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Qualitative assessment of uptake retention and evaluation of prevention materials for skin cancer among Hispanics

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Abstract

Objective: Examine retention and evaluation of incorporating melanocortin-1 receptor genetic risk information materials in a skin cancer prevention intervention conducted in Hispanics living near Tampa, Florida and Ponce, Puerto Rico.

Methods: Two researchers applied thematic content analysis to identify major themes of open-ended responses (n=1,689) from 489 participants.

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Results: Five major thematic categories emerged: 1) intervention comments; 2) tips and tricks; 3) cancer prevention; 4) general information; and 5) risk factors and genetics. Responses captured under intervention comments (e.g., information was clear, easy to understand) and tips and tricks for sun protection (e.g., using sunscreen, wearing protective clothing) were most frequent. Participants noted the importance of conducting skin exams professionally or at home. English-preferring Tampa residents stated their individual risk factors, especially race and/or ethnicity, more frequently than Ponce residents and Spanish-preferring Tampa residents. Ponce residents were more likely to comment on wanting to share intervention materials with family and friends.

Conclusion: Findings suggest Hispanic participants implemented sun safety activities.

Practice implications: Qualitative findings suggest materials for a skin cancer prevention intervention were translated ensuring cultural relevance, thus increasing disseminability among Hispanics, with rates of retention of important topics similar to non-Hispanic Whites.

Keywords

qualitative research; Hispanic; skin cancer; prevention; *MC1R* ; public health; precision prevention

Introduction

The Hispanic community is an underserved healthcare minority impacted by skin cancer disparities.[1, 2] Despite overall lower rates of skin cancer, Hispanics tend to be diagnosed with later stage melanoma and present with larger squamous and basal cell carcinomas, and thus experience higher morbidity and mortality compared to non-Hispanic whites.[3–5] Hispanics tend to report lower frequency of skin-related dermatology appointments than their **non-Hispanic** counterparts[6, 7] and practice fewer skin cancer prevention activities (e.g., using sunscreen, wearing hats).[8–10] The rising rates of skin cancer among Hispanics and the relatively faster growth rate of this population will exacerbate skin cancer disparities.[3, 11]

The Hispanic community is also underserved with respect to genomic technologies[12] and the majority of Spanish-preferring individuals are unaware such testing exists.[13, 14] Genetic testing is a useful tool in precision medicine and can provide individuals the opportunity to screen for risk variants linked to common diseases.[15] Spanish-preferring Hispanics who are aware of genetic testing often view it favorably and are highly interested in receiving testing.[13, 14, 16, 17]

The melanocortin-1 receptor (*MC1R*) gene is highly polymorphic with numerous variants associated with the development of melanoma, squamous cell carcinoma, and basal cell carcinoma.[18–20] Over half of Hispanics in Puerto Rico and Tampa carry *MC1R* variants that put them at increased risk of skin cancer.[21] We previously showed that providing precision prevention intervention materials to these individuals incorporating *MC1R* genetic risk information can improve skin cancer prevention activities.[22] However, research on the evaluation of the impact of intervention materials on behaviors, attitudes, and perceptions in the Hispanic population are limited. Only a few studies have provided skin cancer genomic risk education materials translated to Spanish,[23, 24] and it is unknown if topic retention is the same qualitatively for Spanish versus English speakers.

The current study was an *a priori* secondary analysis to our randomized controlled trial (RCT) that assessed the efficacy of a precision prevention intervention to improve skin cancer prevention activities among Hispanic individuals living in Tampa, Florida and Ponce, Puerto Rico.[22] Here, our objective was to qualitatively compare open-ended comments about the intervention materials captured at 3- and 9-months post-intervention reported by Spanish-preferring Ponce residents to those reported by Spanish- and English-preferring Tampa residents. The study builds upon our positive RCT findings with the goal of informing public health messaging and encouraging positive health behavior change for an underserved group.

Materials and Methods

Details of the RCT have been published.[22] In brief, self-identified Hispanic participants were recruited from eight primary care clinics and community health centers near Tampa, Florida and Ponce, Puerto Rico between September 2018 and January 2020 and block randomized within *MC1R* risk groups (higher, average) to receive generic information about skin cancer prevention (standard arm) or precision information about skin cancer prevention anchored in results of *MC1R* genotyping (precision prevention arm). DNA was isolated from saliva, and *MC1R* was sequenced using standard procedures. *MC1R* variants previously shown to increase odds of melanoma, SCC, or BCC by at least 80% or predicted as probably damaging based on the bioinformatic tool Polyphen were considered higher-risk variants.[19, 20] Participants who carried at least one higher-risk variant were classified as *MC1R* higher-risk, and participants who did not carry a higher-risk variant were classified as *MC1R* average-risk. Participants chose between English- or Spanish-language study materials and received the mailed intervention a couple weeks after completing a baseline questionnaire. Follow up health education phone calls were also completed upon receipt of educational materials to provide participants with an additional opportunity to ask questions. The intervention was based on the Protection Motivation Theory: An individual is more likely to adopt preventive behaviors if the individual perceives themself to be at risk of a severe threat and is capable of adopting behaviors perceived as effective in eliminating the threat.[25]

