	.172	.071	.188**

NOTE1: Type of community – 1= non-gated, 2= perceived gated, 3= gated community.
NOTE2: B = Unstandardized Coefficients B, SE B= Standard Error for B,
β = Standardized Coefficients Beta
NOTE 3: During the day: R^2 = .111 for Step 1; R^2 = .165 for Step 2; R^2 = .205 for Step 3
At night: R^2 = .105 for Step 1; R^2 = .164 for Step 2; R^2 = .194 for Step 3
*p<.01 ** p<.05 *** p<.005 **** p<.001

The histogram in Figure 4.5 and the normal P-P plot of regression standardized residual in Figure 4.6 assessed the normal distribution of the data and the

appropriateness of the proposed model for predicting residents' perceptions of safety at night.

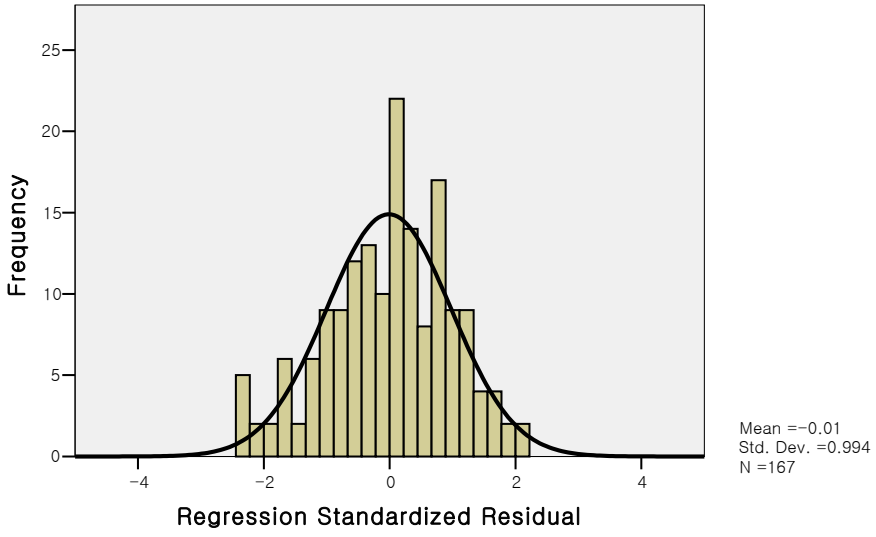

Figure 4.5: Histogram of the Model of General Perceived Safety in Apartment Territory at Night.

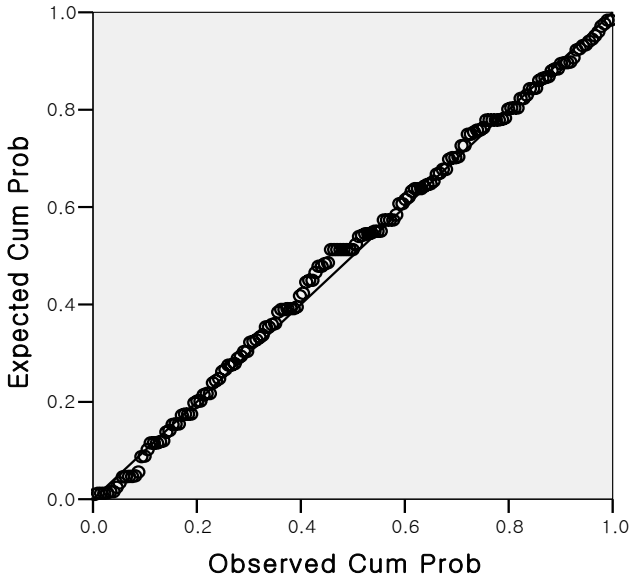

Figure 4.6: The Normal P-P Plot of Regression Standardized Residual

4.6 Hypothesis Testing and Discussions

Residents' perceptions of safety and their crime experiences were investigated and their responses were analyzed in terms of their apartment community types, architectural factors, demographic factors, and socialization factors. Based on the statistical analyses and the multiple regression models proposed in the previous chapters, the research hypotheses were finally tested as follows.

1) Hypothesis I. Residents live in gated communities because of the safe environment.

The reasons residents chose their current apartment communities demonstrated that residents living in gated communities and perceived gated communities consider the safety issue more significantly than those in non-gated communities. In other words, it is inferred that the residents who live in gated communities chose their current apartment communities to have safer residential environments. Based on the results, it is recommended that the safety issue in people's residential environments should be fully considered for future housing survey conducted by housing authorities or federal survey organization (refer to Figure 4.2. and Table 4.5).

However, more perceived gated community residents indicated the safety issue in determining their current apartments, though the perceived gated communities did not provide fully controlled traffic entry from the outside. Therefore, the perceived territoriality by residents should be more important than the fully exclusive physical territoriality provided by gates and fences.

2) Hypothesis II. Residents' general perceptions of safety differ according to the conditions of gating and fencing of communities: their perception of safety is greater in gated communities than in perceived gated communities or in non-gated communities.

Residents' general perceptions of safety during the day and at night were significantly different according to the types of community based on one-way ANOVA and Tukey's post hoc tests. Thus, the differences according to the three types of community were verified (refer to Tables 4.17 and 4.18).

However, residents' perception of safety was not greater in gated communities than in perceived gated communities. For the general perception of safety during the day, there were statistically significant differences between gated and perceived communities and non-gated communities. For the general perception of safety at night, there were also statistically significant differences between gated and perceived communities and non-gated communities. Thus, the fully controlled gated communities were perceived safer than non-gated communities by residents in terms of easing their fears of crime. But, residents' perceived safety in perceived gated communities did not significantly differ from those in gated communities (refer to Table 4.18).

For the other items measuring residents' perceived safety -"our apartment property is free from crime and very safe", "our apartment property is a safe place for children to play in", and "our apartment property is safe for parking residents' cars" – significant differences also existed between gated communities and non-gated communities (see Table 4.18). The responses of perceived gated community resident, however, showed similar characteristics to those of gated community respondents.

Consequently, residents' general perception of safety differed according to the territoriality provided by fences. Residents' felt safer in fenced communities than in the communities having neither gates nor fences. Residents' perception of safety in fenced territory, or perceived gated communities, was not significantly different from those in gated communities having fully controlled gate systems. Therefore, the important issue for residents' perceived safety seems to be territoriality. The territoriality in residential environments should thus be considered for improving residents' perceived safety.

3) Hypothesis III. Residents' perceived safety in private, semi-public, and public areas differs according to the conditions of the gating and fencing of communities: their perception of safety in public, semi-public, and private areas is greater in gated communities than in perceived gated communities or in non-gated communities.

The results from the one-way ANOVA for verifying the mean differences in residents' perceived safety in private, semi-public, and public areas demonstrated statistically significant differences according to the three types of communities (refer to Tables 4.13 and 4.15).

The results from the Tukey's post hoc tests demonstrated that the differences usually occurred between gated community residents' responses and non-gated community residents' responses. But, residents' perception of safety in the designated spaces during the day was not critically different between gated communities and perceived gated communities (refer to Tables 4.14. and 4.16).

However, residents' perceived safety at night in the designated spaces was statistically different between gated communities and perceived gated communities. Except for the residents' perceived safety in the private area at night, residents' perceptions of safety in semi-public areas and public areas at night were statistically different between gated communities and perceived gated communities.

In summary, residents' perceived safety during the day differed according to the conditions of community fencing or physical territoriality. But, residents' perceived safety at night differed according to the conditions and level of the gating and fencing of the apartment communities.

Additionally, it was indicated that residents' perceived safety in apartment communities would be improved by guaranteeing residents' perceived safety in semi-public and public areas in apartment properties (refer to Tables 4.21 and 4.22). The stepwise multiple regression models proposed in this study presented the importance of the perceived safety in public and semi-public areas for improving residents' general perceived safety in their apartment territory.

4) Hypothesis IV. Residents' crime experiences differ according to the conditions of gating and fencing in the communities. Residents in gated communities experience less crime than residents in perceived gated communities or in non-gated communities.

The correlations between the type of community and residents' crime experiences were tested. Residents' crime experiences did not differ according to the conditions of gating and fencing in the apartment communities (refer to Tables 4.26 and 4.27).

However, their neighbors' crime experience differed according to the types of community; more gated community residents heard about their neighbors' crime experiences than perceived gated community residents and non-gated community residents. From the results that showed respondents' own property crime experiences and their neighbors' crime experiences, it was thus indicated that gated community respondents experienced more crimes than perceived gated community respondents and non-gated community respondents.

Therefore, the sub-hypothesis, residents in gated communities experience less crime than residents in perceived gated communities or in non-gated communities, was rejected. Gated territory does not guarantee residents' free from crime in apartment communities.

5) Hypothesis V. Residents' perceived safety and crime experiences correlate with the gate and fence status of communities.

Residents' perceived safety and crime experiences correlated with the gate and fence status of communities, based on the correlation coefficients and the linear regression models proposed earlier in this chapter. The following correlation table, Table 4.38, and the multiple regression models support the above statement.

TABLE 4.38
Correlation Coefficient between Types of Community and Perceptions of Safety

Independent variables	Pearson's Correlation Coefficient	
	During the day	At night
Types of community	0.354**	0.326**

NOTE: Type of community: 1= non-gated , 2= perceived gated, 3= gated community
** Correlation is significant at the .01 level.

In order to test this hypothesis, other factors related to security - night lighting, security patrol service, 24-hour maintenance service, and contact with neighbors - were also considered. Though residents' perceived safety correlated with the gate and fence status of communities, their crime experience was opposite to their perceived safety. These results imply that gates in apartment communities are not the absolute solutions for reducing property crimes in apartment territory (refer to Figure 4.4).

Survey participants thus indicated patrol services by private patrol companies and bright lighting at night would be more important than gates and fences in apartments. Additionally, they indicated the important role of the visual access to the local police and the direct emergency connection to outside the apartments in order to ease the fear of crime at night in apartment communities (refer to Table 4.33).

6) Hypothesis VI. Residents' perceived safety and crime experiences correlate with their demographic characteristics, socioeconomic characteristics, and socialization in their housing communities.

Residents' perceived safety and crime experiences correlated with their demographic characteristics, such as gender and dwelling floor level. Those variables

were statistically correlated with residents' perceptions of safety, but were not explanatory predictors for multiple regression models proposed for predicting residents' perceived safety. Such variables as age, race, and length of residence indicated as significant in the previous studies were not significant in this study.

Residents' perceived safety and crime experiences strongly correlated with their socioeconomic characteristics, such as educational attainment and annual income. Their perceived safety and crime experiences likewise correlated with their neighborhood attachment. Considering these diverse aspects and the statistical significance of the models, the two multiple regression models were presented as follows.

Multiple Regression Model .

General Perception of Safety during the day = 2.538 + (0.300) Type of community + (0.208) Neighborhood attachment + (0.163) Family's annual income

The R-square of the model was 0.205 and the F-value was 13.803. The model was statistically significant at the 0.001 level (refer to Tables 4.37).

Multiple Regression Model .

General Perception of Safety at night = 1.525 + (0.374) Type of community + (0.268) Neighborhood attachment + (0.172) Family's annual income

This model had 0.194 as the R-square value and 12.887 as the F-value and this model was significant at the 0.001 level (refer to Tables 4.37).

For the successful applications of the multiple regression models, the type of community variable should have three values including 1 (= non-gated communities), 2 (= perceived gated communities), or 3 (= gated communities).

The two multiple regression models imply the importance of territoriality (= type of community). The models also indicate that residents' demographic characteristics such as family's annual income affect their perceptions of safety in their near-home environment. The models additionally explain that residents' socialization with their neighbors can improve their perceived safety.

CHAPTER V

FINDINGS FROM THE COMMUNITY MANAGER SURVEY

5.1 General Information of Participants

Seventy two managers were asked to participate in the survey that investigated apartment community managers' opinions on gates and fences in apartment communities. Among them, 18 managers refused to participate in the survey saying that they could not respond to the questions regarding the safety issue in apartment communities. Thirteen managers actually participated in the survey, while the remainder never responded to the survey.

Among the 13 survey participants, one respondent did not contribute his/her demographic information. Among the 12 identified respondents, ten were females and two were males; seven were managers of gated communities, three were managers of perceived gated communities, and two were the managers of non-gated communities.

Their age range was between 20's and 40's. The managers were divided into the two ethnic groups: African-American and Caucasian; among the 12 identified participants, five were African-American and seven were Caucasian. All had educational attainment of high school or higher. Ten respondents among the 12 were property managers and the other two were assistant managers. Regarding the work experiences, the majority had more than five years experience as apartment property managers. The general characteristics of the survey participants are tabulated in Table 5.1.

TABLE 5.1

General Characteristics of the Subject Managers

General characteristics		Frequency	Percent
Types of Community	Gated	7	58.3
	Perceived gated	3	25.0
	Non-gated	2	16.7
Gender	Female	10	83.3
	Male	2	16.7
Age	20s	3	25.0
	30s	5	41.7
	40s	4	33.3
Ethnic group	African America	5	41.7
	Caucasian	7	58.3
Educational attainment	High school	4	33.3
	College graduate /Bachelor	7	58.3
	Other	1	8.3
Position	Property manager	10	83.3
	Assistant manager	2	16.7
Work experience as an apartment property manager	Less than 1 year	2	16.7
	5-8 years	3	25.0
	8-10 years	2	16.7
	10-15 years	2	16.7
	15-20 years	1	8.3
	More than 20 years	2	16.7
	Total	12	100.0

5.2 Perceived Safety and Reality of Crime

Managers were asked how much they agreed with the items in the survey that assessed the safety issues in their apartment communities. They showed positive opinions on “our apartment property has no crime and very safe”; the mean value was 3.69. However, they indicated that they had some vandalism such as graffiti, trash, or other damage in their apartment communities; the mean value was 2.69.

With the items that directly asked about their opinions on residents’ perceived safety, two indirect questions were used to measure the perceived safety by residents. The items asking if residents in their apartment communities use, at night, the public spaces such as the fitness center and club house were included as the indirect questions in the survey. The responses of the managers were neutral. The mean values for the two questions were 3.00 and 3.27 respectively.

