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Simulated walks through dangerous alleys: Impacts of features and progress on fear

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Abstract

The current work considered how concerns for personal safety varied as respondents viewed two sequences of slides depicting walks down two dangerous urban alleys. It extended the Nasar/Fisher model of site-level fear-inspiring features by applying it to urban alleys and by controlling for relative position along a pathway. In Study 1, consistent with the Nasar/Fisher model, multilevel models linked refuge positively to fear in both alleys as did a prospect/escape composite. In Study 2 respondents estimated day and night time fear, day and night time chances of being attacked, and provided their own ratings of Nasar/Fisher features. All three features significantly affected fear. The replication also observed effects of being Chinese-born, and tentatively explored connections between mystery, danger, and Nasar/Fisher features. Results confirmed that safety concerns varied as respondents proceeded down an alley, and such variation was a function of both Nasar/Fisher features, where they were in the alley, and who they were.

1. Introduction

Urban alleys are often avoided even during daylight hours. This was not always so. In the late 19th up through the mid 20th century, when large, older eastern cities were more racially segregated at the micro-scale than they are today, alleys were more populated and the site of significant communities and community life (Borchert, 1980; Damer, 1974). But in the last 40 years, with urban renewal (e.g., Daemmrich & West, 1994) and housing desegregation, alleys have depopulated. In the 1980s and 1990s with the advent of open air drug markets in many large cities (Rengert, 1996), ethnographic work in lower income urban neighborhoods found alley entryways to be widely used as drug market locations in some neighborhoods (Simon & Burns, 1997). From the perspective of territorial functioning (Brower, 1980; Suttles, 1968; Taylor, 1988) alleys represent micro-scale interstitial areas located between different social groups centered on the front of the streetblocks. They are unsupervised, confined, often poorly lit corridors usually empty of people; it is no wonder they represent the prototypical dangerous urban location. Much serious crime does happen there (e.g., Simon, 1991).

It may seem terribly obvious to point out that urban alleys currently are seen as the prototypical dangerous urban location. Less apparent, however, are the following questions. If one is moving down an alley, how does the fear one feels vary as one moves along? Further, if it does vary, what factors drive those shifts? Finally, do different people respond differently as they move along such a path? These questions were considered here relying on three classes of site-level features—prospect, escape, and refuge for potential attackers—linked in earlier studies to perceived danger along pathways.

Earlier work has been based on one of two theoretical points of origin. Some has emerged from the fear of crime literature (Ferraro, 1994), while other work has been grounded more generally in work on environmental perceptions and cognitions (Kaplan & Kaplan, 1982).

The work on fear of crime has generally considered four sets of physical factors affecting fear: physical incivilities, those signs of deterioration such as abandoned houses, vacant lots, abandoned cars, graffiti, and trash (Taylor, 2001); the absence of cues of upkeep and local involvement (Taylor, 1988); specific types of landuse (Kurtz, Koons, &

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Taylor, 1998; Taylor, Koons, Kurtz, Greene, & Perkins, 1995); and a cluster of specific micro-level design and landscape factors (Fisher & Nasar, 1992, 1995; Nasar & Fisher, 1994), labeled here Nasar/Fisher features.

1.1. Nasar/Fisher attributes

The specific micro-level design and landuse factors in the Nasar/Fisher model, building on the earlier work of Appleton (1975), are prospect, refuge, and escape vs. boundedness (Fisher & Nasar, 1992; Nasar & Fisher, 1994). These became the theoretical focus of the current work because they already have been found relevant to pedestrians' reactions as they move along a path.

Prospect refers to how well a person in the setting can look ahead to anticipate whom or what he or she is likely to encounter. A path that twists around buildings affords lower prospect to users compared to a path following a straight line. Refuge, also called concealment, refers to the natural and design features alongside one's route or adjoining the outside location that can block one's view and, more importantly, provide a place where a potential attacker can see wait out of line of site for a potential victim. For example, a path flanked by high bushes on both sides, or where abutting building faces are staggered, affords more opportunities for potential offenders to conceal themselves or take refuge compared to a path with no bushes or uniform abutting building faces. Escape versus boundedness reflects the ease of exit at various points along a path or in a location. Even if a path, for example, is flanked by bushes, there may be numerous spaces between the bushes, permitting a user to get off the path should a potential attacker appear. Such a path would be high on escape, whereas a path with no breaks in adjoining shrubbery or facing buildings would be low on escape. The model developed focuses attention on the "site-specific fear-generating process in relation to the microlevel characteristics of place" (Fisher & Nasar, 1995, p. 217).

Previous work (Fisher & Nasar, 1992, 1995; Nasar & Fisher, 1994) found these three features affected how much fear of crime people reported in specific locations, and in some cases even linked to local crime incidence levels. For example one study found "both fear and crime increased in areas characterized by low prospect, high concealment, and high boundedness" (Nasar & Fisher 1994, p. 187).

This model has been applied to predict how users feel as they move along a path by Nasar and colleagues. College students were asked to nominate unsafe places on the main Ohio State University campus at night (Nasar, Fisher, & Grannis, 1993). Physical features of these fear "hot spots" were then assessed. The frequency with which a location was nominated as a fear spot was dependent upon both blocked escape, and a combined concealment/blocked prospect index. As the authors noted (p. 176), this work "confirmed the earlier finding in a more typical campus outdoor setting." In a later study where students walked along paths near or through many of these fear spots, "concealment, and to a lesser extent, entrapment [blocked escape] evoked fear" (Nasar & Jones, 1997, p. 291). Analyses of students' open-ended comments as they walked, referring to both how they were feeling and what features they were considering, yielded these connections. The study, done at night, also went beyond earlier work by examining two aspects of concealment—dark spots as well as places of concealment.

Nasar and Jones' (1997) results confirmed "an uneven distribution of fear across the walk" (p. 320), and linked those variations with shifting features surrounding the path. Three points about potentially extending this study deserve mention. First, the spaces through which students walked were remarkably varied and included alongside buildings, along or across open spaces or parking lots, as well as along a "regular" arterial street. A stricter test of the impacts of Nasar/Fisher features could be obtained if students took a walk along a more generally enclosed path; would variations in features still prove relevant? Second, although portions of the OSU main campus are truly unsafe and perceived as such, does the relevance of Nasar/Fisher attributes persist when the setting is changed from a campus to dangerous urban locations? Will the same pattern of impacts apply? Third, how one feels as one moves along a pathway is undoubtedly linked to what one sees at that point. But it also may be linked to how one was just feeling a bit further back. This raises the question: if one controls for the sequence of fear or perceived threat as a pedestrian moves along, do variations in Nasar/Fisher features continue to affect changing fear? Moving along an alley is a process of traveling a pathway (Heft, 1983), where one's subsequent responses are partially dependent upon preceding ones, and where, like with wayfinding itself (Kato & Takeuchi, 2003), people may differ. Two components of sequential dependencies will be discussed further below. The current work addressed all three of these questions.

There are some reasons why the Nasar/Fisher model might not apply to these settings. Compared to pathways in general, and the mix of pathways investigated by Fisher and Nasar, urban alleys are in general more enclosed, leading perhaps to lower variation in features like escape. In addition, although there are exceptions, they are often straight, which may lead to lower variation in prospect. Limited variation in design and landuse features may "prevent" the model from working. In short, although alleys are clearly pathways, and the Nasar/Fisher model has previously been applied to pictures of pathways as well as real walks in the dark, it is not necessarily clear that their model will apply to dangerous urban alleys.

