Impacts of Store Crowding on Shopping Behavior and Store Image

So Young Lee*1, Jai-Ok Kim2 and Jiunn-Ger Li3

1 Associate Professor, Department of Housing & Interior Design, Chung-Ang University, Korea
2 Visiting Professor, Graduate School of Human Environmental Sciences, Yonsei University, Korea
3 Associate Professor, Department of Textiles & Clothing, Fu-Jen Catholic University, Taiwan

Abstract

The perception of crowding and the shopping environment can influence consumers' decisions on where to shop as well as their buying decision and store image. The purpose of the study is to investigate the effects of store layout design and factors about the consumer on the perception of store crowding and in turn analyze the impact of perceived crowding on shopping behavior and store image. Surveys were conducted at two discount stores in Taipei City, Taiwan. A total of 532 questionnaires were used for analysis. Spatial crowding was assessed using physical area factors including floor layout designs, aisle table area, and ceiling height. Perceptions of crowding resulted from the spatial arrangement, while human crowding contributed to the feeling of overall store crowding. Among a store's physical area factors, aisle table area most strongly impacts the overall degree of perceived store crowding, followed by free-flow layout and grid layout areas. Among various individual factors, age and prior experience of crowding are significantly related to perceived crowding. The results showed that perceptions of spatial crowding had a negative relationship to promotional image while perceptions of human crowding had a positive relationship to discount store image.

Keywords: spatial crowding; human crowding; behavioral outcomes; store image

1. Introduction

The perception of crowding and the shopping environment designed by retail stores have become increasingly important as retailers constantly try to provide consumers with a satisfactory shopping experience and reinforce a favorable image of the store in the consumers' mind.

In a retail environment, inadequate allocation of store space for selling, merchandise, personnel and customers may cause limited space for shoppers' physical movements and shopping activities, thereby creating an uncomfortable feeling of crowding.

While the effects of crowding on human behavior have been examined by several environmental design researchers (Evans & Lepore, 2000), exploration of the effects of layout design on perceived crowding and shopping behavior in the retail setting has been absent in the literature (Eroglu & Machleit, 1990; Machleit et al., 1994; Machleit et al., 2000; Turley & Milliman, 2000). Extension of such investigation, the impact of physical environments such as floor layout design, aisle tables, and ceiling height on retail crowding, from general living environments to the commercial retail domain may have significant practical and theoretical implications in understanding consumer shopping behavior (Turley & Milliman, 2000), and can provide store planners with an insightful guideline for addressing crowded shopping environments.

The purpose of the present study is to empirically investigate the effects of layout design on the perception of crowding as well as how those perceptions of crowding impact consumer shopping behavior and store image. First, it examines consumer perceptions of crowding as affected by five physical environment factors (grid layout, free-flow layout, aisle tables, cash registers and ceiling height) that are most frequently used in discount and department stores. Second, it empirically tests how consumer factors such as time pressure and prior experiences of crowding influence consumer perceptions of crowding. Lastly, it attempts to examine how perceived human and spatial crowding impact consumer shopping behavior and store image.

Store designers can control many of these variables to appeal to their customers by either diminishing or enhancing feelings of crowding through store design. Often store designers can control shopper perceptions by effectively using design variables such as layout, aisle tables, ceiling height and light. Furthermore, as store designers try to provide exciting and interesting
2. Conceptual Framework

Crowding occurs when individuals fail to maintain control over the physical environment and the amount of social interaction exceeds a desired level, while density refers to the objective amount of space per person (Stokols, 1972; Kaya & Weber, 2003; Evans & Wener, 2007).

Typical behavioral responses to crowding are negative feelings such as being constrained, interfered with, or uncomfortable. However, crowding can be associated with negative reactions as well as positive feelings under certain conditions (Bell et al., 2001).

Since individual differences, situational conditions, and social conditions determine perceptions of crowding, it is important to know under what specific conditions in terms of store design, people would have positive or negative feelings or reactions.

In environmental behavior studies (Bell et al., 2001) there are two types of density manipulation: varying spatial density (in which space is manipulated and group size held constant) and varying social density (in which group size is manipulated and space is held constant).

Similarly in retail environments, Machleit et al. (1994) proposed two dimensions of crowding: spatial crowding and human crowding. Spatial crowding is judged by the shopper's perception concerning restrictiveness of physical body movement within a limited customer space while shopping at a store. Perceptions of human crowding result from high densities of shoppers simultaneously participating in browsing, transaction, and interaction activities on the selling floor.