Twenty-four hours maintenance service was considered in the survey as a managerial support mechanism for improving residents’ safety in apartment territory. The managers strongly agreed that residents in their community could contact one of their maintenance staff 24 hours a day. The results of the managers’ opinions on safety in their apartment communities are tabulated in Table 5.2.

To determine the reality of crime in their current properties, managers were asked how often they received reports from residents regarding property crimes. Figure 5.1 demonstrates that the apartment managers received crime reports from their residents more than once a year. Among the 13 managers, three indicated that they received crime reports from their residents more than 20 times a year. Considering that some residents

do not report crime experience to the maintenance group, the actual crime rate may be higher. Based on the results in Table 5.2 and Figure 5.1, it can be inferred that most of apartment properties had difficulties in dealing with residents' perceived and actual safety issues in their property boundary.

TABLE 5.2

Managers' Opinions on the Safety in their Apartment Communities

Items	Agreement level	Freq	%	Mean
Our apartment property has no crime and is very safe	Strongly disagree	1	7.7	3.69
	Disagree	2	15.4	
	Neutral	1	7.7	
	Agree	5	38.5	
	Strongly agree	4	30.8	
	Total	13	100.0	
Our apartment property has no vandalism such as graffiti, trash, or other damage	Disagree	7	53.8	2.69
	Neutral	3	23.1	
	Agree	3	23.1	
	Total	13	100.0	
Many of our residents are using the fitness center at night	Strongly disagree	2	18.2	3.27
	Neutral	4	36.4	
	Agree	3	27.3	
	Strongly agree	2	18.2	
	Total	11	100.0	
Many of our residents are using the club house at night	Strongly disagree	2	22.2	3.00
	Neutral	5	55.6	
	Strongly agree	2	22.2	
	Total	9	100.0	
Residents in our community can contact one of our maintenance staff 24 hours a day	Agree	6	46.2	4.54
	Strongly agree	7	53.8	
	Total	13	100.0	

NOTE: Non-responses were excluded from the anlaysis.

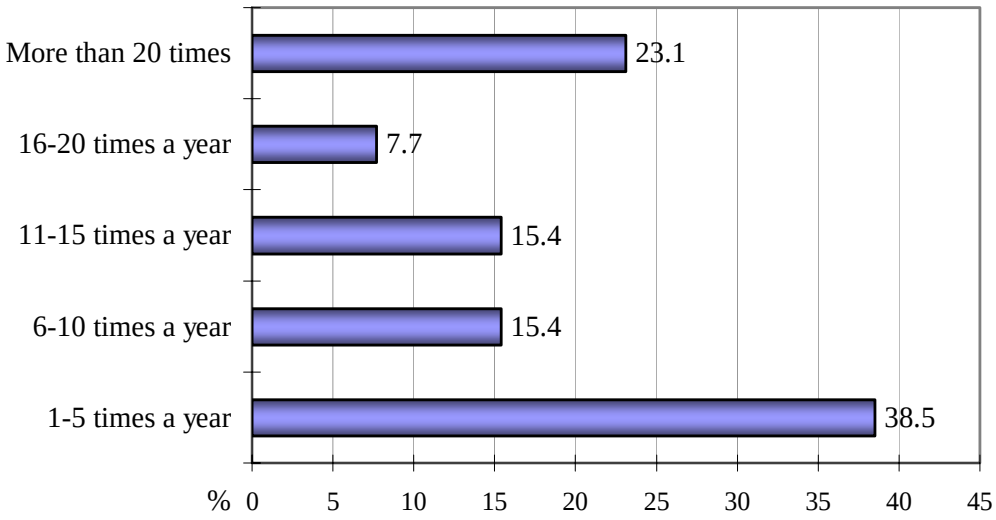

Figure 5.1: Crime Reports from Residents (N=13)

Therefore, diverse efforts for improving residents' perceived safety should be considered from the managerial perspectives.

5.3 Community Managers' Opinions on Gates and Fences

The initial question for this chapter was about how apartment managers think of the gates and fences around their apartment communities. There were six items used to examine this issue.

When managers were asked if they agree that gated apartment communities have less crime than non-gated communities, the mean value was 2.08. This means that managers did not agree that gated apartment communities have less crime than non-gated communities.

When managers were asked if they think that gate control systems in apartment gates would improve residents' safety from crime, the mean value was 2.00. When asked if they think that the fences around apartment properties would improve residents' safety from crime, the mean value was 2.08. In other words, apartment community managers showed a negative attitude to gates and fences.

Compared with the results in Chapter IV, the opinions from apartment community managers were more negative than residents regarding the roles of gates and fences for improving residents' perceived safety. Apartment managers' opinions on gates and fences are exhibited in Table 5.3.

TABLE 5.3

Managers' Opinions on Gates and Fences in Apartment Communities

Managers' Opinions		Min.	Max.	Mean	Std. Deviation
On gated communities	Gated apartment communities have less crime than non-gated communities	1	5	2.08	1.12
	Gates and fences are needed for providing safe communities for residents in the city of Houston	1	5	3.46	1.27
	Residents usually prefer gated communities if their rental prices are similar to those of non-gated communities	1	5	3.31	1.38
On gates	I think that the gate control systems in apartment gates improve residents' safety from crime	1	4	2.00	1.15
On fences	I think that the fences around apartment properties improve residents' safety from crime	1	4	2.46	1.20
On the effects of gated territory	I think that gates or fences of apartment properties are efficient for blocking the unwanted traffic from outside	1	4	2.08	0.95

NOTE: 1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree, 5=Strongly agree

On the other hand, managers agreed that gates and fences would be needed for providing safe communities for residents in the City of Houston, and that residents usually prefer gated communities if their rental prices are similar to those of non-gated communities. The mean values for these items were 3.46 and 3.31 respectively.

In addition to the opinions above, the managers were asked which is more effective for improving residents' safety in apartment properties – gates or fences. In

Chapter IV, 58.7% of residents indicated that both gate control systems and fences are effective for improving residents' perceived safety in apartment properties; 12.4% selected gate control systems, while 4.0% selected fences as the most effective way to improve residents' perceived safety (see Table 4.31).

From the result in Table 5.4, half of the managers indicated that neither gate control systems nor fences would be effective for improving residents' safety from crime in apartment properties. This result was different from the residents' opinions. Approximately 25% of the residents indicated that neither gates nor fences could ease residents' fear of crime (see Table 4.31).

For the importance of both systems, 41.7% of the managers indicated the importance of gate control systems and fences for improving residents' perceived safety. Based on the results in Table 5.3 and Table 5.4, it is found that apartment managers did not highlight the gate control systems and fences around apartment properties for improving residents' perceived safety.

TABLE 5.4
Managers' Opinions on Gates and Fences

More effective system	Frequency	Percent
Gate control system > fences	1	8.3
Both	5	41.7
None	6	50.0
Total	12	100.0

In addition to gates and fences, apartment managers indicated “patrol services by private patrol companies” and “bright lighting at night” as the most important factors in easing residents’ fear of crime at night in an apartment property. Managers’ opinions were similar to residents’ opinion on this issue.

“Fences around the apartment property” were ranked as the third most important factor and “gate control systems” were ranked fourth. Table 5.5 exhibited the important factors for easing residents’ fear of crime at night as selected by the apartment managers.

TABLE 5.5
Important Factors to Ease Residents’ Fear of Crime at Night

Factors*	Frequency	Percent
Patrol services by private patrol companies	10	76.9
Bright lighting at night	7	53.8
Fences around the apartment property	6	46.2
Gate control system	5	38.5
24 hours maintenance service	1	7.7
Direct emergency button on the phone	1	7.7
Visual access to the local police	1	7.7
Open visual access to every space in the property	0	0.0
Total	13	100.0

* Respondents were asked to choose three factors.

5.4 Managers' Suggestions for Safer Communities

The apartment managers participating in the survey were asked to give their opinions or ideas for improving residents' perceived safety in apartment communities. This kind of open-end question provides the opportunity to use their ideas, which might not have otherwise been included in the survey. Managers' suggestions for providing safe residential communities were excerpted from their statements on the questionnaire.

As Table 5.6 shows, most of managers emphasized residents' participations and their interests in their own communities as means to improve their perceived safety; managers also included some managerial considerations such as onsite patrol services and guard systems. Lighting was also emphasized by one manager as an important element for easing residents' fear of crime at night. Additionally, many of the managers indicated the difficulties in managing gate control systems.

TABLE 5.6

Managers' Opinions on Gated Communities and Residents' Perceived Safety

	Emphasis	Opinions on gated communities
1	Residents' participations and Onsite Patrol	Always make residents aware they are responsible for their own safety. The community should have an onsite patrol regularly and offer crime prevention seminars from local police. Crime has been significantly reduced with a visible onsite patrol. Gates slow traffic down, but they do not prevent crime.
3	Residents' participation	Monthly resident meetings will be effective.
4	Onsite guard	Gates and fences ease residents' fear of crime at night. However, they are basically only a deterrent. Difficulties managing a gated community exist. Residents complain when the gate requires a part that is not readily available and must remain open. Gated communities with one entrance and exit that are monitored by a full time guard are most suitable for those extremely concerned with crime. Multiple gates are extremely hard to manage and are very ineffective.
5	Ineffectiveness of gates and fences	The gate control system is considered as the security device. However, it is not. It often requires maintenance.
6	Difficulties in managing gates	Repairing the gates requires a lot of money. Gates are broken and malfunction quite frequently.
7	Gates, fences, extra locks, alarms, guards	For improving resident' perceived safety, such amenities as gates, fences, extra locks, alarms, and guards should be considered.
8	Lighting	Lighting is very important.
9	Residents' participations	Communicate with residents and neighbors. Exchange contact numbers and offer your number to them if they need anything in the future.
10	Residents' participations and guards	Gated communities can give a false sense of security and make residents let their guard down.
11	Residents' participations	Communities need to start telling residents that they are responsible for their own safety

CHAPTER VI

SUMMARY OF RESEARCH FINDINGS

This study aimed to suggest comprehensive suggestions for creating safer apartment communities through gathering information and opinions from residents and community managers, and verifying the relationships between physically provided residential territory and residents' perceived and actual safety.

The primary purpose of the study was to explore the connections between residents' perception of safety and their crime experience, and the existence of gates and fences in multi-family housing communities in urban areas. In order to cultivate discussions regarding the connections between gated community territory, safety, and crime experience, this study classified apartment communities according to the conditions of their gating and fencing; it also investigated apartment community managers' opinions on gated territory and safety.

This study had five specific research objectives. They were : 1) to identify the reason why people live in gated apartment communities, 2) to physically identify and classify three types of communities according to gate control (i.e. gated communities, perceived gated communities, and non-gated communities), 3) to examine the differences in residents' crime experiences in these three types of communities, 4) to determine the effects of gating and fencing on residents' perception of safety, and 5) to discuss if gated communities provide defensible spaces for protecting their residents.

The research hypotheses tested in this study were: (1) Residents live in gated communities because of the safe environment. (2) Residents' general perceptions of safety differ according to the conditions of gating and fencing of communities: their perception of safety is greater in gated communities than perceived gated communities or in non-gated communities having neither fences nor controlled gates. (3) Residents' perceived safety in public, semi-public, and private areas differs according to the conditions of the gating and fencing of communities: their perception of safety in public, semi-public, and private areas is greater in gated communities than in perceived gated communities or in non-gated communities. (4) Residents' crime experiences differ according to the conditions of gating and fencing in the communities: The residents in gated communities experience less crime than the residents in perceived gated communities or in non-gated communities. (5) Residents' perceived safety and crime experiences correlate with the gate and fence status of communities. (6) Residents' perceived safety and crime experiences correlate with their demographic characteristics, socioeconomic characteristics, and socialization in their housing communities.

To pursue the research objectives, this study employed a review of literature and related statistics, a questionnaire survey of residents living in subject communities, and a questionnaire survey of apartment managers. The subject area was a part of Houston, Texas.

6.1 Apartment Communities according to the Conditions of Gating and Fencing

Literature indicates that perceptions of safety and crime experiences are fundamentally related to territoriality. Newman (1973) indicated that residents felt safer in their residential areas when they were provided with territoriality. Based on the literature, the initial question of this research was whether residents feel safer in gated communities that provide exclusive territoriality with fully controlled gates and fences.

However, many gated communities were found to fail to fully control gates; they allowed unwanted external traffic into their communities. This study divided the apartment communities in the three types of communities by defining these gated communities as perceived gated communities.

Gated communities were defined as apartment communities with fully controlled gate systems and fences around their community territory; this type of community fully controlled access from outside traffic. Perceived gated communities were defined as apartment communities with fences around their territory and gates which were not fully controlled systems. Perceived gated communities have open gates and closed fences; therefore, perceived gated communities cannot fully control traffic. Non-gated communities were defined as those having neither fences nor controlled gates. Non-gated communities do not control outside traffic at all. These characteristics are summarized in Table 6.1.

TABLE 6.1

Physical Characteristics and Traffic Controls of the Three Types of Community

Types of communities	Gates	Fences	Traffic Control
Gated community	Yes	Yes	Fully control
Perceived gated community	Exist, but not be controlled	Yes	Cannot control
Non-gated community	No	No	Cannot control

Based on these categories, research subject communities were determined and a survey questionnaire was conducted having the residents living in the subject communities as the survey participants.

6.2 Summary: General Characteristics of Residents' Survey Subjects

Two hundred and seven residents responded to the questionnaire survey. Among them, 63 were from gated communities, 51 from perceived gated communities, and 93 from non-gated communities.

Their demographic characteristics were as follows. More than 63% were females and 36.4% were males. Among the 207 respondents, 32.2% of the survey respondents were in their 20's, 48% were Caucasian, and 80.7% were U.S. citizen. Nearly 54% were living on the first floor of garden apartments. Over 41% of the respondents were non-family household living alone, and 24.2% were female householders with kids. Nearly 49% of the respondents were college educated or higher, and 58.3% had full-time jobs. Half of the respondents reported that the family's annual income was below $30,000 (with the remaining half being greater than $30,000). Their median income was

approximately $40,000. The educational attainment of the survey participants was higher than the national average and their median income was lower than the national average.

6.3 Summary: Perceived Safety and Conditions of Gating and Fencing

Correlations between residents' perceived safety and the three types of communities were found from correlation coefficients. Based on the results from one-way ANOVA tests and Tukey's post hoc tests, residents felt safer in gated communities than in non-gated communities.