1.2. Alleys and global properties

Since the focus here is on urban alleys, the work of Herzog and colleagues merits attention. Broader frameworks (Kaplan & Kaplan, 1989) of environmental cognition and preference suggest humans prefer four macro-level, perceived qualities of scenes: "coherence (immediate understanding), complexity (immediate exploration), legibility (inferred understanding) and mystery (inferred exploration)" (Stamps, 2004, p. 1). These informational features refer not to specific identifiable features in the settings shown, but rather to "relatively global variables that integrate various sources of setting-feature information into a composite that influences affective reactions such as preference and fear" (Herzog & Miller, 1998, pp. 432–433).

This is different from "perception-based predictors" (op cit) such as the presence of graffiti or outdoor plantings. In the global model several specific features might simultaneously contribute to an overall attribute such as mystery. For example an alley entryway that is deep in shadow due to foliage on a bright sunny day, or due to shadows from adjoining buildings, or that shows the alley turning a corner a few yards in, may be rated high on mystery and danger.[1]

Some have suggested the broader preference theory has not fared well. A recent meta analysis of 61 studies concluded "the postulated theory has not generated reproducible results" (Stamps, 2004, p. 14). On the other hand, focusing more specifically on just the mystery dimension itself, Herzog argued "one of the most firmly established findings in the environmental preference literature is that mystery is positively related to preference" (Herzog & Miller, 1998, p. 429). After factoring out perceived danger, alleys rated higher on mystery were more preferred (Herzog & Smith, 1988). This suggested the mystery-preference link applied to urban settings like alleys as well as natural settings.

Although it is not known how global properties like mystery link to site-specific features like the Nasar/Fisher attributes, features treated by Fisher and Nasar as indicative of refuge or concealment and thus fear inspiring have been interpreted as indicators of mystery (Herzog & Flynn-Smith, 2001, p. 654). Alley curvature, which reduces prospect, was positively linked to danger in one study (Herzog & Flynn-Smith, 2001, Table 3).

The point of the foregoing is as follows. First, work on perceptions of safety of alleys has been carried out, but it has used a holistic environmental preference framework rather than a focus on site-specific features. Second, one of the key properties linked to perceived danger has been mystery. It is not the purpose of this study, however, to attempt to definitively map how a holistic feature such as mystery might link to specific Nasar/Fisher features, although this will be considered in an exploratory way in one study. Third, the alley perception work has relied predominantly on pictures of alley entryways, rather than sequences of images moving a perceiver through an alley.

[1]An unexpected negative relationship between curvature and perceived danger observed in one study (Herzog & Miller, 1998) disappeared when alley length was considered (Herzog & Flynn-Smith, 2001).

1.3. Modeling progress and variations

Given budgetary restrictions and human subjects' safety concerns, this study relied on showing respondents pictures. Showing people a series of pictures of what they would encounter is not as good as showing them a videotape (Heft & Nasar, 2000) or having them actually walk through. But at least it does move beyond just pictures of alley entrances and allows viewers to simulate moving through an alley.

In such a design it is critical to control for where the perceiver is in the alley. How he or she feels at one point is likely to be linked to how he or she felt at the immediately preceding point as noted above. There may be a linear trend as one moves along a generally enclosed pathway. Some may become increasingly concerned as they progress, for example. Controlling for this linear trend allows separation of the impacts of specific features from impacts of relative position in the alley. Additionally, it may be important to control for a quadratic effect of progress as well. The alleys depicted have open ends. Respondents may feel relatively relieved at the prospect of impending release from the enclosure as they approach such an opening, or may simply adapt more to hazard as they progress (Taylor & Shumaker, 1990). It is important to model these increasing (linear) or flattening/declining (quadratic) trends, thereby permitting identification of the unique impacts of Nasar/Fisher Features.

In addition to anticipating linear and/or quadratic trends as respondents progress through the alley, there may be variations in these impacts across respondents. Like with wayfinding itself (Kato & Takeuchi, 2003), people may differ in their sequence of responses. This can be modeled by allowing the linear and quadratic impacts of sequence to vary across respondents.

One key individual difference which might affect responses would be degree of familiarity with the settings depicted. Respondents who are non-native might find the scenes depicted more fear inspiring. The studies to follow used both Chinese-born and US born respondents, and the impacts of this individual differences factor were explored.

In sum, the purpose of the current study was to extend the Nasar/Fisher model linking site-level attributes to fear in real urban alleys, and to a slightly different methodology. Respondents would take simulated walks down alleys, and report their fear at each point. It was expected that fear would be higher when refuge (concealment) was higher, escape was lower, and prospect was lower, even after controlling for linear and quadratic effects of relative position in the alley. Additionally, respondents may differ in how their reported fear progresses as they move through the alleys, even after controlling for the specific, site-level features.

2. Study 1: methods

2.1. Site selection process

Several newly arrived foreign, Chinese graduate students residing in a building adjoining a college campus were asked by the first author to think of places near their location that were dangerous, and that they would avoid at night. The building where these students lived was located in University City, near the campus of the University of Pennsylvania in Philadelphia, a major urban core city of more than a million residents. The part of the city where they lived, although not the most dangerous part of the city, was not the safest either. It's 2002 neighborhood violent crime rate placed it 26th out of 45, where 1st was the most dangerous, and its drug arrest rate for the same year placed it 25th.

Several students nominated two alleys a few blocks from their building. These two alleys were linked end-to-end, and were sometimes used as a shortcut to a nearby grocery store. Alley A ran along Sansom street between 38th and 39th streets; Alley B ran along Sansom Street between 39th and 40th Streets. Nominators reported definitely avoiding these locations at night because of potential safety concerns. For these students, these alleys qualified as fear hot spots (Nasar & Fisher, 2004). Both of these alleys were retained because they were different from one another in terms of their lengths, adjoining landuse patterns, and site level features. Using two different alleys permitted attempting an internal replication of results. While collecting data for Study 2, in January of 2006, a night time shooting occurred right at the beginning of Alley A: "between 6 and 8 gunshots [were heard] and [witnesses reported] that they saw a man wearing a black puffy jacket and brandishing a silver gun running west on Sansom Street away from 38th [down Alley A, toward Alley B]"(Daily Pennsylvanian, 2006).

2.2. Stimuli

On a sunny late fall afternoon (early November, between 1 and 3 p.m.) the first author took three pictures every eight yards, from the beginning to the end of each alley. At each picture point he took a picture of what lay straight ahead, 45° to the left, and 45° to the right. The three pictures were then stitched together to create a panorama at each point, and the entire sequence was placed in PowerPoint. The first alley generated 15 picture points and the second, longer alley generated 25. Fig. 1 shows an early, middle, and late picture from each alley.[2]

Moving through the first alley (Alley A, starting at the East end) one sees the following. Small parking lots lie on both sides at the beginning of the alley. These give way on the left to the back of a small commercial building, and on the right to the back of a large business building. Later on the right this in turn gives way to the back of a large apartment building. Small lots used for parking appear on the left. About halfway down the alley there is an abandoned house with graffiti and broken windows. At the end on the left is the side of a restaurant with windows, partially blocked with decorations and ads, facing the alley.

The second alley (Alley B, starting at the West end) is longer and has a more complicated landuse pattern than the first one. Two connecting parking lots lie at the beginning along the left side, separated from the alley by an open spiked fence. On the right one passes the side of a church, a back yard of a commercial building, and a brown building without any windows. Around the midpoint of the alley the parking lot along the left ends, and views become less open. A small number of set back rowhouses appear at the right, while on the left one encounters several buildings of indeterminate use, and one bar. At the end of the alley the side of a large building and of a rowhouse abut on either side.

