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THE EFFECT OF ROOM ENVIRONMENT ON PATIENT EXPERIENCE IN A PRENATAL GENETIC COUNSELING SESSION

Elizabeth C. Baack

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by

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A

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An important facet of aesthetic design, a topic of increasing interest in healthcare, is the concept of using positive distractions to promote wellness (Ulrich, 1991). To date, this concept has largely been explored in long-term, in-patient care settings and findings suggest these positive distractions decrease patient anxiety. This study sought to understand the effects of a supportive healthcare design characterized by positive distractions on patients receiving short term, out-patient care, specifically prenatal genetic counseling. Participants were patients at a Houston high-risk pregnancy clinic randomly assigned to one of two room environments: an experimental room which incorporated positive distractions, or a control room lacking such features. Participants (n=98) completed the State-Trait Anxiety Inventory (STAI) for Adults pre- and post-genetic counseling and an observational questionnaire post-counseling. There was a decrease in state anxiety scores overall from pre- to post-counseling (p = 0.011); however, scores did not differ between participants exposed to the two room designs (p =0.530). This suggests that the room environment may not significantly impact patient anxiety levels in this setting. However, these findings highlight the benefits of genetic counseling in decreasing patient anxiety. Several themes were identified from the open-ended responses, suggesting that patients do value certain aesthetic features of clinic rooms, such as having a window.

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INTRODUCTION

Although the ultimate goal of healthcare encounters is improving patient well-being, the process and experience can be difficult and anxiety-provoking. Genetic counseling is no exception. The National Society of Genetic Counselors defines genetic counseling as the "process of helping people understand and adapt to the medical, psychological and familial implications of genetic contributions to disease," (Resta et al., 2006, p. 77). As one might expect, discussing disease and all of its implications can be an anxiety-inducing experience. Prenatal genetic counseling in a high risk pregnancy clinic can be particularly anxiety-provoking, involving emotionally-charged discussions about increased risks, fetal anomalies and pregnancy management decisions such as termination. Gunning et al. (2010) found that in general, pregnant women receiving care in high-risk hospital clinics had significantly higher anxiety scores than those in low-risk community clinics. Anxiety can have important implications for patient care, as higher anxiety levels have been correlated with lower scores in processing and storing information (Darke, 1988). Identifying ways to help patients cope with anxiety, such as adjusting the room environment, may help improve the patient care experience, particularly in genetic counseling.

A shift has occurred in the focus of healthcare design to a growing interest in the aesthetic aspects of the healthcare environment and how they impact patient satisfaction and health outcomes. The idea behind this is the creation of a supportive environment, which Roger Ulrich has defined as "characteristics that support or facilitate coping and restoration with respect to the stress that accompanies illness and hospitalization," (Ulrich, 2001, p.53). An important facet of this supportive environment is the concept of positive distractions which are useful in promoting wellness and fostering coping with stress (Ulrich, 1991). Positive distractions may promote patient well-being by keeping distressing thoughts at bay while not

being overly taxing themselves (Ulrich, 1991). Ulrich expands on this by stating that, while over-stimulation and under-stimulation can be detrimental because they may increase stress (Ulrich, 1991), a moderate amount of positive stimulation may be beneficial to patient well-being (Wohlwill and Berlyne, as cited in Ulrich, 1991).

The amount of stimulation is highly dependent on what constitutes these positive distractions, and the most effective distractions may be happy faces, animals and nature (Ulrich, 1991). Of these, nature has been the most extensively studied and scientifically supported. Many studies have shown that access to nature, whether through art depicting tranquil nature scenes, indoor plants, or windows with nature views, is correlated with better patient outcomes, such as higher patient reported satisfaction, lower blood pressures, shorter hospital stays, and decreased need for pain medications (Ulrich, 1991, 2000; Ulrich, Quan, Zimring, Joseph, & Choudhary, 2004). Studies have indicated that patients respond positively to natural art and are negatively affected by abstract art (Ulrich, 2000). In a sample of open heart surgery patients who were randomly assigned to be exposed to nature scene art, abstract art or no art at all, post-operative anxiety was lowest in those exposed to the nature scene, followed by the controls with no art and those exposed to the abstract art (Ulrich, 1991).

The presence or absence of a window has also been reported to affect patient experience. Patients in rooms without windows in an intensive care unit reported higher levels of anxiety and depression than those in rooms with windows (Ulrich, 2000). Windows also allow for natural lighting, which has been shown to have positive effects on well-being and in reducing depression (Ulrich et al., 2004). Poor lighting can also be detrimental to patient well-being; for example, indoor lighting that flickers or causes glare can aggravate existing vision issues as well as lead to headaches (Schweitzer, Gilpin, & Frampton, 2004).