The perceived safety of gated community respondents was higher than that of non-gated community respondents. Residents' perceptions of safety in private, semi-public, and public spaces were statistically different according to the three types of communities. The differences of the perceived safety both during the day and at night were statistically significant. The differences, however, usually occurred between gated community respondents and non-gated community respondents.

In general, residents' perceptions of safety in perceived gated communities were similar to those in gated communities. There were insufficient statistical differences in residents' perceived safety between gated communities and perceived gated communities. However, respondents' perceptions of safety in the perceived gated communities at night were statistically different from those of gated communities at night. These results recall the territoriality issue for improving residents' perceived safety in apartment communities.

Residents' perceptions of safety in architectural spaces showed that their perceived safety in semi-public and public spaces is correlated with their general perception of safety in apartment communities. The statistical evidences including correlation coefficients and linear and multiple regression analyses support the conclusion that the perceived safety in public and semi-public should be considered for improving residents' general perceptions of safety in their apartment territory. Therefore, in order to ease residents' fear of crime in an apartment territory, their fear of crime in the public and semi-public spaces must first be addressed.

6.4 Summary: Crime Experience and Conditions of Gating and Fencing

Gated community residents reported a higher crime rate than non-gated community residents. From the residents' reports regarding their own crime experiences and their neighbors' crime experiences, gated communities experienced more crime than perceived gated and non-gated communities.

Among the three groups of respondents, perceived gated community respondents experienced less crime than the other two groups of respondents. For their neighbors' crime experience, 50% of non-gated community respondents reported that they had not heard about neighbors' crime experiences.

Therefore, the reality of crime in apartment communities was different from residents' perceptions of safety. Gated and fenced territory could not prevent property crimes in apartment communities.

6.5 Summary: Other Factors for Improving Residents' Perceived Safety and Preventing Crimes

In addition to gates and fences which define apartment territory, other elements were indicated for improving residents' perceived safety. Those include patrol services by private patrol companies, bright lighting, direct emergency buttons on the wall/phone, and the visual access to the local police.

Additionally, some architectural factors and demographic factors exhibited statistical correlations with residents' perceptions of safety in apartment communities. Those were types of community, dwelling floor level, gender, educational attainment, annual income, and family size. Among them, the types of communities and family's annual income were verified as predictors for statistically significant multiple regression models. The following multiple regression models presented linear relationships between independent variables and residents' general perception of safety during the day and at night in apartment territory (see Table 4.25).

Multiple regression model I.

General Perception of Safety during the day = 3.205+ (0.291) Type of Community + (0.162) Family's annual income

Multiple regression model II

General Perception of Safety at night = 2.405+ (0.357) Type of Community + (0.166) Family's annual income

The models, however, had limitations. The types of community variable employed the categorical scales such as 1(=non-gated communities), 2(=perceived gated communities), or 3(=gated communities). The R-square values are .150 and .130 which show low linear relationships between the independent variables and the dependent variable. However, the two models are statistically significant at the .001 level. Those models did not consider socialization aspects of residents such as sense of community or neighborhood attachment.

Previous studies on residents' perceptions of safety emphasized residents' social contact to their neighbors. Thus, considering residents' socialization aspects, the following two models were used. The variable of "neighborhood attachment" was considered in the following multiple regression models. After the neighborhood attachment factor was included, the multiple regression models to explain residents' perception of safety in their apartment communities became more statistically significant. The models are presented below (see Table 4.37).

Multiple regression model III.

General Perception of Safety during the day = 2.538 + (0.300) Type of Community + (0.208) Neighborhood attachment + (0.163) Family's annual income

The R-square of the model was 0.205 and the F-value was 13.803. The model was statistically significant at the 0.001 level.

Multiple regression model IV.

General Perception of Safety at night = 1.525 + (0.374) Type of Community +

(0.268)Neighborhood attachment + (0.172) Family's annual income

This model had 0.194 as the R-square value and 12.887 as the F-value with significant at the 0.001 level. The two models indicated that neighborhood attachment had positive functions for improving residents' perception of safety in their apartment territory or their near-home environment. Most of all, from the multiple regression models, it was inferred that the two aspects including architectural aspects of the community (= territoriality) and socialization aspects of residents (= neighborhood attachment) should be considered in order to improve residents' perceived safety in apartment communities.

6.6 Summary: Apartment Managers' Opinions on Gates and Fences

Apartment managers disagreed that gate control systems in apartments improve residents' safety from crime. They also disagreed that gated apartment communities have less crime than non-gated communities. They expressed more negative opinions on the role of gates and fences on the point of improving residents' perceived safety in apartment communities. The apartment community managers typically emphasized direct maintenance issues such as patrol services and 24 hours maintenance services, but they also suggested residents' participation and social contact with neighbors would improve their perceived safety.

CHAPTER VII

CONCLUSIONS AND SUGGESTIONS

7.1 Conclusions

Residential environments are fundamental for people, and safe homes and communities have received significant attention from architectural researchers, residential managers, and residents.

The conclusion of this research study addresses how gated and fenced territory of residential environments affect residents' perceived and reality of safety. The results of this study support that people's perceived safety and crime experiences are fundamentally related to territoriality, as literature indicated.

Residents perceived safer in gated communities or perceived gated communities than in non-gated communities. Newman (1973) and Taylor et al. (1984) also indicated that residents felt safer in their residential areas when they were provided with territoriality.

However, people's perceptions of safety in gated communities and in perceived gated communities were not critically different. This means that "the exclusive territoriality provided by fully controlled gate systems and fences" does not guarantee residents' perceived safety. The results from assessing residents' crime experience in community territory support this claim. Residents living in gated communities had higher crime rates than those in perceived gated communities or in non-gated communities.

Thus, beyond the physical territoriality, other factors should be considered in order to create safe apartment communities for residents. Those include patrol services by private patrol companies, bright lighting, direct emergency buttons on the wall/phone, and the visual access to the local police.

Additionally, some architectural factors and demographic factors had statistical correlations with residents' perceptions of safety in apartment communities. Those were dwelling floor level, gender, and educational attainment which were verified as predictors for statistically valid multiple regression models for predicting residents' perceived safety in apartment communities.

As another important factor that affects residents' perceived safety, the residents' socialization aspect was also considered in the multiple regression models. Newman (1973) and Taylor et al. (1984) also indicated the importance of residents' socialization aspect for easing residents' fear of crime. Blakely and Snyder (1999) also indicated the important role of residents' social contact with their neighbors for easing their fear of crime in gated communities.

In the managerial perspective, the apartment community managers emphasized direct maintenance issues such as patrol services and 24 hours maintenance services, but they also suggested residents' participation and social contact with neighbors would improve their perceived safety.

As the conclusions, not only physical territoriality but also design and managerial considerations should be provided for safer communities. For creating safer multi-family housing communities, diverse aspects including territoriality and related architectural conditions, managerial considerations, and residents' participations should be considered.

Additionally, the concept of community programming for safer multi-family housing communities is suggested based on the results of this study. The comprehensive concept of community programming for safer multi-family housing communities includes architectural interventions, managerial efforts, and residents' participants.

The concept of community programming is basically motivated by Newman (1973), Taylor et al. (1984) and Blakely and Synder (1999), and developed based on the research findings and suggestions of this study. The architectural and managerial considerations and the community programming concept for creating safer multi-family communities are demonstrated in the next chapter.

7.2 Suggestions for Safer Communities

One of the contemporary topics which recalls Newman's work, *Defensible Space*, is the issue of gated communities. Literally, gated communities are residential areas whose restricted access privatizes normally public space. Initially popular among the wealthy, gated communities are now available to members of nearly every income level. This popularization turns various discussions about gated communities to issues of safety, urban segregation, and community cohesion. Among those various issue, this study focused on safety, both actual and perceived.

The following suggestions for providing safe apartment communities were made based on the results from the survey of residents and the survey of apartment managers.

7.2.1 Territoriality and Architectural Considerations

The results of the survey demonstrated that territoriality provided in the residential environment is necessary for improving residents' perceived safety and preventing crimes in multi-family housing communities. Territoriality can be provided using various architectural interventions. Even without gates and fences, apartment communities can still provide perceived territoriality to their residents. Controlling unnecessary traffic to the apartment communities would further improve residents' safety from vehicles.

For example, a narrowed community entrance and internal roads can give warning to the approach of vehicles from outside of the communities. Figure 7.1 showed a

narrowed community entrance and Figure 7.2 showed narrowed internal roads of an apartment community.

Figure 7.1: Narrowed Community Entrance

Figure 7.2: Narrowed Internal Roads

(Photos by author)

Cul-de-sacs in the internal roads of apartment communities prevent pass-through traffic (see Figure 7.3). Newman (1996) also suggested blocking pass-through traffic in order to prevent crimes in residential areas. Instead of steel fences, wooden fences surrounding an apartment complex can provide territoriality and openness to the residents (see Figure 7.4). Though this study did not consider the perceived fences for providing territoriality that use the natural landscape elements such as trees or plant materials, this issue can be discussed for future research.

Figure 7.4 was from an apartment community that remodeled its fences around the community. The community replaced steel fences with the trees and added walking trails to beside the tree fences. After they replaced the fences, more residents walking in the

apartment community were found and crimes against parked vehicles were reduced, the manager reported. Thus, the fences by trees will be recommendable.

Figure 7.3: Cul-de-sac in a Community

Figure 7.4: Wooden Fences

(Photos by author)

Based on the results that residents living on the 3rd floor felt safer than those on the 1st floor, some architectural interventions should be considered for the residents on the 1st floor. For example, providing low and visual fences - such as shrubs and low wooden fences - around the patio and backyard of the individual unit should be considered. This perceived territoriality was also suggested by Newman (1996) from his work in the Clason Pont Experiment. This kind of fence can improve residents' surveillance of their semi-public areas and give them control over the semi-public areas around their apartments. Figure 7.5 and 7.6 are examples of the semi-public areas, patios and garden, for first floor residents. These personalized areas are expected to increase residents' control of their semi-public areas.

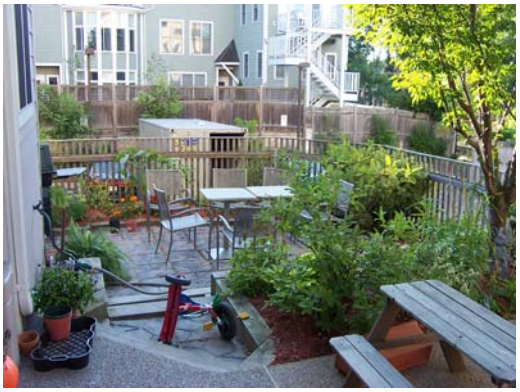

Figure 7.5: Garden for Residents' Surveillance Figure 7.6: Patio Providing Territoriality (Photos by Author)

Residents who felt safer in the semi-public and public areas showed more positive opinions on their general perceptions of safety in their apartment communities. In order to improve the quality of residents' perceived safety, the semi-public and public areas should be preserved as safe places. Thus, those areas should be designed with visual access from other spaces and be well maintained by maintenance groups. For improving residents' perceived safety at night in those areas, lighting should be consciously planned and maintained unbroken. The following four figures including Figure 7.7-10 show the public spaces with open visual access.

Figure 7.7: Pool with Visual Access I

Figure 7.8: Pool with Visual Access II

Figure 7.9: Playground with Visual Access

Figure 7.10: Mailboxes with Visual Access

(Photos by author)

7.2.2 Managerial Considerations and Residents' Participations for Improving Residents' Perceived Safety

Managerial considerations should accompany the physical territoriality provided by gates and fences. As Blakely and Snyder (1999) indicated, managerial services for improving residents' perceived safety should be provided. Planning patrol services by hiring private patrol companies and enabling their residents to contact the maintenance staff 24 hours a day are representative examples. Additionally, apartment management groups should maintain the semi-public and public areas of apartment communities and keep paying attention to the residents' needs and opinions on their communities.

Management groups can also arrange residential meetings or educational programs with local police for improving perceived safety. These plans will eventually improve residential satisfaction in their apartment communities and bring a higher reputation to the management groups.

Usually, residents in apartment communities are renters. This fact make them be ignorant their community issues and their neighbors. However, as Newman (1973) and Blakely and Snyder (1999) indicated, residents' participation is important in preventing crimes and improving the perceived safety in residential areas. Residents in apartment communities should be interested in the common and social issues in the communities and make efforts to be involved. They need to improve social contact with their neighbors and should pay attention to their neighbors' needs. Thus, management groups should encourage their residents to be involved in community issues and to provide opportunities for them to meet and communicate with their neighbors.

7.2.3 Community Programming for Safer Apartment Communities

Based on the suggestions mentioned earlier, comprehensive considerations of community programming were suggested in Table 7.1 for creating safer multifamily housing communities.

TABLE 7.1
Summary of Comprehensive Considerations for Community Programming

Category	Issues	Considerations
Architectural considerations	Territoriality	Providing territoriality Perceived gates Narrowed entrances and internal roads Perceived territoriality with fences
	Dwelling floor level	Providing territoriality to the 1st floor dwellers Enabling the 1st floor dwellers to control the semi-public areas around their apartments
	Semi-private and Public areas	Bright lighting provided Visual access to these areas for residents' observations
	Lighting	Provide appropriate lighting in semi-public and public areas
Managerial considerations	Programming by management groups	Providing patrol services by hiring private patrol companies Keeping 24-hours maintenance service Planning security related seminars Reporting the community issues to the residents Participating in Crime Free Multifamily Housing Program
Participation of residents	Social interactions and neighborhood attachment	Increasing social contacts with their neighbors Paying attention to the community issues Participating in community activities

The concept of community programming includes diverse aspects in multifamily housing communities. Community programming proposed in this study emphasizes the comprehensive efforts from architectural designer, housing developers, management groups, and residents for providing safer residential communities for people to live in.

For future studies on the safety issue in residential environments, this concept should be considered. From the surveys and various statistical analyses, it was verified that gated and fences territory would be effective. Beyond the physically provided territory of gates and fences, other factors were found to be important for improving residents' perceived safety. Therefore, for improving residents' perceived and actual safety in multifamily housing communities, the comprehensive considerations including diverse aspects in a community should be employed. In conclusion, this study proposes the following diagram in Figure 7.11.

