

APPEARANCE WOOD PRODUCTS AND PSYCHOLOGICAL WELL-BEING

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ABSTRACT

The study of how people's psychological health and well-being can be connected to wood used in appearance applications is a new and relatively unexplored area of inquiry, despite strong theoretical support, intuitive reasoning, and a growing recognition of the importance of healthful living. This research attempted to better understand this phenomenon by mapping out people's perceptions of wood used in interior applications. Specifically, the aim of this exploratory study was to determine what types of environments appearance wood products can create and to gauge whether or not the use of these types of products could have positive impacts on people's emotional states. To that end, a total of 119 respondents from the Greater Vancouver Regional Area were asked to partake in a three-part experimental study, consisting of a q-sort exercise, personal interviews, and a self-administered survey. The findings suggest that people's response to wood is, for the most part, extremely positive, with subjects generally showing a strong preference for rooms containing many wood details. There also appears to be a strong belief that the use of wood can help to create healthful environments, and commonly evoked descriptors for wood rooms include "warm," "comfortable," "relaxing," "natural," and "inviting." The reasons underlying these findings are complex and further exploration rooted in the field of environmental psychology is warranted. However, the results of this study could have potentially far-reaching implications for manufacturers of appearance wood products seeking to differentiate themselves in an increasingly competitive marketplace. Specifically, these findings point to an opportunity to market wood in an entirely new and innovative manner with the inclusion of potential psychological benefits into the total product concept.

Keywords: Appearance wood products, psychological health, well-being.

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INTRODUCTION

The environment that we live in has a tremendous impact on our lives; it affects us physically, as well as psychologically. Many studies have been conducted to determine the physical health effects of different aspects of our homes (Godish 2001; Shaw et al. 2001; Small 1983), but little has been done to investigate their psychological impacts. How do the materials that we finish our homes with affect our psychological well-being? Are some materials more beneficial than others in terms of how people emotionally respond to them? The purpose of this research is to determine if increased psychological well-being can be attained from wood used in interior finishing applications as opposed to the use of other more industrial or synthetic materials, like steel, concrete, and plastics.

BACKGROUND AND OBJECTIVES

Healthful living and healthy homes

A new movement is slowly beginning to take shape across the continent and around the world. “Healthy homes” are appearing out of concern for the environment, and personal health and demand for such homes is poised to increase (Spetic et al. 2005). Healthy housing represents an approach to the construction, renovation, and operation of homes that focuses on the health of occupants, as well as the environment (Canada Mortgage and Housing Corporation 2001). The concept itself is slowly gaining momentum, but is far from common practice. People are now beginning to understand the effects that their homes can have on their health and are placing a much higher priority on these issues. The concept of furnishing rooms to not only increase aesthetic appeal, but to improve psychological well-being is in its infancy. While it seems intuitive that indoor environments can affect our well-being, there is currently only a limited understanding of these effects.

Recent scientific evidence indicates a strong connection between housing and health (Krieger and Higgins 2002). To an occupant, a house is more than just a building; it is an interdependent

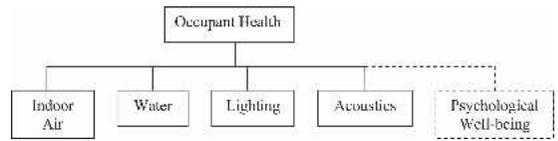


FIG. 1. Proposed addition to occupant health framework for the healthy home.

system made up of many parts, including its structure, lighting, acoustics, and air quality (Building Science Basics 2001). A general framework for healthy housing includes a consideration of environmental sustainability, universal design, and occupant health (Baker et al. 1998; Spetic et al. 2005). Research in the area of occupant health generally includes a consideration of indoor air quality, water quality, lighting, and acoustic properties,¹ with studies traditionally focusing on improving indoor air quality as an important means of eliminating health problems (Spetic et al. 2005).

Proposed addition to the occupant health framework

According to the constitution of the World Health Organization, health is defined as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” (Colburn 1968). How humans perceive and interact with their environments can affect their well-being, stress levels, and overall health (Wade and Tavris 2000) and, for most people, homes are their primary environments (Building Science Basics 2001). In light of this, the current occupant health framework lacks a psychological well-being component, and it is proposed that it should be added to the healthy home concept (see Fig. 1). To fully grasp the meaning of health within our homes, it is essential that the psychological effects of our homes be uncovered. In other words, do the materials that we use to furnish our homes affect us, and in turn, our psychological well-being?

¹ This list is by no means exhaustive. For example, thermal comfort is often included in northern climates.

These sorts of questions are timely in that architecture is now taking a new approach to design in order to improve the overall performance of buildings. The disciplines of architecture and neurology are now converging in the study of how people perceive their built surroundings, and how this affects their behavior (Penney 2003). Neuroscientists now surmise that our behavior is influenced by a variety of stimuli, including our built environments, and that this process can occur over the course of our lifetimes (Jarmusch 2003). Examples of this marriage between architecture and psychology are becoming more and more abundant, with hospitals currently being designed to maximize the use of wood and natural light in order to create more “therapeutic” spaces for recovering patients (Farrow 2003).

*Psychological impacts of the environment,
nature, and wood*

The rise of environmental psychology over the past thirty years shows a universal acceptance that the environment has a tremendous impact on humans and well-being. Environmental psychology “is the study of transactions between individuals and their physical settings. In these transactions, individuals change the environment and, conversely, their behaviors and experiences are changed by the environment” (Gifford 1987). It follows that the materials we use in our homes are likely to have a tremendous effect on how we perceive and view our surroundings and how they, in turn, affect us. By increasing our knowledge about the effects of the environment on our health and well-being, it becomes possible to design buildings and habitations that deliver these benefits to occupants. In short, the use of certain materials in interior applications may help to create relaxing, healthy homes that are conducive to a feeling of well-being.

Research into the environment’s impact on psychological health indicates that people generally prefer natural landscapes to artificial scenes (Ulrich 1984; Kaplan et al. 1972). This preference for nature leads to the hypothesis that

within our homes and other buildings, natural materials may lead to the same sort of elevated preferences and provide a sense of well-being to the occupants.

