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Effects of Cultural Cues on Perceptions of HPV Vaccination Messages among Parents and Guardians of American Indian Youth

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Abstract

The encouragement of human papillomavirus (HPV) vaccination is an important goal for interventions among American Indians (AIs), given the significant disparities AIs face with respect to HPV cancers. Tailoring intervention messages to the culture of message recipients has been proposed as a potentially useful intervention approach, yet cultural tailoring of HPV messages has never been tested among AIs. The objective of this research was to test the effectiveness of cultural tailoring in positively affecting two variables that have been proposed as mechanisms of tailoring effects, namely identification with the message and perceptions of message effectiveness. We conducted a between subjects randomized experiment among 300 parents of AI children. Participants saw one of three messages that differed in the extent to which the message contained cues to AI culture. Analysis of variance (anova) showed that participants identified more strongly (partial eta^2 =.10) with messages that included stronger AI cultural features and thought these messages were more convincing (partial eta^2 =.14) and pleasant (partial eta^2 =.11) compared to messages that included weaker cultural cues. Effects on perceived identification and convincingness were moderated by AI identity, such that the more participants identified themselves with AI culture, the stronger the effects of the culturally-tailored messages were (R^2_{change}= 043 and .020 in hierarchical regression analyses). These findings suggest good potential for cultural tailoring to encourage HPV vaccination among AIs.

Keywords

American Indian communities; HPV vaccination; cultural tailoring; message effectiveness perceptions

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American Indians (AIs) face significant cancer disparities compared to the U.S. general population (White et al., 2014). Human papillomavirus (HPV) cancers are among the cancers with the highest disparities between AI women and men compared to non-Hispanic whites (MDH, 2012; Watson et al., 2014). HPV vaccination during adolescence reduces HPV cancer risk. Thus, encouraging parents of AI youth to vaccinate their children against HPV is an important goal for public health practitioners seeking to reduce HPV cancer-related problems for this population.

There is good evidence that messages can be an effective tool for moving people to vaccination behaviors (Brewer et al., 2018). A prerequisite for the effectiveness of messages is that they resonate with the message's intended audience. It is plausible that messages that refer to AI culture resonate with AI audiences more so than messages that do not. Cultural tailoring is the prevention approach used to achieve such resonance. Tailoring is the adaptation of messages to match characteristics of the audience (Pasick, D'Onofrio, & Otero-Sabogal, 1996; Rimer & Kreuter, 2008). Cultural tailoring is a special case of tailoring, in which specific cultural audience characteristics are the basis for message adaptation (Kreuter & McClure, 2004; Pasick, 2000). In support of the potential of cultural tailoring as a prevention tool for AI populations, there is evidence from qualitative research that AI audiences prefer health promotion messages that are tailored to their cultural identity (Bosma, D'Silva, Jansen, Sandman & Hink, 2014). Further, a quantitative meta-analysis of 36 cultural tailoring experimental studies in the context of cancer communication found positive persuasive effects of culturally tailored messages (Huang & Shen, 2016). None of these studies, or any other published work, concerned the HPV vaccine in AI populations.

Tailoring involves two complementary goals (Hawkins et al., 2008). First, tailoring seeks to affect proximal determinants of behavior, such as attitude and intention. By far, most existing research has focused on tailoring effects on behavioral determinants. For example, in Huang and Shen's (2016) meta-analysis of 36 cultural tailoring studies, all analyses focused on a combination of attitude, intention, and/or behavioral self-reports. A second goal of tailoring focuses on the mechanisms by which a tailored message works, or put differently, the goal to "make message acceptance more likely by addressing cognitive preconditions of acceptance" (Hawkins et al., 2008, p. 2). Unfortunately, there is a paucity of research on cognitive preconditions of tailored message effects, such as attention to and evaluative perceptions of tailored messages, which leaves largely unsubstantiated the question of whether the hypothesized mechanisms by which tailoring should facilitate behavioral effects actually occur.