The proposed conceptual framework is based on interdisciplinary literature, such as the environmental constraints perspective (Stokols, 1972), store layout research by Levy and Weitz (2008), and retail crowding models by Eroglu and Harrell (1986). The concepts in the framework shown in Fig.1. suggest that spatial crowding perceived from sets of selected physical layout designs and human crowding factors affect the shopper's perception of overall store crowding in the retail setting. However, the model for the present study differs from those used by Eroglu and Harrell (1986), Harrell et al. (1980), and Gilbert and Hutt (1976) with respect to: (a) the store layout patterns and promotional fixtures, e.g., aisle table area, were included as a physical retail environmental factor in this study, and (b) the breadth of shopping behavior was expanded. As to the latter, this focused on individual differences such as time pressure, prior experiences of crowding, age and gender, as these may influence one's perceptions of store crowding.

Whether or not crowding leads to negative consequences depends in part on control and whether we believe we can escape the density if we want to (Bell et al., 2001, p.317). Since in this study spatial crowding refers to the perceived condition due to physical constraints and human crowding refers to that by physical restriction of human movement in store areas, the authors propose that spatial crowding and human crowding result in different behavioral outcomes and store images.

The final component of the model is the results of store crowding, such as customer satisfaction, behavioral outcomes, and store image. The behavioral outcomes include the following variables: (a) time spent in the store, (b) in-store browsing, (c) impulse buying, and (d) aisle table buying. Store image was selected from prior retail studies (Beatty & Ferrell, 1998; Baker et al., 1994; Eroglu & Machleit, 1990).

3. Literature Review and Hypotheses Development

1) Physical environmental condition

The design of a building influences the degree of perceived crowding in a constant amount of objective space (Bell et al., 2001). Physical condition can be assessed by its adequacy for the type of functions to be performed in that space.

The physical store environment refers to store layout, which is the arrangement of the amount and the size of merchandise and fixtures (Berman & Evans, 1992). Properly allocating these spaces such that the space can contribute to an individual's sense of privacy needed for the tasks of shopping was a major consideration in reducing shopper perceptions of crowding (Greenbaum & Greenbaum, 1981). Overall, the effects of these layout patterns on perceived store crowding depend on density levels, height of fixtures, type of merchandise, and function of the displays.

The basic types of store layouts are defined in a variety of terms. Several researchers (Levy & Weitz, 2008; Bell & Ternus, 2002; Berman & Evans, 1992) divide retail store layout into two general patterns: grid layout and free-flow layout. The utilization of space
between these designs can be made to help alleviate the intensity of customers' feelings of being crowded.

**Grid Layout.** The grid layout has been adopted by most grocery stores to display dry packaged or canned products. This type of layout allows orderly stocking of merchandise in a horizontal and vertical manner, helping shoppers locate and reach the bulk of the merchandise quite easily (Levy & Weitz, 2008). This grid pattern is often utilized in order to maximize selling space. When the store is crowded with shoppers, the parallel aisles can effectively control the traffic flow directing shoppers to move around the store easily.

**Free-Flow Layout.** The free-flow layout can be found in many large department stores and in the vegetable and fresh produce sections in supermarkets or hypermarkets. This type of layout arranges fixtures and aisles asymmetrically. The free-flow layout usually allows and encourages customers to browse throughout a store in any direction (Bell & Ternus, 2002). When the store is crowded, the limited space and the multidirectional traffic flow can easily confuse shoppers as they move around, and sometimes even cause them to get lost (Levy & Weitz, 2008). The restriction of movement imposed by limited space and crowds of people in this free-flow layout could evoke feelings of uncontrollability over the environment (Rodin, Solomon & Metcalf, 1978) and may arouse a feeling of crowding in customers (Stokols, 1972).

**Aisle Tables.** Aisle tables (Pegler, 1998) are feature tables set in an aisle. Stores often use these tables to display short-term promotional items or value merchandise to catch customer attention for impact selling (Pegler, 1998). These tables sell merchandise more readily than do the shelf displays. In a discount store, the aisle tables are usually located in the middle of aisles, arranged at feature areas in open spaces, or placed close to the entrance of the store. Shoppers are often attracted to and gather around these tables to shuffle through and examine the merchandise to find a good deal. Aisle tables give retailers great flexibility in utilizing limited retail space and usually create crowding conditions, yet they can also contribute to an exciting, fun, and adventurous atmosphere in a store.

**Cash Registers.** Cash registers usually increase high spatial density because of customers who also often have shopping carts with them. Retailers have introduced several systems to minimize such crowding situations at cash register areas. For example, most stores offer express-checkout lanes, which are typically limited to shoppers with 20 items or less or shoppers with cash. Yet, this area still creates high spatial and human density.