All participants provided written informed consent, and the study was conducted in accordance with the Declaration of Helsinki. The study was approved by the Institutional Review Boards of the University of South Florida (Pro00020044, approved August 30, 2018), Ponce Health Sciences University (170807-BS, approved December 6, 2017), and the Comité de Seguimiento de la Investigación Clínica at Hospital Damas (HD 19–17, approved December 18, 2017).

Eligible participants self-identified as Hispanic and were at least 18 (Tampa) or 21 (Ponce) years of age. Exclusion criteria included having: 1) a skin examination within the past year; 2) a previous diagnosis of melanoma; and having 3) more than one previous diagnosis of basal cell carcinoma and/or squamous cell carcinoma. Additional information about genotyping, randomization, and study assessments have been published.[22]

At baseline, participants completed a study survey eliciting information on demographic and behavioral characteristics, including age, sex, ethnicity, marital status, education, family history of melanoma, non-melanoma skin cancers, and other cancers.

Participants completed 3- and 9-month surveys either in hardcopy or electronically that contained two open-ended questions: 1) “Please tell us the most important information you remember from the education packet”; and 2) “Is there anything else that you would like to let us to know about the health education packet?”

Only participants who completed at least one follow-up survey and who responded to at least one open-ended question were included in the current qualitative analysis. The open-ended responses were analyzed by Braun and Clarke’s six-step thematic analysis approach.[26] This method is used for identifying, analyzing, and reporting common themes in qualitative research.[26] Thematic analysis provides a rich description of the data while identifying themes to build on the respondents’ collective experience.[26] All coding was conducted manually. All responses recorded in Spanish were translated to English by a bilingual co-author (J.D.R). After translation, the first (S.L.C.) and second (A.W.B.) authors read through all open-ended responses verbatim. Line-by-line coding was conducted, and statements were categorized into common themes. A preliminary codebook was developed based on common descriptors. Codes were then amended and refined through discussion between the first and second author until a single list was agreed upon. The first author entered the list of codes in Dedoose (Sociocultural Research Consultants), a web application used for qualitative data analysis.[27] The first and second authors coded the first 25 transcripts together with codes added to the list when necessary. The first author then coded half of the transcripts and the second author coded the remaining transcripts. The two authors then randomly selected 30% of all transcripts to check for reliability. Minimal discrepancies were identified (Cohen’s Kappa coefficient >.80) and were resolved in discussion. Once coding was finalized, the two researchers reviewed the coded transcripts and identified common themes. Themes were reviewed, refined, and named. The data generated in this study are not publicly available as such information could compromise patient privacy or consent but are available upon reasonable request from the corresponding author.

Results

Of the 579 participants who completed at least one follow-up survey, 489 (84.5%) responded to at least one of the two open-ended questions at either 3- or 9-months. Of the 259 Tampa participants, the majority (80.7%) preferred English, while nearly all (99.1%) Ponce participants preferred Spanish. The two English-preferring participants from Ponce were removed from all data analyses. Table 1 shows the characteristics of the 489 participants, and Table 2 displays participant response rates for open-ended questions at 3- and 9-months. Five major thematic themes were identified from open-ended response data: (1) intervention comments; (2) tips and tricks; (3); cancer prevention; (4) general information; (5) risk factors and genetics. Table 3 shows an overview of findings, with response frequencies reported to broadly indicate important topics.

Ponce participants, Spanish-preferring

Several participants from Ponce (n = 90) reported retaining awareness of prevention materials stating: “very good to raise awareness of things that mostly happen or go unnoticed” ID 934-Female, 28 years; “it has been useful to me since it is a topic that has not been talked about much” ID 852- Female, 69 years; and “what to look for because you let me know I must be aware of not only of the symptoms” ID 826- Male, 33 years.

Residents from Ponce also commonly mentioned sharing or wanting to share the study information with family, friends, or schools (n = 25) stating “excellent brochure. Visit schools” ID 872-Female, 37 years; “you should get the message across to other people” ID 861- Male, 61 years; “I liked it because I could talk a little more about skin cancer to my family and friends” ID 844- Female, 50 years; and “I am showing my grandchildren and explaining to them” ID 751-Female, 73 years.