To date, much of the research that relates nature to positive psychological benefits has revolved around plants and vegetation and their potential to reduce stress (Ulrich 1984; Ulrich et al. 1990; Ulrich et al. 1991; Lohr et al. 1996; Frumkin 2001). The study of the psychological impacts of wood used in interior applications is a burgeoning and largely unexplored area of research. Wood is a naturally occurring and variable material that has a number of unique features—color, figure, grain, knots—that give it aesthetic appeal (Hoadley 1990; Broman 2000; Fell 2002) and, thus, could potentially contribute to an individual’s sense of well-being within an interior space. However, only a handful of researchers have looked at people’s impressions and perceptions of wood to date.

Broman (2000) focused on developing methods to measure preferences for the different visual appearances of wood and on connecting these subjective preference ratings with objective measurements of wood features. One of the main conclusions of this study was that “the overall blend of wood features and divergent features that mismatch in a surface” were both important in determining people’s impressions, valuations, and, ultimately, preferences for different types of wood (Broman 2000). In either case, the different features of wood seem to evoke feelings of “harmony,” “simplicity,” and “balance” in individuals that contribute to the overall appeal of wood. For example, clear surfaces were generally found to be more “harmonious” than knotty surfaces.

Research out of Japan has attempted to uncover a scientific link between wood use and individual interpretations and feelings about the environments created by its use (Masuda and Yamamoto 1988; Masuda 1992). The findings showed that interior spaces containing high proportions of wood are generally described as “warm” and “calming,” although directly proportional relationships between wood use and these descriptors were not found (Masuda and

Yamamoto 1988). Interestingly, there is a positive relationship between these descriptors and the color of wood, especially as it increases in value on the yellow-red (YR) spectrum (Masuda and Yamamoto 1988). Masuda (1992) also found that the natural variability of wood induces different psychological feelings in individuals, especially across cultures. For example, in Japan, knots are seen as blemishes or defects and people associate them with “cheapness.” In general, Japanese people prefer clear wood as it is more in keeping with their fondness of “purity.” On the contrary, in Europe and North America, wood products containing knots are widely sold and are associated with descriptors like “natural” and “rustic.”

Study objectives

While much research has been conducted revolving around the concept of healthy homes (for example, Baker et al. 1998; Godish 2001; Spetic et al. 2005), very little has been done to incorporate psychological health into the various frameworks for healthful living that have been proposed. Environments and nature have been proven to have beneficial effects on stress reduction, psychological health, and well-being. Wood is a natural material that is used to produce interior environments for habitation and work, and it is perhaps time to look more closely at the use of interior wood products in the same light.

Given that there is a realistic possibility that the use of natural materials like wood may have positive health benefits, the overarching objective of this research was to map out people’s emotional responses to wood relative to other materials commonly used in interior environments. Specifically, this study aimed to explore whether or not the use of wood in interior has a positive impact on emotional states, and therefore, potential implications for psychological health and well-being. It is hoped that the results of this study can be used in the development of marketing and differentiation strategies for manufacturers of appearance wood products.

At the outset, one caveat is worth noting. This

research represents a relatively new area of inquiry, namely the potential of appearance wood products to affect our psychological well-being. Undoubtedly, the design and styling of products and interior spaces can also play a role in altering our emotional states, and while this is discussed here, these sorts of issues are not explicitly under study.

METHODS

To meet the objectives of this research, three methodologies were employed on a sample of 119 individuals²: 1) a q-sort experiment; 2) personal interviews; and 3) self-administered questionnaires. All of the research subjects completed the interviews and self-administered questionnaires, while every third person who arrived at the study location was asked to complete the q-sort experiment (for a sample size of 40 individuals).

The sample frame for this study consisted of all individuals living in the Greater Vancouver, British Columbia area over the age of 20 who could be reached by telephone. The total population in this region is approximately 2,283,125 people, with twenty-five percent of this population being under the age of twenty, leaving approximately 1,712,343 individuals potentially eligible for this study (BC Stats 2001). Households were contacted through random digit dialling. The individual in the household over twenty years of age whose birthday was next up-coming was requested, and basic demographic information was obtained to ensure his/her suitability for the study. Once subjects were deemed suitable, they were apprised of the study site and a convenient time was scheduled. In addition, a small financial remuneration (\$40 Canadian) was offered as an incentive to participate in the study.

Q-sort methodologies are commonly used in the field of psychology because they provide researchers with a systematic and rigorously

² Originally, this study consisted of 120 individuals, but one of the subjects was deemed invalid.

quantitative means of examining human subjectivity (McKeown and Thomas 1988). Recently, Bigsby et al. (2005) used q-sort methodologies to determine consumer preferences for timber used in furniture. For the q-sort experiment portion of this research, subjects were given a deck of 25 numbered cards, each containing a picture of a living room. All of the pictures were taken from current home and design magazines, and were printed onto 5- by 7-inch hard-backed cards (see Table 1 for a description of each of the living rooms; note that codes for each room were randomly assigned and no order is implied). The selection of images was based on two constraints. First, a variety of flooring, furniture, and wall covering materials were represented in order to address the objectives of this research. Second, some level of consistency between the pictures was maintained in order to limit variation. As such, an attempt was made to standardize the following list of elements in each living room:

- rooms had low (regular) ceilings;
- rooms had at least one window;
- some plant life was present;
- abstract art was absent;
- electronic equipment was absent;
- animals were absent; and
- people were absent.

Each subject was asked to look through the 25 cards and sort them into three categories: rooms that they did not like, rooms that they felt indifferent about, and rooms that they liked. Sorting images into these three piles was a preliminary task performed only to facilitate and simplify the subsequent q-sort experiment. Once subjects had assigned each of the pictures to the three preliminary groupings, they were asked to take individual cards and place each of them on one of 25 spots contained on a normal distribution (see Fig. 2). The scale of the normal distribution ranged from -4 (least preferred) to $+4$ (most preferred), forcing subjects to decide between images and choose their absolute most and least preferred living rooms.

Each of the subject's responses was recorded

on a standardized q-sort form, and means for each picture were computed based their average ratings. In computing the means, a q-sort score of -4 was given a value of 1 (least preferred), while $+4$ corresponded to a value of 9 (most preferred). In other words, the ratings that the test subjects gave to each of the 25 pictures were converted to a scale from 1 to 9 and means were calculated to produce an average score for each picture. In this way, the pictures could be ordered from most to least preferred.