**Ceiling Height.** Previous studies showed that ceiling height affects human behavior in an environment. Greater ceiling height is related to less crowding (Savinar, 1975). In retail stores, the ceiling represents an important element for store interior design (Berman & Evans, 1992). Ceiling height can also be varied to create a particular store atmosphere (e.g., intimacy). Although ceiling height is an important element for creating a good shopping atmosphere, its impact on shopper perception of crowding has not yet been studied very much.

Thus, based on a review of the previous research findings, the following hypothesis is proposed:

**H1:** There is a positive relationship between overall perceived store crowding and perceived crowding in the areas of (a) grid layout, (b) free-flow layout, (c) aisle tables, (d) cash registers, and (e) ceiling height.

2) Individual differences in crowding

Stokols (1972) found that individual characteristics had an effect on the degree to which a particular environment was perceived as being crowded. Another study addressed various individual differences and situational factors affecting adaptation level to store crowding (Ng, 2003). These studies suggested that perception of crowding may vary among individuals, and individual characteristics and situational constraints need to be taken into account when examining levels of perceived crowding in the retail setting.

**Shopping Motives.** Task oriented shoppers have been defined as those who are more interested in immediate completion of a shopping task within a limited time (Eroglu and Machleit, 1990). Therefore, task oriented shoppers are more likely to perceive higher crowding than non-task oriented shoppers, because the store density may be perceived to interfere with the task for shoppers in achieving goals.

**Time Pressure.** Time pressure will influence the reaction to psychological stimuli and increase perceptions of behavioral interference resulting from a high-density retail environment. If a shopper has limited time available to complete his/her shopping trip, he/she may feel the impact of interference from high retail density more intensely. The crowding perception can be greatly affected by the degree of time pressure the shopper experiences while shopping (Eroglu & Harrell, 1986).

**Expectations of Crowding.** Expectations regarding present level of density may play a role in determining an individual's reactions to crowding confinement (Webb & Worchel, 1993). Langer and Saegert (1977) found shoppers who were warned about a crowded supermarket showed more positive feelings regarding the shopping experience than uninformed shoppers. Expecting to be in a crowded situation may decrease one's feeling of crowding and sensitivity to stress.

**Prior Experiences of Crowding.** The individual difference related to the reaction to high density depends on one's adaptation level from past experience (Gove & Hughes, 1983). Employees from high density environments respond more favorably to a high-contact
work environment (Sundstrom, 1978). It is in turn likely that one's prior experiences with high density environments influence interpretations of subsequent high-density situations and the perception of crowding. Thus, shoppers who are used to shopping at crowded stores will perceive lower retail crowding than those shoppers who typically shop at less crowded stores or times.

**Tolerance for Crowding.** Intrusions into one's personal space usually cause perceptions of crowding (Altman, 1975). Thus, people who need more personal space generally perceive more crowding (Rustemli, 1992). Therefore, it seems reasonable to assume that shoppers with a higher tolerance of crowding perceive lower retail crowding than those with lower crowding tolerance.

In addition, demographic factors such as age, gender, and family income were analyzed. Therefore, based on the review, the following hypothesis is proposed:

**H2:** There is a positive relationship between overall perceived store crowding and (a) task-oriented shopping motives, (b) time pressure, (c) age, (d) gender, and (e) family income, and a negative relationship between overall perceived store crowding and (f) expectation of crowding, (g) prior experience of crowding, (h) tolerance for crowding, and (i) frequency of store visits.

### 3) Crowding and satisfaction

Customer satisfaction has been defined as an evaluative judgment regarding a purchasing experience (Oliver, 1993). The judgment is a comparison of store attributes perceived by consumers using their own evaluation standards. Perception of crowding is an important store attribute that may affect customer satisfaction with the retail environment (Eroglu & Machleit, 1990; Eroglu & Harrell, 1986). It is found that perceived crowding decreases feelings of pleasure in a service environment (Hui & Bateson, 1991). These unpleasant feelings may influence consumer satisfaction (Oliver, 1993; Machleit et al., 1994). Thus, it is proposed:

**H3:** There is a negative relationship between customer satisfaction and (a) perceived spatial crowding and (b) perceived human crowding.

### 4) Behavioral outcomes of crowding

The shopping behavioral outcomes were selected from previous retail studies (Beatty & Ferrell, 1998; Baker, Grewal & Parasuraman, 1994; Eroglu & Machleit, 1990).

**Time Spent in the Store.** As for research on the crowding variable, one focus group interview found that customers spend less time on shopping when in a crowded store (Eroglu & Harrell, 1986).