The impact of positive distractions and supportive design has largely been explored in cases where patients are receiving long-term, in-patient care. There are few studies regarding the potential impact of these elements on patients who are seen for short-term but potentially intense visits on an out-patient basis. One study found that supportive changes such as indoor plants in the waiting room and ceiling murals of a seafront in the suture room in an emergency department were associated with lower stress and greater responsiveness to nursing care and instruction (Gulrajani, 1995). Healthcare providers may also highly value windows, lighting and plants among other features in creating their therapeutic environment (Antony & Watkins, 2007). However studies have typically not evaluated patients' perceptions of these features.

This study evaluated whether a supportive healthcare environment design in a short but potentially emotionally intense session, such as a prenatal genetic counseling session, would be associated with lower anxiety levels compared to an environment lacking positive distractions. It also examined which physical features of the room environment participants remarked upon most often.

MATERIALS AND METHODS

Recruitment

English-speaking women at least 18 years of age who received prenatal genetic counseling at the Texas Fetal Center and Maternal Fetal Medicine Clinic at The University of Texas Health Science Center at Houston from September 1, 2014 to January 30, 2015 were eligible for this study. There were no exclusions based on clinical indication. This study was approved by The University of Texas Health Science Center Committee for the Protections of the Human Subjects (HSC GSBS-14-0545).

Data Collection

An anonymous questionnaire was administered before and after genetic counseling. Patients were offered study participation at the time of check-in to the clinic, and those who agreed to participate completed a self-administered questionnaire in the waiting room prior to genetic counseling. Following completion of this baseline questionnaire, participants were randomized to have genetic counseling in either an experimental room (designated as rooms A or B) or a control room (rooms C or D). The experimental rooms included supportive features with indoor plants, windows with open shades with a view of either the building next door or a street, full spectrum lighting, and art depicting a floral, nature scene. The control rooms lacked these supportive features and did not have any plants, had windows with drawn shades, standard fluorescent lighting, and abstract art. The post-counseling, or follow-up, questionnaire was completed by participants immediately after genetic counseling in the waiting room, typically prior to ultrasound or another subsequent appointment.

Measures

The baseline questionnaire included demographic questions (Appendix B), the State-Trait Anxiety Inventory (STAI) for Adults (Appendix C), and a section for the counselor to record details such as clinical indication (the reason the patient was referred to genetic counseling) and decisions made in the session (i.e. whether or not they chose to pursue testing or screening) after participants completed the questionnaire (Appendix D). The STAI is composed of two, 20 item subscales: a state anxiety subscale measures how someone feels, "right now, at this moment," (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983); and, a trait anxiety subscale measures how someone feels, "generally," (Spielberger et al., 1983). All items are rated on a 4-point scale (e.g., from "Almost Never" to "Almost Always"), with higher scores indicating greater anxiety. The STAI has been repeatedly validated across multiple populations (Spielberger, 1983), and is also valid for use with pregnant women(Gunning et al., 2010). The follow-up questionnaire included the state anxiety subscale of the STAI and an observational questionnaire, created to assess the participant's observations and opinions about the room environment (Appendix E). Participants were asked to identify the presence or absence of each room feature, the state or type of feature (i.e. window with open blinds, abstract vs. floral art), and to elaborate through open-ended response on aspects of the environment that they noticed in the room, liked or disliked, wished had or had not been present, and anything they would have changed.

Data Analysis

Categorical data were tabulated and compared across strata using contingency tests (chi-square or Fisher exact). Continuous baseline or follow-up data (including Likert scales) were compared across strata using unpaired t-tests or ANOVA (with post-hoc Tukey test). Repeated measures ANOVA (RMANOVA) was utilized to evaluate changes in state anxiety scores from

baseline to follow-up across the two room designs. All analysis was performed using STATA (v. 13, College Station, TX). Statistical significance was assumed at a Type I error rate of 5%, $p < 0.05$.

Responses to multiple choice questions on the Observational Questionnaire were re-coded for correctness (i.e. in experimental room design correctly recalled = window with blinds open, incorrectly recalled = window with blinds closed) for the questions about plants, art and the window. Responses to open-ended questions on the Observational Questionnaire were evaluated qualitatively by two members of the research team (EB and RC). The topics discussed in each response were identified and the comments were grouped into common themes. For example, the comment "chairs were comfortable," was grouped into the Furniture theme.