Ponce participants (n = 81) reported the intervention information and materials were clear and presented in an easy to understand format, although some (n = 14) reported preferring a different layout stating “make it more explicit and easy to understand” ID 944- Female, 59 years; “there is no information about makeup that has SPF and how effective they are” ID 904- Male, 43 years; “very long” ID 870- Female, 32 years; and “the information should be more understandable for those of us who are not experts in the medical research field” ID 680- Female, 53 years.

Tampa participants, Spanish- and English-preferring

Participants from Tampa (n = 36; Spanish-preferring, n = 74; English-preferring) frequently commented that the information format and information was readable, easy to understand, and had clear information. None of the Spanish-preferring Tampa residents reported they would have preferred different formatting or information. However, some English-preferring Tampa residents (n = 18) reported preference for more information or a different format stating “is there a digital version” ID 340- Female, 31 years; “percentages of each race that acquire this type of cancer based on geographic location would be nice” ID 292- Male, 27 years; “include offices or locations that are willing to do basic skin checks” ID 235- Female, 26 years; and “very generic information that appeared to be generated to fit a large number of people” ID 201- Male, 63 years.

Tampa residents frequently stated general cancer prevention and protection techniques/methods (n = 38; Spanish-preferring, n = 68; English-preferring) including “I remember everything, it’s important to protect ourselves from the sun in hours when the rays are strongest and it is also essential to examine yourself when moles or spots appear” ID 457-Female, 48 years; and “Sun is the strongest between 10 to 4pm, SPF >15 sunscreen, do not forget to apply on ears, lips, hand, feet and hand, what to look for in our skin really help. Skin cancer can be prevented” ID 375- Female, 38 years.

Commonalities between Tampa and Ponce participants

There were several common subthemes for Tampa and Ponce residents. In particular, when asked about what was most important, both groups mentioned mole exams (n = 31;

Tampa English-preferring, n = 5; Tampa Spanish-preferring, n = 39; Ponce), professional dermatology checks (n = 17; Tampa English-preferring, n = 5; Tampa Spanish-preferring, n = 17; Ponce), self-exams (n = 16; Tampa English-preferring, n = 4; Tampa Spanish-preferring, n = 19; Ponce), protective clothing (n = 38; Tampa English-preferring, n = 11; Tampa Spanish-preferring, n = 54; Ponce), avoiding the sun (n = 36; Tampa English-preferring, n = 16; Tampa Spanish-preferring, n = 45; Ponce), and limiting sun hours (n = 31; Tampa English-preferring, n = 5; Tampa Spanish-preferring, n = 23; Ponce). Tampa participants frequently mentioned the need or use of sunscreen for sun protection (n = 66; English-preferring, n = 15; Spanish-preferring; n = 57; Ponce). In general, Tampa Spanish-preferring participants reported similar themes as Ponce participants. For instance, avoiding tanning beds was mentioned four times (n = 1; Tampa; n = 3; Ponce) and only among Spanish-preferring individuals.

Differences between Tampa and Ponce participants

Ponce participants frequently mentioned general sun protection tips and tricks (n = 97) although only one Tampa resident mentioned a general tip as the most important information retained. General sun protection tips included statements such as “the importance of protecting yourself from the sun” ID 943- Male, 49 years; “sun protection methods” ID 917- Female, 26 years; “how to take care of myself against the sun” ID 893- Female, 73 years; and “protect yourself from sun rays” ID 796- Female, 30 years. English-preferring Tampa participants (n = 59) stated their *MC1R* risk (e.g., higher risk, average risk) more frequently than Ponce participants (n = 18) and Spanish-preferring Tampa participants (n = 1). Tampa English-preferring (n = 16) participants were more likely to mention race and/or ethnicity as a cancer risk factor than Ponce participants (n = 1). The only notable difference between Ponce participants and Tampa Spanish-preferring participants was the importance of sharing intervention materials with family and friends (n=2; Tampa Spanish-preferring; n=25; Ponce).

Three and nine month timepoints

Of the participants who answered the most important information question at each timepoint (n=239; 49% of sample), the majority (n=154) reported similar statements. Some (n=31) participants reported more general responses at the 9 month compared to 3 month timepoint, such as “prevention behaviors as measures” versus “checking my skin, having a professional do a skin check, the different changes in moles or skin lesions,” respectively; ID 141, Female, 52 years. Conversely, some (n=22) participants reported more specific information at 9 months as compared to 3 months, such as “clothing needed to be added to protect me and ability to share the information” versus “it reiterated that need for prevention for everyone,” respectively; ID 105, Female 62 years. As well, some (n=32) participants reported different responses at the two timepoints, including n=17 who discussed prevention/risk factors at 3 months and then changed to information about sun protection at 9 months, and n=8 who discussed sun protection at 3 months and then prevention/risk factors at 9 months.