Figure 7.11: Diagram of Community Programming (Copyright by Author)

7.2.4 Policy Implications

The results of this study present that we should consider the issue of safety in the National Housing Survey. The issue of safety has not been considered thus far in the National Housing Survey in the item of why people move into their current homes. Based on the results from this study, an item indicating the issue of safety is recommendable. For example, an item asking if people moved into their current home "because they believe their current home and neighborhood to be safer than any other homes and neighborhoods" is suggestible.

The research findings also support the need to pay attention to safety and crime prevention in multi-family housing (i.e. rented residential properties) in the United States. The summary of research findings and architectural and managerial considerations needs to be reported to the executive board of the Crime Free Multi-Housing Program (CFMHP)[30].

[30] The program usually consists of three phases: 1) An eight-hour seminar for on-site managers and office staff, during which they receive information from the Police Department, as well as several other departments, that they can use to operate a better, safer community. 2) An on-site Crime Prevention Through Environmental Design (CPTED) survey of their property. The CPTED assesses proper lighting, landscaping, and individual unit security features. 3) A resident social, during which the residents receive information on the program and how it works. In addition, they receive information on what they need to do to increase the success of the program, as well as what will be done by the managers and police (The source was based on City of Greensboro, 2004)

As the most significant recommendation of this study, the inter-relationships should be considered for creating safer communities. Previous studies related to this research and the community managers in this study indicated these inter-relationships for improving residents' perceived safety in their communities or in their residential environments.

Inter-relationships should exist between community planners, community managers, and community dwellers. Community planners such as architectural designers and developers, community managers such as property managers and maintenance staff, and community dwellers such as residents or tenants should have an interest in their community issues and make mutual efforts to create safer communities. In addition, the inter-relationships between apartment communities and neighboring communities should be considered because those inter-relationships may guarantee both the perceived and objective safety of current residents.

7.3 Limitations of the Study

Several limitations of this study existed. The first limitation is related to the subjects of this study. The subject area was limited to a part of Houston, Texas. The response rate was approximately 16.2%, thus non-response errors could occur. Therefore, generalization of the research results should be carefully considered.

The second limitation is related to the nature of the collected data. Most data came from the survey participants' responses. No official crime data was included for assessing objective safety of the subject communities. Thus, the actual safety of the communities was not verified. Official crime statistics should be included for future research.

The third limitation is related to the measurement of residents' perceptions. Residents' perceptions of safety were measure by the 5-point bipolar scales having the same intervals. The 5-point bipolar scales were assumed to be continuous scales in this study. This assumption was also applied in the correlation coefficients and regression models. However, these 5-point bipolar scales can also be regarded to be categorical scales, which may not be continuous. Thus, the interpretations of the statistical results in this study should be carefully considered.

7.4 Suggestions for Future Studies

The findings of this research clearly indicate the need for future research on the perception of safety and territoriality. Territoriality and related issues have been explored for a long time. Safety has been also highlighted by a lot of architectural designers and researchers. Though the research history of gated communities is short, the interest in gated communities has become worldwide in scope. Thus, the combination of territoriality, safety, and gated communities will provide a large body of potential for future studies.

To suggest more inclusive communities, this study brought a concept of perceived gated communities. In addition to the perceived gates, a concept of perceived fences in apartment communities will also provide various research directions for the researchers who are interested in the territoriality issue.

As mentioned earlier, in this study, there was a limitation of the subject area and communities. Though the subject communities were limited in the Houston area, the subject areas can be widened and research findings can be further discussed. Considering that the number of gated communities is increasing, the influence of locations and neighborhood settings of gated communities on the perceived and actual safety can likewise be assessed in future research.

The results of this study can also be compared with other cultural contexts in the future. The research findings can also be interpreted in other cultural contexts. Thus, this study potentially provided a base for international joint studies.

To enhance the qualitative approach, future studies can employ face-to-face interviews to assess residents' perceived safety in their apartment communities. An experimental study to verify residents' perceived safety according to the conditions and level of territoriality can also be suggested.

Finally, for having a more in-depth analysis and comprehensive suggestions in order to create safer communities, more objective perspectives from police officers and housing community designers can be added in future research.

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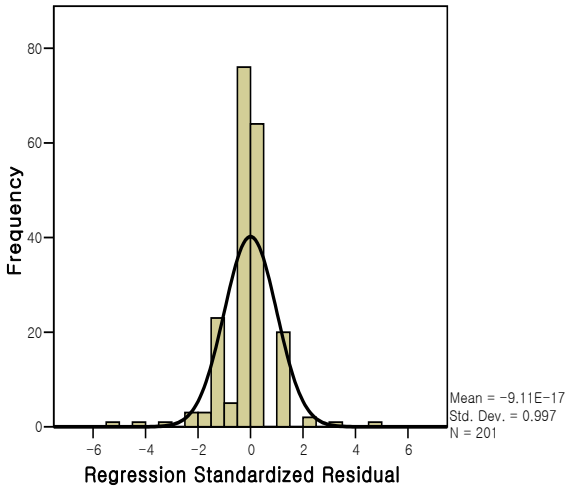
APPENDICES

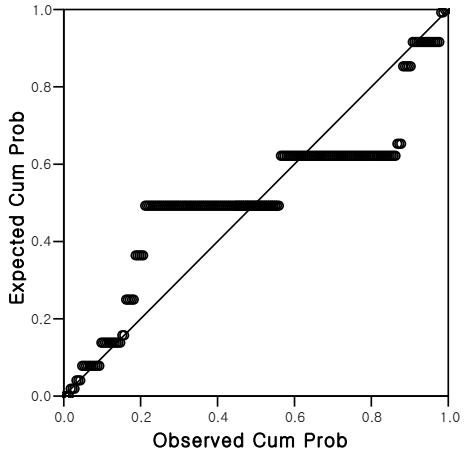
APPENDIX 1
CHECKING THE NORMAL DISTRIBTIONS FOR TABLE 4.21

Appendix 1-1. Residents' Perception of Safety during the Day

1. Residents' perception of safety = 0.954+(0.765) Perception in parking lot

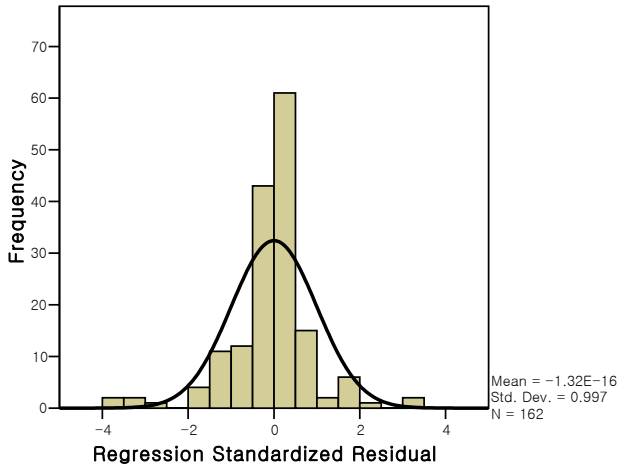


Histogram

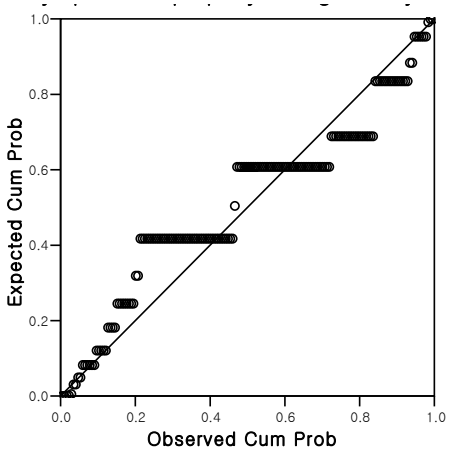


Normal P-P Plot of Regression Standardized Residual

2. Residents' perception of safety = 1.806 + (0.593) Perception in the laundry room

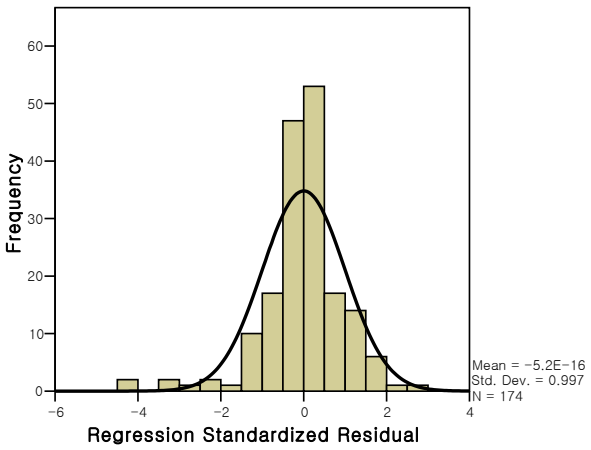


Histogram

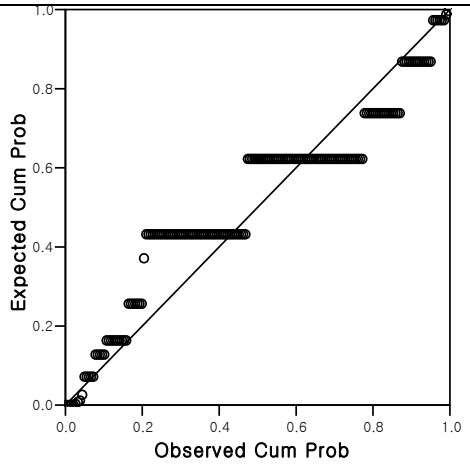


Normal P-P Plot of Regression Standardized Residual

3. Residents' perception of safety = 1.628 + (0.626) Perception in the swimming pool

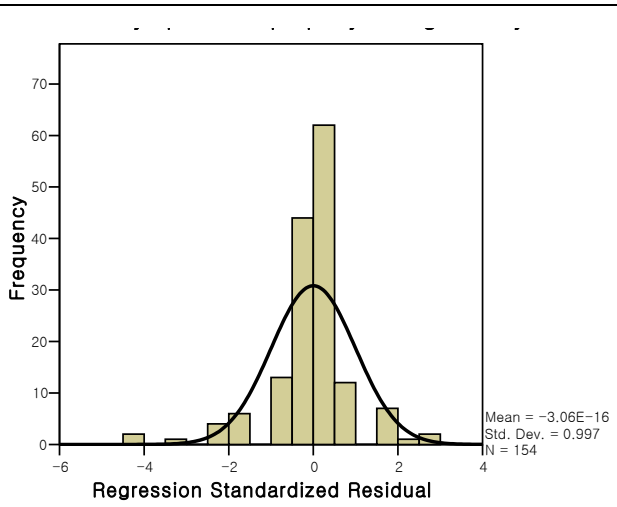


Histogram

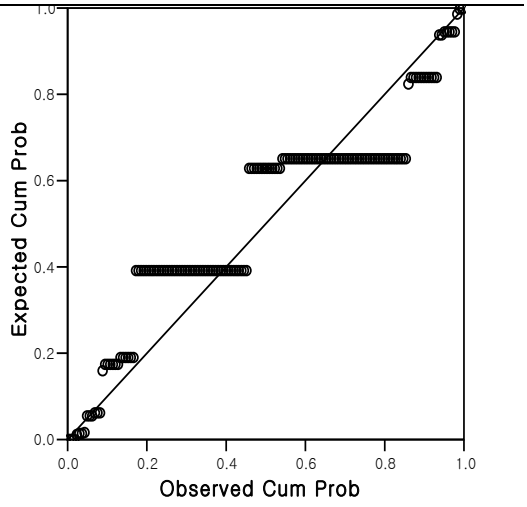


Normal P-P Plot of Regression Standardized Residual

4. Residents' perception of safety = 2.312 + (0.476) Perception in fitness center

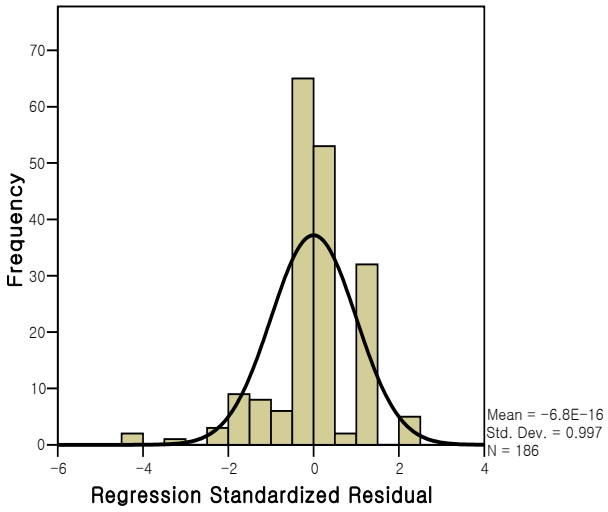


Histogram

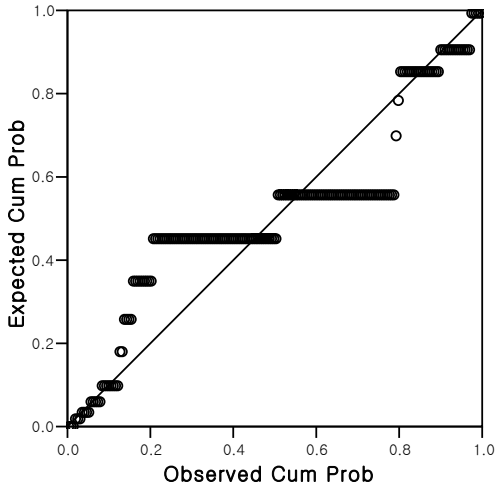


Normal P-P Plot of Regression Standardized Residual

5. Residents' perception of safety = 0.822 + (0.816) Perception in stairs



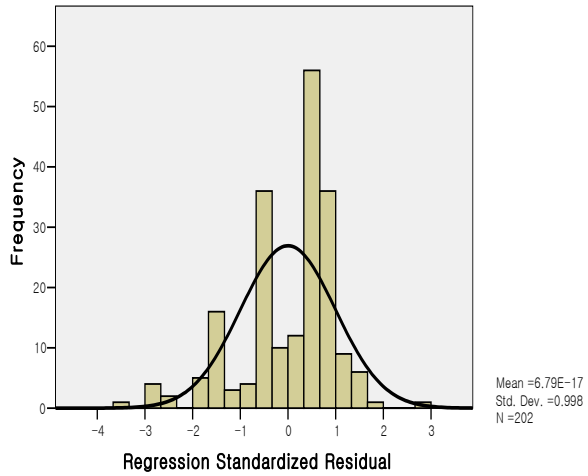
Histogram



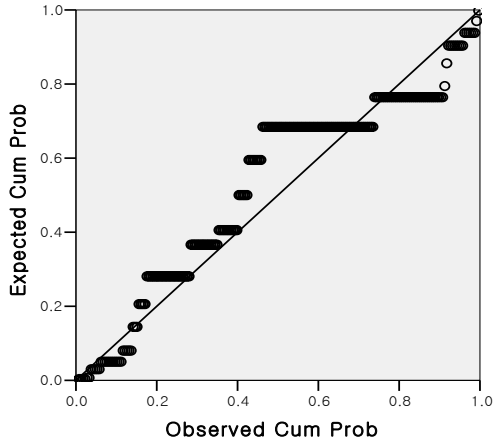
Normal P-P Plot of Regression Standardized Residual