RESULTS

During the data collection period, 282 eligible patients were seen at the clinic; 98 patients (34.8%) returned both baseline and follow-up questionnaires. Of these, 96 answered both pre- and post- counseling STAI measures. The remaining patients were not offered participation due to logistical or clinical reasons (e.g. clinic schedule, patient demonstrating an unsuitable emotional state, etc.), declined participation when offered, or only submitted the baseline questionnaire.

Respondents were primarily either non-Hispanic white (25%), Hispanic (30%), or African American (31%), (Table 1). Nearly two-thirds reported their highest level of education as some college or above (63%). Most participants were married (59%), employed (62%) at the time of receiving counseling, and identified themselves as Protestant (36%) or Catholic (23%). Most women who responded were multigravida and among those with children just over half reported more than one living child (n=39, 55%). The experimental and control groups did not differ on demographic characteristics. Each counselor saw approximately the same number of participants in each of the two room designs (p=0.108).

Table 1. Demographic Distribution in Study Sample

	Room Design		Total (n=98)	p-value
	Control (n=33)	Experimental (n=65)		
Age, Mean (SD), (range 18-44 years)	32.3 (5.4)	30.9 (6.2)	31.4 (5.9)	0.264
Number of Children, Median (Range)	1 (0-6)	1 (0-5)	1 (0-6)	0.272
Ethnicity, n (%)				
Non-Hispanic White	8 (26)	16 (25)	24 (25)	
Hispanic	6 (19)	22 (34)	28 (30)	
African American	14 (45)	15 (24)	29 (31)	
Other	3 (10)	11 (17)	14 (14)	
Total	31 (100)	64 (100)	95 (100)	0.110
Education				
<High school	4 (13)	5 (8)	9 (9)	
High School Grad	7 (23)	20 (31)	27 (28)	
Some College	14 (45)	18 (28)	32 (34)	
College Degree or higher	6 (19)	21 (33)	27 (29)	
Total	31 (100)	64 (100)	95 (100)	0.282
Marital Status				
Single	12 (39)	20 (31)	32 (34)	
Married	17 (55)	38 (60)	55 (59)	
Other	2 (6)	5 (9)	7 (7)	
Total	31 (100)	63 (100)	94 (100)	0.869
Employment Status				
Employed	14 (45)	44 (70)	58 (62)	
Unemployed	7 (23)	8 (12)	15 (16)	
Homemaker	8 (26)	7 (11)	15 (16)	
Other	2 (6)	4 (7)	6 (6)	
Total	31 (100)	63 (100)	94 (100)	0.110
Religion				
Protestant	14 (45)	19 (31)	33 (36)	
Catholic	7 (23)	14 (23)	21 (23)	
Christian/Non-denominational	3 (10)	10 (17)	13 (14)	
Other	2 (6)	8 (13)	10 (11)	
No religious preference/affiliation	5 (16)	10 (16)	15 (16)	
Total	31 (100)	61 (100)	92 (100)	0.664

Baseline mean trait anxiety score for the entire sample, was 35.2 (SD: 8.6) and mean scores did not differ between the control and experimental room designs (34.8, SD: 10.2 vs. 35.5, SD: 7.8, respectively; p=0.709). Similarly, there was no difference in baseline mean state anxiety scores between the experimental and control groups (35.9, SD: 13.8 vs 38.0, SD: 10.9, respectively; p =0.409) or by age, ethnicity, education, marital status, employment status or religion; however, patients with more children had lower mean state anxiety scores compared to those with fewer children (p=0.009). Analysis of variance (ANOVA) showed that the mean baseline state anxiety scores were not the same across all clinical indications (overall ANOVA p=0.009). To identify which groups were different, post-hoc Tukey tests were utilized. These identified lower baseline state anxiety scores in participants with the indication of soft-ultrasound markers (25.8, SD: 4.6) than in participants with major ultrasound findings (44.6, SD: 13.2) and positive family history (43.1, SD: 15.0). These differences in baseline state anxiety scores by indication and number of children were observed independent of each other and the room design. Compared to a previous study on pregnant women, the mean baseline scores were similar in our study for both state (35.3, SD: 10.6 vs 37.3, SD: 11.9 respectively; p = 0.138) and trait (37.3, SD: 9.6 vs 35.2, SD: 8.6 respectively; p=0.065) anxiety (Gunning et al., 2010).

