

Environmental Design and Fear: The Prospect-Refuge Model and the University College of the Cariboo Campus

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This study examines the influence of environmental design features on the student population's fear of crime. Based upon Nasar and Fisher's (1992) prospect-refuge model, it was predicted that (a) fears levels would be greatest in areas with high prospect and low refuge (b) lower in areas of low prospect and high refuge and that (c) avoidance behaviour would be utilized as a coping mechanism in response to fears on campus. The analysis of 167 survey responses by students indicated that environmental design features had a significant effect on fear of crime and spatial behaviour. Fear levels fluctuated with the amount of prospect and refuge afforded in specific areas and avoidance behaviour was the most significant response to these fears. The implications of these findings for the prospect-refuge model and the future policy direction of campus planning are discussed.

Introduction

Throughout the past two decades, media reports and academic studies (Swisher, 1989 in Fisher & Nasar, 1992) have documented the profound effect that crime and fear of crime has posed on university campuses throughout North America. In many instances, universities have been found liable where students, employees, or visitors to the campus have suffered injuries because the campus environment was deemed to be unsafe (Nasar & Fisher, 1992). In an effort to improve safety and limit liability, British Columbia's Ministry of Skills, Training and Labor implemented the Safer

Campuses Initiative (Thomson, 1996). Using the funding provided by this program, the University College of the Cariboo (UCC) conducted two separate safety audits in 1993 and 1996.

The objective of the following analysis is to supplement these studies by examining perception and spatial behavior as an index into the level of fear experienced on the UCC campus. More specifically, it examines fear of crime and avoidance behavior in relation to environmental design features. The research extends the existing body of literature on crime prevention through environmental design and explores the significance of architectural form, spatial design, and the physical environment in the student body's perception of safety and use of space. The analysis tests the theoretical relevance of the Nasar and Fisher's (1992) prospect-refuge model and derives several policy recommendations for planning decisions guiding future development of the UCC campus.

Social Behaviour and Environmental Design

The relationship between social behaviour and the physical environment was initially examined by sociologists throughout the first half of the twentieth century. The research examined the impact of social conditions and community characteristics upon individuals in an attempt to explain deviancy and delinquent behaviour (Merton, 1938; Shaw and Mckay, 1942; in Schneider and Pearcey, 1996). Evolving from this, various theories have explored the relationship between crime and the physical environment—arguing that criminal behaviour may be understood independent of prevailing social conditions. These have contended that specific qualities of the physical environment (built and physical form) are conducive to particular types of behaviour that precipitate criminal activity. As such, these theories have embodied a school of thought that believes “the immediate environment is more relevant to the decision to commit a crime than those social factors that represent the root cause of the crime” (Cornishe and Clarke, 1986 in Schneider and Pearcey, 1996: 4).

Jacobs (1961) was the earliest to proclaim this relationship and argued that architectural form and spatial design had the ability to break down community cohesiveness, and destabilize informal social control. Subsequently, this provided the basis for increased opportunities and incidences of criminal activity. Newman's (1972) seminal work extended this idea by examining the intricacies between the built form, similar social compositions, and criminal activity. His work emphasized the relationship between architec-

tural design (building height), social cohesion, and crime and extended the theoretical body by proposing design concepts that created "defensible space." Highly controversial, this work spurred further research that advocated the importance of other physical and spatial features on criminal activity such as: accessibility, adjacent land use, lighting, street activity, and proximity to transportation routes (Schneider and Pearcey, 1996).

Subsequently, the research revealed the complex relationship that existed between criminal activity and the physical environment. It culminated in an array of theories that have attempted to further explain the numerous environmental features that may influence crime and help "conceptualize the situational perceptions and behaviour of the offender" (Schneider and Pearcey, 1996: 4). Thus, environmental criminologists and social psychologists have developed numerous models exploring criminal behaviour and the decision-making process that emphasize the importance of opportunities afforded in the physical environment.

These models have argued that opportunities and risk levels are the key determinants of criminal behaviour. As such, they extend the notion that opportunistic behaviour is intricately linked to the design and characteristics of the physical environment (Brantingham and Brantingham, 1981). The emphasis on situational and locational characteristics has become integral to this body of research. Felson's (1987) emphasis on the importance of accessibility to criminal activity led to the development of his "principle of least effort" which contends that criminals seek out areas that provide the best possibility for escape when confronted by a potential threat.

Furthermore, (Molunby, 1976) extended Newman's concept by examining the importance of surveillance in the physical environment. He argues that the key determinant of opportunity for criminal activity is intricately linked to the amount of concealment afforded a potential offender. Subsequently, environments characterized by high levels of concealment and reduced levels of surveillance, are conducive to opportunities, lower risk levels, and therefore, higher levels of criminal activity.