We add to the research on mechanisms by testing cultural tailoring effects on two cognitive preconditions of tailoring effects, i.e., identification with the message and perceptions of the effectiveness of the message. Davis and colleagues (2017) argue that seeing a message that in content and format matches one's cultural identity leads to identification with that message. Kreuter and McClure (2004) similarly argue that tailoring to cultural identity increases a sense of personal relevance, as well as a favorable evaluation of the message. In the context of our research, we hypothesize that the more HPV vaccination messages are tailored to AI culture, the more AI message recipients will identify with the message and perceive the message as effective. To explain the position of our study in the full message-

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based behavior change process, Figure 1 offers a simplified summary of the relations between tailoring, cognitive preconditions of message acceptance, behavioral determinants and vaccination.

Our discussion of tailoring makes clear that two things need to be in place for a culturally tailored message to be effective. First, the message needs to include message design components that explicitly reflect the audience's culture. Second, message recipients should in fact identify with the culture represented in the message. Consistent with this, Davis and colleagues (2017) concluded from their review of work on cultural tailoring that "…the more health materials fit an individual's cultural orientation, the more effective they may be" (p. 1411). This implies that culturally tailored messages do not have a uniform effect on each and every member of a particular cultural community, but increase in effectiveness as a function of the extent to which message recipients identify with the culture addressed in the message. Applied to our focus on AI culture, we hypothesize that references to AI culture are more effective for message recipients who strongly identify with AI culture than for message recipients who identify less strongly with AI culture. Whereas this contention has been made conceptually, it has not been tested empirically.

In sum, to date, no research has tested HPV vaccination messages tailored to AI culture. The present research begins to address this gap. We designed a community-engaged experimental study building on scholarship on cultural tailoring (e.g., Kreuter & McClure, 2004), identification with health messages (e.g., Davis et al., 2017) and perceived message effectiveness (e.g., Yzer, LoRusso, & Nagler, 2015). Our aims were to test among parents and guardians of AI youth the hypotheses that (1) message cues referring to AI culture strengthen identification with, as well as the perceived effectiveness of HPV vaccination messages; and (2) these effects on message identification and perceived effectiveness are moderated by the extent to which message recipients identify with AI culture.

Method

Design and Participants

We designed a cultural message cues (manipulated: weak, moderate, strong) x AI identity (measured) between subjects experimental study. We purposively sampled parents and guardians of AI youth between 8–17 years at community events in the Minnesota urban and reservation areas (N=300; 98% were members of Anishinaabe/Chippewa and Dakota/Sioux tribes; 80.7% female; M_{age}=41 years, SD=12.03). Participants were randomly assigned to one of the three message conditions. The study was approved by the University of Minnesota's institutional review board.

Procedures

Study representatives, who are members of AI tribes themselves, approached participants at community events to introduce the study and review the consent form with interested participants. Participants completed the survey using a tablet computer. After a first set of demographic questions, participants saw one of three HPV vaccination messages. Participants could look at the message for as long as they liked. After message exposure,

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participants responded to questions about how they identify as AI, engagement in AI activities, identification with the message and perceptions of the effectiveness of the message they just saw (as well as questions about concepts that are beyond the scope of this study, such as trust in information sources). After excluding 15 participants who reported not having children in the 8–17 year age range, 93 participants saw the message with weak cultural cues, 97 participants saw the message with moderate cultural cues, and 95 participants saw the message with strong cultural cues. Participants were compensated for their time with a $10 gift card.

Stimulus materials

We took a dosage approach to message design, such that messages differed in the extent to which AI cultural cues were made salient. The first featured a non-AI youth with Caucasian features (fair skin and light brown hair) playing soccer (which we labeled as weak cultural cues); the second an AI youth (brown skin and dark brown hair) playing traditional lacrosse (or Creator's game, which is a field sport developed by AI nations: moderate cultural cues); and the third an AI youth (brown skin and dark brown hair) dancing in grass dance regalia at a powwow (strong cultural cues: Figure 2).