Repeated measure ANOVA identified a significant drop in state anxiety scores for the entire sample from baseline to follow-up (p=0.011), with a mean change of -2.6 points (SD: 8.8). Participants assigned to the experimental room design had a mean change in state anxiety of -3.0 (SD: 7.8), while those assigned to the control room design had a mean change of -1.9 (SD: 10.5); these differences were not significant (p=0.523), (Table II).

Table II. Mean State Anxiety Scores from Baseline to Follow-Up

| Room Design | n | Mean State Anxiety Score (SD) | | | p-value* |
		Baseline	Follow-up	Difference	
Overall	96	37.3 (11.9)	34.6 (11.8)	-2.6 (8.8)	0.011
Room effect					
Experimental	63	38.0 (10.9)	34.9 (11.1)	-3.0 (7.8)	0.530
Control	33	35.9 (13.8)	33.9 (12.9)	-1.9 (10.5)	

*p-values from stratified repeated measures ANOVA

The changes in mean state anxiety scores from baseline to follow-up were evaluated after stratification by clinical indication and participants' post-counseling decisions regarding diagnostic testing or screening. No significant changes in the state anxiety scores from baseline to follow-up were identified for any of the indications, regardless of room design. There was a decrease in state anxiety scores (mean change: -6.1, SD: 10.3) from pre- to post-counseling for those participants who chose not to pursue any further testing (p=.007). This was also independent of room design. Changes in state anxiety scores were not significant for those who chose to pursue testing or who were undecided after counseling (Table III).

Table III. Mean Changes in State Anxiety Scores By Decision Regarding Testing

Decision Following Session**	n	Mean Change (SD)	p-value*
No Testing/Screening	28	-6.1 (10.3)	0.007
Pursued Testing/Screening	65	-1.6 (7.6)	0.223
Undecided	3	6.0 (4.7)	0.293

*p-values from stratified repeated measures ANOVA
**Multivariable generalized linear mixed model with "No Testing/Screening" as referent group showed a significant difference in change in stress scores between the referent and the "Pursued Testing/Screening" group, p=0.019

There were no differences between participants' recall of room features by room assignment (p = >0.050, Table IV). There were also no difference in the mean change in state anxiety scores between those who recalled the room features correctly and those who recalled them incorrectly (p-values: Plants= 0.624, Lighting=0.059, Art=0.997, Window=0.714). In general, multiple choice responses revealed that the majority of participants did not recall or recalled incorrectly the presence of a plant as well as the presence and style of art in the room (Table IV). Most participants found the lighting to be pleasant regardless of whether it was the full spectrum lighting in the experimental room or the traditional fluorescent lighting of the control room (Table IV). Most also recalled the presence and status of the window correctly (Table IV). Among those participants who recalled that a window was present, a greater proportion of those in the experimental room design (91%) recalled correctly that the blinds were open compared with those who correctly recalled that the blinds were closed in the control room design (65%), (p=.026).

Table IV. Recall of the Presence and State of Supportive Features by Room Design

| Feature | Room Design | | | p-value |
	Control (n=33)	Experimental (n=64)	Total (n=97)	
Plants, n(%)				
Correctly Recalled	13 (39)	20 (31)	33 (34)	
Incorrectly Recalled	6 (18)	10 (16)	16 (17)	
Don't Recall	14 (43)	34 (53)	48 (49)	
Total	33 (100)	64 (100)	97 (100)	0.573
Lighting				
Yes, Pleasant	19 (58)	45 (70)	64 (66)	
Yes, Harsh	1 (3)	2 (3)	3 (3)	
No Opinion	10 (30)	13 (21)	23 (24)	
Didn't Notice	3 (9)	4 (6)	7 (7)	
Total	33 (100)	64 (100)	97 (100)	0.609
Art				
Correctly Recalled	8 (24)	12 (19)	20 (21)	
Incorrectly Recalled	4 (12)	5 (8)	9 (9)	
No Art	4 (12)	5 (8)	9 (9)	
Don't Recall	17 (52)	42 (65)	59 (61)	
Total	33 (100)	64 (100)	97 (100)	0.581
Window				
Correctly Recalled	13 (41)	41 (64)	54 (57)	
Incorrectly Recalled	7 (22)	4 (6)	11 (11)	
No Window	5 (15)	6 (10)	11 (11)	
Don't Recall	7 (22)	13 (20)	20 (21)	
Total	32 (100)	64 (100)	96 (100)	0.063

