On Native American Boarding Schools, Racial Bias, and Perceptions of Americanness versus Foreignness

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Abstract

Between 1819 and the 1970s, the United States government forced Native American children to attend boarding schools with the explicit purpose of assimilating them into White American culture. In the present paper, we examined whether the cultural legacy of historical Native American boarding schools persists locally in the aggregated racial biases of modern-day residents. Using the data of 290,593 Project Implicit visitors, we found that counties where Native American boarding schools were located in the past show lower levels of modern-day racial prejudice against Native Americans and view Native Americans as more US American / less foreign compared to counties without historical boarding schools. Our findings provide a nuanced perspective on the ways in which historical injustices can manifest in physical, social, and cultural environments.

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" *A great general has said that the only good Indian is a dead one, and that high sanction of his destruction has been an enormous factor in promoting Indian massacres. In a sense, I agree with the sentiment, but only in this: that all the Indian there is in the race should be dead. Kill the Indian in him, and save the man*." - Captain Richard Henry Pratt, superintendent of the Carlisle Indian Industrial School, 1892.

Between 1819 and the 1970s, the United States forced Native American children to attend boarding schools with the explicit purpose of culturally assimilating them and exterminating Native American languages and cultures. These boarding schools were established by the federal government in communities across the United States. In the present research, we investigate whether the cultural legacy of these boarding schools has persisted over time. Specifically, we investigate the relationship between historical boarding schools locations and modern regional biases against Native Americans.

Our work takes a situational perspective on bias (Calanchini et al., 2022; Murphy & Walton, 2013; Murphy et al., 2018; Payne et al., 2017). Situational models of bias argue that bias is a product of, and endures in, the physical, social, and cultural environments we inhabit. The streets we walk through, the media we consume, the people we surround ourselves with all shape our perceived norms, values, and biases. Accordingly, a substantial amount of research shows that environmental cues and features are linked to intergroup biases (e.g., Goedderz & Calanchini, 2023; Jimenez et al., 2022; Payne et al., 2019; Primbs & Calanchini, 2025; Primbs et al., 2024b; Vuletich & Payne, 2019; Vuletich et al., 2023) and that changes in the environment are associated with changes in these biases (e.g., Charlesworth et al., 2022; Jimenez et al., 2021; Ofosu et al., 2019; Primbs et al., 2024a;

Primbs et al., 2025b). Importantly, physical, cultural, and social environments tend to change slowly and locally, so traces of past events can still be found in present-day environments – which, in turn, shape the biases of people currently inhabiting these environments.

Research linking historical inequalities with present-day intergroup biases supports these claims (Payne et al., 2019; Primbs & Calanchini, 2025; Primbs et al., 2024b; Vuletich et al., 2023). Focusing specifically on the relationship between historical inequalities and pro-White / anti-Black biases, present-day residents of areas that had a higher number of enslaved people in 1860 show higher levels of racial bias today (Payne et al., 2019). Similarly, present-day residents of regions where a higher proportion of Black people lived during the Great Migration show higher levels of present-day racial bias (Vuletich et al., 2023). Finally, present-day residents of areas with historical sundown towns show higher levels of contemporary racial bias (Primbs & Calanchini, 2025).

That said, the opposite relationship between historical inequalities and modern biases can also emerge. For example, regions with stronger historical Ku Klux Klan presence show lower levels of present-day racial bias (Primbs et al., 2024b). This counterintuitive finding constitutes an interesting conundrum and allows us to ponder the circumstances under which historical inequalities should lead to higher versus lower levels of present-day biases. Primbs and colleagues (2024b) speculated that the Klan's vivid legacy of hate and terror – traces of which can still be seen today in events like the Charlottesville "Unite the Right" rally – motivated liberal White residents of areas in which the Klan was active to distance themselves from the Klan's extremism, thereby shifting their attitudes towards equality. For such a contrast effect to occur, a sufficient number of people with dissenting opinions (e.g., egalitarians) need to contrast against a clearly-defined group (e.g., the Klan). When we embarked on the present research, we assumed that Native American boarding schools should not induce such contrast effects: Boarding schools were usually located in remote places with

sparse populations, and the otherwise ordinary-looking schoolhouses where Native American children were culturally assimilated do not loom as large in the modern US American public consciousness as do white-robed figures and burning crosses in the night. Instead, we expected that the same types of cultural processes by which the historical legacies of slavery, the Great Migration, and sundown towns persist throughout centuries should also perpetuate the hateful legacies of Native American boarding schools. As such, we predicted that the historical presence of Native American boarding schools should be associated with higher levels of present-day regional racial biases against Native Americans.