The choice for these visual cues and their interpretation as weak, moderate and strong doses of cultural cues was informed by a discussion with the project's AI team members on defining AI culture and identity. We determined that one may identify as AI for different reasons and based on different cultural upbringings. For example, there is no universal definition of AI culture and identity, because the variants in each tribe make them unique and separate from one another. We agreed that certain cultural activities may characterize AI culture, including traditional dancing, healing, arts and crafts, storytelling, ceremonies/spirituality, sports, singing, food gathering, and tribal language learning/teaching. We considered these cultural activities as possible cultural cues in developing the messages. Because it is not considered central to AI identity, we chose soccer as a weak cultural cue. We chose traditional lacrosse and dancing in grass dance regalia at a powwow as moderate and strong cultural cues. We labeled lacrosse and regalia as moderate and strong, respectively, based on the idea that lacrosse is not exclusively associated with AI culture whereas regalia worn at powwows is.

Measures

Message Identification.—To measure identification with the message, participants were asked "How much do you feel that the child in the picture is like children in your family or community?" (1=n*ot at all*, 7=v*ery much*).

Perceived Message Effectiveness.—Previous research has shown that perceived message effectiveness (PME) has two dimensions, i.e., perceived message convincingness and perceived message pleasantness (Yzer et al., 2011), and has good predictive validity (Dillard, Weber & Vail, 2007). We measured both types of PME. Four semantic differential items were used to assess perceived convincingness: "To me, the message that I just saw was..." (1=*unconvmcmg*, 7=*convincing*), (1=*unbelievable*, 7=*believable*), (1=*forgettable*, 7=*memorable*), and (1=*bad*, 7=*good*). Scores on these four items were averaged to compute

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a perceived convincingness scale, Cronbach's alpha=.92. To assess perceived pleasantness, participants responded to the same stem using two semantic differential items: (1=*unpleasant*, 7=*pleasant*) and (1=*negative*, 7=*positive*). Scores on these two items were averaged to compute a perceived pleasantness scale, r=.82.

AI Identity.—To assess the extent to which participants identified with AI culture, we created two items based on a social identification measure validated by Postmes and colleagues (2013). We asked participants to respond to the statements "I identify with AI culture" (1=*strongly disagree*, 5=*strongly agree*) and "AI culture is a big part of my daily life" (1=*strongly disagree*, 5=*strongly agree*). We averaged the scores on these two items to compute an "AI identity" scale, r=.70.

Engagement in Cultural Activities

To obtain a deeper understanding of how our participants manifested their AI identity, we asked participants whether they engaged in a number of activities (answer options: no, yes). Specifically, we asked: "Of these cultural activities, I do:" followed by (1) traditional dancing, (2) traditional healing, (3) traditional arts and crafts (including beading, quillwork, sewing), (4) traditional storytelling, (5) tribal language learning/teaching, (6) traditional ceremonies/spirituality, (7) traditional sports/games, (8) traditional singing, and (9) traditional food gathering. We also offered "other" and "none of these activities" options.

Results

Descriptive Statistics

Table 1 presents means, standard deviations and correlations between the study's key variables. Across the three message conditions, average levels of message identification, convincingness and pleasantness were moderately high. As expected, message identification was related to but not the same as perceived convincingness (r =.34) and perceived pleasantness (r =.25). Perceived convincingness and pleasantness were strongly related, r=.88. On average, AI identity was high in our sample, M=4.49 on a 5-point scale, SD=.89.

With respect to engagement in cultural activities, of our participants, 39.5% engaged in traditional dancing, 39.8% in traditional healing, 59.5% in traditional arts and crafts, 32.8% in traditional storytelling, 46.2% in tribal language learning/teaching, 60.5% in traditional ceremonies/spirituality, 19.1% in traditional sports, 27.4% in traditional singing, 57.2% in traditional food gathering, and 16.1% in other, undefined cultural activities. Only 5% of our participants reported not engaging in any of these cultural activities. The mean number of activities was 3.98, SD=2.59. Although engagement in any of these activities is a meaningful expression of one's AI identity, we observed a positive correlation between the number of activities participants engaged in and their response to our AI identity measure, r =.34, p=.000.

Hypothesis 1: Message effects on perceived identification and message effectiveness

We used anova procedures to test for main effects of message condition on message identification, perceived convincingness, and perceived pleasantness. Because these three

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measures were correlated, we ran a multivariate anova. The results showed that participants more strongly identified with the moderate and strong cultural cues messages than with the weak cues message, and perceived the moderate and strong cultural cues messages as more convincing and pleasant than the weak cues message (Table 2).

