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ORIGINAL ARTICLE

Toward a therapeutic relationship: A randomized control trial of the physical environment and client-centered communication in genetic counseling

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Abstract

Genetic counselors routinely provide service in many environments, including counseling-type and medical-type rooms; in this study, counseling environments are characterized by office décor that facilitates discussion around a seated table, while medical environments include an exam table and separate seating. Outside of the genetic counseling context, manipulation of the environment can influence client comfort in disclosing personal information, well-being, and overall satisfaction with clinician communication. However, there is little known about how clients experience genetic counseling in one environment versus the other and how that might influence their evaluation of genetic counselor communication. To explore the extent to which the physical environment influences client perceptions, we video recorded two simulated sessions addressing the same genetic counseling topic with two contrasting styles of communication (more and less patient-centered) in front of a greenscreen background. Videos were digitally placed in counseling and medical environments such that the same verbal and nonverbal communication was presented in the two environments, creating a total of four videos (e.g., a 2 ×2 experimental design). Participants ($N = 861$) were randomly assigned to observe one of the four videos and respond as if they were the client in the video (e.g., as analog clients). Overall, participants rated the less patient-centered communication more favorably ($p < 0.05$ across variables), contrary to our expectations. Structural equation modeling revealed that perceptions of nonverbal communication mediated the relationship between communication style and perceptions of the counselor's encouragement of participation in the session and the therapeutic bond. Results offer insight into how the physical environment might influence communication in genetic counseling, illustrating new avenues for improving client-counselor communication in this context.

KEYWORDS
communication, genetic counseling, genetic counselors, roter interaction analysis system, therapeutic bond, working alliance

Data collection was conducted while the first author was affiliated with Johns Hopkins University and the National Institutes of Health. During the analysis and manuscript drafting the first author was affiliated with Rutgers University.

1 | INTRODUCTION

Establishing a therapeutic relationship is a key component to successful genetic counseling and can have tangible effects on clients' health and well-being. In psychotherapy, a strong therapeutic relationship is associated with better client outcomes, including better quality of life, satisfaction with care, and decreased symptoms of depression (Barber et al., 2000; Howgego et al., 2003). Moreover, a poor client-counselor relationship can actively worsen psychological symptoms (Goldsmith et al., 2015). Genetic counseling is often a short-term relationship, though this therapeutic bond has been demonstrated within single sessions (Caleshu et al., 2022; Erby et al., 2021; Murray et al., 2022). However, the circumstances that optimally support forming this bond have been under-researched in genetic counseling. This study aims to explore whether the physical environment in which genetic counseling takes place and the patient-centeredness of counselor communication affect the degree to which a therapeutic bond is formed in pre-test genetic counseling for hereditary cancer risk.

What is known about this topic?

Previous work has demonstrated the importance of patient-centered communication in medical appointments, including genetic counseling sessions. The physical environment in which communication takes place has also been associated with client comfort in disclosing personal information, client well-being, and overall satisfaction with counselor communication.

What this paper adds to the topic?

The study provides evidence that client perceptions of the counseling environment can influence how favorably they view the genetic counselor's verbal and nonverbal communication and relationship-building.

1.1 | Patient-centered communication and the therapeutic bond in genetic counseling

Patient-centered communication can be broadly conceptualized as communication that actively seeks to understand client perspectives, encourages participation, recognizes the client within a larger psychosocial context, and facilitates shared understanding and decision-making aligned with the clients' values (Epstein et al., 2005). Patient-centered communication includes verbal communication features, such as displaying understanding and empathy, as well as nonverbal communication, such as effective eye contact (Gorawara-Bhat & Cook, 2011). Patient-centeredness has been quantitatively operationalized using the Roter Interaction Analysis System (RIAS) in a variety of medical studies as well as specifically applied to genetic counseling communication (Roter et al., 2006; Roter & Larson, 2002). Patient-centered communication is associated with better relationship-building, patient satisfaction, psychological adjustment, and patient participation in care (Mead & Bower, 2000; Pinto et al., 2012; Wissow et al., 2010). In genetic counseling, patient-centered communication has been seen to contribute to better ratings of genetic counselor affect, more satisfaction with the communication, and better ratings of nonverbal communication by simulated clients (Roter et al., 2006).