For the personal interviews portion of the study, subjects were systematically given one of three pictures of living rooms from the q-sort analysis and interviewed about the environments created by each and what they liked/disliked about them. The three pictures varied extensively in the materials used to furnish the rooms and their general aesthetic, with the aim of this part of the study to delve into these differences. The three living rooms used in the personal interviews were as follows (see Table 1 for complete descriptions):

- No. 8—a modern living room;
- No. 9—a traditional living room; or
- No. 10—a rustic living room.

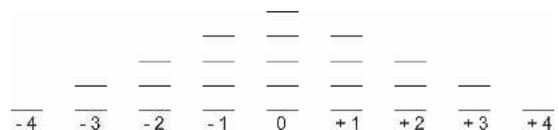


FIG. 2. Normal distribution provided for the q-sort experiment.

As subjects were interviewed using only one of the three pictures, the photos were rotated in order and each successive subject was shown a different one than the person before or after him/her. This yielded sample sizes of 40 interview subjects per image.³ Five questions were posed to each of the subjects during the course of the interview:

³ One group consisted of 39 subjects for the reason stated in Footnote 2.

TABLE 1. *Descriptions of 25 living rooms used in the q-sort experiment.*

Image no.	Description of living room
1	Stone wall with large wood wall unit in front, black coffee table with yellow flowers in a vase on it, dark grey tiled floor with a grey area rug over it, grey upholstered couch and chair.
2	Modern style, white walls, a beige jute rug covering most of the floor, beige day bed in foreground, white chair and a plain coffee table, tulips visible in the rear of room.
3	Wood ceiling with visible wooden beams, white adobe style walls, slate stone floor, a fireplace, one white wicker chair, one classical wood chair with an upholstered seat, a chest used as the coffee table.
4	Back wall painted green, wood floors, large window in back wall, brown couch and two beige chairs with an occasional table in between them, low bookshelves lining the walls.
5	Medieval style, white stone walls, white pillars, light marble tile floor, two large white upholstered couches.
6	Wood wall paneling on back main wall with a fireplace, off-white side wall with wood trim and wood windows, wood columns, terracotta ceramic tile floor, black and white striped upholstered couches and ottoman, wooden coffee table with glass top.
7	Green painted walls, French doors with blinds, yellow upholstered couch and chair with a floral pattern, green upholstered coffee table/ottoman, small chair with red upholstered seating cushion, off-white concrete floor, orange tree in corner of room.
8	Modern style, grey concrete floor, long brown couch and two chairs, glass coffee table on a cream colored round shag rug, walls painted white except back wall which has horizontal dark wood slat paneling.
9	Classic style, beige floor rug, light brown classical upholstered sofa, two chairs and ottoman, cast steel coffee table with glass top, plant at back of room, large book shelf on back wall.
10	Wood ceiling, columns and support beams visible, wood floors, two sofas and chair with upholstered cushions on a wood frame, marble coffee table, large windows looking into side room, large open air window looking onto a garden with a large tree.
11	Large wood beams visible in ceiling, walls painted beige, brown leather chair, grey upholstered couch, large brown coffee table, dark but natural lighting in picture.
12	Large windows surrounding room, white ceiling, curtains and window frames, two white upholstered couches with green throw pillows, two brown leather chairs, two brown leather ottomans, marble coffee table with a green rug on the floor.
13	Walls painted with white and beige stripes, white shag area rug, cream leather L-shaped couch with a square back coffee table, three lamps behind couch, no natural light.
14	Entire room is white, large white round upholstered couch, two white modernist chairs, round silver coffee table, white carpeting, white cupboards, white curtains.
15	Old fashioned style, floral patterned curtains around windows, green upholstered couch with floral throw pillows, beige carpeting, upholstered coffee table, four individual chairs with three having some wood accents, large mirror behind couch with ornate gold frame.
16	Beige carpet, one wicker chair, rustic wooden coffee table, wood wall paneling with a brick ledge, one built-in couch with brown upholstered cushion on a wood bench frame, bright throw pillows.
17	Rustic style, some wood walls, some off-white painted walls, exposed wood columns, beige stone/ceramic flooring, grey leather couch, two black coffee tables with wooden legs, one brown upholstered couch with green leaf pattern.
18	Rustic style, wood floors, wood walls and window frames, wooden coffee and side tables, stone fireplace, black leather couches, area rug under coffee table/chest, two upholstered chairs, three green plants.
19	Wood floors, zebra print area rug under wood coffee table with steel legs, white couch and chair, two modernist black leather chairs, two large back windows, white painted walls.
20	White painted walls, white upholstered couch with three similar chairs, blue print throw pillows, white door, white coffee table with glass top, area rug, large grey bookshelf against wall.
21	Wood floor mostly covered by area rug, white upholstered couches, brick walls painted white, white ottoman used as coffee table.
22	Wood slat flooring, black leather chair, beige printed upholstery couch, black coffee table and side tables, textured walls, silver pillar, window with blinds drawn.
23	Colonial style, wood wall paneling and windows, white painted ceiling, two brown leather chairs, large brown leather bench used as table, two upholstered couches.
24	Light yellow painted walls, area rug, glass coffee table, bay windows, upholstered couch and chair, cactus.
25	White painted ceiling with exposed wood beams, area rug over wood floor, light yellow painted walls, two pink plaid upholstered couches, two cream upholstered chairs with wood accents, pink plaid curtains and side table cloth, glass coffee table top on an ornate pedestal.

- What is the first word that comes to mind when looking at this room?
- Give an overall assessment of the room in terms of the atmosphere and feeling you get from this room.
- What are the positive elements within this room?
- What are the negative elements within this room?
- In your opinion, what are the most important factors in creating a room that you would want to live/spend time in?

Interviews typically lasted between 15 and 20 minutes. All of the sessions were tape-recorded for subsequent transcription and analysis. The analysis itself consisted of a qualitative assessment in the form of a content analysis as a means of extracting some of the major themes that emerged in the ways that respondents described the three living room types.

The final section of this research was a self-administered questionnaire completed by all 119 study subjects. The survey was designed in accordance with methods prescribed by the Tailored Design Method (Dillman 2000) and was pre-tested among peers. The purpose of the questionnaire was to gain information on a variety of topics from demographics and preferences for furniture and furnishings to feelings

about different materials and the environments that they create. The survey was comprised of two sections. The first section asked a variety of questions concerning material preferences and environments. The second section focused on background information for each subject, but is not reported here. Results of the self-administered survey were summarized using both descriptive and inferential statistical techniques. While an analysis of the background section of the self-administered survey is not detailed here, it is worth noting that the final sample of subjects used in this study was very diverse, and for the most part, was demographically representative of the adult population in the Greater Vancouver region of British Columbia.