Extending this notion, research has also examined the importance of fear of crime and its relationship to environmental design features (Taylor and Gottfredsen, 1986, Nasar and Fisher, 1992; Fisher and Jones, 1997). As Crowe (1991, 96 in Schneider and Pearcey, 1996) argues, the "relation of defensible space to these environmental cues is symbiotically applicable to both 'normal' (legitimate) and 'abnormal' (illegitimate) users of space."

Subsequently, environmental features that convey opportunity to a potential offender relay a feeling of vulnerability and fear to a normal user of space. In this respect, environmental design provides a unique framework in evaluating individuals perception and use of space.

Fear of Crime in a University Setting

University settings possess many characteristics that make them attractive to potential offenders and hence, perpetuate an overall climate of fear. Firstly, they are characterized by a diverse student population, a lack of guardianship, and a freedom of movement that reduces risk and enhances opportunities for a potential offender (Cohen and Felson, 1979 in Fisher and Nasar, 1992). The transient nature of students, and their numerous belongings accompanied by this freedom of movement provides many opportunities for a potential offender and facilitates a lack of guardianship on campus (Fisher & Nasar, 1992). Furthermore, the heterogeneous nature of campus settings creates a degree of uncertainty that subsequently heightens fear amongst the student population (Kennedy & Silverman, 1985). In doing so, campus settings not only provide the necessary opportunity for criminal activity, but perpetuate an overall climate of fear experienced by many students throughout North America.

In areas where opportunities for criminal activity and fear of crime are relatively high, environmental design can play an important role in reducing opportunities for criminal activity and improving perceived safety (Cater & Jones, 1989; Nasar & Fisher, 1992). Previous research (Appleton, 1975; Tuan, 1979) has shown that features of the physical environment may convey particular cues of threat that directly influence an individual's perception of space. In this sense, Golledge and Stimson (1997) note that through ongoing experience humans develop mental images of space that carefully assesses the level of safety afforded within a particular setting. In turn, this "mental map" helps individual's evaluate space, identify potential hazards, possible consequences, and take measures to avoid threatening situations (Kaplan, 1973 in Nasar & Jones, 1997). Within this context, fear often elicits a coping mechanism in which individuals attempt to avoid or reduce a threatening situation (Keane, 1998). Thus, environmental design features that increase fear directly affect individual's behaviour and possibly serve as a mobility restrictor in their daily activity space.

Nasar & Fisher (1992) have argued that although various studies have established the link between the built environment and risk perception (see Taylor & Gottfredson, 1986), very little research has examined the site-specific factors that perpetuate fear of crime. They contend that research on the built environment and fear of crime has tended to focus more on residential and commercial areas rather than on campus settings. Furthermore, there has been an overt tendency to examine individual-, block-, neighbourhood-level characteristics rather than site specific cues that influence levels of fear experienced by individual's (Nasar & Fisher, 1992).

It is in this context that Nasar & Fisher (1992) developed a theoretical model examining the relationship that exists between exterior site characteristics and fear of crime. Within it, they argued that environmental design features such as prospect, refuge, and escape may pose a direct impact on spatial behaviour and perceived safety. The intention of this analysis is to examine the applicability of Nasar and Fisher's (1992) prospect refuge model in a small university setting. Essentially, to determine if the model applies to a university that possesses relatively low rates of criminal activity. In doing so, the study examines the intricate relationship between environmental design, levels of fear and spatial behaviour on the UCC campus.

Prospect-Refuge Theory and Perceptions of Safety

Prospect-refuge theory was first introduced as an explanation of human environmental preferences. It was believed that environments that afforded a certain amount of prospect (open view) and refuge (concealment, protection) offered an evolutionary advantage to humans (Appleton 1975). Appleton (1975) postulated that humans preferred settings with prospect and refuge because "such places aided survival from animate hazards by offering an observation point to see, to react, and if necessary, to defend" (Fisher & Nasar, 1992: 37). In this regard, individual's did not necessarily have to experience an area to determine its suitability. Rather, they could evaluate their surroundings and infer the amount of prospect and refuge afforded to determine whether it constituted a suitable location.

Similarly, prospect and refuge are the key determinants of opportunities provided for a potential offender (Knox, 1987). Offenders desire environments exhibiting a high degree of refuge so that they can "wait, attack and if need be, take the victim out of sight" (Fisher & Nasar, 1992: 38). In support of this concept,

research findings have indicated that offenders evaluate numerous site factors throughout the built environment when selecting their target (Taylor & Nee, 1988 in Fisher & Nasar 1992). Archea's (1985) access and exposure model thoroughly explored the connection between bank robberies and environmental design that further supported this concept. He argued that bank robbers selected their targets by the amount of visual exposure and access provided by the surrounding environment (Archea, 1985 in Nasar & Fisher, 1992).