There were n=172 participants (35% of sample) who answered the “additional comments” question at both timepoints, but this included n=25 participants who reported a response

of “nothing”, “na”, or “no” at 9 months while providing a detailed response at 3 months and n=18 participants who reported a response of “nothing”, “na”, or “no” at 3 months while providing a detailed response for 9 months. Of the n=129 participants providing two analyzable responses, the majority (n=84) reported similar statements at each timepoint. Of the participants who reported different responses, n=16 reported a more general response at 9 months as compared to 3 months, such as “It was very much appreciated to get the information” versus “I already suspected I was at high risk due to being light-skinned and having freckles. I already follow many of the recommendations so that was not new information for me,” respectively; ID 166, Female, 36 years. In contrast, some (n=21) participants reported a more specific response at 9 months as compared to 3 months such as “I think it was useful and it made me want to have my family members get tested also, since our oldest son tested “high risk” and our middle son has spots in his scalp that always worry me” versus “It was helpful,” respectively; ID 301, Female, 46 years.

Discussion

This study qualitatively examined implications of receiving personal genetic information for skin cancer **between language (Spanish versus English) and location (Ponce, Puerto Rico versus Tampa, Florida)** at 3- and 9-months post-intervention in Hispanic participants. Open-ended survey responses can enhance quantitative findings and identify further avenues for future research. Five main themes of response and 25 topics of response were identified from two experienced qualitative coders. Notably, these five themes are the same as those we previously identified in a similar qualitative study of data collected by our team in a melanoma precision prevention intervention trial conducted among non-Hispanic white participants.[28]

In the parent RCT study, there was a significant intervention effect of the precision prevention materials on sunscreen use and total body skin examinations.[22] Moreover, participants reported that the mailed study materials were highly believable and clear, regardless of whether they received standard, *MC1R* average-risk, or *MC1R* higher-risk intervention materials; and participants reported positive intentions to change sun protection behavior.[24] Our qualitative study further supports these findings as nearly 138 participants (n = 81 Tampa, n = 57 Ponce) reported the most important topic included information on sunscreen use and 78 participants (n = 42 Tampa, n = 36 Ponce) reported the most important information retained was the importance of conducting skin examinations at home or professionally. These findings have important public health implications as previous research suggests U.S. Hispanics do not routinely engage in skin cancer prevention activities (e.g., wearing sunscreen, skin examinations), suggesting our skin cancer prevention intervention is a promising tool for encouraging behavior change.[29, 30]

Of importance, many more Tampa English-preferring Hispanics (n = 104) noted genetic testing and risk factors were the most important information retained as compared to Tampa Spanish-preferring Hispanics (n = 7) and Ponce participants (n = 47). These differences may be related, in part to the heterogeneity of Hispanic identity including sub-ethnicity, nationality, and birthplace noted among our Tampa population (Table 1). This difference may also reflect acculturation, particularly as it relates to English language preference

among those in Tampa to a more “Americanized” (mainland US culture) lifestyle.[31] Our finding also aligns with previous research suggesting US Hispanics who prefer English are more aware of genetic testing than US Hispanics who prefer Spanish.[13, 14] Furthermore, it is possible Spanish-preferring Hispanics may be less likely to report that cancer risk can be attributed to genetics.[32] We also noted that English-preferring US Hispanics reported the importance of including race/ethnicity in intervention materials, acknowledging they were at a higher risk due to ethnicity.

More Ponce residents (n = 25), as compared to Tampa English- (n = 5) and Spanish-preferring residents (n = 2), noted the importance of sharing intervention materials with family and friends, likely resulting from familism. Familism, or *familismo*, places importance of family over the self and is considered a core value in Hispanic culture.[33, 34] These differences may be related to acculturation, although it was initially surprising that more Tampa English-preferring participants reported the importance of sharing with family compared to Tampa Spanish-preferring participants these results were similar to a study by Romero et al., who reported individuals who English ($p < 0.05$) reported higher familism scores than those who preferred Spanish.[35]