1.2 | The physical environment and communication

Although evidence supports the importance of patient-centered communication in genetic counseling and for establishing a therapeutic relationship in medical encounters, little is known about factors that might affect the patient-centeredness of genetic counseling communication. Research in the medical and counseling psychology fields has documented the ways in which variation of elements within the physical environment can influence perceptions of patient-centeredness (Ajiboye et al., 2015; Almquist et al., 2009; Okken et al., 2012). For example, in a randomized experiment investigating the physical environment in medical consultation rooms, clients who sat with a clinician at a table, rather than on an exam bed, were more satisfied with how clinicians engaged them about their health records (Ajiboye et al., 2015). Additionally, a simulated counseling study found that individuals who participated in counseling in an environment that included personal items (e.g., rugs and photos) rated the environment as more intimate, felt more relaxed, and self-disclosed at a more intimate level than those who participated in the same environment without the personal items present (Chaikin et al., 1976). These examples demonstrate that manipulation of specific elements within the physical environment can influence both perceptions of communication as well as client participation in care. However, genetic counselors routinely provide service in both counseling-type and medical-type environments, and research is needed to understand how this element of the physical environment might influence perceptions of communication or relationship building in genetic counseling.

In genetic counseling, a counseling-type environment is often characterized by office décor that facilitates discussion around a seated table, while medical-type environments, typical to outpatient clinics, usually include an exam table and separate seating. Few studies have examined how the physical environment influences client-counselor communication *across* environments, rather than *within* environments. A retrospective study of client empowerment and self-efficacy after genetic counseling found that clients who were seen in a counseling room tended to report more favorable ratings than those who were seen in medical exam rooms, though the effect was null (Morris et al., 2019).

Null effects in this study may be due, in part, to the limitations of the retrospective design and a discrepancy in the distribution of clients who completed the survey data in each environment. Additionally, a qualitative study of women at risk for breast cancer found that changing the session context of the genetics clinic from a medical environment in a hospital to a house located across the street improved client comfort and alleviated feelings of being presymptomatically pathologized (Phelps et al., 2008). Although these studies provide evidence that perhaps a counseling-type environment is preferable to clients who are receiving genetic counseling, further systematic research on the effects of the environment on client experiences is needed.

2 | METHODS

2.1 | Hypotheses and research question

Based on the existing understanding of verbal and nonverbal patient-centered communication, their relationship to each other and to relationship-building, we propose the following hypotheses (see Figure 1 for the full hypothesized model):

> **Hypothesis 1.** More patient-centered *verbal* genetic counselor communication will be associated with better ratings of features of the counselor's (a) nonverbal and (b) verbal communication (encouraging participation).

> **Hypothesis 2.** Better ratings of *verbal* patient-centeredness features (encouraging participation) will be associated with better ratings of the therapeutic relationship.

> **Hypothesis 3.** Better ratings of *nonverbal* patient-centeredness will be associated with better ratings of (a) features of verbal genetic counseling communication (encouraging participation) and (b) the therapeutic relationship.

Given the dearth of literature in this area, the following research question was proposed to investigate the effect of the physical environment on analog client perceptions of genetic counseling communication and relationship building:

> **RQ:** Does the physical environment in which genetic counseling occurs moderate the relationship between genetic counselor communication and analog client perceptions of features of verbal and nonverbal patient-centeredness and the therapeutic bond?

2.2 | Participants and procedures

Participants were recruited through the Amazon Mechanical Turk crowdsourcing platform and CloudResearch participant management system in August of 2020. CloudResearch was used to increase the integrity of our data. Only users previously vetted by CloudResearch as having high-quality responses were invited to take part. Additionally, Qualtrics security metrics were turned on (e.g., time tracking and preventing multiple submissions) and participants were asked to attest before and after the survey that they would respond to the best of their ability. Recruitment was based on a power analysis that estimated 787 participants would be needed to detect a small effect size ($f = 0.10$) with two groups (two rooms) at 80% power and an alpha level of 0.05. We aimed to collect a final sample of 800 participants for the study. Accounting for potential attrition and/or insufficient quality of responses of 10% of participants, we aimed to enroll 900 participants ($N = 902$).