We tested this idea across a multitude of statistical models, datasets, and variable operationalizations. Importantly, the published literature linking historical inequalities with modern biases to date has focused exclusively on Black/White racial bias. However, situational models of bias (Calanchini et al., 2022; Murphy et al., 2018; Payne et al., 2017) are articulated to be domain-general, such that their predictions should generalize beyond the context of Black/White racial bias to other social groups. Moreover, psychologists generally operationalize intergroup bias in two main ways. *Prejudice* refers to positive or negative evaluations of one social group relative to another (McConahay & Hough, 1976), so we operationalized racial prejudice in terms of preferences for and evaluations of Native Americans relative to White US Americans. *Stereotypes* refer to associations between social groups and traits (Hamilton, 1981), so we operationalized racial stereotypes in terms of the extent to which Native Americans versus White US Americans are viewed as US American versus foreign. What could it mean for Native Americans to be perceived as foreign? They are indigenous to the North American continent, predating the arrival of White settlers by centuries, so they cannot be foreign in a literal, location-based sense. Instead, the present research is guided by the question of whether Native Americans are perceived as foreign in terms of their cultural distance from the dominant White US American standard.

To date, most published investigations of regional intergroup bias have focused on prejudice. However, the mechanism underlying situational models of bias – concept accessibility varying systematically at the level of the situation or environment (Payne et al., 2017; Payne & Hannay, 2021) – should also apply to stereotypes. Thus, the present research extends the existing literature on regional intergroup bias by investigating the relatively understudied domain of bias against Native Americans in the forms of both prejudice and stereotypes.

We had the most straightforward predictions for the relationship between boarding schools and racial prejudice (H1). In line with the majority of existing empirical evidence, we expected that the historical presence of a boarding school in a county would be associated with higher levels of modern racial prejudice against Native Americans compared to counties without boarding schools (H1a). Likewise, given that some counties contained multiple boarding schools, we expected that counties with higher numbers of historical boarding schools would show higher levels of modern racial prejudice against Native Americans compared to counties with fewer boarding schools (H1b).

In contrast, we had competing predictions about the relationship between boarding schools and racial stereotypes (H2). The explicitly-stated goal of boarding schools was to assimilate Native Americans into White US American culture. Consequently, we expected the presence of boarding schools to affect the extent to which Native Americans are perceived to be US American – but in which direction? If the perspective that Natives are insufficiently US American that motivated boarding schools persists in places where boarding schools were located, then we should expect modern stereotypes of Native Americans as more foreign / less US American in counties where boarding schools had been located. However, if boarding schools succeeded at assimilating Native Americans to White cultural norms, then the Native Americans who attended boarding schools may have behaved

in ways that were less Native and more White compared to Native Americans in other places who did not attend boarding schools. From this perspective, we should expect modern stereotypes of Native Americans as more US American / less foreign in counties where boarding schools had been located. We test these competing predictions in the context of the presence versus absence of boarding schools (H2a) and the number of boarding schools (H2b) in counties across the United States. Together, the present research provides an in-depth investigation of the cultural legacy of historical Native American boarding schools and helps advance theoretical models of bias.

Methods

Transparency Statement

We pre-registered our hypotheses, datasets, exclusion criteria and analyses (https://osf.io/p5q4x/?view_only=6be7151e2d964cddb4f74126cecabe92). Our confirmatory analyses did not deviate from our pre-registration and are clearly distinguished from our non-pre-registered exploratory analyses. We make all the analysis code freely available (https://osf.io/ejptm/?view_only=c6e94d75d11c4a0eb1c1d73cb1a6520c). Because of legal agreements with the National Native American Boarding School Healing Coalition, we are unable to publicly share the raw boarding school location data that they provided to us. However, these data can be freely viewed at https://boardingschoolhealing.org/list/. Due to an oversight, we failed to pre-register H2b.