Limitations of the study should be noted. The open-ended questions did not probe for specific aspects of behavior change, understanding of risk factors and genetic results, or context based on individual characteristics, rather they captured only participant responses to the general questions of “most important information remembered” and “anything else you would like us to know.” Thus, although responses obtained from our open-ended questions are ideal for thematic analysis, like the one conducted, their utility for use in more quantitative-styled analyses is restricted. While it may be appealing to associate open-ended responses with quantitative responses captured by our intervention study, e.g., change in frequency of sunscreen use, we contend the interpretation of such associations would not add meaningfully to overall study findings. We recognize the addition of qualitative interviews to our study might have enhanced findings, however, the thematic analysis of open-ended responses can yield meaningful qualitative insights. **Although information was collected at two timepoints, we did not anticipate changes in retention and evaluation across timepoints; in our study, over half of respondents who answered the 3- and 9-month “most important information” and “additional comments” open-ended questions reported similar retention of information**. Because of our large sample size and high percentage of participant responses, we have confidence that our free-text analysis generated preliminary understanding of content areas for retention and evaluation of skin cancer prevention materials for Hispanics. part from the presented comparisons by groups defined by location and language preference, we did not further compare qualitative responses by categories defined by other participant individual characteristics, which may have revealed additional findings for future tailoring or targeting of the intervention materials. Lastly, categorical themes of open-ended responses cannot determine causality.

There are many strengths to the study. The precision prevention materials were robustly grounded in the Protection Motivation Theory.[22, 24, 25] Our large sample size and high percentage of participants who reported responses give us confidence that our free-text analysis generated preliminary understanding of commons themes and topics of importance

for Hispanic skin cancer prevention materials, while further exploring the human experience, which cannot be pictured quantitatively. Perhaps of most importance, it allowed the quantitative findings previously published[22, 24] to be further explored and evaluated in greater detail. Finally, to ensure scientific rigor, two experienced qualitative researchers assisted in data analysis.

Conclusions

Findings suggest Hispanic participants implemented sun safety activities and the intervention materials were translated in a way that ensured cultural relevance, thus increasing disseminability among Hispanics.

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Practice Implications

The Hispanic community is a healthcare minority impacted by skin cancer disparities and underserved in genomic technologies. Qualitative findings suggest materials for a skin cancer prevention intervention were translated ensuring cultural relevance, thus increasing disseminability among Hispanics, with rates of retention of important topics similar to non-Hispanic Whites.

HIGHLIGHTS

- The Hispanic community is a healthcare minority impacted by skin cancer disparities
- Skin cancer prevention in Hispanics living near Tampa, Florida and Puerto Rico
- Qualitative findings suggest materials were translated ensuring cultural relevance

Table 1:

Demographic and clinical characteristics

	Puerto Rico	Tampa	
Characteristic	**Spanish (n=230)**	**English (n=209)**	**Spanish (n=50)**
Age (Mean, SD)	51.5 (14.2)	42.1 (15.1)	39.0 (6.45)
Female	186 (80.9%)	147 (70.3%)	40 (80.0%)
Race			
White	218 (94.8%)	135 (64.6%)	41 (82.0%)
Other	12 (5.2%)	74 (35.4%)	9 (18.0%)
Hispanicity Type			
Puerto Rican	226 (98.3%)	98 (46.9%)	10 (20.0%)
Central or South American, except Brazilian	1 (0.4%)	42 (20.1%)	16 (32.0%)
Cuban	0 (0%)	21 (10.0%)	15 (30.0%)
Dominican (Republic)	1 (0.4%)	6 (2.9%)	3 (6.0%)
Mexican	0 (0%)	23 (11.0%)	6 (12.0%)
Mixed	2 (0.9%)	10 (4.8%)	0 (0%)
Other	0 (0%)	9 (4.3%)	0 (0%)
Marital status			
Single or never married	66 (28.7%)	62 (29.7%)	1 (2.0%)
Married, domestic partnership, or civil union	111 (48.3%)	119 (56.9%)	36 (72.0%)
Divorced, separated, or widowed	51 (22.2%)	27 (12.9%)	13 (26.0%)
Unknown	2 (0.8%)	1 (0.5%)	0 (0%)
Education			
Graduate degree or higher	32 (13.9%)	12 (5.7%)	11 (22.0%)
Four-year college degree	22 (9.6%)	33 (15.8%)	7 (14.0%)
Some college *	56 (24.3%)	57 (27.3%)	12 (24.0%)
High school or GED	75 (32.6%)	64 (30.6%)	7 (14.0%)
Less than high school or GED	44 (19.1%)	42 (20.1%)	7 (14.0%)
Unknown	1 (0.5%)	1 (0.5%)	6 (12.0%)
***MC1R* risk category**			
Higher	140 (60.9%)	119 (56.9%)	31 (62.0%)
Average	90 (39.1%)	90 (43.1%)	19 (38.0%)
Intervention arm			
Precision prevention	111 (48.3%)	113 (54.1%)	21 (42.0%)
Standard	119 (51.7%)	96 (45.9%)	29 (58.0%)
Family history of melanoma	34 (14.8%)	19 (9.1%)	5 (10.0%)
Family history of non-melanoma skin cancer	11 (4.8%)	13 (6.2%)	5 (10.0%)
Familism scale (Mean, SD)	3.10 (0.38)	2.93 (0.40)	3.29 (0.35)
Fatalism scale (Mean, SD)	3.08 (2.85)	3.12 (2.54)	3.02 (3.47)

* Individuals who were educated outside the US were assigned the median value (some college).