Participants were randomly assigned to view one of four videos created for the study. Randomization was completed using Qualtrics block randomization with a quota of 225 for each experimental condition. Each video depicted a 10-min simulated pretest genetic counseling session for hereditary breast and ovarian cancer. Details about each session type are expanded on below. After viewing, participants responded to a cross-sectional survey from the perspective of the client (i.e., responded as an analog client). Eligible participants were 18 years or older, identified as female or non-binary, able to read English, had Internet access to

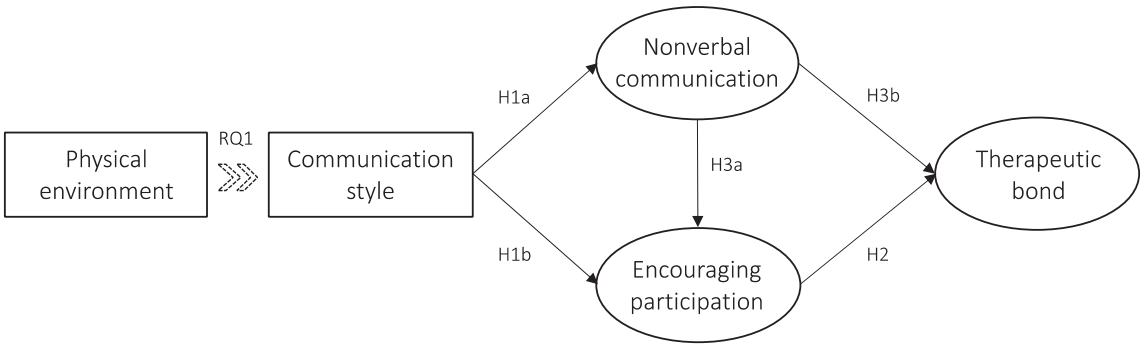

FIGURE 1 Hypothesized model of communication and the therapeutic bond. Latent variables shown without error terms. Dashed arrow represents hypothesized moderation effect.

connect to the survey, and were able to provide informed consent. Participation was limited to female and non-binary participants to enhance identification with the client actor, which is shown to increase the similarity of ratings between analog and actual clients (Blanch-Hartigan et al., 2013; van Vliet et al., 2012). Participants who successfully completed the survey were compensated $5.00. This study was approved by the Johns Hopkins Bloomberg School of Public Health's institutional review board.

2.3 | Experimental manipulation

We employed a two-by-two study design. Independent variables included manipulation of the physical environment (counseling room and medical exam room) and communication styles (more and less patient-centered). Four video recordings were prepared as experimental stimuli. Two videos presented the genetic counselor in front of a greenscreen background, which was substituted with an image of a counseling office or an image of a medical exam room. In each, a genetic counseling client was being addressed off-screen (Figure 2). This design allowed for the same verbal and nonverbal communication in the clinical teaching arm of the study to be presented in the counseling and medical environments, as well as the communication in the psychosocial counseling in the counseling and medical environments. Scripts for both sessions were based on previously collected video recordings of genetic counselors in simulated pre-test cancer genetic counseling sessions that had been coded using the Roter Interaction Analysis System (RIAS) (Roter et al., 2006). The two models of genetic counseling were chosen for adaptation in this study because of their markedly different patterns of patient-centeredness; RIAS coding of clinical teaching sessions were characterized as significantly less patient-centered than psychosocial counseling sessions. Content was arranged in approximately the same order and informational elements of each session were kept consistent. Consistent with the earlier simulation study, clinical teaching communication was designed to be less patient-centered, characterized by low amounts of relationship building (3.2% of session) and high amounts of client education (64.0% of session) as coded using RIAS. Additionally, the clinical teaching communication included high verbal dominance of the genetic counselor (11:1 ratio of counselor to client word count). The psychosocial counseling communication style was designed to be more patient-centered, characterized by high amounts of relationship building (42.0% of session) and lower levels of education (27.0% of session) as coded using RIAS. The psychosocial counseling communication included low verbal dominance of the counselor (2.5:1 ratio of counselor to client word count). The scenario was read by multiple board-certified genetic counselors to check for face validity. The genetic counselor and client actors made efforts to maintain similar nonverbal communication in each scenario (e.g., keeping the same affect, rate of speech, and facial expressions). However, because the verbal communication was different across the two videos, it was not possible to have the exact same nonverbal communication across the two communication types. The final videos were also viewed by genetic counseling students and practicing counselors to ensure that the shortened sessions were representative of actual clinical encounters.

2.4 | Measures

The outcome of interest was analog client perceptions of the therapeutic bond. The predictor variable was scripted counselor communication style. Mediating variables included ratings of nonverbal communication and ratings of features of verbal communication (encouraging participation). Room type was treated as a moderating independent variable. For each unobserved variable (perceptions of the bond, ratings of nonverbal communication, and ratings of encouraging participation), a series of initial analyses were conducted to assess scale reliability and dimensionality. Confirmatory factor analyses (CFA) were performed for each unobserved variable using combined data from all experimental groups. All CFA assumed a single latent variable in alignment with the expected unidimensional structures. Overall CFA fit was assessed using a combination of metrics including confirmatory fit

FIGURE 2 Still frames from the simulated genetic counseling sessions. Image (a) is the medical exam room. Image (b) is the counseling office.

index (CFI), root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), and χ^2. The cut-offs for good fit were CFI > 0.95, RMSEA < 0.06, SRMR < 0.08, and an insignificant χ^2 (Hu & Bentler, 1999). Adequate fit was considered at CFI > 0.90, RMSEA < 0.08, SRMR < 0.10, and $\chi^2/df < 3$ (Herzog & Boomsma, 2009).