Using the concepts put forth by Appleton (1975) and Archea (1985), Fisher and Nasar (1992) developed a model that evaluated individual's perception based on the amount of prospect and refuge afforded within the surrounding environment (see Figure 1). Within it, they argued that areas characterized by large amounts of refuge (concealment) and minimal prospect would evoke the highest degree of fear amongst individuals. These areas are characterized by what Goffman (1971) and Warr (1990) refer to as "lurk lines or blind spots." They constitute a part of the environment in which an individual cannot see and thus exhibit the realm of the unknown.

		PROSPECT (Victim)	
		HIGH (Open Prospect)	LOW (Blocked Prospect)
REFUGE (Offender)	LOW (no hiding places)	Most Safe	Moderately Safe
	HIGH (Many hiding places)	Moderately Unsafe	Most Unsafe

Source: Fisher, Bonnie & Nasar, Jack. (1992). Fear of crime in relation to three exterior site features. *Environment and Behavior*, 24(1), 35-65.

Figure 1 Typology of Perceptions of Safety

It is in this context that previous studies have shown that areas characterized by a large amount of "lurk lines or blind spots" directly influence the amount of fear experienced by an individual. Both Warr (1990) and Hassinger (1985) have thoroughly explored this subject and have shown that an individual's level of fear is directly correlated to the number of hiding places within the surrounding environment. Furthermore, other studies have revealed that actual incidents of crime may be directly associated with the

design of both the built and natural environment (Stoks, 1983 in Fisher and Nasar, 1992).

In contrast, Nasar and Fisher's (1992) model predicts that the highest degrees of safety (lowest fear) would be exhibited in areas characterized by minimal refuge for a possible offender and high prospect for a potential victim. They argue that, if the surrounding environment affords the victim a high degree of visibility, and minimal concealment for a potential offender, then the victim could evaluate the area, observe an offender and most likely avoid the attack. It is in this context that the model predicts that individual's perception of safety is governed by environmental design features. Similar to the concepts of prospect and refuge, Fisher and Nasar (1992) revealed that feelings of safety may be also directly influenced by the way in which the physical environment governs the possibility for escape if confronted by an offender. Goffman (1971) has argued that "boundedness protectively cuts off those in physical frames from the outside...this sometimes will be turned against the individual" (Goffman, 1971 in Fisher & Nasar, 1992:40). The manner in which space affords the possibility for someone to either escape a possible threat or be seen by others are thus viewed as key determinants evoking fear on university campuses (Fisher & Nasar, 1992).

In sum, Nasar & Fisher (1992) have argued certain environmental design features directly influence fear of crime. The prospect-refuge model incorporates Appleton's (1975) early ideas of evolutionary advantages and Archea's (1985) access and exposure model. The following examination will test the applicability of the model in a smaller university setting located in the southern interior of British Columbia. It is hypothesized that if the model is to be justified then perceived safety would improve with increases in prospect (open view) and escape for the victim and decreases in refuge (concealment) for the potential offender. In doing so, the afore mentioned study will further validate or discredit environmental design as a plausible explanation in the levels of fear experienced by the student population.

Contextual Setting

Situated in Kamloops, British Columbia (pop. 80,000) at the centre of the Southern Interior, the University College of the Cariboo was founded as Cariboo College in the early 1970s. It began partnership degrees in the late 1980s and granted its first independent degree in 1996. Amidst this growth, it has become a

popular post-secondary institution and evolved as a regional node for recent high school graduates. The campus has undergone major development in recent years with the construction of the new trades and technology building and the refurbishing of the Old Main (UCC, 2000).

In 1999, the student population totalled approximately 8,300 in a variety of academic, vocational, and technical programs. The student body is comprised of approximately 60% female and 40% male students with approximately 72% of the student body under the age of 24 (UCC, 2000).

Methodology

Techniques and sample profile

To test the applicability of Nasar and Fisher's prospect-refuge model, the analysis followed several basic procedures. Firstly, nine areas were selected on the UCC campus that exhibited varying degrees of prospect and refuge. Following their selection, a small questionnaire was designed and a pilot study conducted to objectively measure the environmental design characteristics (prospect, refuge, and escape) of the selected areas. Following the conclusion of the pilot study, the data gathered was used to apply the selected sites into the prospect-refuge model and to construct a "fear index" that provided a prediction for perceived safety levels within the selected areas.