Appendix 1-2. Residents' Perception of Safety at Night

1. Residents' perception of safety = 0.451 + (0.774) Perception at home

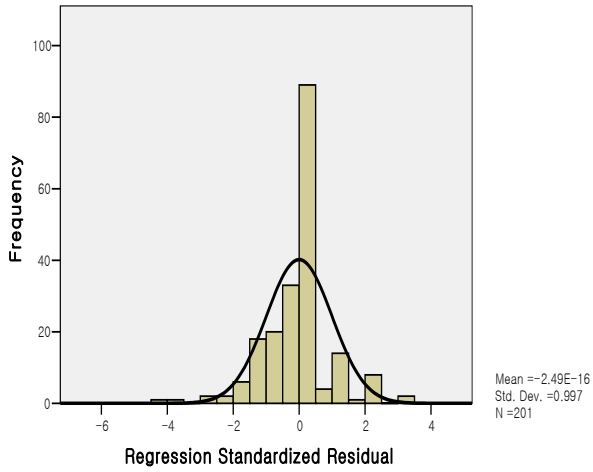


Histogram

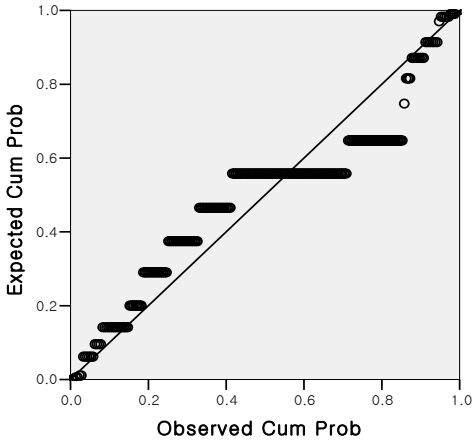


Normal P-P Plot of Regression Standardized Residual

2. Residents' perception of safety = 0.644 + (0.809) Perception in the parking lot

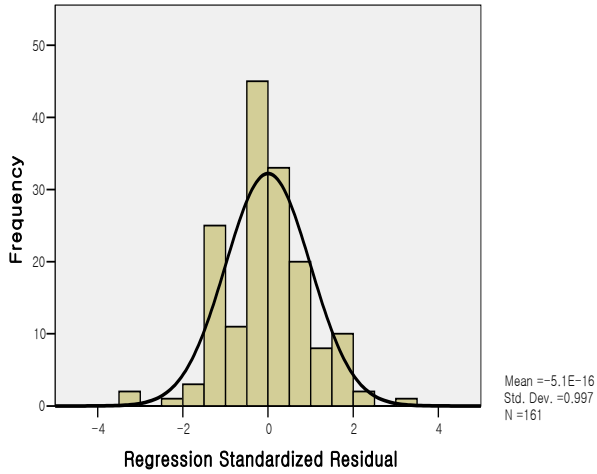


Histogram

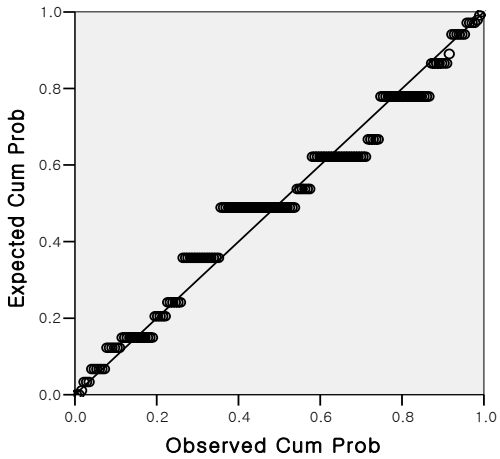


Normal P-P Plot of Regression Standardized Residual

3. Residents' perception of safety = 1.214 + (0.703) Perception in the laundry room

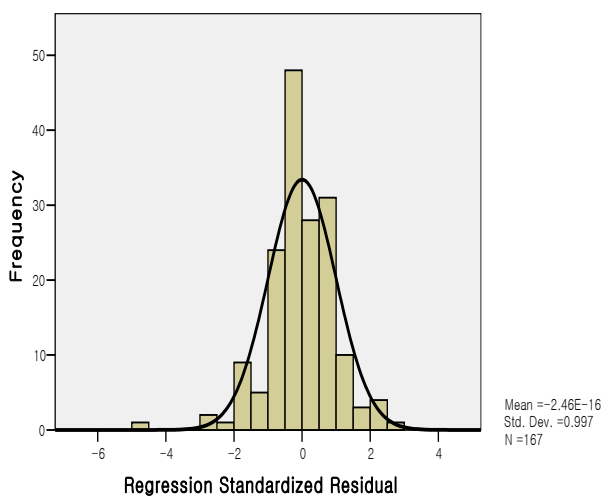


Histogram

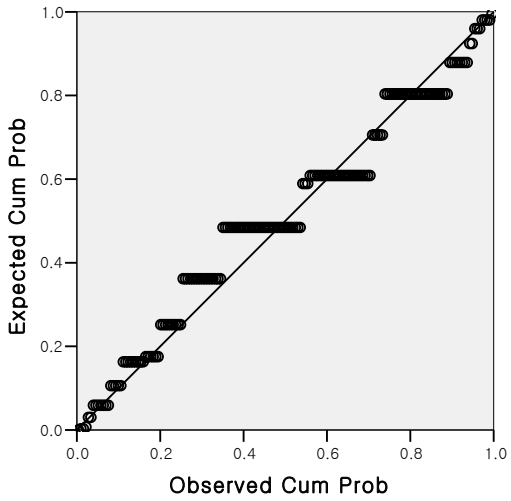


Normal P-P Plot of Regression Standardized Residual

4. Residents' perception of safety = 1.074 + (0.740) Perception in the swimming pool

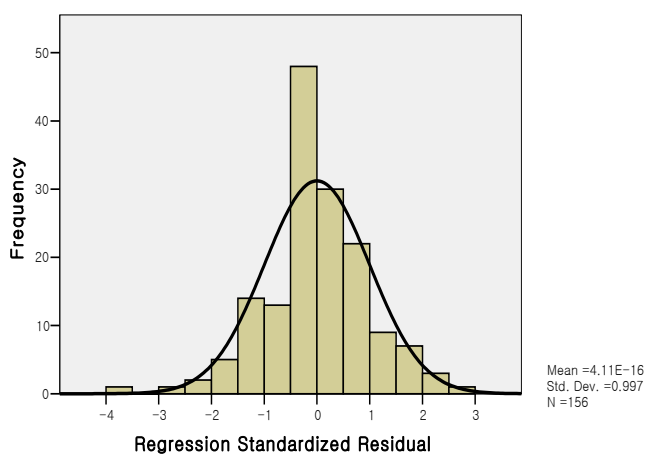


Histogram

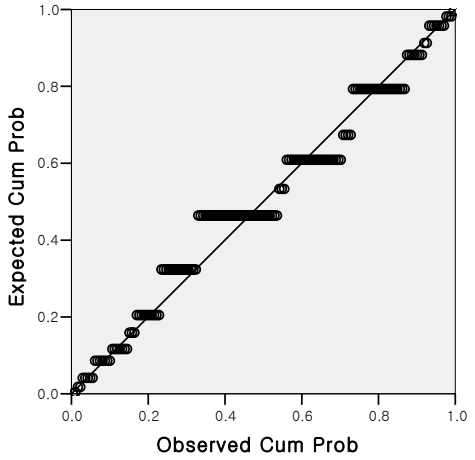


Normal P-P Plot of Regression Standardized Residual

5. Residents' perception of safety = 1.223 + (0.712) Perception in the fitness center

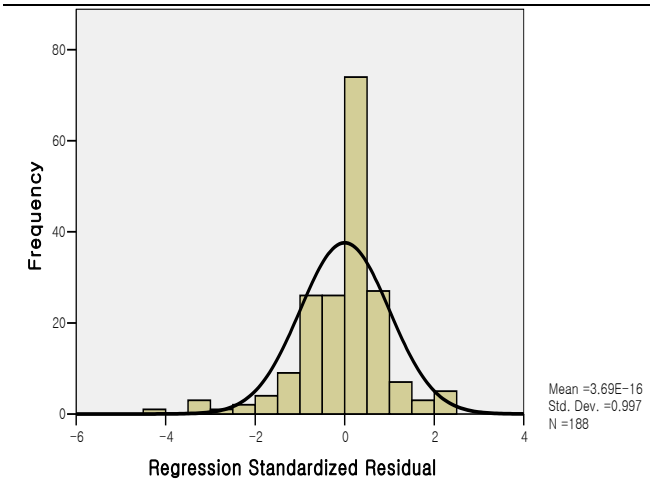


Histogram

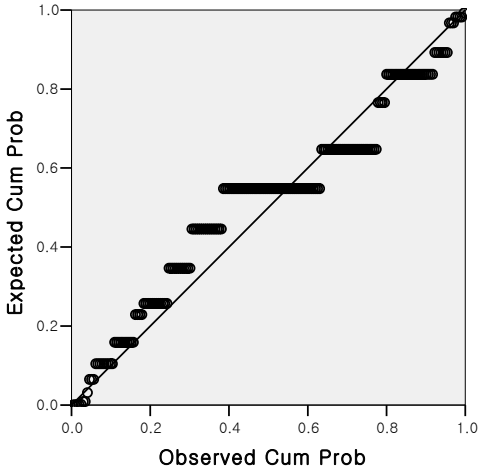


Normal P-P Plot of Regression Standardized Residual

6. Residents' perception of safety = 0.813 + (0.770) Perception in the stairs

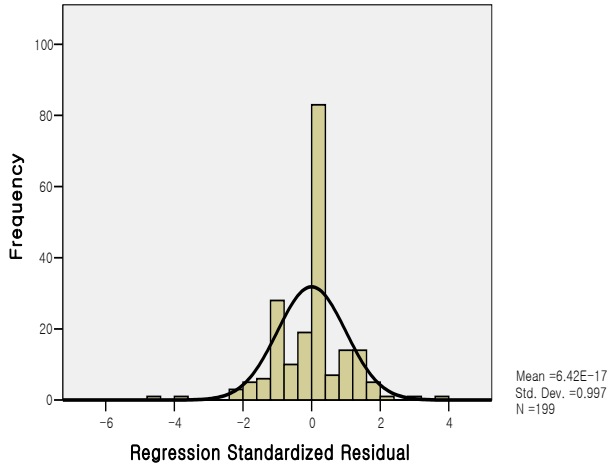


Histogram

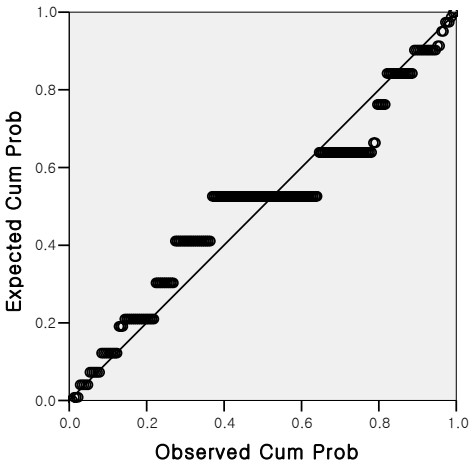


Normal P-P Plot of Regression Standardized Residual

7. Residents' perception of safety = 0.893 + (0.764) Perception to the mail box



Histogram



Normal P-P Plot of Regression Standardized Residual

APPENDIX 2
STATISTICAL TABLES OF MULTIPLE REGRESSION ANAYSES

Appendix 2-1. Stepwise Multiple Regression Analyses Predicting Residents' General Perceived Safety in their Apartment Territory during the Day

Model Summary [d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.742[a]	.550	.547	.64561	
2	.762[b]	.581	.574	.62567	
3	.774[c]	.599	.589	.61511	1.750

a. Predictors: (Constant), Perception of safety in the stairs

b. Predictors: (Constant), Perception of safety in the stairs, Perception of safety in the swimming pool

c. Predictors: (Constant), Perception of safety in the stairs, Perception of safety in the swimming pool, Perception of safety in the parking lot

d. Dependent Variable: General perceptions of safety during the day

ANOVA [d]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	62.270	1	62.270	149.397	.000[a]
	Residual	50.851	122	.417		
	Total	113.121	123			
2	Regression	65.754	2	32.877	83.984	.000[b]
	Residual	47.367	121	.391		
	Total	113.121	123			
3	Regression	67.718	3	22.573	59.660	.000[c]
	Residual	45.403	120	.378		
	Total	113.121	123			

a. Predictors: (Constant), Perception of safety in the stairs

b. Predictors: (Constant), Perception of safety in the stairs, Perception of safety in the swimming pool