2.4.1 | The therapeutic bond

Perception of the therapeutic bond was assessed using the bond subscale of the observer version of the Working Alliance Inventory (Darchuck et al., 2000). The Working Alliance Inventory (WAI-O) bond scale is a 12-item measure on a 7-point Likert scale (*never* to *always*). Two modifications were made to the WAI-O to reflect the counseling setting: (1) the word *therapist* was changed to *genetic counselor* and (2) the phrase *therapy session* was changed to *genetic counseling session*. We used only the nine positively-worded items for analysis as described previously (Broadbridge et al., 2024). Items were averaged for a final score that could range from 1 to 7. Higher scores indicate perception of a better bond. An example item from this measure includes, "the client feels that the genetic counselor appreciates her as a person." The unidimensional factor structure (CFA) supported good model fit ($\chi^2(35) = 119.78$, $p < 0.01$; RMSEA = 0.05 (CI 0.04, 0.06); CFI = 0.99; SRMR = 0.02).

2.4.2 | Genetic counselors' nonverbal communication

Perception of nonverbal communication was assessed using a 6-item questionnaire adapted from Roter et al. (2006). Participants rated nonverbal behaviors associated with patient-centered communication, such as facial expressions, eye contact, and head nods (D'agostino & Bylund, 2011; Gorawara-Bhat & Cook, 2011). Based on factor loadings, model fit, and theoretical relatedness, one item (related to the counselor's use of silence) was not retained resulting in a final composite with five items. Modification indices supported two covariations between error terms, one between the use of eye contact and head nods, and the other between the use of head nods and facial expressions to facilitate communication. The final factor structure supported good model fit ($\chi^2(3) = 11.73$, $p = 0.01$; RMSEA = 0.06 (CI 0.03, 0.09); CFI = 1.00; SRMR = 0.01). Items were averaged for a final score that could range from 1 to 6. Higher scores indicate more favorable ratings of nonverbal communication.

2.4.3 | Encouragement of client participation

An important feature of patient-centered communication is encouraging client engagement in the decision-making process and in participating in care, conceptualized in this study as encouraging participation. Perceptions of encouraging participation were captured using two items adapted from Roter et al. (2006). Items were on 6-point semantic differential scales where lower scores were more favorable ratings of the counselor. The first item ranged from, "Encourages client involvement in decision-making" to "Discourages client involvement in decision-making". The second item ranged from, "Encourages client questions" to "Discourages client questions". Items were totaled for a score that could range from 2 to 12.

2.5 | Analyses

Preliminary analyses included pairwise correlations with Bonferroni-adjusted significance levels across model variables (see Table 2). The relationships between counseling style and room type with the communication and relationship variables were explored using one-way analysis of variance (ANOVA). Structural equation modeling (SEM) using maximum likelihood estimation was conducted to assess the overall fit of the proposed model. Two models were tested, one for each room type. Model fit was assessed for SEM as described above for CFA; the cut-offs for good fit were CFI > 0.95, RMSEA < 0.06, SRMR < 0.08, and an insignificant χ^2 (Hu & Bentler, 1999). Adequate fit was considered at CFI > 0.90, RMSEA < 0.08, SRMR < 0.10, and $\chi^2/df < 3$ (Herzog & Boomsma, 2009). Data were analyzed using STATA (version 17.0).

3 | RESULTS

In total, 902 responses were collected. Participants were excluded from analyses if they self-selected an option indicating that their data was not quality ($n = 2$), if there was an issue with validity on a free-text response ($n = 9$), or if they took less than 15 min to complete the study ($n = 29$; videos required 10 min to view). One participant who reported their age as greater than 800 years was excluded from the analyses. In total, 861 responses were included in subsequent analyses. There were no significant differences in demographics across experimental conditions (see Table 1). Participants who viewed the clinical teaching experimental condition consistently reported better ratings of the therapeutic bond, nonverbal communication, and encouraging participation than those who viewed the psychosocial counseling experimental condition, contrary to the hypothesized directionality (see Table 2). Participants who viewed the medical room experimental condition consistently reported better ratings than those who viewed the counseling room (see Table 2).