Table 2:

Open-ended response percentages for Tampa and Ponce residents who returned at least one follow-up and answered at least one open-ended question

		Tampa residents				Ponce residents	
Question	**Timepoint**	**Precision prevention**	**Generic prevention**	**Precision prevention**	**Generic prevention**	**Precision prevention**	**Generic prevention**
		English-preferring	**English-preferring**	**Spanish-preferring**	**Spanish-preferring**	**Spanish-preferring**	**Spanish-preferring**
		n=113	**n=96**	**n=21**	**n=29**	**n=111**	**n=119**
Please tell us the most important information you remember from the educational packet	3 months	90 (79.6%)	72 (75.0%)	10 (47.6%)	21 (72.4%)	75 (67.6%)	88 (73.9%)
	9 months	78 (69.0%)	73 (76.0%)	18 (85.7%)	20 (69.0%)	86 (77.5%)	88 (73.9%)
Is there anything else that you would like us to know from the health education packet	3 months	71 (62.8%)	61 (63.5%)	10 (47.6%)	14 (48.3%)	60 (54.1%)	70 (58.8%)
	9 months	67 (59.3%)	55 (57.3%)	16 (76.2%)	17 (58.6%)	69 (62.2%)	73 (61.3%)

Table 3:

Themes and subthemes from open-ended questions in a skin cancer prevention intervention

Code	Frequency Location Language Preference	Description	Example Quote. Study ID, Site, Language
	Theme 1: General Information Number of Participants: Tampa: Spanish-preferring: n=11; English-preferring: n=50 Ponce: Spanish-preferring: n=100		
Awareness	Tampa: *English-preferring:* N=26 *Spanish-preferring:* n=5 Ponce: n=90	Mention of increased awareness/information related to sun, sun exposure, or cancer.	"Very important information, I was not aware how dangerous it is to exposure yourself to the sun." – ID 393, Tampa, Spanish "The biggest takeaway from the packet was the list of things I could do to prevent my exposure to the sun. The notes about how people are more likely to get sun exposure just from being in the car was also memorable." – ID 289, Tampa, English
Moles	Tampa: *English-preferring:* N=31 *Spanish-preferring:* n=5 Ponce: n=39	Mention of moles or mole exams	"To check for any abnormalities in a mole."- ID 460, Tampa, English "Re-review the mole exam (asymmetry, edges, color, diameter, and changes)." – ID 930, Ponce, Spanish
Share information	Tampa: *English-preferring:* N=5 *Spanish-preferring:* n=2 Ponce: n=25	Mention of sharing study information with public, friends, schools, etc.	"It is instructive and interesting and should be given more publicity." – ID 377, Tampa, Spanish "It was educational and something I'd like to keep to share with provider in future if necessary." – ID 342, Tampa, English "You should supply at the schools."- ID 912, Ponce, Spanish
	Theme 2: Intervention Comments Number of Participants: Tampa: Spanish-preferring: n=38; English-preferring: n=166 Ponce: Spanish-preferring: n=149		
Follow-up	Tampa: *English-preferring:* N=2 *Spanish-preferring:* n=1 Ponce: n=7	Mention of wanting additional follow-up during study or longer follow-up periods	"More packets would be helpful." – ID 281, Tampa, English "I expected more direct skin tests on people who had spots and moles." – ID 516, Ponce, Spanish
Different format or information	Tampa: *English-preferring:* N=18 *Spanish-preferring:* n=0 Ponce: n=14	Mention of preferring different study materials or layouts (more science, more statistics, digital based, etc.)	"Is there a digital version?"- ID 340, Tampa, English "Percentages of each race that acquire this type of cancer based on geographical location would be nice." – ID 292, Tampa, English "Make more explicit and easy to understand." – ID 944, Ponce, Spanish "That the information should be more understandable for those of us who are not experts in the medical research field." - ID 680, Ponce, Spanish
Liked format or information	Tampa: *English-preferring:* N=74 *Spanish-preferring:* n=36 Ponce: n=81	Mention of preferring the current layout (handouts, readability, information, color, etc.)	"Very good and clear information." – ID 489, Tampa, Spanish "This is very good information that I obtained about this disease that I did not know anything about." – ID 486, Tampa, Spanish "The explanation in the informational materials is detailed and explained in a simple way that is easy to understand." – ID 930, Ponce, Spanish
Did not receive	Tampa: *English-preferring:* N=1 *Spanish-preferring:* n=0 Ponce: n=10	Participant did not receive intervention materials	"I did not get the health education packet referenced above." – ID 254, Tampa, English "I didn't receive them." – ID 713, Ponce, Spanish
Do not remember	Tampa: *English-preferring:* N=15 *Spanish-preferring:* n=3 Ponce: n=17	Participant did not remember intervention materials	"Don't remember." – ID 383, Tampa, Spanish "I don't remember." – ID 909, Ponce, Spanish
Nothing	Tampa: *English-preferring:* N=139 *Spanish-preferring:* n=16 Ponce: n=81	Did not recall anything learned	"No" – ID 468, Tampa, English "No" – ID 889, Ponce, Spanish
	Theme 3: Cancer Prevention Number of Participants: Tampa: Spanish-preferring: n=28; English-preferring: n=70 Ponce: Spanish-preferring: n=94		
General prevention and protection	Tampa: *English-preferring:* N=68 *Spanish-preferring:* n=38 Ponce: n=87	Mention of any general cancer prevention or cancer protections methods	"Always protect yourself from the sun is important." – ID 337, Tampa, English "Skin cancer prevention and the prevalence in individuals of my same ethnicity and place of residence." – ID 934, Ponce, Spanish