Hypothesis 2: Moderating effect of AI identity

We argued that effects of culturally tailored messages should be particularly strong for message recipients for whom AI culture was an important part of their identity. To test this contention, we first confirmed that AI identity did not differ across the three message conditions, $F(2, 282)=.65$, $p=.52$, partial eta^2 =.00. Next, we built linear regression models using methods consistent with Cohen, Cohen, Aiken, and West (2003). In a first step of this analysis, we entered message condition (represented by two dummy-coded variables) and the mean-centered AI identity measure. In a second step, we entered the interactions between the message condition dummy variables and AI identity. A statistically significant increase in explained variance in the second step is evidence for a moderated effect (Cohen, Cohen, Aiken & West, 2003). The analyses showed that AI identity moderated message condition effects on message identification and perceived convincingness, but not on perceived pleasantness (Table 3).

We computed the simple slopes to interpret the interactions. Simple slopes are regression equations for message condition effects at relatively low (one *SD* below the mean) and high (one *SD* above the mean) levels of AI identity (Cohen, Cohen, West & Aiken, 2003). Figures 3 and 4 show the simple slopes. To ease interpretation, we display effects of AI identity within the weak, moderate and strong cultural cues message conditions. In support for the hypothesized role of AI identity, the stronger participants' AI identity, the more they identified with the moderate ($b=.534$, $p=.003$) and strong cultural cues messages ($b=.386$, $p=.014$), but not with weak cultural cues messages ($b=-.146$, $p=.491$. AI identity most strongly affected the effects of the weak cultural cues message on perceived convincingness ($b=-.313$, $p=.053$). The simple slopes in the moderate ($b=.233$) and strong cultural cues message conditions ($b=.097$) were not statistically significantly different from zero ($p=.226$ and $p=.501$).

Discussion

This study addressed a number of gaps in the literature. First, it is a first test of culturally tailored messages among AI communities. Second, it responded to calls for research on how tailoring works, rather than on distal outcomes (Hawkins et al., 2008). Third, it is a first test of the theoretical assumption that cultural tailoring should work particularly well for message recipients for whom the culture referenced is central to their identity. The findings support the potential of culturally tailored messages: parents and caregivers of AI youth in our sample identified more strongly with, and perceived as more effective those HPV vaccination messages that included moderate and strong references to AI culture compared to a message that included weak references to AI culture.

Our data also supported the moderating role of AI identity in explaining culturally tailored message effects. The more our participants identified with AI culture, the more they

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identified with messages that included AI cultural cues, and the less convincing they felt the message with weak cultural cues was. This finding was expected on theoretical grounds, yet it is remarkable that we were able to demonstrate the effect in our data, given the skewed distribution of AI identity in our sample. Skewed, clustered distributions reduce the statistical power of interaction effects, which makes it methodologically more challenging to demonstrate an interaction effect even if it exists (Jaccard & Turrisi, 2003; Yzer, 2007). The fact that we were able to demonstrate an interaction effect of AI identity with only a limited range of AI identity scores in our data thus strongly supports the idea that the effects of culturally tailored messages are particularly likely among those for whom the referenced culture is centrally important.

We designed the stimulus materials as reflecting increasing dosages of cultural cues. Although there exists no theoretical or empirical basis to inform expectations about the exact differences between what we had labeled weak, moderate and strong cultural cues, we did expect that the strong cultural cues message (i.e., an AI youth dancing in grass dance regalia at a powwow) would produce stronger effects than the moderate cues message (i.e., an AI youth playing traditional lacrosse), which in turn would produce stronger effects than the weak cues message (a non-AI youth playing soccer). The findings showed substantive differences between the weak cues message and the moderate and strong cues messages, but not between the moderate and strong messages. The finding that the regalia image did not produce stronger effects than the lacrosse image is particularly interesting, because some of the data collection actually occurred at powwows, where one could argue a visual of regalia would resonate with powwow attendees, but none of our data collection was done at traditional lacrosse games.