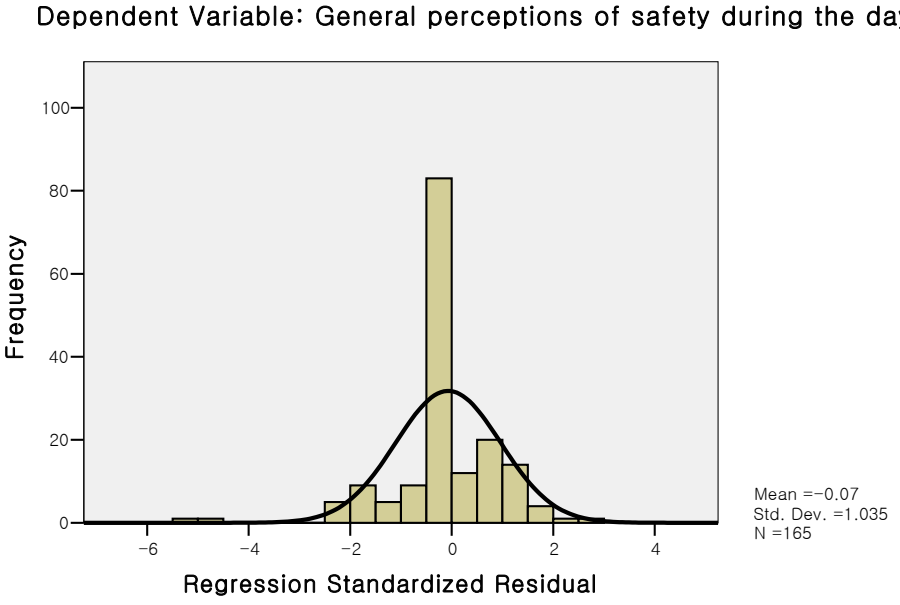
c. Predictors: (Constant), Perception of safety in the stairs, Perception of safety in the swimming pool, Perception of safety in the parking lot

d. Dependent Variable: General perceptions of safety during the day

Coefficients [a]

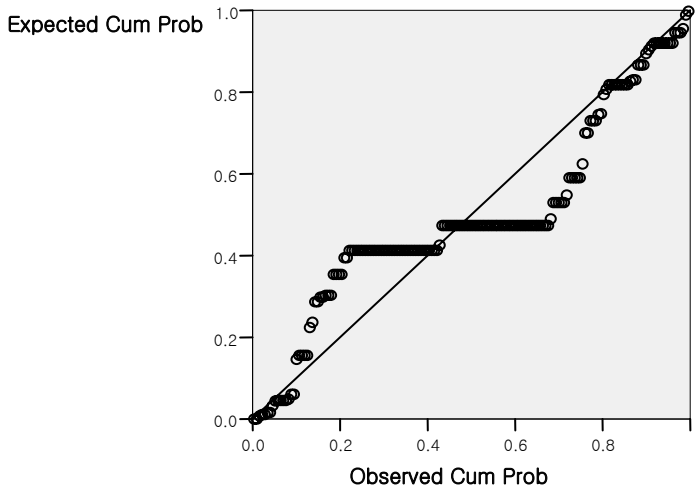
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.117	.260		4.295	.000
	Perception of safety in the stairs	.764	.063	.742	12.223	.000
2	(Constant)	.749	.281		2.667	.009
	Perception of safety in the stairs	.624	.077	.606	8.152	.000
	Perception of safety in the swimming pool	.231	.077	.222	2.983	.003
3	(Constant)	.516	.294		1.753	.082
	Perception of safety in the stairs	.513	.090	.498	5.706	.000
	Perception of safety in the swimming pool	.182	.079	.175	2.301	.023
	Perception of safety in the parking lot	.210	.092	.194	2.279	.024

a. Dependent Variable: General perceptions of safety during the day



Normal P-P Plot of Regression Standardized Residual

Dependent Variable: General perceptions of safety during the day



Appendix 2-2. Stepwise Multiple Regression Analyses Predicting Residents' General Perceived Safety in their Apartment Territory at Night

Model Summary [c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.808[a]	.652	.649	.69237	
2	.834[b]	.696	.690	.65047	1.758

a. Predictors: (Constant), Perception of safety to the mail box at night

b. Predictors: (Constant), Perception of safety to the mail box at night, Perception of safety in the fitness center at night

c. Dependent Variable: General perceptions of safety at night

ANOVA [c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	106.954	1	106.954	223.108	.000[a]
	Residual	57.046	119	.479		
	Total	164.000	120			
2	Regression	114.072	2	57.036	134.800	.000[b]
	Residual	49.928	118	.423		
	Total	164.000	120			

a. Predictors: (Constant), Perception of safety to the mail box at night

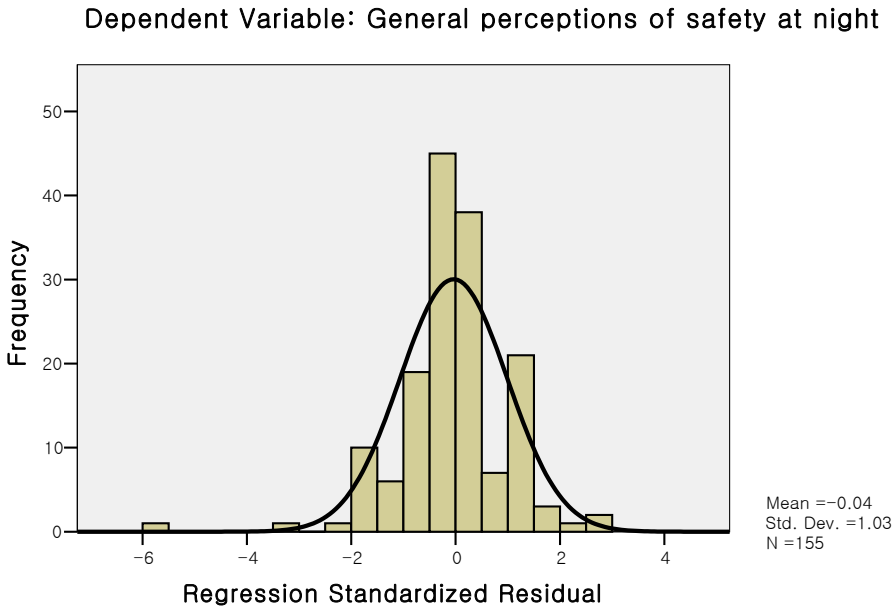
b. Predictors: (Constant), Perception of safety to the mail box at night, Perception of safety in the fitness center at night

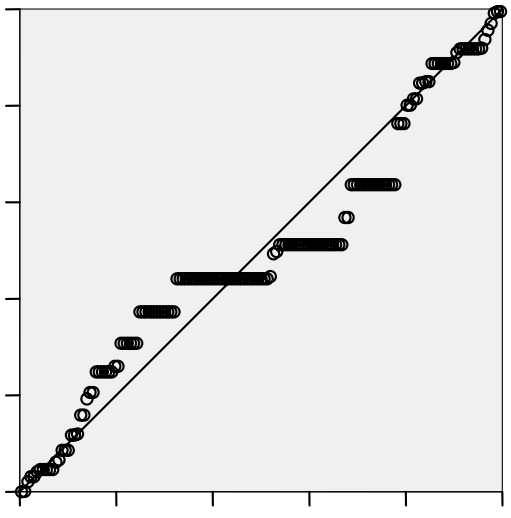
c. Dependent Variable: General perceptions of safety at night

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.722	.205		3.523	.001
	Perception of safety to the mail box at night	.818	.055	.808	14.937	.000
2	(Constant)	.558	.197		2.836	.005
	Perception of safety to the mail box at night	.562	.081	.554	6.931	.000
	Perception of safety in the fitness center at night	.323	.079	.328	4.102	.000

a. Dependent Variable: General perceptions of safety at night


Dependent Variable: General perceptions of safety at night
Frequency
50
40
30
20
10
0
−6
−4
−2
0
2
4
Regression Standardized Residual
Mean =−0.04
Std. Dev. =1.03
N =155



Appendix 2-3. Stepwise Multiple Regression Analyses Predicting Residents' General Perceived Safety in their Apartment Territory during the Day considering Neighborhood Attachment

Model Summary [d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.333[a]	.111	.105	.94955	
2	.406[b]	.165	.155	.92289	
3	.452[c]	.205	.190	.90355	1.818

a. Predictors: (Constant), Three types of community

b. Predictors: (Constant), Three types of community, Neighbhorhood attachment

c. Predictors: (Constant), Three types of community, Neighbhorhood attachment, Family's annual income

d. Dependent Variable: General perceptions of safety during the day

ANOVA [d]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.279	1	18.279	20.273	.000[a]
	Residual	146.970	163	.902		
	Total	165.248	164			
2	Regression	27.268	2	13.634	16.008	.000[b]
	Residual	137.980	162	.852		
	Total	165.248	164			
3	Regression	33.807	3	11.269	13.803	.000[c]
	Residual	131.441	161	.816		
	Total	165.248	164			

a. Predictors: (Constant), Three types of community

b. Predictors: (Constant), Three types of community, Neighbhorhood attachment

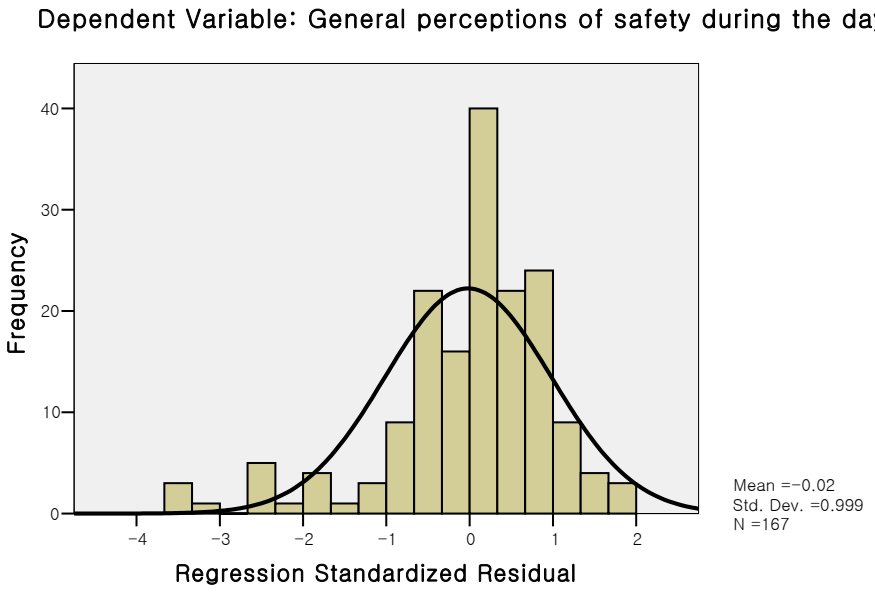
c. Predictors: (Constant), Three types of community, Neighbhorhood attachment, Family's annual income

d. Dependent Variable: General perceptions of safety during the day

Coefficients [a]

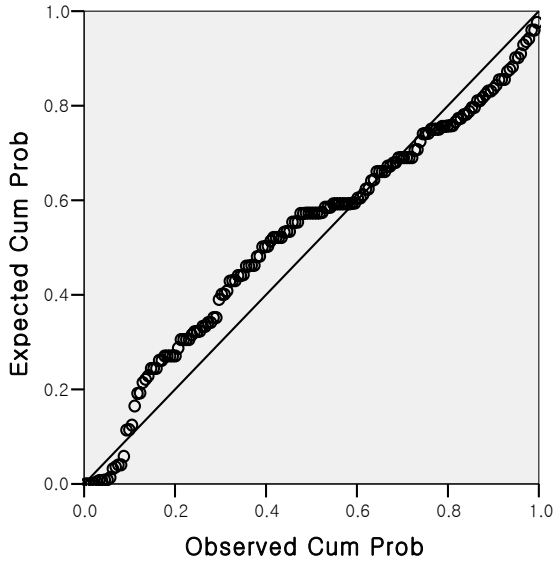
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.419	.182		18.752	.000
	Three types of community	.397	.088	.333	4.503	.000
2	(Constant)	2.761	.269		10.257	.000
	Three types of community	.405	.086	.339	4.722	.000
	Neighbhorhood attachment	.208	.064	.233	3.249	.001
3	(Constant)	2.538	.275		9.229	.000
	Three types of community	.300	.092	.252	3.274	.001
	Neighbhorhood attachment	.208	.063	.233	3.317	.001
	Family's annual income	.163	.058	.217	2.830	.005

a. Dependent Variable: General perceptions of safety during the day



Normal P-P Plot of Regression Standardized Residual

Dependent Variable: General perceptions of safety at night



Appendix 2-4. Stepwise Multiple Regression Analyses Predicting Residents' General Perceived Safety in their Apartment Territory at Night considering Neighborhood Attachment

Model Summary [d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.324[a]	.105	.099	1.16999	
2	.405[b]	.164	.154	1.13401	
3	.440[c]	.194	.179	1.11730	1.969

a. Predictors: (Constant), Three types of community

b. Predictors: (Constant), Three types of community, Neighbhorhood attachment

c. Predictors: (Constant), Three types of community, Neighbhorhood attachment, Family's annual income

d. Dependent Variable: General perceptions of safety at night

ANOVA[d]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.121	1	26.121	19.082	.000[a]
	Residual	223.127	163	1.369		
	Total	249.248	164			
2	Regression	40.920	2	20.460	15.910	.000[b]
	Residual	208.329	162	1.286		
	Total	249.248	164			
3	Regression	48.263	3	16.088	12.887	.000[c]
	Residual	200.986	161	1.248		
	Total	249.248	164			

a. Predictors: (Constant), Three types of community

b. Predictors: (Constant), Three types of community, Neighbhorhood attachment

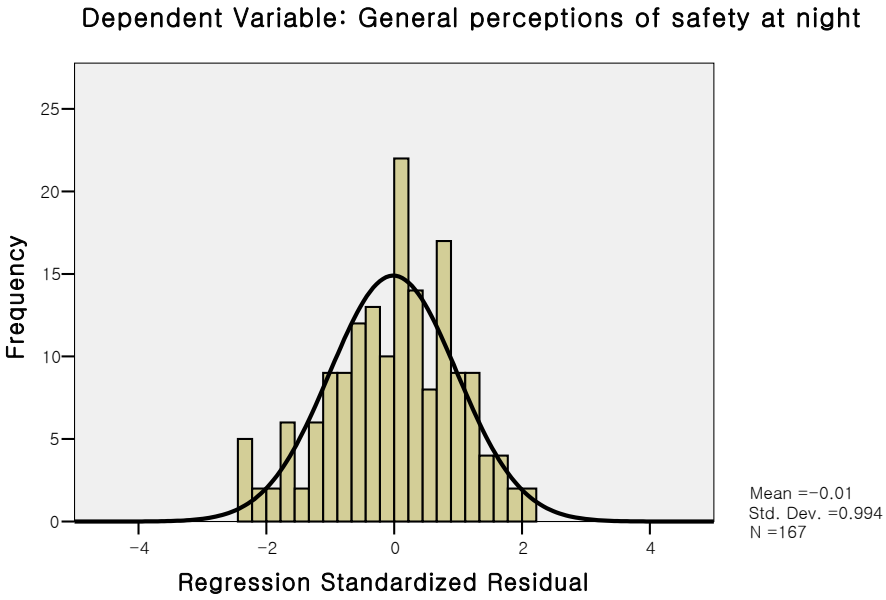
c. Predictors: (Constant), Three types of community, Neighbhorhood attachment, Family's annual income

d. Dependent Variable: General perceptions of safety at night

Coefficients[a]