### Impulse Buying and Aisle Table Buying

The urge to buy or to approach an aisle table will lessen, even when the atmosphere is exciting, if the area is considered too crowded. Thus, fewer impulse or aisle table purchases will be made by shoppers who feel stress from crowding.

Overall, these studies suggest that a shopper's perception of crowding in a retail environment affects the shopper's desire to spend time in the store. Thus, it is hypothesized:

**H4:** There is a negative relationship between spatial crowding and human crowding and (a) time spent in the store, (b) in-store browsing, (c) impulse buying, and (d) aisle table buying.

### 5) Crowding and store image

Retail store image is mostly based on consumer perceptions of store attributes. Studies have shown that the store environment has effects on consumer inferences concerning merchandise quality (Mazursky & Jacoby, 1986) and service quality (Parasuraman, Zeithaml & Berry, 1988). For instance, in a discount/grocery store, the long gondola fixtures and bare fluorescent lighting may generate a low price image (Levy & Weitz, 2008). In a retail study, Harrell et al. (1980) found that consumers evaluate their shopping experience in terms of a crowded environment. For example, based on the authors interviews, some consumers indicated that shopping in a crowded place gave them an impression that there was a promotional event going on in the store. Others may perceive crowding as a cue that the merchandise is of good value. Machleit et al. (1994) suggested that human crowding and spatial crowding may have different effects on store image. For instance, consumers make inferences about promotional activity, merchandise value, and service quality, and thereby, about a store's image partly from the store's human crowding factor (i.e., lots of shoppers in the store). A spatially crowded store with poor displays and cluttered merchandise might convey a discount store image. Therefore, the following hypothesis is proposed with respect to the impact of store crowding on store image:

**H5:** There is a positive relationship between spatial crowding and human crowding and (a) promotion image and (b) discount store image.

### 4. Method

Surveys were conducted at two discount stores in Taipei City, Taiwan. Among twenty-seven stores in Taiwan, two Carrefour stores were selected, which are located four miles apart in Taipei City (see Table 1.). Merchandise assortment, quality and price of the merchandise at each of the two stores are similar. The scale of the physical facility, store exterior, presence of...
a parking lot, size of sales floor, floor materials, width of the aisles, and ceiling height are slightly different, but the overall space design, layout patterns, and lighting are very similar to each other.

Table 1. A Summary of Interior/Fixture Measurements of Stores

| Physical Area Crowding | Tam-Hsia Store | Tier-Mou Store |
|------------------------|----------------|----------------|
| General Merchandise Section | 1st Floor | 2nd Floor |
| Grocery/Dairy Section | 2nd Floor | 1st Floor |
| Size of Selling Floor | 110,000 sq. ft | 41,000 sq. ft |
| Width of Main Aisle | 15 ft | 11.5 ft |
| Width of Aisle between Shelves | 11 ft | 8 ft |
| Number of Cash Registers | 31 | 24 |
| Width of Cash Register Area | 8ft*31 cashiers | 7ft*24 cashiers |
| Ceiling Height | 15 ft | 12 ft |

Five-point Likert-type scales (1 as strongly disagree and 5 as strongly agree) were used for all variables except the demographic variables. All multiple items are averaged for regression analysis.

To measure perceived human crowding and perceived spatial crowding by shoppers, six items validated by Machleit et al. (1994) were used. To create perceived spatial crowding at different areas of the store, items for the grid area for packaged products, the free-flow area for frozen food/meats/dairy product and vegetable sections, the aisle tables area, the cash register areas and the ceiling were developed.

Perceived area spatial crowding in free-flow areas was measured using the items such as "The store feels very spacious when I shop in the frozen food/meats/dairy product and vegetable section" and "I felt confined when shopping in the frozen food/meats/dairy product and vegetable section". Perceived area spatial crowding in aisle table areas was measured using items such as "The store feels very spacious when I shop near aisle table areas", "I felt confined when shopping near aisle table areas."

Purposeful Shopping (shopper motivations) items were taken from Eroglu and Machleit (1990). The two items for Time Pressure were used by Beatty and Ferrell (1998). Items for Expectations of Crowding were adapted from Machleit et al. (2000). Measures for Prior Experiences of Crowding at the store were developed by the author by asking the level of agreement with the statement "I often shop at a crowded store," and "I am accustomed to shopping at a crowded store." Measures for Tolerance for crowding were drawn from the instrument used by Machleit et al. (2000).