3.1 | Structural equation models of communication and perceptions of the relationship

Structural models were assembled using the measurement structures established through CFA. The counseling room model (CR Model) included only participants who viewed the counseling office.

TABLE 1 Participant characteristics and demographics.

	Psychosocial counseling		Clinical teaching		
	Counseling office	Medical room	Counseling office	Medical room	*p*-Value
Age (mean)	40.6	41.4	39.1	38.7	0.11[a]
Education					
Some high school	0	0	0	1	0.56[b]
High school	26	25	18	22	
Some college	64	69	66	64	
Bachelor's degree	96	70	82	77	
Some graduate school	3	9	9	9	
Graduate degree	33	41	39	38	
Race/Ethnicity					
White/Caucasian	185	172	158	170	0.62[b]/0.55[b]
Black/African American	15	20	22	14	
Asian/Pacific Islander	15	17	25	17	
American Indian/Alaska Native	1	2	1	1	
Multiple selected	4	3	7	7	
Other	2	0	1	2	
Hispanic/Latinx	16	18	12	19	
Gender					
Female	219	212	212	209	0.97[b]
Non-binary	3	2	2	2	
Experience with genetic counseling					
Seen a genetic counselor or genetics provider personally	24	25	17	21	0.69[b]
Seen a genetic counselor or genetics provider with a friend or family member	5	11	8	7	
Never seen a genetic counselor or genetics provider	191	177	189	182	
Work with a genetic counselor	2	1	0	1	
Experience with breast or ovarian cancer					
No experience or prefer not to answer	81	67	76	76	0.15[b]
"Other" experience	43	47	38	54	
Family history	93	87	94	77	
Personal history	5	13	6	4	
Total (*n*)	222	214	214	211	

[a]Two-tailed t-test.
[b]χ^2 test.

The medical room (MR Model) included only participants who viewed the medical exam room.

3.1.1 | CR model: Counseling room

The model of therapeutic bond in the counseling office was well-supported by the data ($\chi^2(113)=218.31$, $p<0.01$; RMSEA=0.05 (CI=0.04, 0.06); CFI=0.98; SRMR=0.03). The model accounted for 43.6% of the variance in ratings of the therapeutic bond, 96.7% of the variance in nonverbal communication ratings, and 51.4% of the variance in perceptions of the counselor encouraging participation. The path from communication style to encouraging participation was not significant (H1b not supported). The path from communication style to nonverbal communication was significant, though in the opposite direction as originally hypothesized (H1a not supported). All other paths were supported in the hypothesized directions. Better ratings of encouraging participation in care were associated with better ratings of the therapeutic bond (H2 supported). Better ratings of the nonverbal communication were also associated with ratings of more encouragement of client participation and better ratings of the therapeutic bond (H3a and H3b supported). See Figure 3 for the final model.

TABLE 2 Descriptive statistics and correlations between model variables.

	Descriptive statistics			Correlations				One-way ANOVA			
Variable	*M*	SD	*α*	(1)	(2)	(3)	(4)	Counseling office	Medical room	Psychosocial counseling	Clinical teaching
(1) Communication style	-	-	-	-							
(2) Encouraging participation	10.77	1.86	0.74	0.16*	-			10.67 (1.88)	10.86 (1.84)	10.48 (2.05)	11.06* (1.59)
(3) Nonverbal communication	5.18	0.87	0.89	0.12*	0.56*	-		5.13 (0.89)	5.23 (0.84)	5.08 (0.95)	5.28* (0.76)
(4) Therapeutic bond	5.67	0.96	0.93	0.19*	0.61*	0.64*	-	5.61 (1.00)	5.73 (0.91)	5.49 (1.05)	5.86* (0.82)

Note: α = Cronbach's alpha, *M* = mean, SD = standard deviation. One-tailed Bonferroni corrected correlations between variables. Higher scores of the therapeutic bond and nonverbal communication reflect better ratings; lower ratings of verbal communication (decision-making, question-asking, dominance) reflect better ratings; one-way ANOVAs completed in STATA. $^{*}p < 0.001$.