A number of explanations can be speculated. First, if the dosage effect is theoretically true, then perhaps we were not able to create messages that sufficiently differentiated between moderate and strong levels of cultural cues. Second, cultural tailoring effects may represent a threshold effect, such that once a certain level of cultural cues is reached, further increments in cultural cues in messages no longer increase effects. Third, perhaps the presence or absence of people representing AIs is more important for message identification and effectiveness perceptions than non-person references to AI culture. Here, soccer, lacrosse and regalia worn at a powwow may have mattered less than seeing a non-AI youth versus an AI youth. Recall that the weak cues message featured a non-AI youth, whereas both the moderate and strong cues messages featured AI youth. Fourth, we should consider the different ways in which AIs identify with AI culture. Quite often AIs not only find association to culture and identity through powwow dancing or tribal regalia, but through other cultural activities. As a case in point, in our sample about 40% of our participants engaged in traditional dancing, and almost 80% of our participants engaged in more than one cultural activity. Greater proportions of our participants engaged in traditional food gathering, ceremonies, language learning and teaching, healing, and arts and crafts than in traditional dancing. This may explain why the moderate cultural cue was just as effective as the strong cultural cue.

This possibility has an important implication. Whereas powwow dancing or tribal regalia are perhaps among the most common representations of AIs in health communication materials,

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our findings suggest that other factors and activities associated with AI identity could be equally effective. This speaks to the larger question of what “AI culture” is. In particular, those who do not identify with AI culture should be cautious in thinking of powwow dancing or tribal regalia as the best or only representation of AI culture when designing health communication materials. We recommend that to inform tailored message design, one should first test how relevant different cultural activities are in the community (i.e., tribe) that the intervention seeks to serve. For research purposes, activities can then be selected based on relative differences in cultural relevance, such that dosage effects can be tested. For intervention purposes, those activities can be selected that maximally resonate as culturally relevant. In the present study, our Anishinaabe/Chippewa and Dakota/Sioux project members spoke to the cultural relevance of lacrosse and grass dance regalia for our Anishinaabe/Chippewa and Dakota/Sioux participants. However, because we were not able to pilot test our messages, we could not be certain that grass dance regalia were seen as more culturally relevant than lacrosse.

The results should be interpreted in light of some limitations of this study. First, we recruited in a single geographic area (Minnesota, in the Twin Cities and surrounding areas) and the sample was almost entirely members of Anishinaabe/Chippewa and Dakota/Sioux tribal nations, so results may not apply to AIs living in other regions of the United States. Second, since we recruited at events focused on AI culture, this may have led to the recruitment of a sample with a higher AI identification than if we had recruited in other community settings such as schools, workplaces, or via address or phone-based sampling. Last, because we sought to maximize internal validity, we chose to use visual cues to AI culture only in our message design. Specifically, we conceivably would have created confounding effects if we would also have varied other message features, such as language, color, and other design variables. Of course, it is plausible that such other message features can play a role in tailoring effects, as reviews of tailored messages that varied in message features suggest (e.g., Huang & Shen, 2016). We call for replication of our study using messages that manipulate cultural cues through other message features to test the robustness of our findings.

In conclusion, the findings of our study suggest that cultural cues in HPV vaccination messages can positively affect message identification and perceptions of message effectiveness among parents and caregivers of AI youth. These findings are consistent with research on cultural tailoring among other populations, and thus contribute to the robustness of cultural tailoring effects. Interventionists seeking to encourage HPV vaccination among AIs can use our findings to inform message design. Those efforts will be even better informed if research becomes available that tests whether our findings generalize to AI nations beyond the Anishinaabe/Chippewa and Dakota/Sioux tribal nations we primarily sampled, whether tailoring effects reflect dosage effects of cultural cues or a dichotomous presence or absence of cultural cues effect, and whether the effects of culturally tailored messages on message identification and perceptions of message effectiveness that we found next improve HPV vaccination intentions and actual vaccinations.