Satisfaction was measured using the items developed by Eroglu and Machleit (1990) and Machleit et al. (1994). Time Spent in the Store was measured by the following statements: "I spent more time than I expected at the store," and "The amount of time I spent was fairly high." Impulse buying behavior was assessed by using three items modified from Beatty and Ferrell (1998). Aisle table buying behavior was measured by two items developed for this study based on observations and interviews: "I enjoyed shuffling through the mixed items on the aisle tables," and "I bought things at the aisle tables even though I did not plan to purchase." Store image items were modified based on research by Baker et al. (1994). Promotion image questions included: "A store with lots of shoppers means that the store is having a sale," "A store with lots of shoppers means that the store offers good prices," and "A store with lots of shoppers means that the store offers good value." The discount store image item was "A store with lots of shoppers means that the store is a discount store." A pre-survey was conducted with about 100 undergraduate college students in Taipei City to improve question clarity and refine the scale development.

5. Results

Relationships between Overall Store Crowding and Physical Area Crowding.

In-store space available for customers to move around for shopping and consequent shopper perceptions of crowding may vary when a shopper moves from the area of one layout to that of another layout.

As illustrated in Table 2., the perceived spatial crowding at three different areas including grid layout, free-flow layout and aisle tables were found to be positively related to overall perceived store crowding while the cash register area and ceiling height were found not to be related to overall crowding. Thus, hypothesis H1 was partially supported.

Comparison of the five store physical design factors shows that perceived spatial crowding in the aisle table area is the factor that most strongly impacts the overall perceived store crowding as evidenced by the highest significant regression coefficient (beta = 0.172, p < .01), followed by free-flow layout area (beta = 0.117, p < .05) and grid layout area (beta = 0.104, p < 0.05). The order of the three areas contributing to overall crowding seems reasonable considering the purposes of employing these layouts in terms of both customer accessibility to merchandise and control of traffic in the store.

Table 2. Physical Condition and Store Crowding (H1)

|                      | Beta  | Mean | t    | R²    |
|----------------------|-------|------|------|-------|
| Grid Layout (H1a)    | 0.104*| 2.58 | 2.072| 0.105 |
| Free Flow Layout (H1b)| 0.117*| 2.50 | 2.320|       |
| Aisle Tables (H1c)   | 0.172**| 2.81 | 3.290|       |
| Cash Registers (H1d) | 0.063  | 3.00 | 1.330|       |
| Ceiling Height (H1e) | -0.045| 2.46 | -3.982|       |

(*p < .05; **p < .01)

In terms of factor means for the level of crowding shoppers experienced in the five areas, shoppers perceived higher spatial crowding in the cash register (3.00) and aisle table (2.81) areas than in both the grid layout area (2.58) and free-flow layout area (2.50). The
Table 3. Individual Difference and Store Crowding

| Independent Variable                      | Beta   | t     | R² |
|-------------------------------------------|--------|-------|----|
| Purposeful shopping motives (H2a)         | 0.027  | 0.587 |    |
| Time Pressure (H2b)                       | 0.065  | 1.490 |    |
| Age (H2c)                                 | -0.094*| -1.980|    |
| Gender (H2d)                              | 0.024  | 0.560 |    |
| Family income (H2e)                       | -0.008 | -1.65 |    |
| Expectation of Crowding (H2f)             | 0.045  | 1.036 |    |
| Prior Experience of Crowding (H2g)        | 0.211***| 4.523 |    |
| Tolerance for Crowding (H2h)              | -0.068 | -1.491|    |
| Frequency of store visit (H2i)            | 0.027  | 0.625 |    |

(*p < .05; **p < .01; ***p < .001)

The effect of ceiling height on spatial feelings of crowding (2.46) was rated similarly to the latter two as well. At the cash register area, shoppers rated the highest level of localized perception of crowding. But their rating at that area did not seem to contribute to evoking feelings of overall store crowding. This may be due to the fact that shoppers might be willing to accept the fact that the cash register area is always crowded and they have to go through it to complete their shopping.

The result demonstrates that feelings of crowding perceived at aisle table sections contribute most strongly to the perception of overall store crowding. However, somewhat lower mean rating and beta values in the areas of free-flow layout and grid layout suggest that the perception of crowding in these areas were effectively managed by employing proper floor layout designs in reducing perception of overall crowding in the store.

Relationships between Overall Store Crowding and Individual Factors

Multiple regression analyses were used to examine relationships between overall perceived store crowding and consumer factors (See Table 3.). In evaluating the contribution of each consumer factor to overall perceived crowding, only prior experiences of crowding (beta = 0.211, p < .001) positively affected overall perceived store crowding while age (beta = -0.094, p < .05) negatively affected overall perceived store crowding. Other consumer factors such as purposeful shopping motives, time pressure, gender, family income, frequency of store visits, expectation of crowding, and tolerance for crowding were not significantly related to overall perceived crowding.