3.1.2 | MR model: Medical room

Similarly, the model of therapeutic bond in the *medical room* was also well-supported by the data ($\chi^2(113) = 224.19$, $p < 0.01$; RMSEA = 0.05 (CI = 0.04, 0.06); CFI = 0.98; SRMR = 0.04). The model accounted for 41.3% of the variance in ratings of the therapeutic bond, 99.3% of the variance in nonverbal communication ratings, and 49.2% of the variance in perceptions of the counselor encouraging participation. By contrast to the counseling office, the path from communication style to nonverbal communication was not significant (H1a not supported). The path from communication style to encouraging participation was significant, but in the opposite direction as hypothesized (H1b not supported). All other paths were in the hypothesized directions. Better ratings of encouraging participation in care were associated with better ratings of the therapeutic bond (H2 supported). Better ratings of the nonverbal communication were also associated with ratings of more encouragement of client participation and better ratings of the therapeutic bond (H3a and H3b supported). See Figure 3 for the final model.

3.1.3 | Model moderation

To test RQ1, invariance across the CR and MR models was compared using a change in χ^2 analysis, comparing a structurally constrained model to a fully unconstrained model. The models were significantly different ($\Delta\chi^2 = 166.87$, $\Delta df = 118$, $p < 0.01$), indicating that the constrained model fit the data better than the unconstrained model. In other words, these results supported a moderation effect of room type on the relationships between variables in the model. Unconstrained Wald tests of invariance between the models revealed one significantly different structural path across CR and MR models. The path from communication style to encouraging participation in care significantly varied across models, with the path being stronger for the medical room (MR model) than for the counseling room (CR model) ($p = 0.02$). Though not statistically significant by invariance testing, other differences across the models were present. For both models, participants who viewed the clinical teaching style had more positive views of the counselor's nonverbal communication, though this relationship was only significant for the CR model. The clinical teaching style was also positively associated with perceptions of more encouragement of participation, though this relationship was only significant for the MR model.

Similarities across the models were also seen. Nonverbal communication was strongly positively associated with better ratings of the therapeutic bond for both the CR and MR models ($B = 0.40$ and 0.35). Nonverbal communication was also strongly positively associated with perceptions of more encouragement of participation in the CR and MR models ($B = 0.69$ and 0.67). As hypothesized, higher ratings of encouraging participation were positively associated with better ratings of the therapeutic bond in both the CR and MR models ($B = 0.41$ and 0.43). In other words, in both models (e.g., both

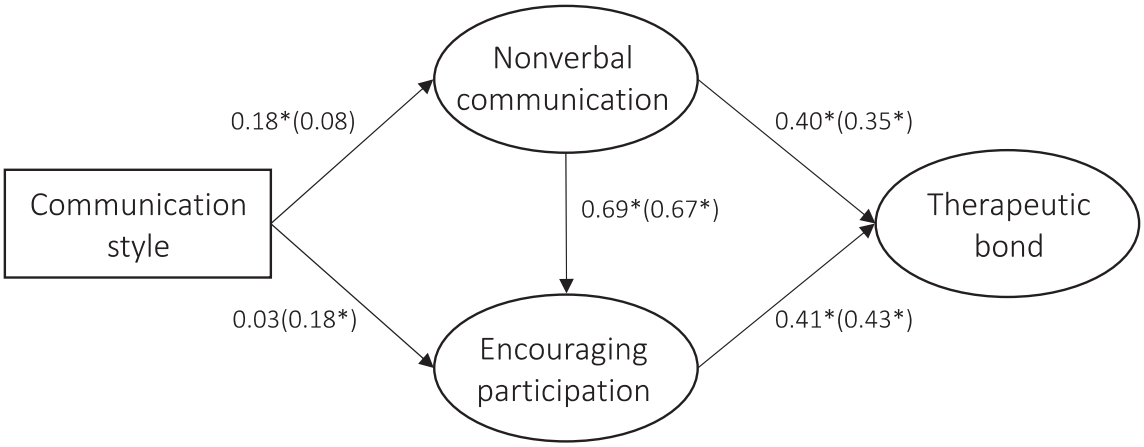

FIGURE 3 Final models of communication and the therapeutic bond for the counseling office (CR model) and medical office (MR model; in parentheses). Parameter estimates are standardized. Model fit indices for the counseling office (paths outside of parentheses) were $\chi^2(113) = 218.31$, $p < 0.01$; RMSEA = 0.05 (CI = 0.04, 0.06); CFI = 0.98; SRMR = 0.03. Model fit indices for the medical room (paths inside parentheses) were $\chi^2(113) = 224.19$, $p < 0.01$; RMSEA = 0.05 (CI = 0.04, 0.06); CFI = 0.98; SRMR = 0.04. Path coefficients designated with * were significant at $p < 0.01$.

environments), there was an indirect effect of communication style on the therapeutic bond that was mediated by perceptions of the genetic counselor's nonverbal communication (CR model) or perceptions of the genetic counselor's encouraging of participation in the appointment (MR model).