Dataset and Measures

This study makes use of the Native American data from Project Implicit (Xu et al., 2022). Our main analyses were restricted to the 2004-2021 subset because Project Implicit adjusted Native American data collection in 2022. We restricted all analyses to people who provide complete geographical information and are located on the US mainland.

Additionally, we excluded people who responded faster than 300ms for 10% or more of trials on the IAT, which corresponds with inattentive responding. These exclusion criteria were pre-registered and are consistent with similar past work (Primbs et al., 2024b; Primbs & Calanchini, 2025). Our final dataset contains the responses of 290,593 participants, with 58,650 living in counties with historical boarding schools and 231,943 living in counties without.

Racial Prejudice

We operationalized racial prejudice in two ways. First, we relied on a single explicit measure assessing the relative preference for White Americans over Native Americans on a 7-point scale from 1 (*"I strongly prefer Native Americans to White Americans"*) to 7 (*"I strongly prefer White Americans to Native Americans"*). Second, we computed a difference score based on responses to two feeling thermometers assessing how warm or cold participants feel towards White Americans and, separately, Native Americans on an 11-point scale from 0 (*"Extremely Cold"*) to 10 (*"Extremely Warm"*). More positive scores reflect stronger pro-White / anti-Native-American prejudice. Figure 1 shows the distribution of the preference scores across the United States. Figure 2 shows the distribution of the feeling thermometer difference scores across the United States.

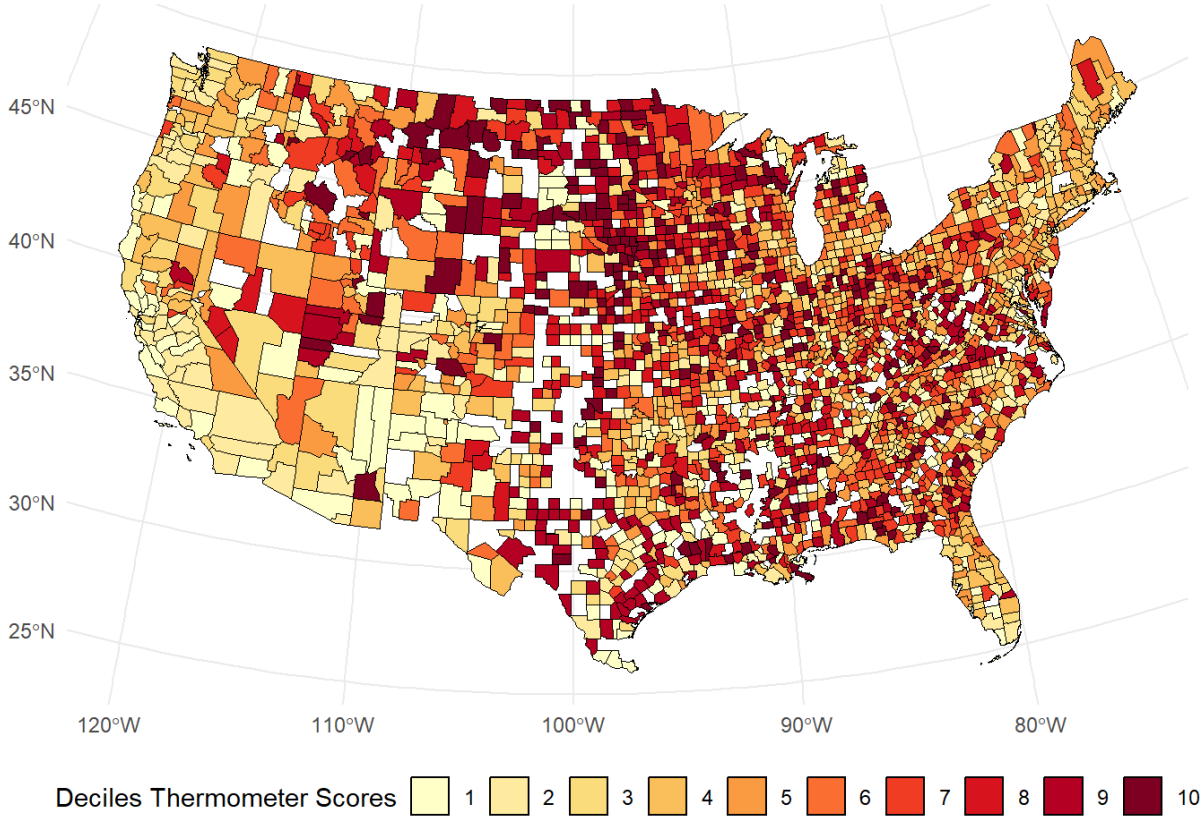

Figure 1. Distribution of Feeling Thermometer difference scores across the United States. Darker areas reflect stronger pro-White / anti-Native American prejudice.