Subsequently, a questionnaire was developed to measure perceptions of safety on a campus and test the hypotheses derived from the model and the fear index. The survey measured respondent's perception of safety during the day and night in each of the nine areas. Responses were based on a seven point bi-polar scale (very unsafe to very safe). Kolmogorov-Smirnov, Chi-square, and Spearman rank correlation were used to test the statistical significance of the research findings and the associated hypotheses. Avoidance behaviour was measured from closed-ended questions and to a site-plan of the UCC campus. The results were quantified, interpreted and linear interpolation was applied to construct a spatial patterning of fear on campus.

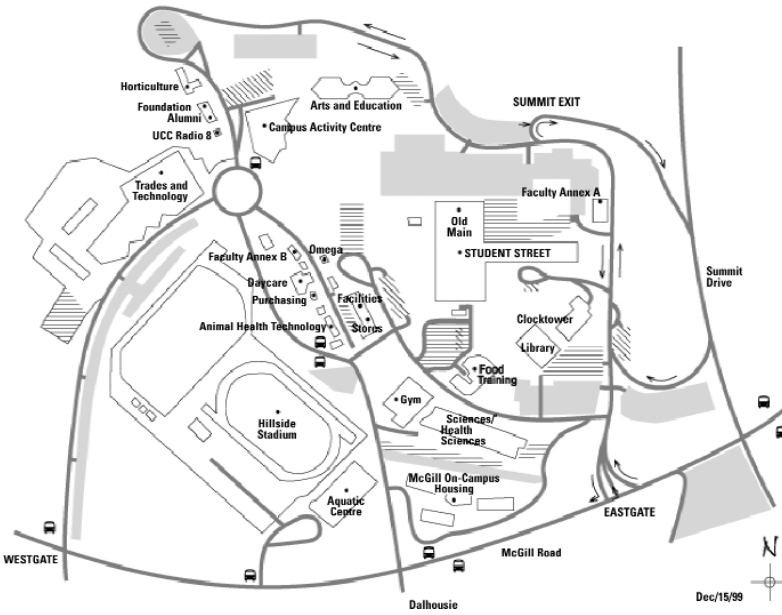
The sample consisted of 167 individuals surveyed at various locations throughout the campus from October to December, 1999. Responses were obtained from numerous sites throughout campus, however, the majority of questionnaires were received from students in the university activity center. The sample consisted of 108

females (64.6%) and 58 males (34.7%) with 74% of the sample under the age of 23. In doing so, it largely paralleled the composition of the student population in terms of gender and age distribution. The slight skew was a result of reluctant participation from many males as well as the time and resource constraints placed upon this analysis. It is important to emphasize that the data for the combined sample may be slightly weighted towards female responses, as the sample is not completely representative of the student population.

Site Selection and Classification

The University College of the Cariboo provided an excellent setting to test the prospect-refuge model and the hypotheses of this study. As one wanders throughout the campus, it is evident that the architectural form, design features, and physical landscape exhibit varying degrees of prospect, refuge, and escape. Furthermore, interviews with UCC administration, security guards, and a review of security incident records revealed that the level of reported criminal activity on campus remained relatively low and virtually no incidences of personal attacks had been reported (Galloway, 1999) which, as Nasar & Fisher (1992) argue, might bias perceptions of safety. It is in this context that the UCC constitutes a prime setting to undertake and test the applicability of the prospect-refuge model as an explanatory mechanism of fear of crime.

As Figure 2 exhibits, the areas selected (A-I) were distributed throughout the old and new portions of the UCC campus. The areas chosen exhibited varying degrees of prospect and refuge that made them applicable to Nasar and Fisher's (1992) prospect-refuge model (See Figure 3 to 5 photos). Each area's site characteristics varied with their orientation to surrounding buildings as well as the physical environment. To establish the specific characteristics of the selected sites, eighteen upper-level geography students were asked to participate in a pilot study. The students rated each area on a 5-point bipolar scale for prospect (limited to open), refuge (none to much), and ease of escape if confronted by an offender (easy to limited). As Table 1 indicates, the selected areas exhibited a high degree of variance that established and justified their applicability to the prospect-refuge model. To supplement these classifications, the data gathered was also used to construct a "fear index" (see Table 2). The index took into consideration the environmental design features and was used to predict fear levels associated with the selected areas and to provide a numerical interpretation of the prospect-refuge model.