RESULTS

Q-sort experiment

For each living room used in the q-sort experiment, an average preference value was obtained (see Table 2). Prior to carrying out a one-way analysis of variance ($\alpha = 0.05$) to test differences between these means, an F-max test was performed, which indicated that the assumption of equality of variances for each treatment was met. The analysis of variance revealed that there were significant differences between the average preference values of living rooms, and a Bonferroni critical distance *post hoc* test

TABLE 2. Average preference ratings of 25 living rooms used in the q-sort experiment (less preferred living rooms are significantly different from more preferred living rooms at $\alpha = 0.05$).

More preferred living rooms		Neutral living rooms		Less preferred living rooms	
Image no.	Average preference value	Image no.	Average preference value	Image no.	Average preference value
10	6.875	3	5.475	14	4.100
18	6.500	23	5.475	13	4.075
12	6.075	19	5.425	5	4.000
20	5.718	9	5.205	22	3.700
4	5.675	17	5.205	11	3.625
24	5.625	6	5.103		
		21	5.075		
		7	5.000		
		2	4.923		
		1	4.800		
		8	4.575		
		16	4.375		
		15	4.350		
		25	4.350		

(alpha = 0.05; critical distance = 1.56) was used to determine which of the means significantly differed.

The *post hoc* test revealed that six highest rated living rooms (image Nos. 10, 18, 12, 20, 4, and 24) were all significantly different from the five lowest rated living rooms (image Nos. 14, 13, 5, 22, and 11). These were respectively categorized as *more* and *less* preferred living rooms in Table 2. Fourteen living rooms that rated in between these groupings (i.e. were not significantly different from either the top six or the bottom five living rooms) were categorized as *neutral*.

In many ways, the top rated six living rooms are remarkably similar. Each either has a large window or is extremely bright (giving the impression of a large window off to the side of the image). For the most part, the views from these windows are of trees, grass, or other natural elements, and plants are found in, or can be viewed from, all of the rooms. The two highest rated living rooms (Nos. 10 and 18) are completely wood-dominated with very few synthetic materials. Interestingly, living rooms with wood, large windows, or natural materials were all contained within the top half of all of the 25 q-sort images. There also appeared to be a discernable flooring effect, with almost all of the wood, tile, and slate floors appearing in the top half of the rooms and carpet dominating in the bottom half.

A lack of light is the most prevalent feature in the bottom five rated living rooms. In addition, these rooms all appear to be decorated in modern styles, and in most cases, contain comparatively few natural materials like wood. There is almost a complete lack of greenery seen from or displayed in these five rooms, as well as a clear lack of natural materials. That said, the lowest rated room (No. 11) is not overly modern and does have some wood present, but the image is extremely dark and this may have confounded the results.

Personal interviews

Of the three living rooms that subjects were interviewed about, the modern living room (No.

8) was not widely liked and was found to be, by far, the least preferred room of the three. The positive elements elicited by this room were its spaciousness, as well as its view to a garden, while the negative comments revolved around the furniture, the lack of color, and the coldness of the room. Of the 40 subjects that were interviewed about the modern living room, the most common first response induced by the image was "cold," followed by "modern" (Table 3). The most common descriptors of the atmosphere and feeling created by the modern living room are also given in Table 3. Again, "cold" and "modern" are common descriptors of this modern living room, in addition to "open/spacious" and "uncomfortable."

The traditional living room (No. 9) received neutral to positive responses from the 40 subjects interviewed. Subjects generally responded favorably to its brightness and the plants contained within, but disliked its monochromatic color, crowding, and old-fashioned style. The most common first words triggered by this photo were "warm" and "old/older," followed by "nice" (Table 4). The atmosphere and feeling created by this room were generally described favorably with more than one-fifth or more of the descriptors being "comfortable," "warm," and "old/older" (Table 4).

The most liked living room among study subjects, by far, was the rustic living room (No. 10). The most positive elements within this room seemed to revolve around the view of the tree and plants, the natural lighting, and the incorpo-

TABLE 3. *Descriptors of a modern living room (image no. 8) given by subjects in terms of the first word induced by the image and the atmosphere and feeling created by the image (by proportion of responses).*

Descriptor	First word (% of responses) ¹	Atmosphere and feeling (% of responses) ^{1,2}
Cold	12.5%	25.0%
Modern	10.0%	15.0%
Open/spacious	5.0%	17.5%
Stark	5.0%	—
Clean	5.0%	12.5%
Uncomfortable	—	15.0%
Institutional	—	12.5%

¹ Only the most common responses are reported.

² Multiple responses were provided by some subjects.

TABLE 4. Descriptors of a traditional living room (image no. 9) given by subjects in terms of the first word induced by the image and the atmosphere and feeling created by the image (by proportion of responses).

Descriptor	First word (% of responses) ¹	Atmosphere and feeling (% of responses) ^{1,2}
Warm	12.5%	20.0%
Old/older	12.5%	20.0%
Nice	10.0%	—
Comfortable	7.5%	25.0%
Bright	—	15.0%
Expensive/upper class	—	15.0%
		—

¹ Only the most common responses are reported.

² Multiple responses were provided by some subjects.

ration of the outdoors into the room. That said, some of the subjects did complain about its lack of color and light. Two of the more common first words that came to mind in describing this room were “warm,” followed by “wood” (Table 5). The atmosphere and feeling of this room were also described in very favorable terms, with “warm,” “relaxing,” and “comfortable” being the most common descriptors (Table 5).

A tremendous variety of responses emerged when subjects were asked about what the important factors were in creating a room that they would want to live in or spend time in. A qualitative assessment of these responses uncovered an assortment of underlying themes (Table 6). For instance, color appears to be an extremely

TABLE 5. Descriptors of a rustic living room (image no. 10) given by subjects in terms of the first word induced by the image and the atmosphere and feeling created by the image (by proportion of responses).