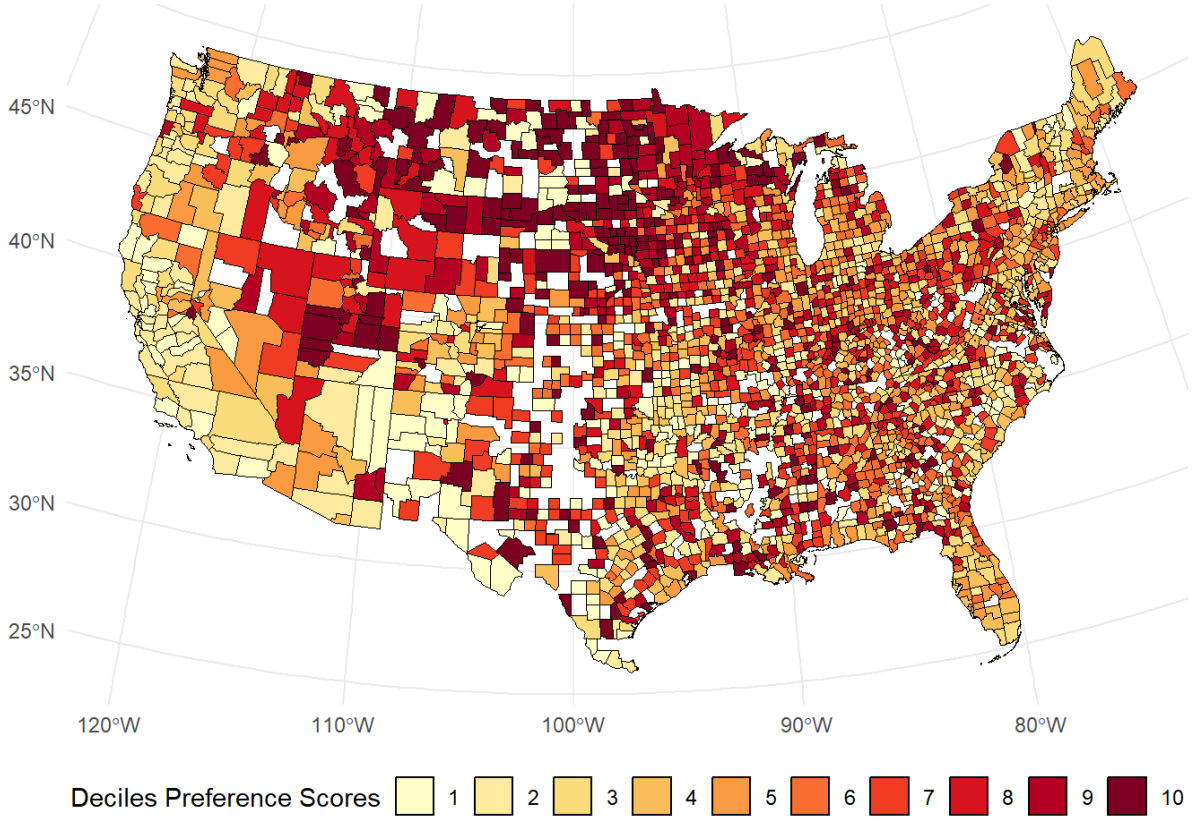

Figure 2. Distribution of preference scores across the United States. Darker areas reflect stronger pro-White / anti-Native American prejudice.

Native American Stereotypes

We assessed stereotypes linking Native Americans versus White Americans with Americanness versus foreignness with the Native American Implicit Association Test (IAT: Greenwald et al., 1998). In this IAT, participants categorize faces as Native American or White American and landscapes as American or foreign. We calculated IAT D-scores (Greenwald et al., 2003) following the Project Implicit algorithm and interpreted higher D-scores as reflecting stronger stereotypes linking White US Americans with US Americanness and Native Americans with foreignness. Figure 3 shows the distribution of the IAT scores across the United States.