This suggests that in the discount retail store setting, consumer factors, which have frequently been investigated in previous crowding studies, do not seem to play any important role in determining the level of store crowding that shoppers perceive while shopping. Thus, hypothesis H2 is rejected.

Relationships between Spatial Crowding and Human Crowding and Satisfaction

The results showed that spatial crowding and human crowding influence satisfaction differently, in an opposite manner (See Table 4.). While perceived human crowding positively affected customer satisfaction (beta = 0.294, p < .001), spatial crowding negatively influenced customer satisfaction concerning the shopping experience (beta = -0.423, p < .001). This result demonstrated the strong negative role of spatial crowding in contrast to the important positive role of human crowding on store atmosphere. Thus, hypothesis H3 is partially supported. The results also suggest that the effects of retail crowding on the performance of retail stores should be studied separately, as spatial crowding and human crowding impact the customer’s feeling of satisfaction differently.

Table 4. Relationships between Spatial Crowding/Human Crowding and Satisfaction

| Independent Variable   | Beta   | t     | R²  |
|------------------------|--------|-------|-----|
| Perceived Spatial Crowding | -0.423*** | -11.155 |   |
| Perceived Human Crowding | 0.294*** | 7.767  | 0.245 |

(*p < .05; **p < .01; ***p < .001)

Relationships between Perceived Spatial Crowding and Perceived Human Crowding and Behavioral Outcomes

Perceived spatial crowding was found to negatively impact most of the behavioral outcomes: time spent in the store (beta = -0.107, p < .05), impulse buying (beta = -0.118, p < .05), and aisle table buying (beta = -0.142, p < .01) as shown in Table 5. In contrast, perceived human crowding positively impacted one of the most important consumer shopping behavioral outcomes that any retailer wishes, impulse buying (beta = 0.114, p < .05). Mattila and Wirtz (2008) found that perceived over-stimulation (higher than desired) has a positive impact on impulse buying.

Table 5. Relationships Between Spatial Crowding/Human Crowding and Behavioral Outcomes

| Dependent Variable   | Independent Variable   | Beta   | t     | R²  |
|----------------------|------------------------|--------|-------|-----|
| Time Spent in the Store | Spatial Crowding | -0.107* | -2.467 | 0.011 |
| Human Crowding       |                        | 0.070  | 1.625 |    |
| Impulse Buying       | Spatial Crowding      | -0.118* | -2.744 | 0.021 |
| Human Crowding       |                        | 0.114* | 2.652 |    |
| Aisle Tables Buying  | Spatial Crowding      | -0.142**| -3.309 | 0.025 |
| Human Crowding       |                        | 0.082  | 1.903 |    |

(*p < .05; **p < .01)

The results emphasized the importance of controlling perceived spatial crowding using appropriate physical layouts and arrangements of the fixtures in the store, while demonstrating the importance of attracting...
crowds of shoppers to increase the human crowding.

**Relationships between Perceived Spatial Crowding and Perceived Human Crowding and Store Image**

The result showed that there is a close relationship between store crowding and store image. While perceived spatial crowding was found to be negatively related to the promotional image of a store (beta = -0.125, p < .01), perceived human crowding was positively related only to the discount store image (beta = 0.133, p < .01) as shown in Table 6.

This outcome means that stores perceived high in spatial crowding resulting from dense arrangement of fixtures and merchandises were interpreted as discounts stores which are less interested in providing promotions for special sales and events.

| Dependent Variable | Independent Variable | Beta  | t     | R²   |
|--------------------|----------------------|-------|-------|------|
| Promotion Image    | Spatial Crowding     | -0.125** | -2.881 | 0.012 |
| Discount Store Image | Spatial Crowding  | -0.047 | -1.099 | 0.015 |
|                    | Human Crowding       | 0.031 | 0.717 |      |
|                    | Human Crowding       | 0.133** | 3.084 |      |

(*p < .05; **p < .01; ***p < .001)

However, a positive relationship between human crowding and discount store type image means that keeping a store crowded with shoppers is very important to discount store customers to assure them that the store provides appropriate value and services as expected.

**6. Discussion**

The findings reinforce that crowding results from a combination of physical density stimuli and human interaction (Stokols, 1972) and feelings of crowding are perceived when an individual's activity is restricted (Stokols et al., 1973).

In the discount/grocery store of the study, perceptions felt at aisle table areas most strongly impact overall store crowding followed by free-flow layout and grid layout areas. This result is consistent with the purpose of selecting different layout designs for discount stores. It also means that upscale stores need to consider whether they want to use aisle tables to promote additional sales since the results suggest that having aisle tables on the floor may not only damage the image of the upscale store, but may also add greatly to the feeling of crowding that shoppers might perceive about the store.