Descriptor	First word (% of responses) ¹	Atmosphere and feeling (% of responses) ^{1,2}
Warm	18.0%	28.2%
Wood	15.4%	—
Open/spacious	10.3%	12.8%
Inviting	5.1%	—
Natural	5.1%	—
Dark	5.1%	—
Relaxing	—	23.1%
Comfortable	—	20.5%
Cozy	—	12.8%
Peaceful/calm	—	12.8%

¹ Only the most common responses are reported.

² Multiple responses were provided by some subjects.

TABLE 6. Importance of various factors in creating a room that subjects would want to live in or spend time in (by proportion of responses).

Factor	% of responses ¹
Color	49.6%
Lighting	42.0%
Comfort	27.7%
Natural lighting	27.7%
Furniture	25.2%
Warmth	21.0%
Windows	18.5%
Space	16.0%
Wood	15.1%
Plants/flowers	13.4%
Efficient/functional layout	13.4%
Not cluttered/crowded	12.6%
Clean/tidy	10.9%
Openness	10.1%

¹ Total exceeds 100% because multiple responses were provided by some subjects.

important factor to many people, being mentioned by approximately half of the subjects, of whom almost 24% specifically required warm colors. Lighting was also seen to be a key factor, with 42% of the individuals stressing its importance, and approximately 28% explicitly mentioning the need for natural light. Comfort understandably plays a central role in creating liveable rooms, but warmth also appears to be a requirement. Lastly, the need for wood and plants were also included in the top ten most common responses.

Self-administered questionnaires

The self-administered questionnaire asked test subjects to judge a variety of materials used in various appearance applications (wood, ceramics, stone, leather, plastic, glass, painted surfaces, and wallpaper) in terms of possible attributes that these materials may or may not possess in their opinions. A list of the possible attributes was given (warm, natural, homey, relaxing, inviting, stylish, contemporary, modern, industrial, and artificial), and respondents were asked to rate whether each material possessed the attribute in question (a score of +1), lacked the attribute in question (a score of -1), or neither

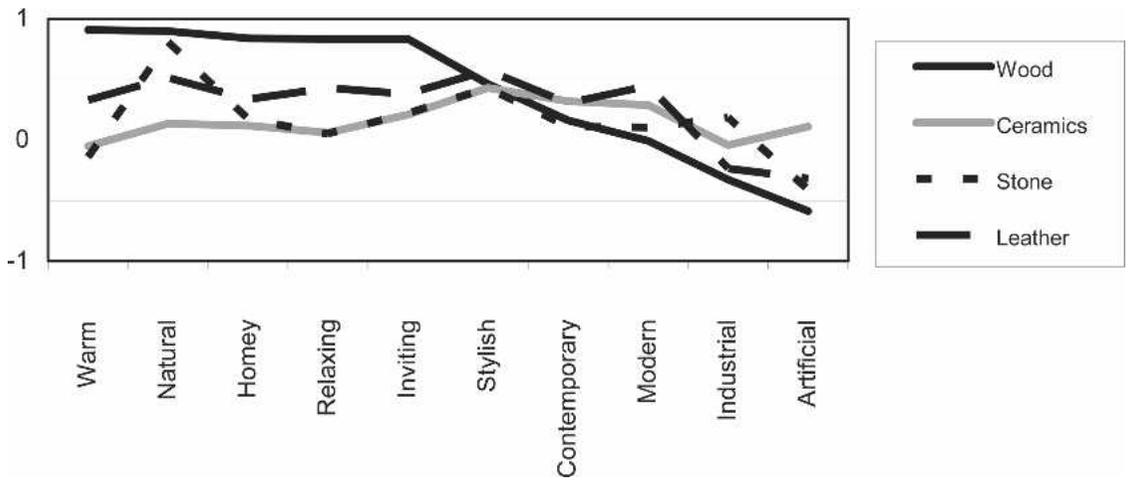


FIG. 3. Perceived attributes of wood versus other natural furnishing materials (1 = material possesses attribute; -1 = material lacks attribute).

(left blank). Means⁴ were computed for each of the possible attributes by material and are plotted in Figs. 3 through 5 (wood versus natural furnishing materials, artificial materials, and wall materials, respectively). Note that the means for wood are displayed in each of the graphs to provide referential information.

Wood, ceramics, stone, and leather were grouped together as natural furnishing materials (Fig. 3). Wood rated higher than the other materials in terms of being perceived as “warm,” “natural,” “homey,” “relaxing,” and “inviting,” but less so than the others on the “modern,” “industrial,” and “artificial” attributes. On the “stylish” and “contemporary” attributes, wood rates comparably.

⁴ Means were computed only to provide directional information and, for all intents and purposes, this question is a qualitative assessment.

Figure 4 shows wood in comparison to two artificial or synthetic furnishing materials—

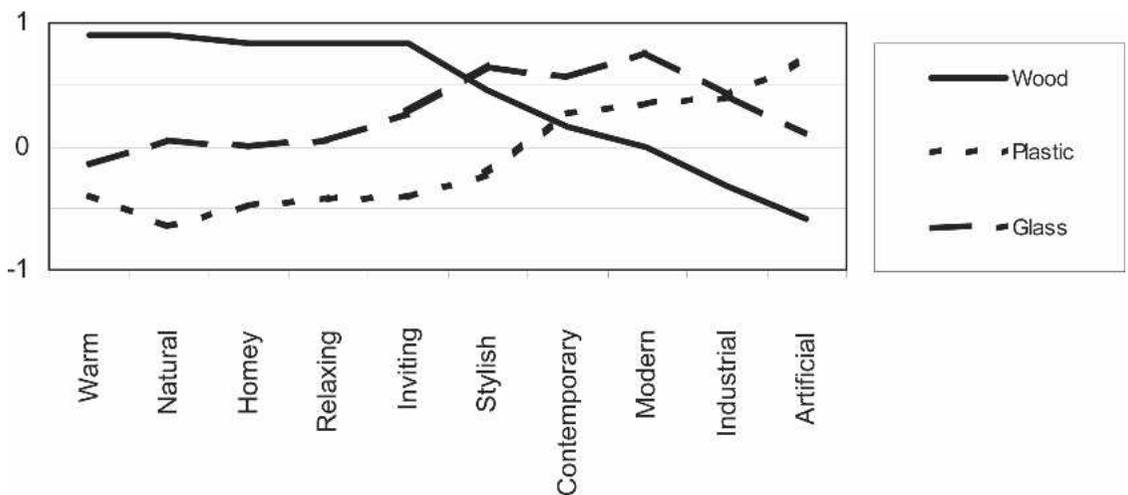


FIG. 4. Perceived attributes of wood versus other artificial materials (1 = material possesses attribute; -1 = material lacks attribute).