Source: UCC (December 9, 2000) *UCC Campus Maps and Tours*. Available at <http://www.cariboo.bc.ca/campmap.htm>

Figure 2 Selected areas on the UCC campus



Figure 3 Site "B"



Figure 4 Site "E"



Figure 5 Site "H"

Table 1 Judgement of site characteristics

<i>Prospect</i> 1=Limited, 5=Open		<i>Refuge</i> 1=None, 5-Much		<i>Escape</i> 1=Easy, 5=Limited	
B	1.89	D	4.58	B	4.05
D	2.11	B	3.79	D	3.89
C	2.42	C	3.42	C	3.32
F	2.89	F	3.16	F	3.16
G	3.26	E	2.84	G	3.16
E	3.32	G	2.79	E	2.53
I	4.16	I	1.58	I	2.16
A	4.79	H	1.16	H	1.89
H	4.79	A	1.11	A	1.42

Table 2 The construction of the "fear index"

<i>Area</i>	<i>Prospect</i>	<i>Refuge</i>	<i>Escape</i>	<i>Fear Index</i>
H	4.79* (2)**	1.16 (1)	1.89 (1)	4†
A	4.79 (1)	1.11 (2)	1.42 (2)	5
I	4.16 (3)	1.58 (3)	2.16 (3)	9
E	3.32 (4)	2.84 (5)	2.53 (4)	13
G	3.26 (5)	2.79 (4)	3.16 (5)	14
F	2.89 (6)	3.16 (6)	3.16 (6)	18
C	2.42 (7)	3.42 (*7)	3.32 (7)	21
D	2.11 (8)	4.58 (9)	3.89 (8)	25
B	1.89 (9)	3.79 (8)	4.05 (9)	26

*Average rank value derived from pilot study

**Assigned rank in terms of how average rank ranks within data set

†Fear index value derived from adding ranks together

The implementation of the selected areas into the prospect-refuge model (see Figure 3) was based on these classifications and careful examination of the of the "fear index." In regards to prospect, I classified areas H, A, and I as high prospect (very open), E, F, and G with moderate prospect, and B, C, and D with low prospect (not very open). In terms of refuge, areas H and A were classified as having low refuge (minimal concealment) for a potential offender; areas E, I, and G with moderate refuge; F and C with fairly high refuge; and B and D as having high refuge.

In sum, the selected areas were classified into six categories (see Figure 6) based on the amount of prospect and refuge afforded within the setting:

		Prospect for Victim		
		<i>High</i>	<i>Moderate</i>	<i>Low</i>
Refuge for Offender	Low	H, A		
	Moderate	I	E, G	
	Fairly High		F	C
	High			B, D

Source: Adpted from Nasar, Jack and Fisher, Bonnie (1992).

Figure 6 UCC sites arranged in terms of prospect and refuge

1. high prospect/low refuge (H, A)
2. high prospect/moderate refuge (I)
3. moderate prospect/moderate refuge (E, G)
4. moderate prospect/fairly high refuge (F)
5. low prospect/fairly high refuge (C)
6. low prospect/high refuge (B, D)

Based on Nasar and Fisher's (1992) prospect-refuge model it was hypothesized that perceptions of safety would vary throughout these categories. If the model were to hold true, then highest degrees of fear would be exhibited in the sites characterized by low prospect/high refuge, whereas individuals would feel most safe in areas with high prospect/low refuge. In more specific terms, it was hypothesized that perceptions of safety would vary as follows: most safe in high prospect/low refuge (areas H & A)

1. less safe in high prospect/moderate refuge (area I)
2. less safe still in moderate prospect/moderate refuge (areas E & G)
3. less safe in moderate prospect/fairly high refuge (F)
4. less safe in low prospect/fairly high refuge (C)
5. least safe in low prospect/high refuge (B & D)

Furthermore, in evaluating the selected areas throughout the UCC campus, it was expected that other factors would influence perceptions of safety. Firstly, previous research (Warr, 1990) has shown that darkness increases fear of crime by limiting an individual's visibility and ability to evaluate the surrounding environment. In addition, although women tend to be less victimized, various studies (Keane, 1998; Nasar & Fisher 1992; Nasar and Jones, 1997) have shown that they exhibit higher degrees of fear than their

male counterparts. In this regard, Keane (1998) has argued that women's fear may result from victimization experiences that are not experienced by males. Their more pronounced fear of crime may arise out of the possibility of sexual assault and as Warr (1985 in Keane, 1998) has shown, women equate the seriousness of rape with that of murder.

Subsequently, higher degrees of fear can have a dramatic effect on an individual's lifestyle, mobility, and behaviour (Pain, 1997). As discussed earlier, fear often elicits a stress reaction in which individuals attempt to avoid, reduce, or cope with a threatening situation (Riger, 1985). Often, this avoidance behaviour gradually becomes a routine activity in an individual's daily activity space and serves to reduce their overall quality of life (Riger & Gordon, 1981 in Keane, 1998). As Pain (1997: 234) notes:

Fear of attack may mean a "virtual curfew" on women at night in certain areas but more often it means an assiduous state of vigilance the deployment of well developed coping strategies as women continue to use particular spaces and domains in a highly restricted way.