Previous research has found that one of the most annoying aspects of shopping for customers was a long wait at checkout (Disney, 1999). In this study, however, the perception of crowding at the cash register area did not contribute to the perception of overall crowding of the store. This can be attributed to the fact that people adapt to crowded conditions in the cash register area and consider not perceptions of crowding but waiting time more important.

This research found that individual consumer characteristics, such as prior experiences of crowding and age, also directly affect perceptions of store crowding. However, other characteristics were not found to influence the perceptions of store crowding.

Perceived spatial crowding was found to negatively influence consumer shopping satisfaction, shopping behaviors and promotional store image. A negative relationship between perceptions of spatial crowding and a decrease in time spent for shopping, impulse buying and aisle buying reinforces the belief that store environment is critically important to the amount of time and money shoppers spend in the store (Bellizzi & Hite, 1992), i.e., customers spend less time and consequently less money in a crowded store (Eroglu & Harrell, 1986). Therefore, how to alleviate spatial crowding in a store is an important factor for store design. It is recognized that adequate allocation and arrangement of the store space with fixtures would allow customers to move around the store more freely and easily. In order to reduce the negative reaction of crowding, it is necessary to provide control over the physical environment so that people can easily avoid unwanted crowded situations or facilitate regulation of the level of social interaction. Therefore, store planners need to carefully plan the arrangement of fixtures, the display of merchandise and store layout in order to reduce feelings of crowding. Physical features such as open spaces or wider corridors or isles would help reduce negative feelings and reactions of crowding.

Store image is an overall impression of a store that may be influenced by store environment (Hildebrandt, 1988). The results showed that perceptions of spatial crowding had a negative relationship on promotional image. This suggests that if a store is perceived to have high spatial crowding with a dense physical arrangement of fixtures, shoppers may interpret it to mean that the store is not a type of store interested in providing customers with good merchandise value or good deals through occasional promotions or sales events.

As to the effect of store crowding on store type image, consumers interpret perceptions of human crowding as a signal that the store is of a discount store type. It is reasonable for consumers to expect a lot of shoppers in the store, and with a large shopping crowd they can confirm it is a discount store which always provides a large volume of merchandise at low prices.

While spatial crowding is associated with fixed and immobile hindrances from the crowding of display fixtures, such as shelves and display tables and cases, human crowding is associated with constantly mobile...
crowdedness of shoppers of which the density is changeable as the shopper moves around among the crowd. People may feel that a situation of human crowding is one they can control as opposed to a situation of spatial crowding. Thus, human crowding plays a rather positive role in forming shopper attitudes, leading to favorable shopping behavior, and signaling the appropriate discount store type image. Previous research findings also suggested that either too few or too many shoppers are considered undesirable in a store environment (Eroglu & Machleit, 1990).

In contrast, spatial crowding experienced during shopping might negatively impact shopping satisfaction, retail shopping behavior, and promotional store image, since shoppers may feel that they do not have much control over the situation in the store. Thus, the perception of crowding may be closely associated with shoppers’ ability to control the shopping experience. Therefore, the authors’ findings suggest that store design needs to maintain a balance between how to alleviate perceptions of spatial crowding from spatial density and how to maintain appropriate human crowding from social density.

In future studies, the relationships between objective indicators of density and subjective measures of crowding need to be explored together in store design. In addition, the effects of human crowding on various store types need to be examined since the results of this study are applicable and limited to discount stores.