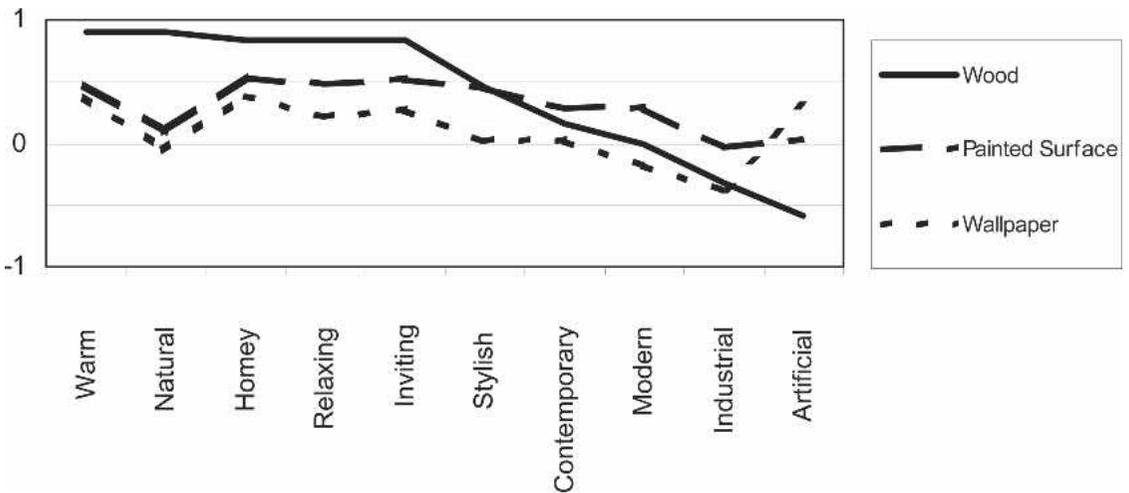


FIG. 5. Perceived attributes of wood versus other wall materials (1 = material possesses attribute; -1 = material lacks attribute).

plastic and glass. Wood scored much higher than both on the attributes “warm,” “natural,” “homey,” “relaxing,” and “inviting.” Glass was seen as the most “contemporary,” while both glass and plastic scored above wood in terms of being perceived as “modern,” “industrial,” and “artificial.” Plastic was deemed to be the most “artificial” of all the materials in the study.

The final grouping of materials was wall materials which included wood, painted surfaces, and wallpaper (Fig. 5). Wood again scored highest on the attributes “warm,” “natural,” “homey,” “relaxing,” and “inviting.” Wallpaper scored lowest on all attributes with the exception of “artificial,” while painted wall surfaces fared better than wood on being thought of as “contemporary,” “modern,” “industrial,” and “artificial.”

Questions related specifically to wood were posed in the latter parts of the self-administered questionnaire in order to minimize bias. For example, an open-ended question was posed in which study subjects were asked to articulate wood’s top attributes (they were limited to three responses). In total, 71 different answers were given. Table 7 shows the six most common responses (by proportion of respondents), echoing the results above that wood is widely perceived to be a “warm,” “natural,” and “attractive” material.

Another open-ended question asked respondents to describe, in their own words, the feelings that a room containing a lot of wood details and furnishings evokes. In total, 111 different categories of responses were recorded, with 75.6% of the comments being deemed positive, 8.0% of the comments being neutral, and 14.6% of the comments having a negative connotation. Table 8 shows the five most common responses, with almost 50% of the subjects stating that a wood room has a “warm” feeling, and more than 20% respectively remarking that wood rooms are “comfortable,” “relaxing,” and/or “natural.”

Part of the self-administered questionnaire also focused on respondents’ purchasing behavior of wood products that subjects currently own. For example, test subjects were asked about their preferences for wood (relative to other materials) in various home applications.

TABLE 7. The top attributes of wood used in interior applications (by proportion of respondents).

Attribute	% of respondents ¹
Warm	46.6%
Natural	33.6%
Attractive	26.7%
Durable	17.2%
Strong	15.5%
Color/color variety	10.3%

¹ Total exceeds 100% because multiple responses were provided by some subjects.

TABLE 8. Feelings evoked by a room containing a lot of wood details and furnishings (by proportion of respondents).

Feeling	% of respondents ¹
Warm	47.9%
Comfortable	23.5%
Relaxing	21.0%
Natural	21.0%
Inviting/welcoming	10.1%

¹ Total exceeds 100% because multiple responses were provided by some subjects.

Specifically, they were asked to rate the degree to which they preferred the use of wood over other materials on a five-point interval scale, with 1 being “wood is the least preferred material for this application” and 5 being “wood is the most preferred material for this application.” The mean preference ratings for each application are summarized in Fig. 6, along with the respective 95% confidence intervals. Interestingly, the response pattern here closely matches test sub-

jects’ actual usage of wood in their homes (not reported here).

It is notable that all of the means are significantly different from a neutral level of 3, meaning that test subjects generally have an opinion (one way or the other) on wood used in home applications. It is also notable that wood seems to be preferred to some degree in all applications but one, wall panelling. The results indicate that test subjects strongly prefer wood used in dining room furniture, doors, kitchen cabinets, flooring, and bedroom furniture. They also prefer, but to a lesser degree, to see wood used in moldings, railings, stairs, structural applications, living room furniture, and windows.