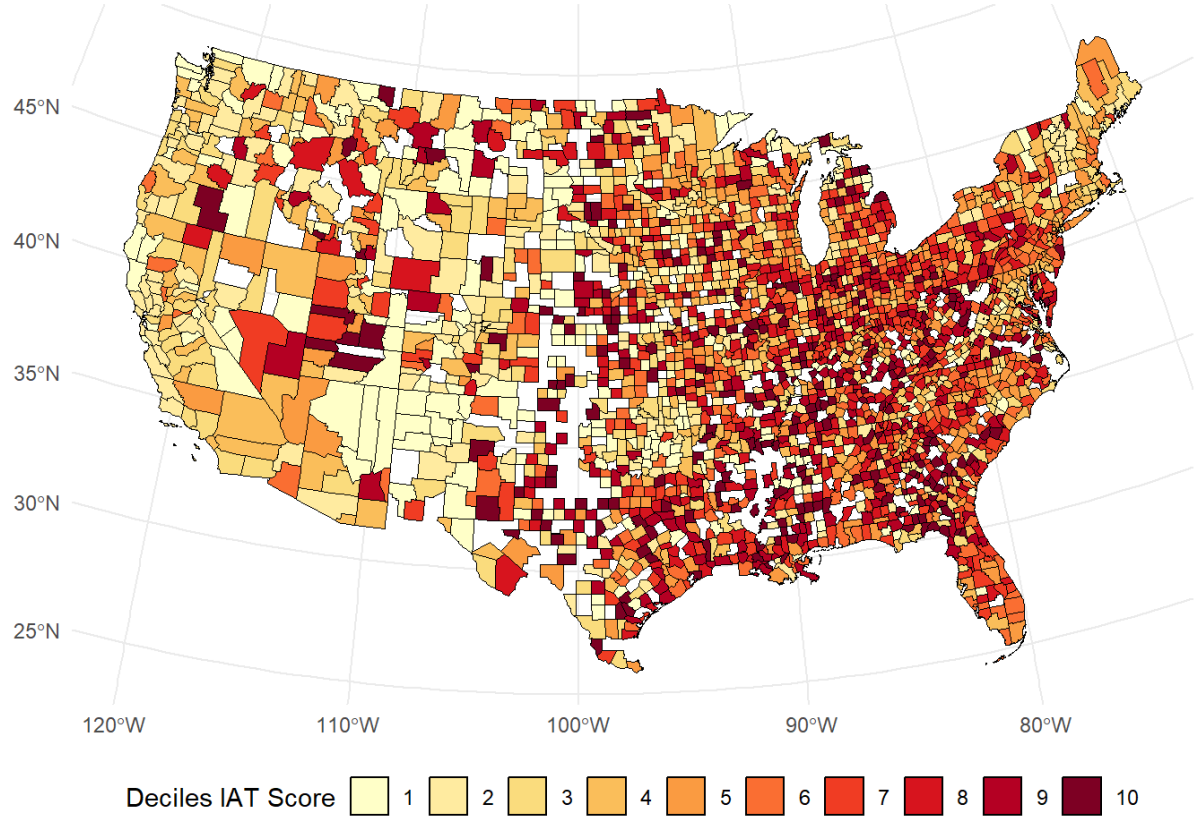

Figure 3. Distribution of IAT Scores across the United States. Darker areas reflect places where Native Americans are perceived as less US American / more foreign compared to White US Americans.

Boarding Schools

Our focal predictors – the presence and number of boarding schools in a county – were built from data collected by the National Native American Boarding School Healing Coalition (2025). Figure 4 shows the distribution of counties with a boarding school and Figure 5 shows the number of boarding schools per county.