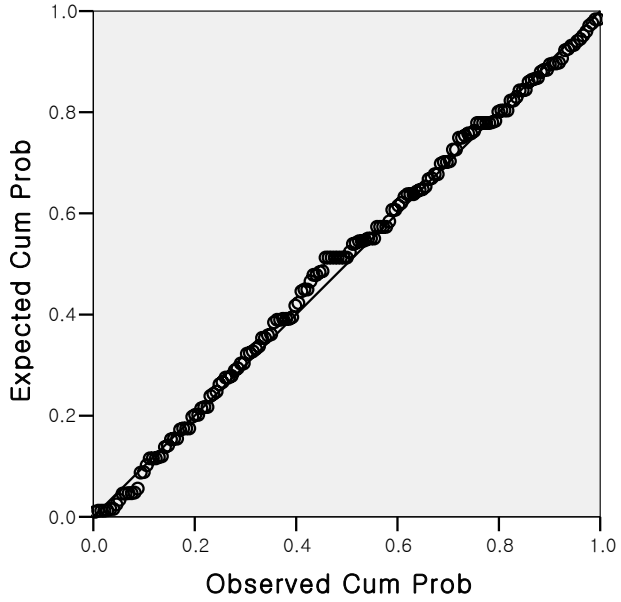
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.606	.225		11.599	.000
	Three types of community	.474	.109	.324	4.368	.000
2	(Constant)	1.760	.331		5.319	.000
	Three types of community	.487	.105	.332	4.623	.000
	Neighbhorhood attachment	.266	.079	.244	3.392	.001
3	(Constant)	1.525	.340		4.483	.000
	Three types of community	.374	.114	.255	3.282	.001
	Neighbhorhood attachment	.268	.077	.245	3.461	.001
	Family's annual income	.172	.071	.188	2.425	.016

a. Dependent Variable: General perceptions of safety at night



Normal P-P Plot of Regression Standardized Residual

Dependent Variable: General perceptions of safety at night



APPENDIX 3
CHECKLIST OF SITE VISIT

1. Name of the Apartment Property
2. Visit Date/ Time:
3. Contact Person (name card)
4. Number of Units
5. Built year
6. Architectural features:

Items	Current status	Descriptions
3story walk-up?	Yes / No	
Gates	Fully controlled / opened	
Gate control system	Card, password, remote control Bar-code,	
Gate open method	Sliding doors Open doors	
Fences	Fully fenced / Partly fenced / No fence	
Materials of fences	Wood / Iron/ others	
Lighting	Main entrance In front of apartment buildings In front of each unit In front of Swimming pool In front of mail-box In front of playground In front of basketball court In front of fitness center In front of Leasing office In front of each unit In front of playground In front of business center	

7. Addresses of apartments
8. Site map
9. Floor plans

APPENDIX 4
QUESTIONNAIRE OF THE RESIDENT SURVEY

SURVEY Of
Residents' Perception of Safety in Gated Apartment Communities

February 21, 2005

Thank you for agreeing to participate in this survey! This survey was reviewed and approved by the Institutional Review Board at Texas A&M University. The approval number is 2004-0659.

This survey is for my PhD dissertation. The purpose of this survey is to investigate the effects of gating and fencing on residents' perception of safety in multi-family housing communities. The respondents of this survey should be older than 18 years old**.**

The questions in this survey ask you about your perception of safety in your apartment property. Please answer the survey as completely as possible and then return it using the enclosed self-addressed envelope within the next ten days.

If you have any questions about the study, please contact me at (979) 862-9149 or sharry@neo.tamu.edu. Likewise, any feedback on the survey or study would be sincerely appreciated. Thanks again for your cooperation.

Sincerely,

Suk-Kyung Kim

PhD. Candidate, Department of Architecture, Texas A&M University

College Station, TX 77843-3137

Mail to: 301 Ball St. #1061, College Station, TX 77840

Phone: 979-862-9149

Email: sharry@neo.tamu.edu

GATES AND FENCES

Please answer for the following questions. Place a check (V) or X on the boxes.

1. Your property was identified as a Gated Community. **Which access system** was applied in the gate control in your property? Please select all that apply.

□ Card Key (Similar to or smaller than a credit card)
□ Password Input system with buttons
□ Badge (round shape)
□ Remote control panel with buttons (smaller than 2X2 inches)
□ Bar-code stickers in front of vehicles
□ Other (explain) _____

2. Which one below describes best **about the condition of the gate control** of your apartment property? Please select only one.

□ The gate of our property is fully controlled by residents day at night. So **it is opened only when residents or their vehicles are passing**.
□ We have a gate control system. But, **the gate is usually opened.**
□ Other (explain) _____

APARTMENT INFORMATION

1. Please write the name of your apartment property.

_____

2. How many bedrooms and bathrooms do you have in your apartment unit? Please write the numbers.

_____ Bedroom(s) and _____ Bath(s)

3. Which floor do you live on? Please place a V on the box.

□ 1st floor □ 2nd floor □ 3rd floor

4. How long have you been living in the present apartment?

_____ years and _____ months

5. What were the ***three*** most important reasons you chose the current gated apartment? Please place a V or X on the boxes.

□ Close to my job □ Convenient to friends or relatives
□ Safety from violent or property crimes □ Convenient to leisure activities
□ Convenient to public transportation
□ Convenient to school (since I am a college or graduate student)
□ Good schools for my kids □ Good design in the apartment property
□ Good interior design of my apartment □ Good maintenance services
□ Appropriate price to live in □ Other public services
□ Other (explain) _____

6**. Before you moved** to the current apartment, which type of housing had you lived in? Please select only one.

□ Condominium □ Rental apartment WITH gate access system(s)
□ Rental apartment WITHOUT gate access system(s) □ Single-Family Housing
□ Duplex □ Other (Explain)_____

7. If you plan to move out, **when will you do so**? Please select only one.

□ I don't want to move out (Go to question 9)
□ within 1 year □ after 1 year □ after 2 years □ after 3 years
□ after 4 years □ after 5 years □ I don't know □ Other(specify)____

8. If you want to move out, **to what type of housing** do you plan to move? Please select only one.

□ Condominium □ Rental apartment WITH gate access system(s)
□ Rental apartment WITHOUT gate access system(s) □ Single-Family Housing
□ Duplex □ Other (Explain)_____

9. **If you don't want to move out**, what were the ***three*** most important reasons you stay at the current apartment? Please place a V or X on the boxes.

□ Close to job □ Convenient to friends or relatives
□ Safety from violent or property crimes □ Convenient to leisure activities
□ Convenient to public transportation
□ Convenient to my school (since I am a college or graduate student)
□ Good schools for my kids □ Good design in the apartment property
□ Good interior design of my apartment □ Good maintenance services
□ Appropriate price to live in □ Other public services
□ Other (explain) _____

10. Before you moved to your apartment, **had you figured out that your apartment community is a gated community**? Please select only one.

□ Yes, I had known.
□ No, I had NOT known

RESIDENT'S PERCEPTION

** How would you feel safe in the following places in your apartment properties **DURING THE DAY**?*
Please place a check (V) or X on each line of boxes to indicate your opinions.

	Not at all Safe	Un safe	Neu-tral	Safe	Very Safe
Ex) Do you feel safe in the park?	□	□	□	**V**	□
1. Do you feel safe when you walk alone through the parking lot during the day?	□	□	□	□	□
2. Do you feel safe when you are alone in the laundry room during the day?	□	□	□	□	□
3. Do you feel safe when you use alone the swimming pool during the day?	□	□	□	□	□
4. Do you feel safe when you exercise alone in the fitness center during the day?	□	□	□	□	□
5. Do you feel safe when you walk through the stairs in your apartment building during the day?	□	□	□	□	□

** How would you feel safe in the following places in your apartment properties AT NIGHT (ex. After dark)? Please place a check (V) or X on each line of boxes to indicate your opinions*.

	Not at all Safe	Un-safe	Neu-tral	Safe	Very Safe
6. Do you feel safe when you are alone at home at night?	□	□	□	□	□
7. Do you feel safe when you walk alone through the parking lot at night?	□	□	□	□	□
8. Do you feel safe when you are alone in the laundry room at night?	□	□	□	□	□
9. Do you feel safe when you use alone the swimming pool of your property at night?	□	□	□	□	□
10. Do you feel safe when you exercise alone in the fitness center at night?	□	□	□	□	□
11. Do you feel safe when you walk through the stairs in your apartment building at night?	□	□	□	□	□
12. Do you feel safe when you go to the mail box at night?	□	□	□	□	□

13. Which one would be the most important **in order to ease residents' fear of crime at night** in an apartment property? Please select **only three**.
□ 24 hours maintenance service by the maintenance staff
□ Gate control system of the main entrance
□ Fences around the apartment property
□ Bright lighting at night
□ Patrol service by a private patrol company
□ Direct emergency button(s) on the phone/ wall
□ Visuality to the local police
□ Open visual access to every space in the property
□ Other (Explain)_____

14. Since you moved to your current apartment, have you had one of following items stolen within the property boundary? Please **select all that apply**.
□ Not at all
□ Bicycle or parts
□ Clothing, luggage
□ Cash
□ Electronics (ex. Camera, Audio system, or TV)
□ Computers or related equipment
□ Part of plants
□ Part of motor vehicles
□ Toys or recreation equipment
□ Purse or Wallet
□ Cell phone(s) or PDA
□ Jewelry, watch, keys
□ Other (Explain)_____

15. Since you moved to your current apartment, how many times have you heard that one of your neighbors had experienced personal property damages or losses? Examples of personal property damages or losses were numerated in the above question 4.
□ Never
□ 1 time
□ 2 times
□ 3 times
□ 4 times
□ More than 5 times

16. Which damages or losses were their major losses? Please select two.
□ Bicycle or parts
□ Clothing, luggage
□ Cash
□ Electronics (ex. Camera, Audio system, or TV)
□ Computers or related equipment
□ Part of plants
□ Part of motor vehicles
□ Toys or recreation equipment
□ Purse or Wallet
□ Cell phone(s) or PDA
□ Jewelry, watch, keys
□ Other (Explain)_____

17. Which one is more effective for easing residents' fear of crime in apartment properties? Please select only one.
□ **Gate control system** are more effective than fences.
□ **Fences** are more effective than gate control systems
□ **Both** are very effective. So, we should have both gate control systems and fences.
□ **None** of the above. Neither gates nor fences can ease residents' fear of crime.

** How much do you agree with the following statement? Please place a check (V) on each line of boxes to indicate your opinions.*

	Strongly Disagree	Dis-agree	Neu-Tral	Agree	Strongly Agree
1. I feel safe being out alone in my apartment property *during the day.*	□	□	□	□	□
2. I feel safe being out alone in my apartment property *at night.*	□	□	□	□	□
3. Our apartment property is free from crime and very safe.	□	□	□	□	□
4. Our apartment property is a safe place for children to play in.	□	□	□	□	□
5. Our apartment property is safe for parking residents' cars.	□	□	□	□	□
6. Our apartment property has no vandalism such as graffiti, trash, and damages.	□	□	□	□	□
7. I think that *the gate control system* in our property gate *improves resident's safety from crime.*	□	□	□	□	□
8. I think that *the gate control system* in our property gate *eases residents' fear of crime.*	□	□	□	□	□
9. I think that *the fences* around our property *improve residents' safety from crime.*	□	□	□	□	□
10. I think that *the fences* around our property *ease residents' fear of crime.*	□	□	□	□	□
11. I think that gates or fences of our apartment property make our residents feel that we are segregated from the neighboring area.	□	□	□	□	□
12. I usually lock the windows while I go out.	□	□	□	□	□
13. I usually lock the windows while I stay inside at night.	□	□	□	□	□
14. I would be willing to work together with others on something to improve something about our apartment property.	□	□	□	□	□
15. I get a sense of community from living on this apartment property.	□	□	□	□	□
16. If one of my friends is looking for a new apartment, I would recommend our property to him/her.	□	□	□	□	□

GENERAL INFORMATION

** Please place a check (V) on boxes to indicate your status.*

1. What is your gender? □ Female □ Male

2. How old are you?
□ 20s □ 30s □ 40s □ 50s □ 60s □ 70s or over

3. How would you describe your race? Please check only one.
□ African American or Black □ White
□ Asian □ American Indian or Alaska Native
□ Hispanic or Latino □ Other (specify)___

4. Please write your nationality. _____

5. What is the highest level of education you completed? Please check only one.
□ Grade School □ High School □ College graduate/Bachelor
□ More than first college degree/Master or higher □ Other (specify)_____

6. What best describes your current employment status? Please check one.
□ Employed full time □ Employed part time □ Retired
□ Not employed or a student with no job □ Other (explain)_____

7. What is your family's annual income? Please include all family members who are living with you. (If you feel uncomfortable, please skip over this question.)
□ $ under 19,999 □ $ 20,000 to $39,999 □ $40,000 to $59,999
□ $ 60,000 to $79,999 □ $ 80,000 more
□ I am a student supported by my parents.

8. Who is the head of household in your current apartment? Please check one.
□ I □ My spouse □ My father
□ My mother □ My brother □ My sister
□ Other (expain) _____

9. With whom do you live in this apartment? Please select all that apply.
□ My parent(s) □ My spouse □ Kid(s)
□ Brother(s) / Sister(s) □ Roommate(s) □ Alone
□ Other (specify)_____

10. How many people live in your apartment? (Include yourself)
□ 1 □ 2 □ 3 □ 4 □ 5 □ 6 or more

11. How many kids live with you in your apartment? Please write the number of kids.
_____

12. How old are they? Please write their ages. _____

THANK YOU VERY MUCH FOR YOUR COOPERTATION~!