    Sixty-eight participants answered at least one of the 6 open-ended observational questions with a specific response regarding their opinion. The remaining thirty participants left all of the questions unanswered or gave all unspecific responses such as "no," "none," or "nothing specific." A total of one hundred twenty-seven specific responses were received to the open-ended questions. Four responses were excluded as they pertained only to people in the clinic and not the room environment. Six different themes were identified in the remaining 123 responses: Overall feel, Miscellaneous objects, Furniture, Sensory, Architecture, and Decorations. Within those 123 responses, participants made 120 unique references to a single theme, meaning that multiple references to the same theme, made by the same participant, were

counted as one reference. Some of the answers concerned more than one theme or topic, yielding a total of 141 references to a theme.

The most common theme was Miscellaneous Objects (24%) comprised of comments about little things that participants recalled from the room (i.e. "tissues on table," "a computer," and "the white board,"). The second most common was Overall Feel (23%) which was characterized by statements that referred to the environment as a whole (i.e. "private setting," "the room was peaceful," and "it didn't look like an office,"). These comments did not discuss specific features of the room and the majority were positive even across room designs. The next most common theme was the Furniture theme (21%) in which most comments referenced chairs (n=19) and the table (n=18). The final three themes identified were Sensory (15%), characterized by responses about what participants noticed with their senses (i.e. sight, smell); Architecture (11%), characterized by structural aspects of the room (i.e. size); and Decorations (7%) characterized by decorative features of the room (i.e. the color of the walls).

Participants answered two questions regarding the room environment and overall experience with genetic counseling, and responses were given on a Likert scale (1=very negative experience to 5=very positive experience). Mean scores indicated high ratings and there were no differences when stratified by room design (p=0.360 and p=0.650 respectively), (Table V).

Table V. Patient Satisfaction with Room Design and Genetic Counseling Experience

Subject of Rating, Mean (SD)	Room Design		p-value
	Control	Experimental	
Room Environment	4.8 (0.5)	4.7 (0.6)	0.36
Overall Genetic Counseling Experience	4.9 (0.4)	4.9 (0.5)	0.65

Scale: 1=Very Negative Experience – 5=Very Positive Experience

DISCUSSION

The aesthetic aspect of room design has become of growing interest in healthcare though the majority of research on this has involved long-term care facilities or extended hospital stays (Gross, Sasson, Zarhy, & Zohar, 1998; Ulrich, 1991, 2000; Ulrich et al., 2004). This study appears to be the first report that explores the effects of a supportive healthcare design in a short-term, out-patient healthcare encounter, specifically a prenatal genetic counseling session.

The primary goal of this study was to determine if creating a supportive healthcare environment would impact patient anxiety levels. We found that changes in mean state anxiety scores from pre- to post-counseling did not differ in the experimental room design compared with the control room design. This finding is in contrast with previous research describing the impact the environmental features have on patient-reported outcomes. However, this inconsistency may be due to a variety of different reasons. First, while the environment may have an effect in long-term healthcare encounters, the length of time of a genetic counseling session may not be sufficient to produce the same measureable effect. Long-term care allows for extended exposure to and possibly more conscious observation of the environment, but a short term encounter may not allow enough time for such observation. Second, a potential confounding factor is the limited physical differences between the room designs. For example, features such as furniture and temperature were discussed by participants in response to open-ended questions (i.e. "the chairs were comfortable," "temperature was nice") but they did not vary between room designs. Due to logistical reasons, only certain aspects of the room environment could be varied between the two rooms, namely lighting, plants, artwork, and the open or closed status of window blinds. Other features, such as furniture, color, and temperature, could not be varied. Another possible confounder is that the drop in anxiety levels may be more attributable to genetic counseling itself than to the room environment. The high

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satisfaction rating of the room environment and positive experience with genetic counseling across room designs serves as evidence for both of these confounders.

A significant drop in state anxiety scores was found for those participants who chose not to pursue testing post-counseling compared to those who either chose to pursue testing or were undecided. This is consistent with other studies that reported lower anxiety levels in women who chose not to pursue amniocentesis compared with women who chose amniocentesis or those who were undecided, regardless of indication (Hoskovec et al., 2008)Ng, Lai, & Yeo (2004). Women may have decided against amniocentesis prior to the counseling session, or they may have felt their risk of Down syndrome was low and thus did not warrant amniocentesis (Ng, Lai, & Yeo, 2004). In addition, many patients are unfamiliar with genetic counseling and arrive at a counseling session with concerns that they will be pressured into having testing or screening done (Witherington, 2014). Given that one of the goals of genetic counseling is to educate patients and facilitate informed decision making, pre-counseling anxiety may be allayed when patients realize that an acceptable outcome of the decision-making process is to not pursue any testing or screening and that their decision will be supported by the genetic counselor (Resta et al., 2006). This concept is further supported by research that showed genetic counseling for hereditary cardiomyopathy was associated with increased levels of perceived control and lower anxiety levels (Otten, Birnie, Ranchor, van Tintelen, & van Langen, 2015).