Subsequently, it is hypothesized that women will display the highest degrees of fear after dark and most likely exhibit avoidance behaviour in response to these fears.

Research Findings

Perceptions of Safety and Time of Day

As discussed earlier, it was expected that perceptions of safety would be lower amongst females during the night. As Table 3 indicates, the results seemingly support and extend this hypothesis. Notable differences in perceptions of safety are evident during day ($x=6.61$) and night ($x=4.86$) and amongst males and females.

To test the significance of these differences, repeated Kolomogrov-Smirnov tests were conducted that confirmed and extended this hypothesis. The analysis revealed that that significant differences not only existed in perceptions of safety during the night ($p=.002$), but during the day ($p=.016$) as well. These findings extend Nasar and Fisher's (1992) results that did not find a significant difference in perceptions of safety during the day amongst males and females.

These preliminary findings further support existing notions that fear of crime is more prevalent among women (Pain, 1997;

Table 3 Perceptions of safety by time of day and gender

<i>Day vs. Night Safety</i>	<i>Combined Sample (n=167)</i>	<i>Women (n=108)</i>	<i>Men (n=58)</i>	<i>Gender Difference</i>
Day Ratings	6.61*	6.47	6.86	0.4
Night Ratings	4.86	4.11	6.23	2.11

*Average ranks based on a seven point bi-polar scale (1=very unsafe, 7=very safe)

Keane, 1998) and after dark (Fisher & Nasar, 1992; 1997). The results substantiate Goffman (1971) and Warr's (1990) concept of "lurk lines" in which an individual's perception of safety is governed by their ability to evaluate specific settings. In this context, the findings reveal that gender differences are evident on campus and that perceptions of safety fluctuate between day and night.

Prospect-Refuge Theory and Fear on the UCC Campus

Similar to that of Nasar & Fisher's (1992) examination, the analysis of the selected areas on campus conducted pairwise comparisons of safety ratings for males and females during the night. The data was gathered and interpreted from a question that addressed individual's perception of safety within the selected areas. Recall that it was hypothesized that perceptions of safety would improve as prospect for the victim increased and refuge for the offender decreased. As Table 4 indicates, the results seemingly confirm the prospect-refuge hypotheses and environmental design as a plausible explanation of individual's perception of safety.

As Table 4 reveals, perception of safety fluctuated accordingly with the amount of prospect and refuge afforded within each area. Respondents rated areas with low prospect/high refuge (B & D) as least safe and the high prospect/low refuge areas (A & H) as the most safe. Furthermore, in examining the differences in the safety scores, the original site classification data offers some insight (see Table 1). Perceptions of safety corresponded with the judgements of site characteristics discussed earlier in this analysis. To test this relationship, Spearman rank correlation was conducted between the constructed "fear index" and the actual safety scores. This revealed that a significant relationship ($r = -.971$, $p < .0001$) existed between the amount of prospect, refuge, possibility for escape and perceived safety on the UCC campus. Thus, the findings support the hypotheses that highest degrees of fear would be exhibited in

Table 4 Safety ratings by area and gender

<i>Prospect/Refuge (Area)</i>	<i>Combined Sample (n=167)</i>	<i>Males (n=58)</i>	<i>Females (n=108)</i>	<i>Gender Difference</i>
High/Low (A)	5.54*	6.48	5.07	1.34
High/Low (H)	5.38	6.37	4.84	1.53
High/Moderate (I)	4.23	5.53	3.52	2.01
Moderate/Moderate (E)	4.18	5.34	3.55	1.79
Moderate/Moderate (G)	4.09	5.37	3.38	1.99
Moderate/Fairly High (F)	3.71	5.15	2.93	2.22
Low/Fairly High (C)	3.35	4.76	2.59	2.17
Low/High (B)	3.35	4.78	2.59	2.19
Low/High (d)	3.04	4.47	2.28	2.19

*Average ranks based on a seven point bi-polar scale (1=very unsafe, 7=very safe)

areas of low prospect/high refuge and that individual's would feel most safe in areas characterized by high prospect/low refuge.

Furthermore, repeated Kolmogorov-Smirnov analyses indicated significant differences ($p=.0002$) in fear levels experienced between males and females in each of the areas. These findings support earlier results, and supplement the notion that women experience much higher levels of fear than men (Keane, 1998) and that this may result from their differing life experiences. Within this context, Smith (1989 in Pain, 1997) has argued that individuals who are alienated and marginalized from mainstream society experience a sense of powerlessness that is often manifested in higher degrees of fear. Thus, the spatiality of women's fear can be directly associated to gender inequality within society as a whole (Valentine, 1989 in Pain, 1997). In this sense, environmental design features underscore the broader social and political basis of spatial inequality within the urban fabric (Valentine, 1991 in Pain, 1997).