APPENDIX 5
QUESTIONNAIRE OF THE MANAGER SURVEY

SURVEY Of
Managers' Opinions on Gates and Fences in Apartment Communities

December 1, 2006

Dear Property Manager or Assistant Manager :

Thank you for agreeing to participate in this survey! This survey was reviewed and approved by the Institutional Review Board at Texas A&M University. The approval number is 2004-0659.

This survey is for my PhD dissertation. The purpose of this survey is to investigate property managers' opinion regarding the effects of gating and fencing on residents' perception of safety in multi-family housing communities. **The respondents of this survey should be the Property Manager or the Assistant Manager of your Apartment Community.**

It will take approximately 15-20 minutes. If you don't want to answer to any questions, you can stop answering.

If you have any questions about the study, please contact me at (979) 695-2680 or sharry@neo.tamu.edu. Likewise, any feedback on the survey or study would be sincerely appreciated. Thanks again for your cooperation.

Sincerely,

Suk-Kyung Kim

PhD. Candidate, Department of Architecture, Texas A&M University

Mail to: 1339 Bunker Hill Blvd. Apt B, Columbus, OH 43220

Phone: 614-459-9254

Email: sharry@neo.tamu.edu

** Please answer for the following questions.

1. Is your community a gated community?

□ Yes (Go to the Question 2 and 3)

□ No (Skip the Question 2 and 3)

2. If yes, **which access system** was applied in the gate control in your property? Please select all that apply.

□ Card Key (Similar to or smaller than a credit card)

□ Password Input system with buttons

□ Badge (round shape)

□ Remote control panel with buttons (smaller than 2X2 inches)

□ Bar-code stickers in front of vehicles

□ Other (explain) _____

3. Which one below describes best **about the condition of the gate control** of your apartment property? Please select only one.

□ The gate of our property is fully controlled by residents day at night. So **it is opened only when residents or their vehicles are passing**.

□ We have a gate control system. But, **the gate is usually opened.**

□ Other (explain) _____

GENERAL INFORMATION

This group of questions is for research purposes only and will be kept strictly confidential. They are designed to help understand more about the social and economic characteristics of participants. Please mark the appropriate boxes to indicate your answers.

1. What is your gender? □ Female □ Male

2. How old are you?
□ 20s □ 30s □ 40s □ 50s □ 60s □ 70s or over

3. How would you describe your race or ethnicity? Please check only one.
□ African American/ Black □ American Indian □ Asian
□ Hispanic/ Latino □ Caucasian □ Other (specify)_____

4. What is the highest level of education you completed? Please check only one.
□ Grade School □ High School □ College graduate/Bachelor
□ More than first college degree/Master or higher □ Other(specify)_____

5. What is your position in the property?
□ Property Manager/ Head manger □ Vice Manager/ Assistant Manager
□ Manager □ Other(Specify)_____

6. When did you begin to work in the current property? Please write the year and month below.

_____/_____
Month / Year

7. How long have you worked as a manager in apartment properties? Please include all your careers.
□ less than 1 year □ more than 1 year- less than 3 years
□ more than 3 years – less than 5 years □ more than 5 years – less than 8 years
□ more than 8 years – less than 10 years □ more than 10 years – less than 15 years
□ more than 15 years - less than 20 years □ more than 20 years
□ Other(specify)_____

8. Please write the number of apartment units in your property. _____

OPINIONS ON RESIDENT'S APARTMENT CHOICE

1. What may be the ***three*** most important reasons your residents choose your apartment? Please place a V or X on the boxes.

□ Close to their jobs
□ Convenient to friends or relatives
□ Safety from violent or property crimes
□ Convenient to leisure activities
□ Convenient to public transportation
□ Convenient to school (since most of them are college or graduate students)
□ Good schools for kids
□ Good design in the apartment property (site amenities)
□ Good interior design of apartments
□ Good maintenance services
□ Appropriate price to live in
□ Other public services
□ Other (explain) _____

2. Which one would be the most important **in order to ease residents' fear of crime at night** in an apartment property? Please select **only three**.

□ 24 hours maintenance service by the maintenance staff
□ Gate control system of the main entrance
□ Fences around the apartment property
□ Bright lighting at night
□ Patrol service by a private patrol company
□ Direct emergency button(s) on the phone/ wall
□ Visuality to the local police
□ Open visual access to every space in the property
□ Other (Explain)_____

3. Since you worked in your current apartment, how many times have you heard that one of your residents had experienced personal property damages or losses? Examples of personal property damages or losses were numerated in the questions 4 below.

□ Never □ 1 time □ 2 times
□ 3 times □ 4 times □ More than 5 times

4. Which damages or losses were their major losses? Please select two.

□ Not at all
□ Bicycle or parts □ Part of motor vehicles
□ Clothing, luggage □ Toys or recreation equipment
□ Cash □ Purse or Wallet
□ Electronics (ex. Camera, Audio system, or TV) □ Cell phone(s) or PDA
□ Computers or related equipment □ Jewelry, watch, keys
□ Part of plants □ Other (Explain)_____

5. How often do you receive the reports from your residents regarding their property crimes? Please select only one.

□ Not at all
□ 1-5 times a year
□ 6-10 times a year
□ 11-15 times a year
□ 16-20 times a year
□ More than 20 times a year
□ Other (Explain)_____

6. Do the residents report their crime experience to your maintenance office right after they experienced?

□ Yes, they usually report their crime experiences immediately.
□ No, they usually don't report their crime experience.
□ I have no idea.

7. For improving residents' safety from crimes in apartment property, which one is more effective? Please select only one.

□ **Gate control system** are more effective than fences.
□ **Fences** are more effective than gate control systems
□ **Both** are very effective. So, we should have both gate control systems and fences.
□ **None** of the above. Neither gates nor fences can ease residents' fear of crime.

8. Do you agree that Gated Apartment Communities DO have LESS Crime than non-gated communities?

□ Strongly Disagree □ Disagree □ Neutral □ Agree □ Strongly Agree

9. Do you agree that gates and fences are needed for providing safe communities for residents in the city of Houston?

□ Strongly Disagree □ Disagree □ Neutral □ Agree □ Strongly Agree

** How much do you agree with the following statement? Please place a check (V) on each line of boxes to indicate your opinions.*

	Strongly Disagree	Dis-agree	Neu-Tral	Agree	Strongly Agree
1. Our apartment property has no crime and very safe.	□	□	□	□	□
2. Our apartment property has no vandalism such as graffiti, trash, and damages.	□	□	□	□	□
3. I think that ***the gate control systems*** in apartment gates *improve resident's safety from crime.*	□	□	□	□	□

	Strongly Disagree	Dis-agree	Neu-Tral	Agree	Strongly Agree
4. I think that ***the fences*** **around apartment properties** *improve residents' safety from crime.*	□	□	□	□	□
5. I think that gates or fences of apartment properties are efficient to block the unwanted traffic from outside.	□	□	□	□	□
6. Residents usually prefer to gated communities if their rental fees are similar to those of non-gated communities.	□	□	□	□	□
7. Many of our residents are using the fitness center at night.	□	□	□	□	□
8. Many of our residents are using the club house at night.	□	□	□	□	□
9. Residents in our community can contact one of our maintenance staff for 24 hours a day.	□	□	□	□	□
10. The residents in our property are willing to work together with their neighbors to improve something about our apartment property.	□	□	□	□	□
11. I think that our residents **get a sense of community** by living in this apartment property.	□	□	□	□	□

12. If you have a report regarding your property crimes, could you give me a copy of the document?
□ Yes (If Yes, please send a copy with this questionnaire) □ No

13. If you are not in gated communities, please skip this question. Do you any difficulties in managing a gated community? If so, please write about them below.

14. If you have any opinions or ideas for improving residents' perceived safety in apartment communities, please let us know them below.

THANK YOU VERY MUCH FOR YOUR COOPERTATION~!

APPENDIX 6
APPROVAL MEMORANDUM OF INSTITUTIONAL REVIEW BOARD

Office of Research Compliance

Academy for Advanced Telecommunications and Learning Technologies

Center for Information Assurance and Security

Computational Medicine Program

Institute for Scientific Computation

Texas Center for Telecommunications and Information Technology

Texas A&M University
1500 Research Parkway
Suite B150
College Station, Texas
77843-1186
979.458.1467
FAX 979.862.3176

Date 01/13/2005

MEMORANDUM

TO: Suk-Kyung Kim
Dept. of Architecture
MS 3137

FROM: Dr. E. Murl Bailey, CIP, Advisor
Institutional Review Board
MS 1112

SUBJECT: IRB Protocol Review

Title: The Gated Community, Another Defensible Space: A Study of Residents' Crime Experience and Perceptions of Safety behind Gates and Fences in the Urban Area

Protocol Number: 2004-0659
Review Category: Exempt from Full Review
Approval Date: January 12, 2005 **to** January 11, 2006

The approval determination was based on the following Code of Federal Regulations
http://ohrp.osophs.dhhs.gov/humansubjects/guidance/45cfr46.htm

_____ **46.101(b)(1)**	_____ **46.101(b)(4)**
✓ **46.101(b)(2)**	_____ **46.101(b)(5)**
_____ **46.101(b)(3)**	_____ **46.101(b)(6)**

Remarks: Request of waived signed consent has been approved.

After specific review, it has been determined that approval for waiver of the requirement to obtain signed informed consent may be granted under 45 CFR 46.117(c). However, a study information sheet with all elements of consent must be provided to study participants.

The Institutional Review Board – Human Subjects in Research, Texas A&M University has reviewed and approved the above referenced protocol. Your study has been approved for one year. As the principal investigator of this study, you assume the following responsibilities:

***Renewal*:** Your protocol must be re-approved each year in order to continue the research. You must also complete the proper renewal forms in order to continue the study after the initial approval period.

***Adverse events*:** Any adverse events or reactions must be reported to the IRB immediately.

***Amendments*:** Any changes to the protocol, such as procedures, consent/assent forms, addition of subjects, or study design must be reported to and approved by the IRB.

***Informed Consent/Assent*:** All subjects should be given a copy of the consent document approved by the IRB for use in your study.

***Completion*:** When the study is complete, you must notify the IRB office and complete the required forms.

Office of the Vice President for Research
Office of Research Compliance - Institutional Review Board
1186 TAMU, College Station, TX 77843-1186
1500 Research Parkway, Centeq Building, Ste. B-150
979.458.4067 Office 979.862.3176 Fax

Dr. J. Steven Moore, Chair
Dr. Alvin Larke, Jr., Chair
Ms. Sharon Alderete, Program Coordinator

November 7, 2005

MEMORANDUM

TO: Suk-Kyung Kim
Architecture MS 3137

FROM: Ms. Sharon Alderete, CIP
IRB Program Coordinator

SUBJECT: IRB Request for Exemption

PROTOCOL NUMBER: 2005-0570

TITLE: A Survey of Property Managers for the PhD Study Titled, "The Gated Community, Another Defensible Space: A Study of Residents' Crime Experience and Perception of Safety Behind Gates and Fences in the Urban Area

---

The Institutional Review Board (IRB) has determined that the referenced protocol application meets the criteria for exemption and no further review is required. However, any amendment or modification to the protocol must be reported to the IRB and reviewed before being implemented to ensure the protocol still meets the criteria for exemption.

This determination was based on the following Code of Federal Regulations:
(http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm)

45 CFR 46.101(b)(2) - Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior, unless: (a) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (b) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

If you have any questions regarding this protocol application or the review process, please contact the IRB Office at (979)458-4067.

APPENDIX 7
FOLLOW-UP LETTER FOR THE RESIDENT SURVEY

Follow-up Letter

SukKyung Kim
PhD candidate, Department of Architecture
College of Architecture, Texas A&M University

December 1, 2005

Dear Resident:

Please permit me to introduce myself to you again. I am SukKyung Kim, a Ph.D. candidate in the Department of Architecture at Texas A&M University.

I sent you a survey package three weeks ago. The survey was for investigating residents' opinions on gates and fences in apartment communities. The survey was for my PhD dissertation. The survey was reviewed and approved by the Institutional Review Board at Texas A&M University. The approval number is 2004-0659.

Since there are only a few surveys being returned, I would greatly appreciate it if you would return it as soon as possible.

Again, your response is really important for my study. I would like to ask you to participate in this survey.

If you have any questions about the study, please contact me at (614) 459-9254 or sharry@neo.tamu.edu. Thank you so much again for your cooperation.

Sincerely,

SukKyung Sharry Kim

PhD. Candidate, Department of Architecture, Texas A&M University

College Station, TX 77843-3137

Mail to: 1339 Bunker Hill Blvd. #B, Columbus, OH 43220

Phone: 614-459-9254

Email: sharry@neo.tamu.edu

VITA

Name	Suk Kyung Kim
Address	1339 Bunker Hill Blvd. B, Columbus, OH 43220 (Pospark Apt #101-407, Amsa 3, Kangdong, Seoul, Korea)
Email Address	sharry@neo.tamu.edu

Education	Ph.D. Architecture, Texas A&M University College Station, TX, August 2006
	M.S. Housing and Interior Design, Yonsei University Seoul, Korea, August 1996
	B.S. Housing and Interior Design, Yonsei University Seoul, Korea, February 1994
Professional Career	Assistant Professor, August 2006 Housing and Residential Science Program Textiles and Consumer Sciences, Florida State University
	Research Assistant, September 2004 to May 2005 Department of Architecture, Texas A&M University
	Research Assistant, May 2003 to December 2003 Center for Housing and Urban Development Texas A&M University
	Senior Research Specialist, October 1996 to October 2001 Housing and Urban Research Institute Korea National Housing Corporation, Korea
	Chief Researcher, June 1996 to September 1996 Living System Design Institute, Samsung Electronic Company
Honors	Department of Architecture Fellowship, 2005 The Norman and Renee Zelman Endowed Scholarship, 2004 The Paul M. Terrill, Jr. ’57 Endowed Scholarship, 2004 The Professor Daniel F. MacGilvray Endowed Memorial Scholarship, 2003 J. W. Van Dyke Memorial Scholarship, 2002 Departmental Fellowship for a New Doctoral Student, 2001