Code	Frequency Location Language Preference	Description	Example Quote. Study ID, Site, Language
Professional check	Tampa: *English-preferring:* N=17 *Spanish-preferring:* n=5 Ponce: n=17	Mention of scheduling or obtaining a dermatology or professional check	"It is critical to be examined by a physician regularly for signs of new or developing skin cancers." - 468, Tampa, English "They are important, but I am crazy that a skin specialist sees me, a good doctor that will send me to do some studies or a biopsy, if needed since I have lupus and many things I've heard and think a lot. I try really hard not to be in the sun too much, too little." – ID 755, Ponce, Spanish
Self-check	Tampa: *English-preferring:* N=16 *Spanish-preferring:* n=4 Ponce: n=19	Mention of conducting skin self-checks	"I remember everything, it's important to protect ourselves from the sun in hours when the rays are strongest, and it is also essential to examine yourself when moles or spots appear." – ID 457, Tampa, Spanish "The diagrams about what suspicious moles look like and how to do self-examination." – ID 347, Tampa, English "Avoid sun exposure, check the body for spots, moles, itching." – ID 848, Ponce, Spanish
	Theme 4: Risk Factors and Genetics Number of Participants: Tampa: Spanish-preferring: n=3; English-preferring: n=62 Ponce: Spanish-preferring: n=40		
Higher risk	Tampa: *English-preferring* N=36 *Spanish-preferring:* n=1 Ponce: n=16	Mention of participant identifying as high risk	"Use sunscreen, take vitamin D because I am at high risk." – ID 485, Tampa, Spanish "That I thought I was low risk when truly I'm high risk." – ID 347, Tampa, English "From being exposed to the sun from my construction work, the report tells me that I have a high risk of contracting skin cancer." – ID 838, Ponce, Spanish
Average risk	Tampa: *English-preferring:* N=23 *Spanish-preferring:* n=0 Ponce: n=2	Mention of participant identifying as average risk	"I was at average risk." – ID 351, Tampa, English "That I'm at average risk of getting skin cancer." – ID 249, Tampa, English "I was below average risk for developing skin cancer." – ID 277, Tampa, English "That the MC1R test is low risk." – ID 701, Ponce, Spanish
General mention of risk	Tampa: *English-preferring:* N=27 *Spanish-preferring:* n=3 Ponce: n=19	Any general mention of risk that was not high, average, or low	"My risk for skin cancer." – ID 351, Tampa, English "Risks, protection behaviors." – ID 318, Tampa, English "That we are all at risk even though the results are negative or low risk." – ID 863, Ponce, Spanish "The risk range and preventive measures." – ID 567, Ponce, Spanish
Genetic information	Tampa: *English-preferring:* N=2 *Spanish-preferring:* n=0 Ponce: n=9	Mention of genetic testing/information	"Learning my genetics, but also learning I still can get it, too. No one is exempt." – ID 267, Tampa, English "The genetic result." – ID 914, Ponce, Spanish "The information about genes." – ID 889, Ponce, Spanish
Race/ ethnicity	Tampa: *English-preferring:* N=16 *Spanish-preferring:* n=3 Ponce: n=1	Mention of race/ ethnicity as a cancer risk factor	"Sun protection for everyone but especially very white people." – ID 470, Tampa, Spanish "Thank you for caring about us Hispanics." – ID 496, Tampa, Spanish "High risk due to my ethnicity bias." – ID 317, Tampa, English "The high rate of skin cancer among Hispanics." – ID 282, Tampa, English "Skin cancer prevention and the prevalence in individuals of my same ethnicity and place of residence." – ID 934, Ponce, Spanish
	Theme 5: Tips and Tricks Number of Participants: Tampa: Spanish-preferring: n=21; English-preferring: n=87 Ponce: Spanish-preferring: n=135		
General tips	Tampa: *English-preferring:* N=1 *Spanish-preferring:* n=0 Ponce: n=97	Mention of general sun protection tips and tricks	"The real life recommendations." – ID 281, Tampa, English "Sun protection methods." – ID 917, Ponce, Spanish "The six ways to protect ourselves in drawings." – ID 938, Ponce, Spanish
Avoid tanning beds	Tampa: *English-preferring:* N=0 *Spanish-preferring:* n=1 Ponce: n=3	Mention of avoiding tanning beds	"I must put on everyday sunscreen, sunbathe as little as possible, use long sleeves, don't use tanning beds." – ID 450, Tampa, Spanish "The importance of using sunscreen and never use tanning booths or tables." – ID 836, Ponce, Spanish "How harmful tanning salons are." – ID 707, Ponce, Spanish
Clothing/hats	Tampa: *English-preferring:* N=38 *Spanish-preferring:* n=11 Ponce: n=54	Mention of protective clothing for sun protection	"Clothing to wear when exposed to the sun, sunscreen." – ID 495, Tampa, Spanish "Wear long pants, hat, sunglasses, long sleeve shirt." – ID 487, Tampa, Spanish "To wear hat, long pants, sunscreen, long sleeve shirt and try to stay