Lastly, subjects were asked to consider the most important attributes when purchasing a wood product for their homes. Nine attributes were listed and respondents were asked to check each that factored into their purchasing deci-

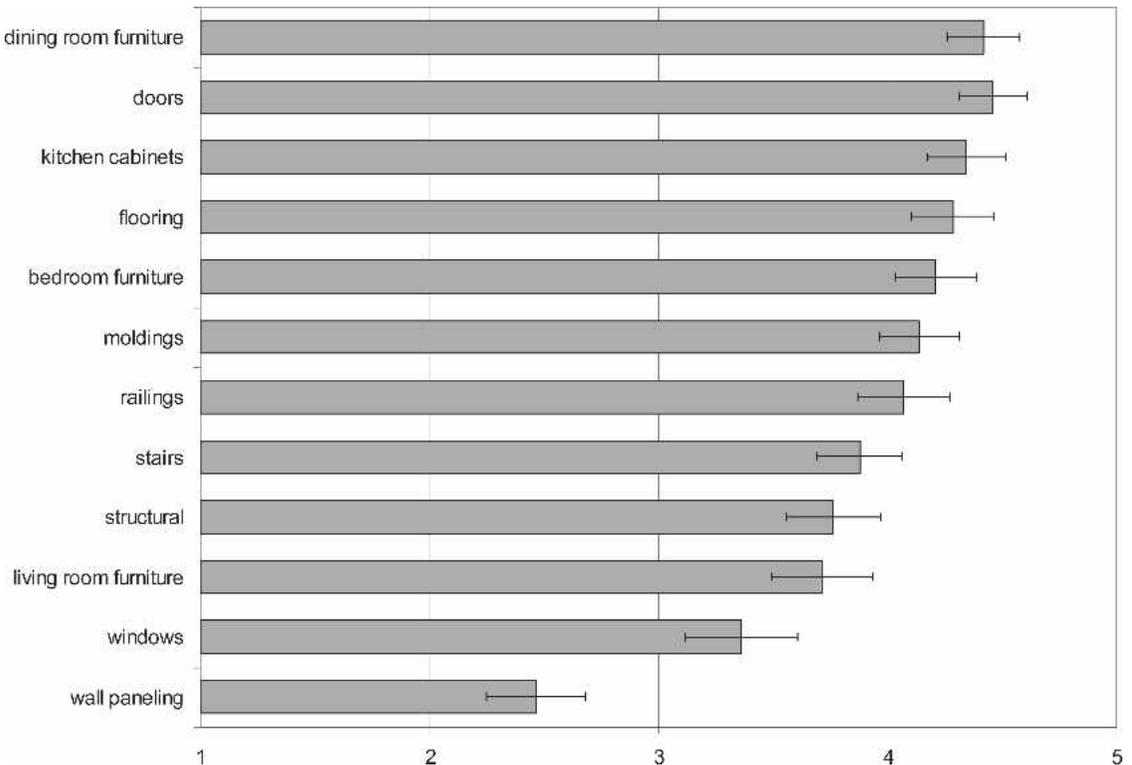


FIG. 6. Mean preference ratings (and 95% confidence intervals) for wood used in various home applications (1 = wood is the least preferred material for this application; 5 = wood is the most preferred material for this application).

sions. Figure 7 shows the results in terms of proportions of time that each attribute was selected. Interestingly, “quality” and “durability” ranked higher than any other attribute including “price,” “aesthetics,” and “environmental friendliness.”

DISCUSSION

Results of this research verify that the use of wood in interior applications like flooring, doors, dining room furniture, kitchen cabinets, and bedroom furniture is not only appropriate, but generally preferred for a variety of reasons. This bodes well for manufacturers of value-added wood products, especially in light of the generally robust market outlooks for new housing, non-residential construction, and repair and remodelling worldwide (Taylor 2002). That said, markets for appearance wood products are becoming more and more competitive, and there

has been a steady influx of lower cost products emerging from China, South East Asia, and Eastern Europe, not to mention growing threats from producers of non-wood substitutes (Taylor 2002). In order to compete within this context of globalization and product substitution, it is fast becoming imperative for companies to develop strategies that go beyond traditional marketing. One possibility would be to show that appearance wood products possess a wide variety of benefits, including those related to health.

To compete in today’s marketplace, it is essential for wood producers to understand that a product is much more than a physical object. Solomon et al. (2001) define it as “a bundle of attributes, including packaging, brand name, benefits, and supporting features in addition to a physical good” which serve to differentiate competitors. This “total product concept” is not new. Traditionally, the marketing of appearance wood products to consumers has revolved around

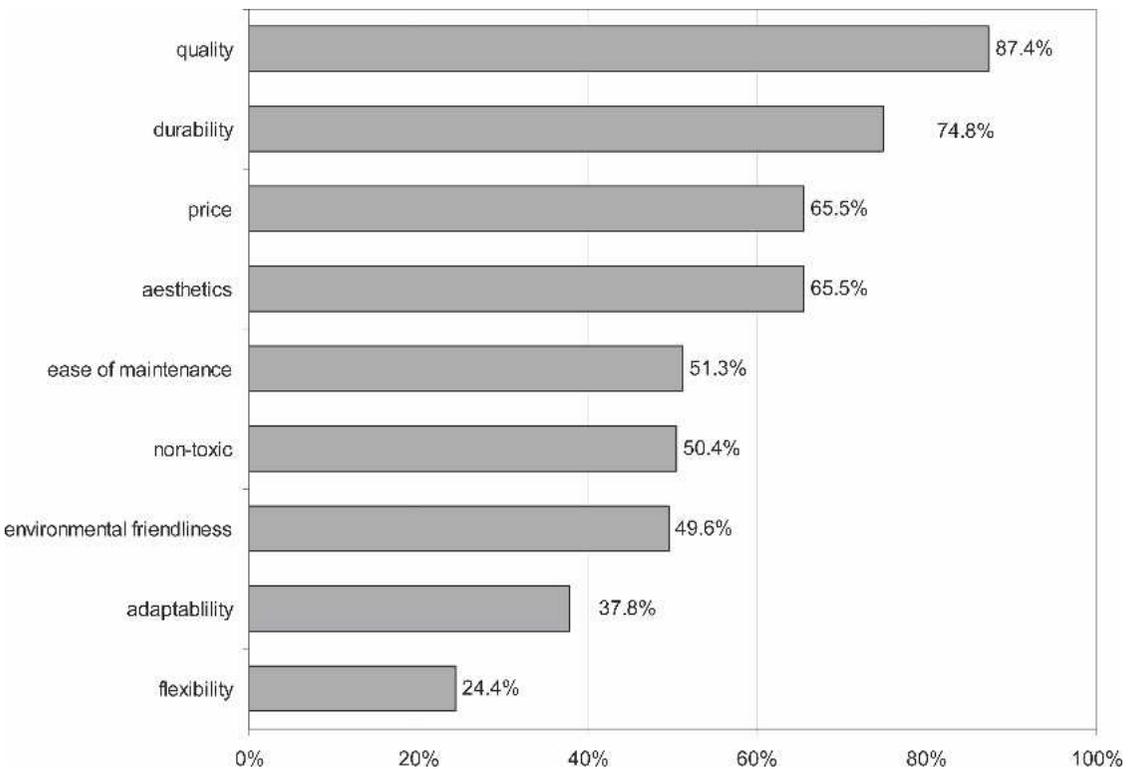


FIG. 7. Most important attributes considered by subjects when purchasing wood products (by proportion of responses).

quality, durability, price, and aesthetics, and this study confirms the importance of these attributes in making purchase decisions. However, this research has also shown that wood products possess appealing attributes related to health, especially compared to other manufactured and unnatural products. This opens the door to new and innovative possibilities for the differentiation and marketing of appearance wood products, especially in light of the trend towards healthy houses and healthful living (Building Science Basics 2001; Spetic et al. 2005).