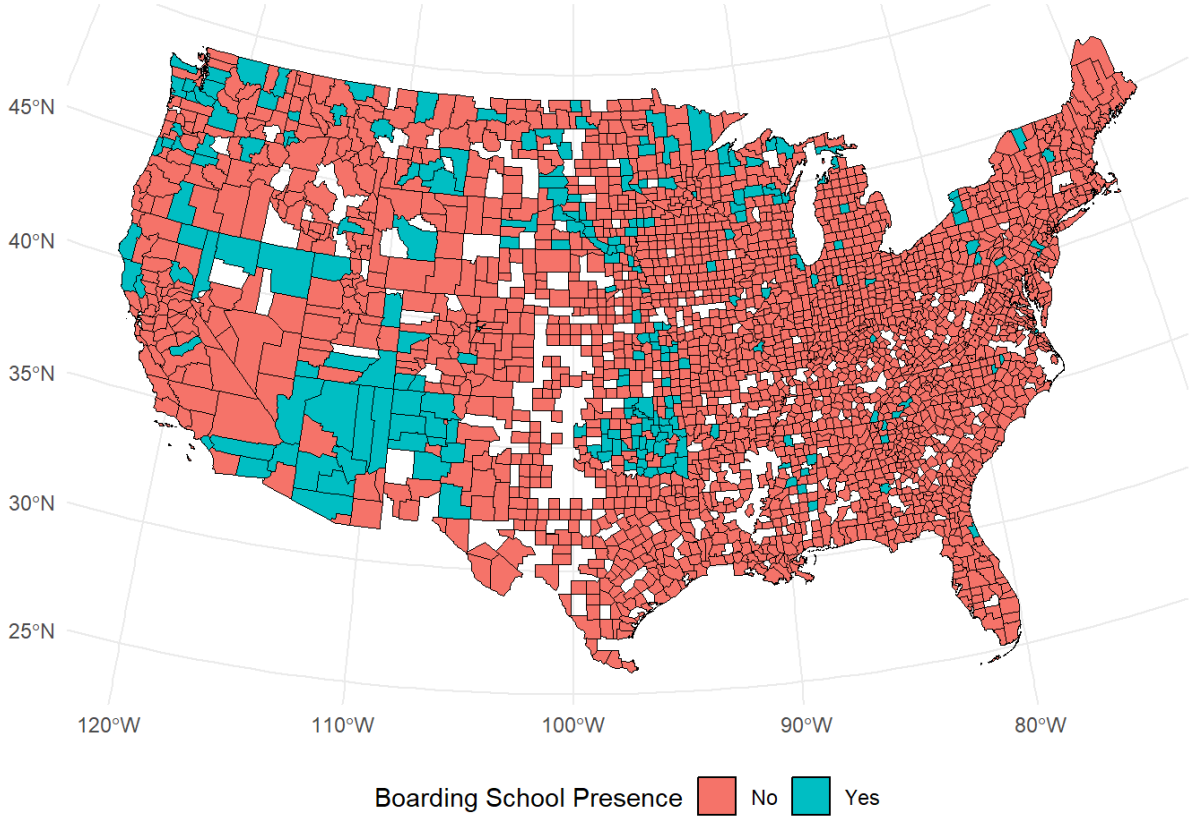

Figure 4. Distribution of counties with a Native American boarding school.