4 | DISCUSSION

This study explored the influence of the physical environment and communication style on analog clients' perceptions of communication and the therapeutic bond within simulated genetic counseling sessions. Overall, there was no direct effect of the experimentally manipulated room type on ratings of the therapeutic bond, ratings of nonverbal communication, or ratings of encouraging participation. By contrast, there was an effect related to counseling style; the clinical teaching was rated more favorably than the psychosocial counseling. This was contrary to our expectations. Although there were no direct effects of the physical environment observed, indirect effects of the environment on the therapeutic relationship were seen via SEM.

One potential reason for the unexpected findings may be attributed to participant expectations. Most participants had no experience with genetic counseling outside of the study (see Table 1). The communication manipulation may have confounded the naïve observer as to what in fact the objective of a genetic counseling session is. Where the clinical teaching approach could readily be seen as direct and relevant to someone seeking clinical expertise, the counseling approach used less direct communication and may have been perceived as uncertain or less relevant. In this way, observers may have been more critical of the genetic counselor using psychosocial counseling communication (cf., Blanch et al., 2009). It is also possible that the experimental manipulation of communication had unintended effects. In the clinical teaching video, the client actor had very few lines, and therefore gave very few verbal indications about the extent to which her needs were being met. By contrast, in the psychosocial counseling video, the genetic counselor spent more time eliciting the client's narrative, asking open-ended questions, and attending to the client's emotion statements. In this way, participants who viewed the psychosocial counseling model may have had stronger reactions to the discussion and subsequently had higher expectations of what could have been accomplished in a genetic counseling session. Conversely, because there were very few emotional cues in the clinical teaching, participants may have had lower expectations for the relationship and have based the ratings more on the quality and pace of the information given. Although we chose to use markedly different styles of communication in this study, it is possible that this manipulation elicited different expectations of what a genetic counseling appointment could or should be. Similarly, it is possible that expectations set by the environments, coupled with the study design of viewing a single environment (rather than a cross-over design) produced the unanticipated findings. For example, participants may not expect a high degree of shared decision-making in a medical office. Thus, regardless of the type of communication they saw, their low expectations for shared decision-making could have been exceeded, resulting in higher ratings of patient-centeredness.

4.1 | Theoretical contributions: Patient-centered communication in genetic counseling

SEM revealed that, even when the counselor's communication was designed to be more patient-centered, participants' ratings of the counselor's nonverbal behaviors mediated how they perceived verbal communication and ratings of the therapeutic bond between client and genetic counselor. This relationship was

consistent for both communication styles and across room types. In other words, regardless of the actual verbal communication or the physical environment viewed, when participants thought the nonverbal communication was effective, they perceived a stronger therapeutic bond. This finding emphasizes the importance of nonverbal communication in establishing an effective relationship in genetic counseling.

Patient-centeredness of communication predicted perceptions of nonverbal communication such that less patient-centered communication was associated with more positive ratings of the nonverbal communication when participants viewed the counseling office, though not the medical room. Conversely, patient-centeredness of communication predicted perceptions of verbal communication when participants viewed the medical, though not for the counseling office. This finding suggests that there may be a difference in how verbal and nonverbal communication behaviors are perceived within different clinical environments. Future research should consider collecting perceptions of both verbal and nonverbal communication behaviors when studying the influence of patient-centered communication on genetic counseling outcomes.

Results of this study align with prior research showing that more patient-centered nonverbal communication, such as eye contact and head nodding, are associated with better ratings of health care professionals (Griffith et al., 2003). However, the results diverge from current understanding of patient-centered verbal communication behaviors and their expected positive relationship with perceptions of nonverbal communication behaviors and participation in care (e.g., Pinto et al., 2012; Thom, 2001). Participants who viewed the patient-centered verbal communication rated the nonverbal communication worse overall, though the association was only significant in our model when participants viewed the counseling office and not the medical exam room. Although we attempted to have consistent nonverbal communication in the simulated sessions, it is possible that there were subtle differences across the two communication types that may have been amplified based on perceptions of the presented verbal communication. The unexpected findings support the need for additional considerations when employing experimentally manipulated communication, such as measurements of expectations of the environment before watching the interaction and warrant future research.