2.3. Ratings of site level features

Four advanced graduate students independently rated each picture point on prospect, refuge, and escape after each of these terms was defined for them, and they were allowed to make some practice ratings on other slides. In the case of refuge, they were instructed to think specifically about refuge for potential attackers. None of these expert raters provided data on the dependent variable. The Intraclass correlations (r_{icc}) reflect inter-rater agreement and are shown in Table 1, along with the rating scales used. Acceptable agreement, above .50 (Nunnally, 1967) was obtained for all three features on Alley A, and for escape and prospect on Alley B, but not refuge.[3] Figures are shown separately for each alley. Throughout, because the alleys were separate entities, and in recognition of their ecological validity, descriptive and analytic results are presented separately by alley. Mean ratings generated by the four raters were then retained as predictors in the analysis.

Stamps (2004, p. 12) has argued against separate "expert panels" when obtaining global judgments on, for example, mystery, to link to preferences. The focus here, however, was on rating specific, observable, site-level features. These are feature specific-ratings, not global judgments. The use of expert raters for gauging specific features of residential environments has been well established (Perkins, Meeks, & Taylor, 1992; Taylor, Shumaker, & Gottfredson, 1985). This procedure for using one group for expert ratings of micro-features, and another group to furnish fear estimates, has been previously used (Fisher & Nasar, 1992, 1995).

[2]Researchers seeking the full stimulus set for the purposes of replication can contact either the first or the second author.

[3]One alley contained noticeable graffiti at different points, and expert raters provided ratings on this as well. The intraclass correlation was .90. Analyses (results not shown) for this alley with the graffiti ratings included were not substantively different from those shown here.

Fig. 1. Pictures at begining middle and end of alleys A (top) and B (bottom).

Table 1
Study 1: Expert rater inter-rater reliabilities on prospect, refuge and escape

Variable	Categories	Intraclass correlation coefficients	
		Alley A	Alley B
Prospect	Very open = 5 Somewhat open = 4 Moderate = 3 Somewhat limited = 2 Very limited = 1	0.7551	0.7718
Refuge	Many refuges = 4 Some = 3 Just a couple = 2 None = 1	0.7040	0.2555
Escape	Very limited = 1 Somewhat less limited = 2 Somewhat easy = 3 Very easy = 4	0.6276	0.8239

Note. Four raters were trained on each of these attributes. Training included reviewing definitions, and viewing training slides illustrating various response categories for each attribute.

2.4. Respondents, dependent variables, and rating sessions

Seven Chinese graduate student volunteers (5 female, 2 male), and seven American graduate student volunteers (5 female, 2 male) viewed the two sequences of slides and rated each picture point, where each picture point was the three stitched together photos described above. Five of the seven Chinese graduate students had been in the United States for less than a year. Respondents were not told of specific hypotheses.

In each session raters were provided a rating form, and told where the alleys were located. They were asked to focus on the alley itself, not the surrounding area. As each picture was presented they were asked to indicate: "At night, after dark, at this point how safe do you feel about continuing to go down this street?" The response categories were: very safe (1)/safe (2)/unsafe (3)/very unsafe (4). In addition, to focus more specifically on imminent harm assessment, they were asked to gauge: "For someone walking on this street, at night, after dark, what are his/her chances of being attacked at this point?" The response categories were very low (1)/low (2)/high (3)/very high (4). Table 2 shows the descriptive statistics for these variables, separately for each alley. The correlation between these two dependent variables was quite high: .855 for Alley A and .816 for Alley B. In recognition of the Nasar/Fisher focus on fear, just the fear item was analyzed.

Half of the respondents were asked about fear and the probability of being attacked during the daytime in addition to being asked about at night, after dark. When we looked at the line charts of the day and night time fear together, and the day and night time attack items together showed the day and night items paralleled each other closely, with the daytime fear item starting out and ending about .8 points lower on the outcome metric. Since, however, daytime and nighttime indicators were not present for all respondents, daytime and nighttime combined indexes could not be created. Table 2 shows mean nighttime fear scores at each point along each alley, and includes data from Study 2 as well. Those thinking that these night time fear reports "should" be much higher than the day time ones might want to bear in mind that these reports come from young adults whose reported fear, despite high victimization risk relative to older adults, is generally lower (Ferraro, 1994).

Table 2
Study 1 and Study 2: Means on dependent variables by alley position

Sequence	Study 1		Study 2 Alley A			
	Nighttime fear		Fear		Perceived risk	
	Alley A		Night	Day	Night	Day
1	2.14	1.64	2.75	1.8	2.6	1.75
2	2.14	1.71	2.65	1.85	2.6	1.75
3	2.07	1.86	2.75	1.85	2.75	1.8
4	2.00	1.79	2.65	1.8	2.7	1.8
5	1.93	2.00	2.8	2	2.65	1.9
6	2.21	1.93	2.65	1.8	2.55	1.75
7	2.43	2.00	2.85	2.05	2.65	2
8	2.36	1.93	2.75	2.05	2.7	1.85
9	2.07	2.00	2.75	2	2.7	1.85
10	2.36	1.93	2.9	2.2	2.85	2
11	2.43	1.93	3	2.15	3	2.1
12	2.43	2.14	3	2.25	2.85	2.05
13	1.93	2.14	2.45	1.8	2.35	1.65
14	1.36	1.86	2.1	1.6	2	1.4
15	1.14	1.93	2	1.35	1.9	1.3
16		1.71				
17		1.71				
18		1.86				
19		1.93				
20		1.93				
21		2.36				
22		2.07				
23		1.57				
24		1.64				
25		1.21				

Note. In Study 1, wording of the fear item was: "At this point, at night after dark, how safe do you feel about continuing to go down this street?" The response categories were: Very safe (1)/safe (2)/unsafe (3)/very unsafe (4). In Study 2 the fear question was "At this point, during the daytime [at night, after dark], how safe do you feel about continuing to go down the alley? (Assume you are walking alone)." Response categories were very safe (1)/safe (2)/unsafe (3)/very unsafe (4). The perceived risk item was: "At this point, during the daytime [at night, after dark], what do you think the chances are of being attacked? (Assume you are walking alone)." Response categories were very low (1)/low (2)/high (3)/very high (4).

2.5. Analysis plan

Each alley was analyzed separately to preserve ecological integrity of the sequence variable. Data were analyzed using multilevel growth models for longitudinal data (Raudenbush & Bryk, 2002, pp. 160–202). Repeated observations were nested within persons. Multilevel models carry numerous advantages over a traditional repeated measures analysis for data such as these. Most importantly, the analysis simultaneously considered all aspects of the data structure when estimating parameters; person-level means were adjusted using Empirical Bayes procedures toward the grand mean with the amount depending on a number of factors; and correlated error structures were appropriately modeled. These models have been widely used to model individual differences over time (e.g., Bryk & Raudenbush, 1987) as well as locational differences. Multilevel models have been widely applied in fear of crime studies (e.g., Perkins & Taylor, 1996; Robinson, Lawton, Taylor, & Perkins, 2003). The repeated measures design represented the sequential presentation.

In a traditional longitudinal repeated measures design capturing individual changes, each data point would have time varying covariates representing varying states of the person. Here the time varying covariates at level 1 represented the different characteristics of each picture, as well as its relative position in the alley.

A sequence variable, scored 1–15 for Alley A and 1–25 for Alley B captured relative position within the alley. A squared sequence variable captured anticipated quadratic effects. Each of these latter two predictors in each alley was centered for each respondent, making their two effects orthogonal.

Two-level, hierarchical linear models treated prospect, refuge and escape as fixed effects; i.e., it was anticipated that for each alley the same slope applied to all respondents.[4] The linear and quadratic effects of relative position, however, were treated as random effects. HLM χ^2 tests of these variations in slope gauged whether these variations in impact were significant beyond what would be expected by chance.