The observed reduction in state anxiety scores from pre- to post-counseling in both study groups is consistent with prior research which showed that counseling provided by nurse-counselors is effective at reducing patient anxiety in a prenatal setting. Research on the effects of genetic counseling for patients at increased risk for hereditary cancer and cardiomyopathy revealed that anxiety levels decreased post-counseling, especially when patients felt their emotional needs were addressed (Meiser & Halliday, 2002; Otten et al., 2015; Pieterse, Ausems,

Van Dulmen, Beemer, & Bensing, 2005). This further supports the benefits of genetic counseling and suggests that it is consistent across disciplines.

Interestingly, the change in scores identified from baseline to follow up overall was approximately 3 points, which is about 5% of the total possible change in scores and the change observed from baseline to follow-up for those patients who chose not to pursue testing was 6 points (10% of total possible change). Although these changes are observed, we do not know if a change of 3-6 points will have a clinically relevant impact on patient experience or other outcomes of health care encounters such as information retention. Also, the difference between the mean change in state anxiety scores between the experimental room design (-3.0, SD: 7.8) and control room design (-1.9, SD: 10.5) was approximately 1 point. Even though a larger sample size may find a result of this magnitude to be statistically significant, it is worth considering if a 1 point change is clinically relevant as well. Future studies are required to confirm or refute our findings and to assess the impact of changes of these magnitudes in relation to these possible outcomes.

The secondary goal of this study was to identify which features of the room environment participants remarked upon most often. Interestingly, despite its well-established impact in previous studies (Shepley & Pasha, 2013; Ulrich, 1991, 2000, 2001; Ulrich et al., 2004), nature, represented by the plant and art depicting a nature scene, and lighting, seemed to be of little importance to participants. On average, participants felt the lighting was pleasant regardless of whether it was the traditional fluorescent lighting or full-spectrum fluorescent lighting. This suggests that the differences in lighting may not have been significant enough to induce a measurable difference in response by participants. The window seemed to be the most noticed of the four manipulated features in this study. It was the feature most commonly recalled overall (68%), participants were more likely to recall it correctly than incorrectly (57% vs 11%

respectively), and participants in the experimental room design were more likely to correctly recall the status of the blinds (i.e. open vs closed) than those in the control room design. Also, participants in both room designs expressed that they liked the window. These findings are consistent with the idea that the presence of the window itself is valuable to patients (Schweitzer et al., 2004; Ulrich, 2000). The open window not only allows for natural light but on a subconscious level it may also allow for connection to the outside world.

Open-ended questions allowed participants to remark upon whatever features they noticed and responses were grouped into themes. Many features, in addition to nature, art, lighting and windows, have been explored as elements of supportive design. These include but are not limited to noise/sound, smells, colors and Feng Shui (Schweitzer et al., 2004). All have been subjected to various levels of scientific inquiry and have their own pros and cons. Several of these features were noted by participants in open-ended comments. In the current study, the numbers of responses are simply too low to draw any significant conclusions; however, the data that emerged regarding what was remarkable to patients is of interest. Further research is necessary to determine the impact of these features, particularly for short-term, out-patient healthcare encounters.

Limitations and Future Research

This study had several limitations. First, there may be an inherent ascertainment bias when assessing participants for anxiety, as participants who did not complete the first part of the survey or declined participation all together may have been more anxious than those who agreed to participate (Gunning et al., 2010). Second, this study was limited by what aspects of the room were available and appropriate for manipulation. Great care was taken to ensure that no negative changes were implemented into the control rooms. Since the clinic was well established,

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experimental and control rooms shared many similar features (i.e. furniture and color) and thus the difference between rooms may not have been sufficient to create a measureable difference in anxiety. Third, data regarding whether or not any participants had already undergone testing prior to their genetic counseling appointment was not recorded; therefore we cannot account for those participants for whom testing had already been done. Lastly, some participants were present for a typical session lasting an average of 45 minutes to an hour while others were present for multiple appointments spanning several hours. The time spent in the counseling room was not recorded; therefore, the relationship between the true length of exposure to the room environment and anxiety scores could not be analyzed.