4.2 | Strengths and limitations

Although this study has provided preliminary evidence to suggest that perceptions of the physical environment are related to how participants perceived the genetic counseling communication and the therapeutic bond, there are limitations to these findings. First, the study was conducted using virtual simulated counseling sessions and analog clients. Because of this, participants were not able to respond in real-time to the counselor and thus our study captured only participant's perceptions of the session, rather than the process of communication and relationship-building themselves. Future research should include methods that allow participants to interact with and respond to the simulated genetic counselor. Second, this study used only one genetic counselor, one client actor, and one clinical scenario. Previous analog studies in genetic counseling have found that participants were able to relate well to a simulated session (Portnoy et al., 2010), though it is possible that participants did not connect with this particular client. A third limitation is the demographic make-up of our study. Because our scenario was for breast cancer risk assessment and we wanted to ensure similarity to the analog patient, we chose to only recruit female participants. While there is no data to suggest that men would have different perceptions of these environments, this has not yet been investigated. Likewise, our sample was not diverse enough to investigate differences across racial and ethnic demographics. The composition of this sample being mostly non-Hispanic White limits the generalizability to individuals from varying cultural backgrounds. Knowing that concordance between patients and clinicians across social demographics (e.g., race/ethnicity, gender, and age) can affect satisfaction with care overall (Thornton et al., 2011), it is possible that results of the mostly white sample would differ in a more diverse, and thus more racially discordant sample. Future research should examine whether the relationships among variables in this study replicate in more diverse populations, and in contexts that affect all genders. In addition to these limitations, the present study had several important strengths. First, the use of video simulation and an analog client allowed for a well-controlled randomized study. Participants viewed the exact same interaction in the two environments, with the same verbal and nonverbal communication and relationship-building characteristics. This design helped to better disentangle the effects of the physical environment from the effects of patient-counselor communication within a live session. Additionally, the large sample size allowed for the detection of subtle effects on perceptions of the genetic counseling session and the use of structural equation modeling to investigate the relationships between the variables of interest. Although we asked participants to imagine they were in the room with the counselor in the video, the greenscreen format of the videos shared characteristics with video telehealth visits. As genetic counseling is increasingly being offered via telemedicine (National Society of Genetic Counselors, 2022, 2023), our study provides additional insight into how clients may perceive the genetic counseling interaction when the counselor is in different environments. Future research focusing specifically on the environment in genetic counseling delivered by telemedicine is needed to understand whether these results directly translate to that context.

4.3 | Practice implications

One implication for practicing genetic counselors is to explicitly address the physical environment. For counselors who practice in both

counseling and medical environments, it may be worth asking clients which room they would prefer. When there is no option for the type of environment, it may be important to help orient the session to the room. For example, genetic counselors practicing in medical-type environments may want to address that the client will not need to have a physical exam during the session and that the primary goal is to have a conversation about the client's experiences and values. While each genetic counseling client is unique, alleviating potential anxiety caused by being in a medical exam room may be one way to increase a client's perceptions of the room as comfortable and create a different expectation than the type of appointment that is typical in medical exam rooms. Likewise, it underscores the importance of agenda-setting in appointments that take place in counseling rooms, setting the expectation that both medical and counseling topics may be addressed.

5 | CONCLUSIONS

Overall, this research suggests that the physical environment can influence how clients experience genetic counseling sessions. Results provide evidence that the physical environment and the way it makes clients feel may affect client perceptions of communication and the therapeutic bond in genetic counseling sessions. These findings are important for practicing genetic counselors as they consider how best to facilitate an environment that is perceived as comfortable, no matter where they are located, and supports the need for future studies to explore how the physical environment influences the genetic counseling session and the genetic counseling process.

AUTHOR CONTRIBUTIONS

The research presented in the paper was conducted while the first author (EB) was in training and the original data collection was conducted by the first author to fulfill a degree requirement. EB was responsible for the conception of the original research project design, analysis, interpretation of the data, and drafting of the manuscript. The original data collection strategy was completed with advice from EB's thesis committee (authors LE, DR, and SP). Authors LE, DR, and SP provided review and editing of the manuscript. Authors EB and LE confirm that they had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All of the authors gave final approval of this version to be published and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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CONFLICT OF INTEREST STATEMENT

The authors declare no competing interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author.

ETHICS STATEMENT

Human studies and informed consent: The study for dataset 1 was approved by and conducted according to the ethical standards of the Johns Hopkins Bloomberg School of Public Health Institutional Review Board. (IRB no. 12958) All applicable international, national, and/or institutional guidelines were followed.

Animal studies: No non-human animal studies were carried out by the authors for this article.

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