The sequence of models tested for each alley was as follows. An ANOVA via HLM indicated the following: how much of the outcome variation was between respondents, i.e., how sizable were individual differences in average fear levels; how much was within respondents, i.e., how much were an individual's fear ratings influenced by different pictures; and how much was between pictures, i.e., across all respondents, how much did the average fear ratings differ by picture? (Model 1). The effects of linear and quadratic position within the alley were estimated via the sequence and sequence squared variables (Model 2). This model described the raw impacts of the linear and quadratic effects of progressing down the alley. It gauged how much each respondent's fear ratings were changing, linearly and curvilinearly, just due to progressing down the alley. Third, Nasar/Fisher prospect, refuge and escape predictors were entered to provide estimated raw impacts for these features, without regard to relative position in the alley (Model 3). Finally, the micro-level attributes and the sequence variables were entered simultaneously to predict effects of the Nasar/Fisher features while controlling for relative position within the alley, and to predict effects of progressing through the alley while controlling for specific attributes (Model 4).

3. Results

3.1. *Alley A*

Results for Alley A appear in Table 3. The ANOVA model indicated a significant difference ($p < .001$) across respondents on how much fear they anticipated for all stimuli, on average. About 41 percent of the outcome variance emerged from differences across respondents. So about 4/10 of all the outcome variation in fear, after Empirical Bayes estimation, arose from differences between respondents. Clearly, individual differences were sizable. The ANOVA model also generated reliability estimates, indicating how closely the Empirical Bayes estimates of the mean picture rating for each respondent were to the "true" mean picture rating. It was extremely high (.913). Stated less technically, this indicates relatively close correspondence between the same respondent's fear ratings for different pictures.

Model 2 showed a linear impact of sequential positioning the alley on fear ($b = .19$; $p < .01$), complemented by a significant quadratic effect ($b = -.01$; $p < .001$). The graph of the mean predicted fear levels across raters, by position within the alley, clarified the pattern. Predicted average fear rose from around 1.7 near the entry, to about 2.35 in the middle of the alley, then dropped to around 1.2 near the exit. The model also allowed the linear and quadratic slopes to vary across respondents. χ^2 tests confirmed each did vary significantly (by χ^2 test: $p < .01$ for linear effect of sequence; $p < .05$ for quadratic effect of sequence).[5]

[4] Chua, Brand, and Nisbett (2005) reported that Chinese-born and US born perceivers differentially attended to foreground versus background characteristics. Although the current study did not separate foreground vs. background features, it might be plausible to argue that nearby refuge, or concealment, could be considered a foreground feature, and therefore that it might be more important for US born perceivers. Several models (results not shown) for both Study I and Study II did allow the impact of refuge to vary across respondents. Sometimes that variation was significant, sometimes not. But when it was significant, country of origin did not predict the size of the impact. Given the tangential connection between Chua et al.'s study, and the focus here, the lack of a clear theoretical rationale for varying slopes, and the analytic limits of simultaneously estimating large numbers of varying slopes due to complicated covariance structures between the parameters, the analyses shown here keep the slopes for prospect, refuge, and escape fixed across respondents.

[5] These estimated slopes had reliabilities of .64 (linear) and .49 (quadratic). These reflected the extent to which these Empirical Bayes estimates of slopes approximate the "true" parameters (Raudenbush & Bryk, 2002, p. 124). These reliabilities were substantial. Since these reliabilities were constrained by the metrics of the variables involved, the usual metric for interpreting reliability coefficients did not apply. Raudenbush and Bryk (2002, p. 125) suggested random level 1 coefficients become suspect when reliabilities drop below .05. Further, Raudenbush and Bryk (2002, p. 84) suggested when random level 1 components correlated highly, as these two did, they may be redundant. In this

Table 3
Alley A: Multilevel models predicting night time fear, Study 1

Predictor	Model 1 ANOVA	Model 2 Sequence variables		Model 3 Nasar/Fisher		Model 4 Full	
		b	*se*	*b*	*se*	*b*	*se*
Sequence-linear		.1949**	.0552			.1534*	.0637
Sequence-quadratic		−.0143***	.0028			−.0105*	.0036
Prospect				−.05170	.0890	−.1455+	.0774
Escape				−.2369*	.0953	.0583	.1157
Refuge				.5654***	.0888	.3897***	.0712
Constant	2.0667	2.0667		3.3047		2.4282	
Random effects							
Variance: Raters	.2852	.2968		.2925		.2996	
χ^2	$p<.001$	$p<.001$		$p<.001$		$p<.001$	
Variance: Linear effect of sequence		.0271				.0288	
χ^2		$p<.01$				$p<.001$	
Variance: Quadratic effect of sequence		.00006				.00006	
χ^2		$p<.05$				$p<.01$	

Note. Fear of crime variable ranges from very safe (1) to very unsafe (4). ***$p<.001$; **$p<.01$; *$p<.05$, +$p<.10$. Sequence and sequence squared variables were both group mean centered. The fixed effects shown in the upper portion of the model are within-respondent, between-picture effects. HLM recognizes that the pictures are repeated measures within respondents, and adjusts accordingly. The random effects are separate components and capture differences across respondents in mean fear (Variance: Raters), differences across respondents in the linear effects of progressing through the sequence of pictures, and differences across respondents in quadratic departures from the linear trend of sequence. Prospect, escape and refuge based on mean ratings for each picture across a panel of four expert raters.

Looking at predicted fear scores based on both linear and quadratic components showed most respondents anticipating initially increasing and later decreasing fear as they moved through the sequence of pictures. Respondents varied in how "flat" their fear curve was across the sequence of positions depicted. Some expected fear to rise substantially, then fall substantially later in the alley, while others expected only slightly increasing then slightly decreasing fear. There were some, however, who expected decreasing fear, to varying degrees, throughout the series.

Model 3 examined just the impact of the Nasar/Fisher fear-inspiring attributes. The model showed significant impacts in the expected direction for both refuge (or concealment) ($b=.56$; $p<.001$) and escape ($b=-.24$; $p<.05$). Concealment possibilities close at hand elevated anticipated fear, and escape possibilities close at hand lowered it. Prospect had no significant impact.

Model 4 considered the simultaneous impacts of relative position in the alley, including both linear and quadratic components, and of Nasar/Fisher fear features. As in Model 2, position still mattered for the average respondent ($b=.15$; $p<.05$ for linear; $b=-.01$; $p<.01$ for quadratic). But after controlling for position, impacts of Nasar/Fisher fear features shifted somewhat. Refuge continued to exert a strong elevating impact on fear, with its coefficient ($b=.39$; $p<.001$) only slightly reduced from its Model 3 impact. Prospect, non-significant in Model 3, became marginally significant ($b=-.15$; $p<.10$) in the anticipated direction. Escape, however, was no longer significant ($b=.06$; ns) after controlling for position. If prospect and escape were combined, the combined feature in the full model demonstrated a significant impact ($b=-.065$; $p<.05$) and other model impacts remained largely unchanged.[6] Both sequential impacts ($p<.001$ for linear; $p<.01$ for quadratic) still varied significantly across respondents, even after having controlled for specific fear-inspiring attributes encountered. The final model explained about 29.1 percent of the within-respondent, across-picture fear differences, in contrast to the 23.1 percent of this portion of the outcome explained by the sequence model (Model 2) and the 14.6 percent of this portion of the outcome explained by the fear attributes model (Model 3).

In sum, night time fear ratings in this alley showed fear levels adjusting as respondents progressed through the sequence of pictures. These adjustments had linear and

(*footnote continued*)
situation they recommend gauging whether setting a random component to a fixed component results in substantial loss of information, through a comparison of deviance statistics. Setting either the linear effect or the quadratic effect to a fixed effect rather than a random effect resulted in a significant increase in the deviance statistic and a significant loss in goodness-of-fit. Therefore both were retained as random coefficients with varying slopes across respondents. χ^2 (df = 3) = 16.54; $p<.001$, when the variance of the linear slope was constrained to zero; χ^2 (df = 3) = 9.84; $p<.01$, when the variance of the quadratic slope was constrained to zero.