In sum, these findings support Nasar & Fisher's (1992) prospect-refuge model and the existing concepts (Newman, 1972) of the link between architectural design, the physical environment, and fear. Perceptions of safety fluctuated accordingly with the amount of prospect and refuge and this was verified by the statistically significant relationship between the "fear index" and perceptions of safety on campus. Furthermore, the data established the existing notions of women's fear in public space and provided insight into the differing personal geographies of men and women on the UCC campus.

Avoidance Behaviour and Fear on Campus

To establish whether generalized notions of safety on campus were manifested in avoidance behaviour, respondents were presented with a site plan of the UCC campus and asked to identify any areas they would not walk through, walk by, or avoided altogether. In doing so, this question tested the hypothesis that women would display the highest degrees of fear after dark and most likely exhibit avoidance behaviour. As Table 5 indicates, the results seemingly support the existing literature that has shown in coping with stress resulting from fear, individual's avoid certain areas or adopt protective techniques. Furthermore, that women are most likely to display avoidance behaviour (Stanko, 1995 in Keane, 1998) which gradually becomes a routine activity (Keane, 1998).

Table 5 Avoidance behaviour and fear on campus

<i>Avoidance Behaviour</i>	<i>Combined Sample (n=167)</i>	<i>Women (n=108)</i>	<i>Men (n=58)</i>
Yes	47.9% (80)	67.6% (74)	6.41% (6)
No	52.1% (87)	32.4% (34)	93.6% (52)

The findings of spatial behaviour (see Figure 7) indicate that avoidance techniques have been adopted as a coping mechanism for many women in response to their fear of crime. As Table 5 reveals, approximately 67.6% of female respondents reported avoidance measures whereas only 6.41% of men admitted to undertaking some type of modified behaviour. Chi square analysis revealed that a significant difference ($X^2= 52.15$, $DF=1$, $p<.001$) existed in avoidance tendencies between men and women. It is in this context that the gender differences that have been predominant throughout this analysis were further substantiated by these findings.

The results indicate that fear of crime on campus has undermined women's spatial confidence, and restricted their activity space. This further establishes the fear-gender paradox in which women are consistently more fearful in public space despite the fact that the actual threat of violence is more prevalent in the private domain (Pain, 1997). In this regards, Valentine (1989: 174 in Pain, 1997) has argued that this paradox exists because encounters with men in the public sphere are "unpredictable, potentially uncontrollable and hence threatening." Respondents offered both



Figure 7 Levels of fear on the UCC campus

insight into the avoidance behaviour and coping mechanisms that many women have adopted to reduce their overall fear on campus:

- I would not walk say from the A&E building to the library. I would drive between the two.
- I don't always avoid...I can't because I have to go somewhere—I am just scared.
- As a female I am cautious and scared about a lot of things. I would rather walk with someone else than by myself throughout the campus.
- I do not usually walk on campus alone at night. I have not a great amount of night courses and the ones I have I always have someone walk with me to my car when the class is finished.

In response to fear, many women noted that they would walk with someone after dark. This evidence supports previous findings (Nasar & Fisher, 1990) that revealed walking in groups represents a collective action in response to fear of crime. Women on the UCC campus thus adopted both techniques of avoidance behaviour and protective measures in response to the overall climate of fear. Thus, women's fear of crime has not only reduced spatial confidence, but

has the ability to shape and decrease their overall quality of life experienced within the campus setting (Valentine, 1989 in Pain 1997). These results provide further evidence into the restricted activity space of female students and extend the existing concepts of gender inequality within the built environment.

Furthermore, respondent's description of environments they avoided provides further anecdotal evidence for the prospect-refuge model as a predictor of fear and spatial behaviour. Similar to that of Nasar and Fisher's (1992) findings, individuals emphasized that the amount of prospect and refuge afforded within a particular setting influenced their use of space. Comments noted that the level of lighting or "dark areas" was a key determinant in how safe they felt walking alone throughout the UCC campus. Once again, this establishes Warr's (1990) concept of "lurk lines or hot spots" in which an individual's perception of safety is governed by their ability to evaluate a particular setting.

In addition, respondents frequently noted the amount of refuge or "concealment" within areas that they avoided. Reference was given to design features, bushes and trees that provided many hiding places and made the surrounding environment very intimidating. Some respondent's stated:

- I will not walk in the turn around area between the Old Main, the Clock tower and the library. There are too many trees and little lighting
- I avoid any parking areas away from the building...they are too far away to walk and there is too many places for someone to hide
- Areas that are covered by trees and hedges causing shadows to be cast and providing possible hiding places for attackers

Thus, individuals noted that the design of certain areas promoted isolation and thus reduced the overall perception of safety. They argued that this isolation limited the possibility of being seen if attacked and hence reduced their overall feelings of safety within these environments.