To this end, we posited that wood environments positively impact people's emotional states, and therefore, have the potential to improve their psychological health and well-being. The concept that the environment that surrounds people affects their overall psychological health and well-being is a generally accepted one (Wade and Tavis 2000), and data from this series of studies generally support this statement. For example, respondents in this experiment typically believe that how a room is furnished affects the way that they feel. Emotionally, they appear to respond very favorably to wood and wood environments, most commonly describing a room with a lot of wood details and furnishings positively as "warm," "comfortable," "relaxing," "natural," and "inviting/welcoming." As interactions between individuals and their physical settings affect one's behaviors and experiences (Gifford 1987), it appears that wood indeed has the potential to play a favorable role in determining one's well-being. This is underlined by the fact that there is a remarkable consistency between these descriptors and ones used to describe the rooms in which respondents would want to live or spend time.

Not surprisingly, the results of the q-sort experiment and personal interviews showed a consistent preference for wood-based rooms. While it was beyond the scope of this analysis to determine the reasons underlying this, two possibilities are as means of counteracting stress and/or bringing nature indoors.

Stress plays a major role in everyone's life, and the relationships between stress and both

physical and mental health are complicated, affected by numerous factors (Wade and Tavis 2000). Certain aspects of our lives can help to mitigate the negative effects of stress, and one of these is the environment in which we surround ourselves (Wade and Tavis 2000). Given that wood rooms are so strongly associated with terms like "warm," "comfortable," "relaxing," and "inviting/welcoming," it is not unreasonable to suggest that appearance wood products and the environments that they help to create may possess such stress-reducing attributes. Perhaps it is the familiarity of the look, feel, and texture of wood that resonates with people or perhaps wood appeals to a more subconscious need for comfort and safety—this is certainly an area of research that warrants further inquiry. Whatever the case, though, it seems that humans generally respond favorably to appearance wood products and this, in turn, may have beneficial psychological health effects related to general well-being, stress reduction, and even productivity.

This research also suggests that perhaps appearance wood products, like plants, fulfill an innate desire in humans to replicate nature in their indoor environments through the use of natural materials. Individuals appear to respond in fundamentally different ways to natural versus man-made materials, generally preferring the former (Ulrich 1984, 1986). Not surprisingly, one of the key descriptors elicited in this study for wood products and wood rooms was that it was "natural," and the need for plants and wood were mentioned in the top ten requirements for creating a room in which respondents would want to live or spend time. The q-sort experiment also yielded data to support this claim. The two top rated rooms were completely wood dominated, containing little to no artificial materials and having large windows with views of nature, while the bottom five rooms were characterized by a marked lack of anything natural.

As society becomes more and more attuned to the physical and psychological effects that indoor environments can have on people, it is likely that a greater emphasis will be placed on

the overall health impacts of furnishing materials and finishes. This bodes well for manufacturers of appearance wood products, which are well regarded in the marketplace on a number of health-related dimensions compared to other competitor materials like steel, concrete, and plastics. Wood products manufacturers should take note as the opportunity exists to extend these findings into new and innovative marketing strategies that promote wood in terms of the positive environments that it can create.

Notably, the general public appears to have a solid understanding of the potential health benefits associated with wood environments; there is a perception that wood creates healthy, warm, and relaxing environments. The seemingly high degree of consumer awareness found in this study indicates that marketers do not need to focus on educating the public on the benefits of wood, but rather need to explore new and innovative ways to use these attributes to promote wood products. Promoting wood by incorporating the health and well-being benefits that it creates into the total product concept is an entirely new way of looking at wood and wood products, but it is essential that all of wood's positive attributes be exploited in order to help wood succeed over competing products.

CONCLUSIONS

A sample of a 119 individuals from the Greater Vancouver Regional Area was subjected to three experiments in order to determine whether wood environments (namely, rooms containing appearance wood products) have an impact on people's emotional states, and therefore, possible implications for psychological health and well-being. The underlying aim of this project was to provide groundwork and catalyze discourse on the potential to use this sort of information in the development of marketing strategies for appearance wood products.

The results of this exploratory research seem to indicate that people have an innate understanding that wood creates healthful environments, with wood rooms being generally positively regarded as "warm," "comfortable,"

"relaxing," "natural," and "inviting/relaxing" spaces. While further empirical inquiry is required to make a precise determination, all of the evidence here seems to suggest that wood environments created by the use of appearance wood products appear to have a positive impact on people's emotional states and psychological health and that this phenomenon is relatively widespread. At the very least, there is a case to be made that our current thinking on, and framework for, healthy housing could be expanded to include psychological health.

Wood is an exceptional material that has benefits beyond just aesthetic and structural properties, and possibly beyond our imagination. This study has indicated that it is time to look at this material in a different light and focus on its ability to create relaxing, healthy environments for people to live in. From a marketing point of view, promotions need to focus on all of wood's positive attributes, including the potential to increase psychological well-being through the creation of warm, comfortable, and relaxing spaces. This is especially salient as the average consumer's awareness of the healthy home concept gains momentum.

In order to successfully compete in today's complex marketplace, wood products companies must seek out new and innovative means of marketing their products to an increasingly fickle consumer-base. This research has shown that there may be outstanding opportunities for manufacturers of appearance wood products to capitalize on wood's ability to create healthful environments. However, there is a need to market wood products in an entirely new manner, focusing on the multitude of positive attributes that wood products possess, including the potential to increase the psychological health and well-being of people who buy and live with appearance wood products.

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