[6] The combining of escape and prospect was suggested by a reviewer. The two features correlated strongly (Alley A: $r=.74$, Kendall Tau $b=.61$; Alley B: $r=.76$; Kendall Tau $b=.61$). The linear effect for sequence was slightly reduced ($b=.12$), and the resulting p level became marginally ($p=.051$) significant. There were no other changes from significance to non-significance or vice versa.

Table 4
Alley B: Multilevel models predicting night time fear, Study 1

Predictor		Model 1 ANOVA	Model 2 Sequence variables		Model 3 Nasar/Fisher		Model 4 Full	
			b	*se*	*b*	*se*	*b*	*se*
Sequence			.0650**	.0211			.0294	.0244
Sequence squared			−.0027**	.0008			−.0014	.0009
Prospect					−.1748**	.0542	−.1500**	.0571
Escape					−.0305	.0701	.0032	.0623
Refuge					.2627**	.0754	.1918**	.0679
Constant	1.8714	1.8714			2.0975		1.9136	
Random effects								
Variance: Raters	.1798	.1836			.1805		0.1838	
χ^2	$p<.001$	$p<.001$			$p<.001$		$p<.001$	
Variance: Pictures within raters	.2945	.2019			.2768		0.1954	
Variance: Linear effect of sequence		.0035					0.0035	
χ^2		$p<.05$					$p<.05$	
Variance: Quadratic effect of sequence		.00001					.00001	
χ^2		$p<.01$					$p<.01$	

Note. Fear of crime variable ranges from very safe (1) to very unsafe (4). **$p<.01$. Sequence and sequence squared variables were each group mean centered. Prospect, escape and refuge based on mean ratings for each picture across a panel of four expert raters.

nonlinear components, each of which varied across respondents. Most anticipated initially increasing fear, then decreasing fear, as they progressed through the sequence. Further, the hypothesized impacts of refuge/concealment on fear were significant and only slightly reduced after controlling for position. Impacts of escape and prospect became non-significant after controlling for position. If, however, prospect and escape were combined, a significant impact for the combined feature emerged after controlling for position.

3.2. Alley B

Table 4 contains the results of the four models completed for Alley B. Significant differences in fear ratings across respondents emerged in Model 1 ($p<.001$). Differences across respondents represented about a third of the variance in fear nighttime ratings; different fear ratings across pictures within respondents represented about 2/3 of the outcome variation. Respondent-level reliability was, on average, quite high (.938).

Model 2 entered the linear and quadratic effects for position. Since Alley B was longer than Alley A, the question of whether the sequence effects replicated was not a trivial one. The expected positive linear effect for position in the alley emerged, as did the expected negative quadratic effect (both p's$<.01$). Average predicted fear rose from around 1.7 at the entrance to around 2.0 near the middle, declining to around 1.6 at the exit. As with Alley A, for Alley B linear ($p<.05$) and quadratic effects ($p<.01$) of relative position both varied significantly across respondents. Fitted values showed that most respondents came relatively close to the average somewhat flattened upside down "U" shape across the series with fear increasing roughly in the first half of the series, and then declining toward the end, with differences across respondents in how high their fear was upon entering, how low it was upon exiting, where it started declining, and how flat the somewhat flattened upside down "U" was. A couple of respondents reported generally declining fear from beginning to end, and one reported generally increasing fear end to end.[7]

Model 3 considered only the impacts of the Nasar/Fisher features, without regard for relative position in the alley. The expected negative impact of prospect appeared ($b=-.17$; $p<.01$) as did the expected positive impact of refuge or concealment on fear ($b=.26$; $p<.01$). Escape's impact was not significant.

Model 4 gauged the impact of the Nasar/Fisher features while simultaneously controlling for the linear and quadratic effects of relative position in the alley. The impacts of prospect and refuge remained significant and were reduced only slightly in their size ($b=-.15$; $p<.01$ for prospect; $b=.19$; $p<.01$ for refuge). The average sequence effects ($b=.03$ for linear effect; $b=-.001$ for quadratic effect), however, were now non-significant after controlling for Nasar/Fisher features. Significant variations across respondents in linear ($p<.05$) and quadratic components ($p<.01$) of the sequence effect remained. In other words, after controlling for Nasar/Fisher features, the average respondent showed no significant linear or quadratic effect of

[7]As with Alley A, the reliabilities of these slopes were acceptable: .57 for the linear component and .62 for the quadratic component. Further, as with Alley A, comparisons of Alley B deviance statistics showed that allowing both the linear and quadratic slopes to vary captured important information. Fixing either the linear effect of sequence to be equal across respondents (χ^2 (df = 3) = 16.02; $p<.001$) or fixing the quadratic effect (χ^2 (df = 3) = 19.01; $p<.001$) resulted in a significant worsening of fit.

position in the alley, but, on each of these components, respondents continued to vary significantly in both their linear and quadratic trends. In short, position in the alley still influenced fear ratings for individual respondents but in different ways, and in such a way that for the average respondent, position did not matter.[8] This model explained about 20 percent of the within-respondent variation in fear. Using just the position variables explained about 18.7 percent of this portion of the outcome, and using just the fear-specific attributes explained about 3.6 percent of this portion of the outcome variance.

As was done with Alley A, an additional analysis (results not shown) combined prospect and escape into one index. In this model the combined attribute had a significant impact in the expected direction ($b = -.08$; $p < .01$), and the impacts of the other parameters were virtually unchanged ($b = -.19$, $p < .01$ for refuge for example).

In sum, results from Alley B, a markedly longer alley with more variations in adjoining landuses, replicated the following results from Alley A: refuge affected fear, even after controlling for position; although prospect and escape did not have significant individual impacts when controlling for progressing through the alley, the attributes combined did have a significant impact in the predicted direction; and linear and curvilinear impacts of position in the alley varied significantly across respondents. Fear changed in different ways for different respondents as they progressed through the alley. The average linear and quadratic effects of position, significant with Alley A, were not significant with Alley B.

4. Study 2: Alley A revisited

Over a year after the initial data were collected, new data were collected for Alley A to address questions still remaining after Study 1.[9] The outstanding questions addressed included the following. (1) Given the less-than-perfect—albeit largely acceptable—inter-rater reliability of the experts' ratings on prospect, refuge, and escape, an alternative approach would be to ask the respondents themselves to directly gauge the Nasar/Fisher features. This was the approach adopted in this replication attempt. Respondents' own ratings for prospect, refuge, and escape were used rather than the expert ratings. (2) Could day time and night time fear ratings be combined to obtain a more general outcome?. Not all respondents in Study 1 provided both day time and night time ratings. They did so in Study 2, and the results were combined into an index. (3) One could explore, in a preliminary fashion, the connections between mystery, a global property, and Nasar/Fisher attributes, by asking respondents to rate each scene on mystery. This was done. (4) Finally, given the interest in impacts of being US born versus Chinese-born, the replication attempt allowed those impacts to be reconsidered with a new set of respondents. Returning to the same stimuli obtained for Alley A, additional respondents were recruited and these questions were investigated.

5. Methods

5.1. Respondents

Twenty respondents were recruited from undergraduate and graduate classes and paid $15 for rating the pictures, and making judgments about features. Age ranged from 20 to 48 (mean = 27.45 years); nine were female and eleven were male. Eight (40%) were born in China, and 12 (60%) were not. The Chinese-born students had been in the US anywhere from 2 to 7 years. None were informed beforehand about the specific hypotheses; none were friends of either investigator.