Most frequently, outlying parking lots were identified as being poorly lit and promoting a sense of isolation that limited an individual's spatial confidence and perception of safety. In this regard, individuals identified that the environment afforded opportunity for a potential offender and limited their possibility for escape due to its isolated nature. Thus, respondents reasons for avoidance behaviour substantiated earlier findings on the level of fear experienced in certain settings and indicated that prospect, refuge, and

escape are key determinants influencing their use of space on campus.

Recommendations for future development

In examining fear of crime and its effect on the spatial behaviour throughout the UCC campus, it is important to synthesize the underlying themes and concerns that have characterized the research findings. In doing so, several recommendations can be put forth that address the concerns uncovered in this analysis and that serve to improve the quality of life for students, faculty and visitors alike.

- Environmental design plays an active role in determining the student body's perceptions of safety and use of space in a campus setting. UCC must maintain its current safety initiatives while taking steps to improve settings with poor lighting high amounts of refuge, and minimal possibility for escape. This may entail improving the amount or type of lighting or by simply hedging bushes and reducing the level of concealment in certain areas. This will improve the amount of prospect and increase the sense of control important in reclaiming space and reducing fear.
- There exists a need for a more holistic approach in current safety initiatives. By simply adding a map, a whole different interpretation into safety issues was brought forth. There are clear discrepancies in the old and new developments on campus that must be addressed.
- Students' biggest concern was lighting and the isolated nature of parking lots. Obviously, lighting improvements are expensive, however, by simply reducing the amount of refuge in certain areas, new lighting may not be required. Thus, it may be possible to improve general perceptions of safety through simply addressing certain environmental design features.
- The aesthetic value of the campus must be preserved while addressing these issues. Improving perceptions of safety requires careful planning and through examining spatial behaviour and perception, problem areas can be identified and initiatives undertaken to remedy student concerns.

Conclusions

This analysis has shown that prospect and refuge can be used as framework in understanding how exterior design features influence perceptions of safety. The findings have substantiated Nasar and Fisher's (1992) prospect-refuge model and indicate that an overall climate of fear can be experienced in a smaller university setting. Furthermore, the analysis has broadened the model's applicability by revealing prospect and refuge directly influence an individual's cognitive image of space and their subsequent behaviour within a campus setting.

Similar to Nasar and Fisher's (1992) research, the findings have verified the intimate connection that exists between architectural form, the physical landscape and general perceptions of safety. Environmental design features were directly correlated to how individuals evaluated specific settings and their overall perceptions of safety. The findings confirmed that fear levels fluctuated accordingly with the amount of prospect and refuge afforded within each setting. It is in this context, that the research extends the prospect-refuge model and the existing notions of Appleton's (1975) and Archea's (1985) access and exposure model.

Furthermore, the findings indicate that women's fear of crime is relatively widespread and has posed major constraints on their spatial behaviour and activity space throughout the UCC campus. In response to their fears, women have adopted both coping mechanisms and protective techniques to improve general feelings of safety and their overall quality of life. Whether this is simply avoiding certain areas or having someone accompany them after night classes, the findings reveal that UCC is not immune to the gender-specific fears experienced in larger university settings. Within this context, it becomes clearly evident that:

Crime statistics are irrelevant...the real issue is that people perceive themselves to be at risk in particular environments at specific times of the day. The fact remains that whether a fear is justified or not, to a vulnerable person the threat is as frightening as the crime itself. (Hutchings, 1994:33)

Thus, this research has revealed the gender specificity of fear on campus and how fear has been manifested in avoidance behaviour.

In this regard, the findings also indicate that the model's applicability extends beyond that of predicting perceptions of safety. The spatial patterning of avoidance behaviour tended to vary with the amount of prospect and refuge afforded within the immediate

surroundings. Although this may have arisen due to other factors, open-ended questions suggested that individuals evaluated space in terms of the amount of prospect and refuge and that this directly influenced their spatial behaviour. Thus, the model not only served to predict general notions of safety on campus, but also established that environmental design features are closely related to avoidance behaviour.

In sum, this analysis has documented the profound effect that environmental design can play in the generalized perceptions of safety on campus. Although these fears may be misconstrued in terms of actual risk, "they can influence behaviour and have profound negative psychological effects, making individuals feel powerless, vulnerable and impotent in the face of their fears" (Nasar & Fisher, 1992:62). In this sense, university administration should take into consideration how the design and permanency of the physical environment may adversely affect its student population. In doing so, the future development of the campus can be designed and maintained to reduce fear and improve the quality of life on campus for students, visitors and faculty alike (Nasar & Fisher, 1992).

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