Despite the above limitations, this was the first study to explore whether a supportive healthcare design affects patient anxiety levels in a short but potentially emotionally intense session, such as a prenatal genetic counseling session. Continued research is necessary to further delineate if and what features of the room environment have an impact for patients in such sessions. This could extend to other short-term, out-patient encounters, such as other genetic counseling disciplines (i.e. cancer, medical genetics) as well. In addition, it may be beneficial to further investigate the reasons why genetic counseling appears to have a greater effect on reducing anxiety in those patients who do not pursue screening or testing after counseling.

Appendix A. Cover Letter

Dear Participant:

We are conducting a research study as part of a graduate student's thesis project. The goal of the study is to improve the genetic counseling experience of patients here at the Texas Fetal Center. You are being invited to participate in this study because you are scheduled to have a prenatal genetic counseling appointment today. **Participation in this research is completely voluntary. If you choose not to participate it will not affect your care.**

This study consists of a survey taken in two parts. The first part of the survey will be completed now, prior to your genetic counseling appointment, and should take about 15 minutes. Once it is completed, please return it to the front desk. **By turning in the completed survey you agree to participate in this study.**

The second part of the survey will be given to you immediately after your genetic counseling appointment and will take about 15 minutes to complete as well. The two parts of your survey will be linked to each other by a number. This number will not be linked to you or your information in any way. We will not collect any personal identifying information from you so **all responses are completely anonymous** and will be maintained in a confidential database.

There will be no direct benefit from participating in this research however, it is our hope that the information gained from this study will provide us with ways to improve care for all patients here at the Texas Fetal Center in the future. Therefore, we value your responses. There are no identified risks from participating in this research.

Contact information.
If you have any questions about this study or would like to know the results of this research, you can contact the person(s) below:

Principle Researcher	Advisor
Elizabeth Baack, BS	Rebecca Carter, MS, CGC
UT Health Science Center at Houston	UT Health Science Center at Houston
Genetic Counseling Program	Genetic Counseling Program
Elizabeth.Baack@uth.tmc.edu	Rebecca.D.Sample@uth.tmc.edu

This study has been reviewed and approved by The University of Texas Health Science Center at Houston's Institutional Review Board (IRB). The IRB has determined that this study meets the ethical obligations required by federal law and University policies. Neither the researcher nor the University has a conflict of interest with the results.

Thank you for your consideration. Your help in this research is greatly appreciated.

Sincerely,

Elizabeth Baack

Demographics
Please check the box next to the most accurate choice for each question below and fill in blanks where appropriate:

What is your age? _____

Are you:
- ☐ White, non-Hispanic
- ☐ Hispanic
- ☐ Black or African American
- ☐ Native American or American Indian
- ☐ Asian / Pacific Islander
- ☐ Other: _____
- ☐ Multiracial: _____

What is the level of education you have completed?
- ☐ Some high school
- ☐ High school graduate, diploma or the equivalent (for example: GED)
- ☐ Some college credit or Associate degree
- ☐ Bachelor's degree
- ☐ Master's degree, Professional degree or Doctorate

What is your marital status?
- ☐ Single, never married
- ☐ Married or domestic partnership
- ☐ Widowed
- ☐ Divorced
- ☐ Separated

Are you pregnant now?
- ☐ Yes
- ☐ No

How many times have you been pregnant? _____

How many living children do you have? _____

What is your current employment status?
- ☐ Employed
- ☐ Unemployed
- ☐ Homemaker
- ☐ Student
- ☐ Military
- ☐ Retired
- ☐ Unable to work

What is your religious preference? Protestant (Baptist, Methodist, Lutheran, etc.)
- ☐ Catholic
- ☐ LDS / Mormon
- ☐ Jewish
- ☐ Muslim
- ☐ Hindu
- ☐ Buddhist
- ☐ Other _____
- ☐ No Preference / No religious affiliation

Appendix C. State Trait Anxiety Inventory for Adults (STAI)

mind garden

www.mindgarden.com

To whom it may concern,

This letter is to grant permission for the above named person to use the following copyright material for his/her thesis or dissertation research.

Instrument: **State-Trait Anxiety Inventory for Adults**

Authors: **Charles D. Spielberger, in collaboration with R.L. Gorsuch, G.A. Jacobs, R. Lushene, and P.R. Vagg**

Copyright: **1968, 1977 by Charles D. Spielberger**

Five sample items from this instrument may be reproduced for inclusion in a proposal, thesis, or dissertation.