5.2. Procedures and variables

Respondents were run in groups. Since perceived risk is conceptually distinct from fear, albeit related (LaGrange & Ferraro, 1989), they were asked about perceived risk of attack as well. After reading an informed consent form, and asking questions, they were shown two warm-up pictures. For each one they were asked to respond to four questions:

- "At this point, during the daytime, how safe do you feel about continuing to go down the alley? (Assume you are walking alone)." Response categories were very safe (1)/safe (2)/unsafe (3)/very unsafe (4).
- At this point, during the daytime, what do you think the chances are of being attacked? (Assume you are walking alone)." Response categories were very low (1)/low (2)/high (3)/very high (4).

These same two questions were repeated for nighttime, with them being asked to assume it was "at night, after dark." Following the two warm-up slides, from Alley B, they were then shown the sequence of 15 slides for Alley A, and asked to complete the ratings.

Following the ratings of reactions, they were told "we are interested in what you see in the picture." They were then provided two "warm-up" slides and asked to gauge the following:

- For prospect: "At this point, how open is your view of the immediate environment? Is it open or limited by

[8] Additional analyses (results not shown) examined impacts of gender, non-US origin, and length of stay on the varying slopes. None of the impacts proved significant.

[9] The authors appreciated the thoughtful comments of three anonymous reviewers, and the editor, which led to the collection of these replication data. Given time constraints, budgetary constraints, and a new protocol that gathered much more data from each respondent, it was possible only to do the replication on one alley. Since Alley A had yielded a significant average linear and quadratic impact of position, and therefore presented the larger number of significant findings to attempt to replicate, this site was chosen for the replication attempt.

buildings or other features?'' (very limited (1)/somewhat limited (2) moderate (3)/somewhat open (4)/very open (5)).

- For refuge: ''At this point, how many possible hiding places are there right close by for potential attackers?'' (none (1)/one (2)/a couple (3)/three or four (4)/five or more (5).
- For escape: ''At this point, how hard would it be to escape from the alley if you wanted to?'' (very hard (1)/somewhat hard (2)/neither hard nor easy (3)/somewhat easy (4)/very easy (5)).
- For mystery: ''At this point, does the view seem to promise that more could be learned about the alley if you continued?'' (definitely not (1)/no (2)/not sure (3)/yes (4)/definitely yes (5)).

Following the two practice slides from Alley B, they were shown the same sequence of fifteen Alley A slides again, and made their judgments. Following the ratings and judgments they provided background information about themselves. Correlations between respondents' and experts' ratings of Nasar/Fisher attributes were all highly significant ($p<.001$; .47, escape; .36 , prospect; .42, refuge).

Dependent variables. Initial exploratory models confirmed that the impacts of individual features were slightly different for the risk of attack questions vs. the safety concern questions, so the four were not combined into a single index. Patterns for day and night versions of each question were comparable, however, so the two fear items were z scored and averaged (Cronbach's alpha = .73), and the two attack potential items also were z scored and averaged (Cronbach's alpha = .77). Raw scores on each of the four outcome variables for each picture, averaged across respondents, appear in Table 2. Because the fear and perceived risk indices correlated highly ($r = .79$), and in order to avoid inflated alpha levels, detailed results are presented only for the fear index.

Sequence of models. The sequence of models, for each of the two outcomes included: an initial ANOVA model (Model 1), a model gauging just the impacts of linear and quadratic sequence, while allowing both those impacts to vary across respondents (Model 2), a model with impacts of sequence as well as the Nasar/Fisher features (Model 4), and, finally, a model using country of origin to predict the linear and quadratic effects of sequence. (Model 3 shown in Study 1 was skipped.) As explained above, if Chinese-born respondents found these settings less familiar, they may have entered the alley with higher initial levels of concern, not experienced as strongly increasing concern as they progressed down the alley, and felt less relieved as they neared the end. This would mean a negative impact of being Chinese-born on the linear effect of sequence, and a positive impact on the quadratic effect.[10] Finally, an exploratory series of models were run predicting mystery to gauge impacts of country of origin on this outcome, and the impacts of sequence and Nasar/Fisher features on this more global attribute.

6. Results

6.1. Fear

The ANOVA model for fear revealed substantial variation ($p<.001$) across respondents (43 percent), with the remaining variation being between pictures (see Table 5). As before, there was strong reliability of average ratings across pictures within respondents (.919). Model 2 showed that linear and quadratic effects of position in the alley varied significantly across raters ($p<.001$ for each). As before, the average linear effect was positive and significant ($b = .23$; $p<.01$), and the average quadratic effect was negative and significant ($b = -.02$; $p<.001$). Model 4—so named to correspond to the same model in the first assessment—showed significant effects, controlling for relative position, of all three Nasar/Fisher factors, each in the expected direction.[11] Better prospect dampened safety concerns ($b = -.10$; $p<.05$) as did access to nearby escape routes ($b = -.12$; $p<.05$). More numerous nearby potential refuges for attackers elevated concerns ($b = .12$; $p<.01$).

A final, full intercepts and slopes as outcome model used Chinese-born (coded 1) or not (coded 0) to predict the varying linear and quadratic effects of sequence.[12] Significant negative impacts of being Chinese-born on the linear slope for sequence were observed ($b = -.31$; $p<.01$), and significant positive impacts on the quadratic slope for sequence ($b = .02$; $p<.05$). Graphical inspection of the slopes by the two groups helped interpret the patterns. Initially, upon entering the alley, the safety concerns of Chinese-born students were higher, and, as they ''progressed'' down the alley, their concerns elevated more slowly than the US born respondents. For the quadratic effect, the graph showed a weaker impact among the Chinese-born students; as they neared the end of the alley their relief at nearing the end was relatively weaker than for the US born respondents. Upon exiting the alley, however, fear levels were closely comparable for the two groups. In this final model the average slopes in the fixed effects model captured linear and quadratic effects for non-Chinese-born respondents, and both of these were strong ($b = .23$; $p<.01$ for linear effect; $b = -.01$; $p<.01$ for quadratic effect). Effects of prospect, refuge and escape remained roughly identical to the previous model.

[10]Additional models were run (results not shown) gauging impacts of being Chinese-born on overall levels of concern for fear and perceived risk. Impacts were not significant.

[11]In this replication with Alley A, Nasar/Fisher attributes were group mean centered; each respondent's average score was rescored to 0. This permitted a more straightforward interpretation of the linear and quadratic sequence effects after controlling for impacts of being Chinese-born on these slopes.

[12]Although this variable had been tested in Study 1, it had not proved significant.

Table 5
Study 2: Multilevel models predicting day and nighttime fear index, Alley A

Predictor	Model 1		Model 2			Model 4			Intercepts and slopes as outcomes		
	ANOVA		Sequence variables			Full					
			b		*se*	*b*		*se*	*b*		*se*
Sequence			0.2313	**	0.0585	0.1108		0.0625	0.2337	**	0.0675
Sequence squared			−0.0161	***	0.0034	−0.0073		0.0038	−0.0144	**	0.0041
Prospect						−0.0974	*	0.0433	−0.0983	*	0.0432
Escape						−0.1190	*	0.0486	−0.1163	*	0.0484
Refuge						0.1239	**	0.0441	0.1250	**	0.0442
Constant	0		0			0			0		
Random effects and slopes as outcomes											
Variance: Raters	0.3484	***	0.3588	***		0.3617	***		0.3617	***	
Variance: Pictures within raters	0.4585		0.3019			0.2579			0.2579		
Variance: Linear effect of sequence			0.0487	***		0.0552	***		0.0342	***	
Impacts of Chinese origin									−0.3054	**	0.1035
Variance: Quadratic effect of sequence			0.0002	***		0.0002	***		0.0001	***	
Impacts of Chinese origin									0.0176	*	0.0063

Note. A higher score indicates more fear. See text for outcome index details. Variables for linear and quadratic effects of sequence were group mean centered. Escape, prospect, and refuge also were each group mean centered. In this study, in contrast to Study 1, ratings on escape, prospect, and refuge were made by respondents after they had gauged fear and perceived risk for the entire set of pictures. * = $p<05$; ** = $p<.01$; *** = $p<.001$.