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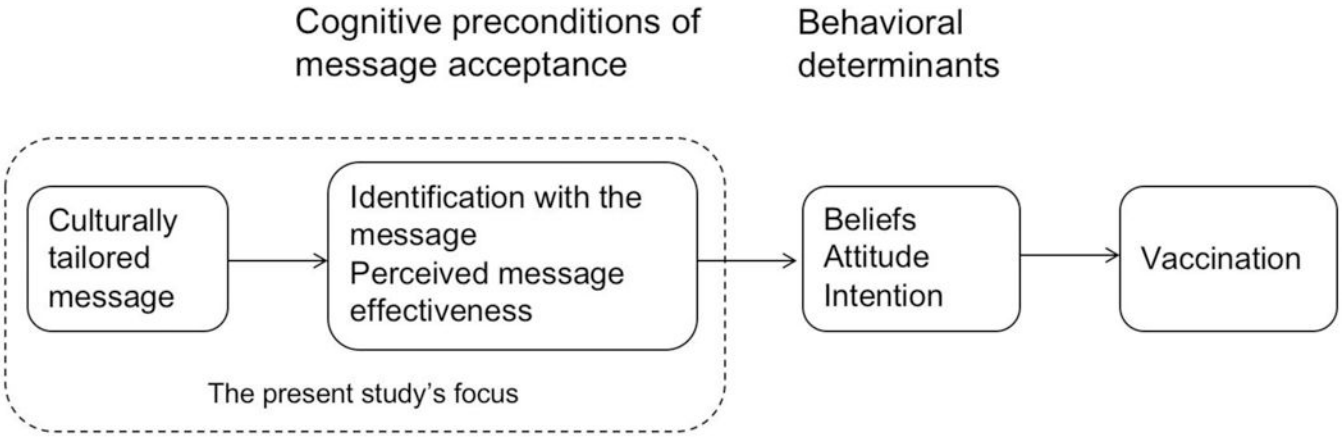

Figure 1.
Logic model summarizing the relations between tailoring, preconditions for message acceptance, behavioral determinants and vaccination.

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Figure 2.
Messages used in the three cultural cues conditions.

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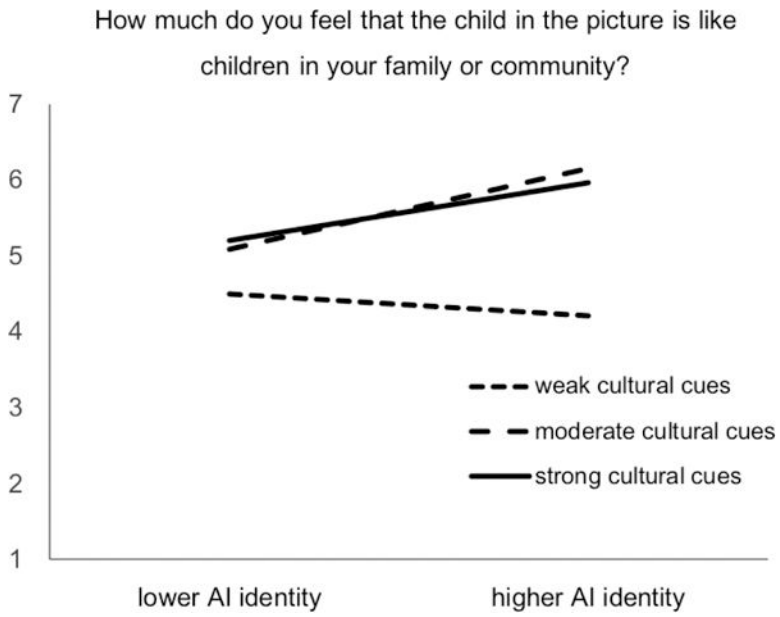

Figure 3.
Message effects on message identification: The role of AI identity.