Code	Frequency Location Language Preference	Description	Example Quote. Study ID, Site, Language
			out of the sun between hours of 10 am – 4 pm.” – ID 415, Tampa, English “Sunscreen, hats, basically protecting your skin.” – ID 394, Tampa, English “The type of clothing to wear, sunscreen, doctor’s visits, self-skin examination.” – ID 761, Ponce, Spanish “The use of clothes and sunscreen.” – ID 877, Ponce, Spanish
Avoid sun	Tampa: *English-preferring:* N=36 *Spanish-preferring:* n=16 Ponce: n=45	Mention of avoiding sun	“Take care of yourself, follow the instructions on how to prevent or develop skin cancer from too much exposure to the sun.” – ID 487, Tampa, Spanish “You must avoid damaging sun rays.” – ID 344, Tampa, English “Nor to stay on the hot sun for long periods of time.” – ID 258, Tampa, English “How to prevent sun exposure and the hours of increased likelihood of sun damage.” – ID 943, Ponce, Spanish “Protect yourself from the sun wear appropriate clothing, less hours in the sun.” – ID 818, Ponce, Spanish
Limit sun hours	Tampa: *English-preferring:* N=31 *Spanish-preferring:* n=5 Ponce: n=23	Mention of limiting sun hours specifically between 10 am to 4 pm	“Avoid going out after 10:00 am - 4:00 pm.” – ID 485, Tampa, Spanish “To avoid sun exposure between 10 to 4.” – ID 315, Tampa, English “Utilize SPF 15. Don’t exposure yourself to the sun from 10–4.” – ID 839, Ponce, Spanish “Limit sun exposure between 10:00 am and 4:00 pm.” – ID 781, Ponce, Spanish
Lifestyle routine	Tampa: *English-preferring:* N=10 *Spanish-preferring:* n=2 Ponce: n=6	Mention of incorporating intervention materials into lifestyle routine	“Thank you for the information, here I was tested, if it wasn’t for it I would be all the time outside in my backyard at any time or at the pool or beach.” – ID 485, Tampa, Spanish “Made me look for what to buy. Doing all this made me want to start using more sunscreen rather than tanning oil.” – ID 339, Tampa, English “After reading through, I immediately went out and bought SPF 15 to keep in my car.” – ID 289, Tampa, English “I am taking better care of myself than before in the sun.” – ID 541, Ponce, Spanish “Many of these measures to protect ourselves from the sun are known to us, but we do not apply them. I am happy to apply them and seek more information about melanoma and carcinoma.” – ID 532, Ponce, Spanish “I have the gene and now I take care of myself more.” ID 511, Ponce, Spanish
Sunscreen	Tampa: *English-preferring:* N=66 *Spanish-preferring:* n=15 Ponce: n=57	Mention of using sunscreen for sun protection	“The use of sunscreen.” – ID 419, Tampa, Spanish “Use sunscreen all the time.” – ID 408, Tampa, English “Use sunscreen.” – ID 914, Ponce, Spanish