In this final model, 44 percent of the pooled within-rater, variation across pictures was explained, 30 percent of the variance in the linear effects of sequence was explained, and 25 percent of the variance in the quadratic effect of sequence was explained.

A model (results not shown) combining escape and prospect into one parameter yielded a significant impact in the expected direction $b = -.11$; $p<.001$); other parameters in the model were virtually unchanged.[13]

6.2. Exploring mystery

A series of analyses began a preliminary exploration of connections between mystery and Nasar/Fisher features. An ANOVA model (results not shown) confirmed significantly varying average ratings on mystery across respondents ($p<.001$); about 43 percent of the ratings arose from differences across respondents. Across the whole set of pictures, different respondents saw significantly different amounts of mystery, and these individual differences accounted for about 4/10 of the variation in mystery ratings. Another model (results not shown) trying to predict these respondent means showed, on average, Chinese-born respondents saw less mystery ($p<.05$) than others. Controlling for these average differences between Chinese-born and non-Chinese-born respondents, and for linear and quadratic effects of sequence, another model (results not shown) gauged the effects of each of the three Nasar/Fisher attributes on mystery. Proximate escape routes enhanced mystery ($p<.001$). The other two features had no significant impacts. Being Chinese-born had no impact on the linear or quadratic slopes for sequence, although both these slopes did vary significantly ($p<.001$) across respondents.

To what extent did mystery predict perceived danger? Controlling for linear and quadratic effects of sequence, and for effects of being Chinese-born on both these sequence slopes, the points where respondents perceived more mystery were points where respondents felt less fearful ($p<.001$; results not shown). Controlling for prospect, refuge and escape altogether (results not shown), or for just prospect and refuge (results not shown) reduced the effect of mystery to non-significance ($p>.05$). Although extensive earlier work clarifies perceptions of mystery and danger at alley entryways, it appears much more needs to be done to specify how these relate to each other, or how mystery relates to Nasar/Fisher attributes, as one progresses through alleys.

7. Discussion

The present study's limitations and strengths each deserve mention, and they are addressed further below.

[13] The pattern of impacts for perceived risk was closely comparable (results not shown). Average linear and quadratic impacts of sequence were significant ($p<.001$), and refuge and prospect both had significant ($p<.001$ and $p<.01$, respectively) impacts in the predicted direction. Escape did not have a significant impact. But if escape and prospect were combined, the significant impact in the predicted direction ($p<.01$) was observed. Further, as with the fear outcome, being Chinese-born was associated (both ps$<.01$) with both sequence components. As with fear, their ratings increased more slowly early in the alley, and they declined less rapidly toward the end of the alley, compared to non-Chinese born respondents. The average linear and quadratic impacts of sequence were both significant ($p<.001$ for linear, $p<.01$ for quadratic) for non-Chinese born respondents.

Putting aside these issues for the moment, what is worth noting about the current results?

The current work sought to extend earlier work on specific fear-inspiring site features by Nasar and his colleagues, which has pointed toward three design elements: opportunities for concealment (refuge), proximity of escape routes, and how well one can see what is coming (prospect). Their previous work has gauged how respondents' safety concerns vary across specific locations and along a complex pathway on a large campus. The current work sought to extend the earlier work by: isolating the net impacts of each of these three features, simulating a walk down off-campus, relatively enclosed settings, and simultaneously controlling for where the respondent was along the route. Urban alleys are a different type of path than the ones previously investigated by Nasar and colleagues, and generally seen as more dangerous.

The results seen here extended the Nasar/Fisher model in the following ways. Using two different and ecologically valid settings, the Nasar/Fisher features predicted both fear (Alley A and B) and perceived risk of attack (Alley A, replication), while controlling for where the respondent was in the alley. In all these analyses refuge had a significant stand-alone impact. Prospect and escape had a significant impact if combined in Study 1, and on their own in Study 2 for one alley. The effects surfaced when expert ratings on the site level features were used, or when respondents generated their own ratings after reporting fear and perceived risk. These findings represent an extension of the Nasar/Fisher work to relatively enclosed and highly dangerous pathways such as urban alleys.

On the one hand the impacts for the linear and quadratic effects of where the picture was positioned in the alley are just control variables, allowing the isolation of impacts specific to the Nasar/Fisher features. On the other hand they are of some inherent interest themselves. In all the models, the linear and quadratic effects of sequence varied significantly across respondents. For Alley A, in both Study 1 and Study 2, the average respondent became increasingly concerned in the early part of the alley as he/she progressed through the pictures, and decreasingly concerned toward the end. In Study 2 but not Study 1 for Alley A being Chinese-born affected these slopes. Basically, Chinese participants in Study 2 had higher concerns upon initial entry, less rapidly accelerating safety concerns as they progressed through the early portion of the alley, and less rapidly decelerating concerns as they neared the end of the alley. With both the fear and perceived risk outcomes in Study 2, the Chinese- and non-Chinese respondents reported the same levels of concern when exiting. More attention to interpreting these differences is warranted if they can be replicated. Although it is possible the differences emerged from discrepancies in relative attention to foreground vs. background features (Chua et al., 2005), it seems more likely that this specific type of setting is less familiar to the Chinese-born respondents.[14] Perhaps personality diagnostics like the Environmental Response Inventory (McKechnie, 1974) might help better unpack some of these different reaction patterns to the sequence of slides.

Environmental simulation has a relatively long history in environmental psychology and landscape assessment (Marans & Stokols, 1993). The simulation depicted here was relatively "low tech" by many standards. The static sequence of pictures rather than video is an important limitation of this study. There are many advantages to be obtained from using an even more dynamic simulation, like video (Heft & Nasar, 2000). With video one could choose random stop points where respondents make an assessment, and allow that to vary across respondents.[15] But the pictures used here, it could be argued, represent an improvement over prior work. They present a whole pathway, not just an entryway or a point on a path, as has been used in previous work on alleys. Furthermore, at each picture point three pictures were stitched together providing the viewer with a "wide angle" on what was happening at that point.

Additional limitations besides the use of photos rather than video are several and include the following. Respondents were asked to extrapolate from daytime photos to nighttime reactions. Nighttime settings, where dark spots and shadows can strongly influence perceived safety (Nasar & Jones, 1997), could have produced markedly different patterns. Given the dangerousness of the setting, and the restricted budget, nighttime pictures were not feasible. Using such nighttime stimuli for analyses such as these represents an important future direction to be explored. Finally, it was not feasible to extensively consider how global properties of alleys, such as the degree of mystery present, might link to Nasar/Fisher features. That remains for future work. A very preliminary exploration here (Study 2) suggested that mystery linked to escape possibilities, but did not contribute to perceived risk or fear after controlling for Nasar/Fisher features. This exploration, however, was not as systematic as it needed to be, and should be considered extremely preliminary.

Perhaps somewhat counterbalancing these limitations were several study strengths. The places used were nominated as fear spots and proved by recent events to be quite dangerous. Second, two different alleys were used, of differing lengths, with differing adjoining landuse mixes. Key results replicated across both alleys. Third, key results replicated with one alley when a second group of respondents were run and respondent-supplied rather than expert ratings of Nasar/Fisher features were used. Fourth, the analytical model employed made use of all the variance

[14]A series of analyses (results not shown) allowed slopes of Nasar/Fisher features to vary, and, if that variation was significant, to predict those slopes with Chinese versus non-Chinese born. No significant impacts of that variable were found, for either the fear or perceived risk outcome.