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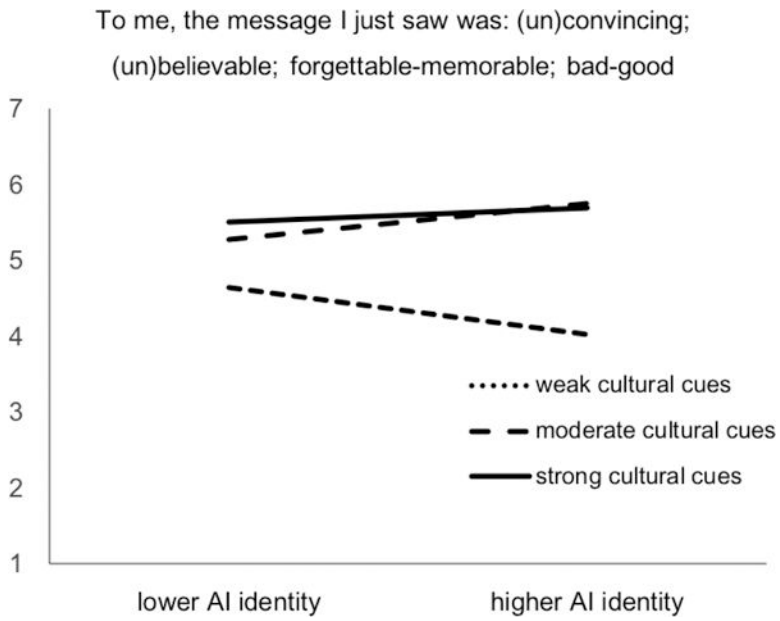

Figure 4.
Message effects on perceived convincingness: The role of AI identity.

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Table 1

Key Variables: Means, Standard Deviations and Correlations

			Correlations		
Measure	**M**	**SD**	**2**	**3**	**4**
1. Message identification	5.20	1.89	.34***	.25***	.12*
2. Perceived convincingness	5.20	1.15		.88***	−.01
3. Perceived pleasantness	5.19	1.57			.02
4. Identification with AI culture	4.49	.89			

Note.

*** $p < .001$;

* $p < .05$.

Message identification, convincingness and pleasantness were measured on 7-point scales. Identification with AI culture was measured on a 5-point scale.

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Table 2

Multivariate Analysis of Variance Summary for Message Condition Effects on Message Identification, Convincingness and Pleasantness

	Multivariate effect					Univariate effects						
	F	***df***	***P***	η^2_p		***F***	***df***	***P***	η^2_p	M_{weak}	$M_{mod.}$	M_{strong}
Omnibus test	8.84	6, 496	.000	.10								
Perceived identification						13.27	2, 250	.000	.10	4.33[a]	5.64[b]	5.54[b]
Perceived convincingness						20.27	2, 250	.000	.14	4.34[a]	5.52[b]	5.59[b]
Perceived pleasantness						15.08	2, 250	.000	.11	4.53[a]	5.65[b]	5.58[b]

Note. η^2_p is partial eta^2. Means with different superscripts within the same row differ from each other at a statistical significance level that was set to $p = .001$ in Tukey B post hoc tests.

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Table 3

Regression Analysis of the Interaction between Message Condition and AI Identity in Explaining Message Identification, Convincingness and Pleasantness

	Message identification> (N = 284)			**Perceived convincingness (N = 255)**			**Perceived pleasantness(N = 264)**	
	Step 1	***Step 2***		***Step 1***	***Step 2***		***Step 1***	***Step 2***
Constant	4.36***	4.35***		4.34***	4.33***		4.55***	4.55***
AI identity	.22*	−.15		−.03	−.31*		.01	−.15
Message condition dummy 1	1.28***	1.27***		1.20***	1.18***		1.09***	1.07***
Message condition dummy 2	1.21***	1.23***		1.25***	1.26***		1.09***	1.10***
Message dummy 1 X AI identity		.68*			.55*			.28
Message dummy 2 X AI identity		.53*			.41*			.26
ΔF	11.78***	3.88*		13.81***	3.08*		10.18***	.89
ΔR^2	.123	.024		.141	.021		.105	.001

Note. For message condition dummy 1, the weak cultural cues condition was coded 0, the moderate cues condition was coded 1, and the strong cues condition was coded 0. For message condition dummy 2, the weak cultural cues condition was coded 0, the moderate cues condition was coded 0, and the strong cues condition was coded 1. Coefficients are unstandardized regression coefficients.

*** $p < .001$;

* $p < .05$.