The entire instrument may not be included or reproduced at any time in any other published material.

Sincerely,

Robert Most
Mind Garden, Inc.
www.mindgarden.com

Example Questions from the STAI:

S-Anxiety Scale Examples:

   1. I feel calm...1   2   3   4

   3. I am tense 1   2   3   4

T-Anxiety Scale Examples:

  21. I feel pleasant... 1   2   3   4

  22. I feel nervous and restless 1   2   3   4

For Office Use Form

For Office Use Only:

Room: A   B   C   D

Counselor:
   ☐ RC
   ☐ BS
   ☐ Other: _____

Student Counselor Present:
   ☐ Yes
   ☐ No
   ☐
   If yes, name: _____

   ☐ Student acted as primary counselor

Indication:
   ☐ AMA
   ☐ Screen Positive T21
   ☐ Screen Positive T13/T18
   ☐ Screen Positive ONTD
   ☐ Fetal Anomaly: _____
   ☐ Other: _____

Results of session:
   ☐ Pursue NIPT
   ☐ Pursue CVS/Amnio
   ☐ No further testing
   ☐ Other: _____

Other Notes:

Observational Questionnaire

Observational Questions
The following questions relate to the room in which you received your <u>genetic counseling</u>. We are interested in your opinions about the features of the room, such as the presence of a window or plant, and whether or not they impacted your experience. Please answer to the best of your ability.

Did you notice if there were any plants in the room?
☐ Yes, there were plants in the room.
☐ No, there were no plants in the room.
☐ I don't recall if there were plants in the room.

Did you notice if there was any artwork in the room? If so, what kind?
☐ Yes, there was a floral painting on the wall.
☐ Yes, there was an abstract painting on the wall.
☐ No, there was no artwork in the room.
☐ I don't recall if there was artwork in the room.

Did you notice the lighting in the room? If so, how did it seem to you?
☐ Yes, the lighting was harsh.
☐ Yes, the lighting was pleasant.
☐ I have no opinion about the lighting.
☐ No, I didn't notice the lighting.

Did you notice a window in the room? If so, were the blinds open or closed?
☐ Yes, there was a window with open blinds.
☐ Yes, there was a window with closed blinds.
☐ No, there was no window in the room.
☐ I don't recall if there was a window in the room.

Are there any particular features of the room that you noticed? If so, please specify.

Is there anything about the room environment you liked? If so, please specify.

Is there anything about the room environment you disliked? If so, please specify.

Is there anything you wish had been and/or had not been in the room? If so, please specify.

Is there anything you would change about the room environment? If so, please specify.

Are there any other features of the environment that you noticed? (ex: noises, colors, smells) If so, please specify and indicate if they had a positive impact, negative impact or no impact on your experience.
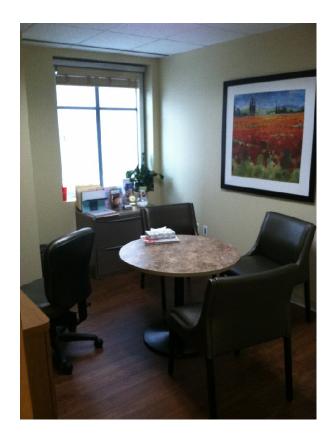
How do you feel about your overall experience in the environment of the genetic counseling session (the feel of the room)? Please rate on the scale below.

Very Negative Experience: 1   :   2   :   3   :   4   :   5   : Very Positive Experience

How do you feel about your overall experience with the genetic counseling session (personnel, information, etc)? Please rate on the scale below.

Very Negative Experience: 1   :   2   :   3   :   4   :   5   : Very Positive Experience

Photographs of Room Designs

Experimental Room Design
(Images are of Room A. Room B had similar features)

Control Room Design
(Images are of Room C. Room D had similar features)

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VITA

Elizabeth Catherine Baack was born in Columbus, Ohio on May 16, 1990, the daughter of Catherine Maurer Baack and James Baack. After completing her work at Grove City High School, Grove City, Ohio in 2008, she entered The Ohio State University in Columbus, Ohio. She received the degree of Bachelor of Science with a double major in Molecular Genetics and Psychology from Ohio State in May, 2013. In August of 2013 she entered the Genetic Counseling Master's Program at The University of Texas Graduate School of Biomedical Sciences at Houston.

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