[15]Although perhaps a case could be made for taking respondents on actual walks down dangerous alleys, if they really are dangerous locations important human subjects protection questions would arise.

in the outcome, appropriately modeled error structures, and allowed separating respondent outcome variation from between picture variation. Finally, the results from Study 2 suggested the results applied to both perceived risk as well as fear of crime.

One final matter deserving mention is statistical power. Power can be estimated for a range of parameters in a multilevel model, and the literature in this area is quite advanced (e.g., Raudenbush & Liu, 2000). Statistical power is not a concern here, per se, because the key anticipated effects did appear as expected.

In conclusion, in the first study using two different alleys, the amount of fear respondents expected to feel as they progressed down each alley was linked in the expected direction to refuge or concealment for attackers, and to a prospect/escape composite, while controlling for position in the alley. In the second study returning to one of the original alleys with a new set of respondents results revealed separate net impacts for each of the three Nasar/Fisher features—prospect, refuge, and escape—while controlling for position, on both fear and perceived risk. In addition to exploring the questions remaining for future work noted immediately above, it is hoped that researchers in this area more fully immerse themselves in the fear of crime and reactions to crime literatures so that an even more comprehensive view of relevant physical features, and a more detailed understanding of potentially relevant processes, might be developed.

References

Appleton, J. (1975). *The experience of place*. London: Wiley.

Borchert, J. (1980). *Alley life in Washington: Family, community, religion, and folklife in the city, 1850–1970*. Urbana: University of Illinois Press.

Brower, S. N. (1980). Territory in urban settings. In I. Altman, & C. Werner (Eds.), *Human behavior in the environment: Advances in theory and research*, Vol. 4. New York: Plenum.

Bryk, A. S., & Raudenbush, S. W. (1987). Application of hierarchical linear models to assessing change. *Psychological Bulletin*, *101*(1), 147–158.

Chua, H. F., Bland, J. E., & Nisbett, R. E. (2005). Cultural variation in eye movements during scene perception. *Proceedings of the National Academy of Sciences*, *102*(35), 12629–12633.

Daemmrich, J., West, N., (1994). Neighbors welcome city plan to demolish abandoned, tumbledown houses. *The Baltimore Sun*, October 9, 1994, B2.

Damer, S. (1974). Wine alley: The sociology of a dreadful enclosure. *Sociological Review*, *22*, 221–248.

Daily Pennsylvanian (January 15, 2006). Penn student shot at 38th, Sansom: Student released from hospital this morning. [ONLINE: http://www.dailypennsylvanian.com; retrieved 3/20/06].

Ferraro, K. F. (1994). *Fear of crime: Interpreting victimization risk*. Albany: SUNY Press.

Fisher, B., & Nasar, J. (1995). Fear spots in relation to microlevel physical cues: Exploring the overlooked. *Journal of Research in Crime and Delinquency*, *32*, 214–239.

Fisher, B., & Nasar, J. L. (1992). Fear of crime in relation to three exterior site features: Prospect, refuge and escape. *Environment and Behavior*, *24*, 35–65.

Heft, H. (1983). Way-finding as the perception of information over time. *Population and Environment*, *6*(3), 133–150.

Heft, H., & Nasar, J. L. (2000). Evaluating environmental scenes using dynamic versus static displays. *Environment and Behavior*, *32*(3), 301–322.

Herzog, T. R., & Flynn-Smith, J. A. (2001). Preference and perceived danger as a function of perceived curvature, length and width of urban alleys. *Environment and Behavior*, *33*(5), 653–666.

Herzog, T. R., & Miller, E. J. (1998). The role of mystery in perceived danger and environmental preference. *Environment and Behavior*, *30*(4), 429–449.

Herzog, T. R., & Smith, G. A. (1988). Danger, mystery, and environmental preference. *Environment and Behavior*, *20*(3), 320–344.

Kaplan, R., & Kaplan, S. (1989). *The Experience of nature: A psychological perspective*. Cambridge: Cambridge University Press.

Kaplan, S., & Kaplan, R. (1982). *Cognition and environment: Functioning in an uncertain world*. New York: Praeger.

Kato, Y., & Takeuchi, Y. (2003). Individual differences in wayfinding strategies. *Journal of Environmental Psychology*, *23*(2), 171–188.

Kurtz, E., Koons, B., & Taylor, R. B. (1998). Land use, physical deterioration, resident-based control and calls for service on urban streetblocks. *Justice Quarterly*, *15*, 121–149.

LaGrange, R. L., & Ferraro, K. F. (1989). Assessing age and gender differences in perceived risk and fear of crime. *Criminology*, *27*, 697–719.

Marans, R. W., & Stokols, D. (1993). *Environmental simulation: Research and policy issues*. New York: Plenum.

McKechnie, G. E. (1974). *Environmental response inventory*. Palo Alto, California: Consulting Psychologists Press.

Nasar, J. L., & Fisher, B. (1994). Hot spots of fear and crime: A multi-method investigation. *Journal of Environmental Psychology*, *13*, 187–206.

Nasar, J. L., Fisher, B., & Grannis, M. (1993). Proximate physical cues to fear of crime. *Landscape and Urban Planning*, *26*, 161–178.

Nasar, J. L., & Jones, K. M. (1997). Landscapes of fear and stress. *Environment and Behavior*, *29*(3), 291–323.

Nunnally, J. (1967). *Psychometric Theory*. New York: McGraw Hill.

Perkins, D., & Taylor, R. B. (1996). Ecological assessments of disorder: Their relationship to fear of crime and theoretical implications. *American Journal of Community Psychology*, *24*, 63–107.

Perkins, D. D., Meeks, J. W., & Taylor, R. B. (1992). The Physical environment of street blocks and resident perceptions of crime and disorder: Implications for theory and measurement. *Journal of Environmental Psychology*, *12*, 21–34.

Raudenbush, S., & Bryk, T. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed). Thousand Oaks: Sage.

Raudenbush, S., & Liu, X. (2000). Statistical power and optimal design for multisite randomized trials. *Psychological Methods*, *5*, 199–213.

Rengert, G. (1996). *The geography of illegal drugs*. Boulder: Westview.

Robinson, J., Lawton, B., Taylor, R. B., & Perkins, D. D. (2003). Longitudinal impacts of incivilities: A multilevel analysis of reactions to crime and block satisfaction. *Journal of Quantitative Criminology*, *19*(237–274).

Simon, D. (1991). *Homicide: A year on the killing streets*. New York: Ballantine.

Simon, D., & Burns, E. (1997). *The Corner: A year in the life of an inner-city neighborhood*. New York: Broadway Books.

Stamps, A. E., III (2004). Mystery, complexity, legibility and coherence: A meta-analysis. *Journal of Environmental Psychology*, *24*(1), 1–16.

Suttles, G. D. (1968). *The social order of the slum*. Chicago: University of Chicago Press.

Taylor, R. B. (1988). *Human territorial functioning*. Cambridge: Cambridge University Press.

Taylor, R. B. (2001). *Breaking away from broken windows: Evidence from baltimore neighborhoods and the nationwide fight against crime, grime, fear and decline*. New York: Westview Press.

Taylor, R. B., Koons, B., Kurtz, E., Greene, J., & Perkins, D. (1995). Streetblocks with more nonresidential landuse have more physical deterioration: Evidence from Baltimore and Philadelphia. *Urban Affairs Review (formerly Urban Affairs Quarterly)*, *30*, 120–136.

Taylor, R. B., & Shumaker, S. A. (1990). Local crime as a natural hazard: Implications for understanding the relationship between disorder and fear of crime. *American Journal of Community Psychology*, *18*(5), 619–642.

Taylor, R. B., Shumaker, S. A., & Gottfredson, S. D. (1985). Neighborhood-level links between physical features and local sentiments: Deterioration, fear of crime, and confidence. *Journal of Architectural Planning and Research*, *2*, 261–275.