References
1) Altman, I. (1975). The environment and social behavior: Privacy, personal space, territoriality and crowding. Monterey, CA; Brooks.
2) Baker, J., Grewal, D., & Parasuraman, A. (1994). The influence of store environment on quality inferences and store image. Journal of the Academy of Marketing Science, 22, pp.328-39.
3) Beatty, S. & Ferrell, M. (1998). Impulse buying: Modeling its precursors. Journal of Retailing, 74, pp.169-191.
4) Bell, P., Greene, T., Fisher, J., & Baum, A. (2001). Environmental psychology, 5th ed. Bermont; Wadsworth Group.
5) Bell, J. & Ternus, K. (2002). Silent selling: Retailing, 2nd Edition. New York, NY; Fairchild.
6) Bellizzi, J. & Hite, R. (1992). Environmental color, consumer feelings, and purchase likelihood. Psychology and Marketing, 9, pp.347-63.
7) Berman, B. & Evans, J. (1992). Retail management: A strategic approach, 5th Edition. New York; Macmillan.
8) Disney, J. (1999). Customer satisfaction and loyalty: The critical elements of service quality. Total Quality Management, 10, pp.491-497.
9) Eroglu, S. and Harrell, G. (1986). Retail crowding: Theoretical and strategic implications. Journal of Retailing, 62(4), pp.347-63.
10) Eroglu, S. & Machleit, K. (1990). An empirical study of retail crowding: Antecedents and consequences. Journal of Retailing, 66(4), pp.201-21.
11) Evans, G. & Lepore, S.J. (2000). Cross-cultural differences in tolerance for crowding: Fact or fiction? Journal of Personality and Social Psychology, 79, pp.204-210.
12) Evans, G. & Wener, R. (2007). Crowding and personal space invasion on the train: please don't make me sit in the middle, Journal of Environmental Psychology, 27, pp.90-94.
13) Gilbert, D. & Hutt, M. (1976). Buyer behavior under conditions of crowding: An initial framework. Advances in Consumer Research, 3, pp.54-64.
14) Gove, W. & Hughes, M. (1983). Crowding in the household, New York: Academic Press.
15) Greenbaum, P. & Greenbaum, S. (1981). Territorial personalization: Group identity and social interaction in a Slavic-American neighborhood. Environment and Behavior, 13, pp.574-89.
16) Harrell, G., Hutt, M., & Anderson, J. (1980). Path analysis of buyer behavior under conditions of crowding. Journal of Marketing Research, 17, pp.45-51.
17) Hildebrandt, L. (1988). Store image and the prediction of performance of retailing. Journal of Business Research, 17, pp.91-100.
18) Hai, M. & Bateson, J. (1991). Perceived control and the effects of crowding and consumer choice on the service encounter. Journal of Consumer Research, 14, pp.404-20.
19) Kaya, N. & Weber, M. (2003). Cross-cultural difference in the perception of crowding and privacy regulation: American and Turkish students, Journal of Environmental Psychology, 23, pp.301-309.
20) Langer, E. J., & Saegert, S. (1977). Crowding and cognitive control. Journal of Personality and Social Psychology, 35(3), pp.175-182.
21) Levy, M., & Weitz, B. A. (2008). Retailing management, 5th Edition. New York, NY; McGraw Hill.
22) Machleit, K., Eroglu, S., & Mantel, S. (2000). Perceived retail crowding and shopping satisfaction: What modifies this relationship? Journal of Consumer Psychology, 9(1), pp.29-42.
23) Machleit, K., Kellaris, J., & Eroglu, S. (1994). Human vs. spatial dimensions of crowding perceptions in retail environments: A note on their measurement and effect on shopper satisfaction. Marketing Letters, 5, pp.183-194.
24) Mattila, A. & Wirtz, J. (2008). The role of store environmental stimulation and social factors on impulse purchasing. Journal of Services Marketing, 22(7), pp.562-567.
25) Ng, C. (2003). Satisfying shoppers' psychological need: from public market to cyber-mall, Journal of Environmental Psychology, 23, pp.439-455.
26) Oliver, R. (1993). Cognitive, affective and attribute bases of the satisfaction response. Journal of Consumer Research, 20, pp.418-430.
27) Parasuraman, A., Zeithaml, V., & Berry, L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality, Journal of Retailing, 64, pp.12-40.
28) Pegler, M. (1998). Visual Merchandising and Display, 4th Edition. New York, NY; Fairchild Publications.
29) Rodin, J., Solomon, S., & Metcalfe, J. (1978). The role of control in mediating perception of density. Journal of Personality and Social Psychology, 36, pp.988-990.
30) Rustemli, A. (1992). Crowding effects of density and interpersonal distance. The Journal of Social Psychology, 132, pp.51-58.
31) Savinar, J. (1975). The effect of ceiling height on personal space. Man-Environmental systems, 5, pp.321-324.
32) Stokols, D. (1972). On the distinction between density and crowding, Psychological Review, 79, pp.275-277.
33) Stokols, D., Rau, M., Pinner, B., & Schopler. J. (1973). Physical, social and personal determinants of the perception of crowding. Environment and Behavior, 5, pp.87-116.
34) Sundstrom, E. (1978). Crowding as sequential process: Review of research on the effects of population density on humans. In A. Baum & Y. M. Epstein (Eds), Human response to crowding (pp.31-116). Hillsdale, NJ; Erlbaum.
35) Turley, L. & Milliman, R. (2000). Atmospheric effects on shopping behavior: A review of the experimental evidence. Journal of Business Research, 49, pp.193-211.
36) Webb, W. & Worcel, S. (1993). Personal experience and expectation in the context of crowding. Journal of Personality and Social Psychology, 65, pp.512-521.