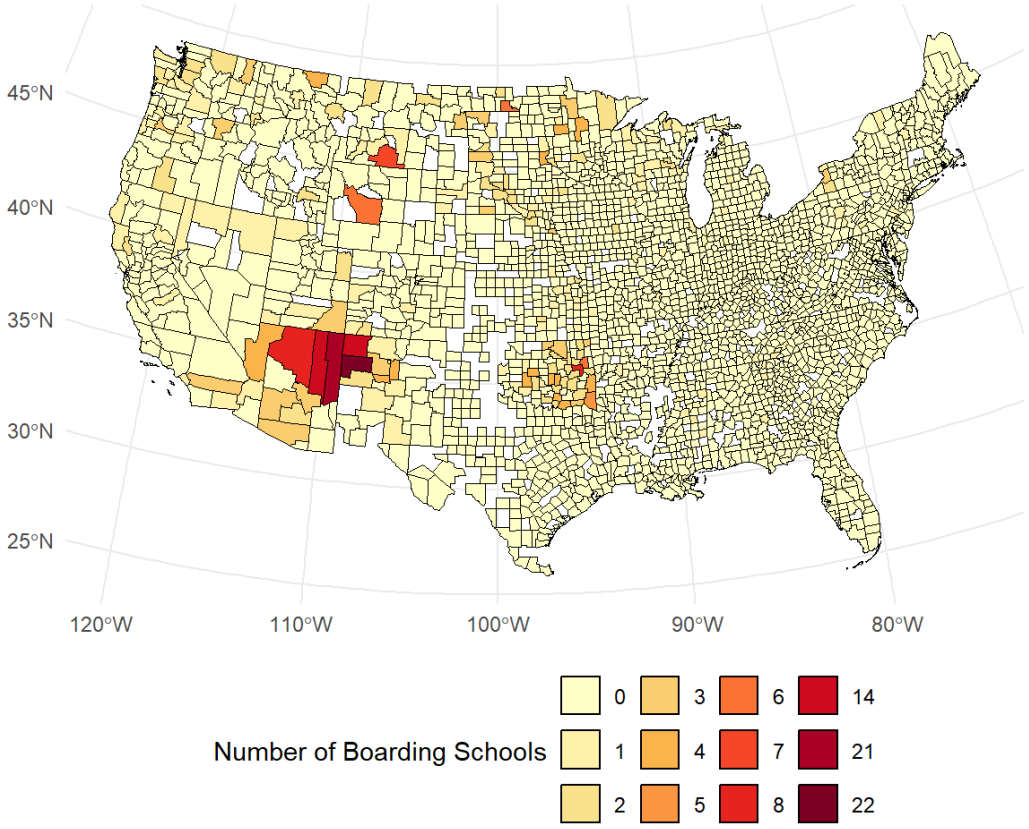

Figure 5. Number of Native American Boarding Schools per county across the United States.

Control Variables

We included population density, the proportion of Native Americans living in a county, education (defined as the proportion of people aged 25 or older with a high school degree), and income (defined as median household income over the past 12 months) as control variables. All control variables reflect 5-year estimates (2017-2021) from the American Community Survey (United States Census Bureau, 2024). We based these covariates on similar previous research (Primbs et al., 2024b; Primbs & Calanchini, 2025) and pre-registered our choice of covariates.

Analyses

In line with our pre-registration, we first specified a series of linear regression models to predict Native American prejudice and stereotypes. In one set of models, we included the

presence of a Native American boarding school in a county as a predictor (H1a, H2a), and in another set of models we included the number of boarding schools as a predictor (H1b, H2b). In all models, we included population density, proportion of Native Americans, education levels, and income as covariates, and implemented weights representing the number of Project Implicit participants per county. We ran each model once with untransformed covariates and, given a moderate degree of skewness in our variables, ran each model again with log-transformed covariates.

As in previous studies (Primbs & Calanchini, 2025), we followed up on these linear regressions models by implementing spatial regression models (Ebert et al., 2023). Regions that are closer to each other or share borders are often more similar to each other than are more distant regions. Such spatial autocorrelation can lead to violations of the basic independence assumption that underlies standard regression models and, thus, produce biased estimates. To assess the extent of spatial autocorrelation, we used permutation-based Moran's tests on the residuals of the linear regression models, as implemented in the R package spdep (version 1.3.3; Bivand & Wong, 2018). If Moran's test was not statistically significant (i.e., $p > .05$), we calculated and interpreted marginal effects obtained with the marginaleffects R package (version 0.21.0; Arel-Bundock et al., 2024). However, if Moran's test was statistically significant ($p \leq .05$), we interpreted this as evidence of spatial autocorrelation and ran spatial regression models.

We created spatial weights matrices using k-nearest neighbour weights and used these matrices as regression weights for our spatial regressions (and, thus, did not implement weights representing the number of Project Implicit participants per county, as we did in the linear regressions). The spatial regressions included the same predictors and dependent variables as the linear regressions. We estimated two types of spatial regression models – spatial lag and spatial error – using the spatialreg R package (Version 1.3.2, Bivand et al.,

2013) aided by the sf R package (version 1.0.14; Pebesma, 2018; Pebesma & Bivan, 2023). For each spatial regression, we once again used Moran's test to assess whether the spatial regressions successfully reduced spatial autocorrelation.

We only interpret linear models with no evidence of spatial autocorrelation (i.e., Moran's I $p > .05$). For linear models with evidence of spatial autocorrelation (i.e., Moran's I $p \leq .05$), we interpret the results of the spatial model. In some cases, significant spatial autocorrelation remained in one or both spatial models (i.e., accounting for spatial autocorrelation did not eliminate dependence among regions). We only interpret the results of spatial models with no evidence of remaining spatial autocorrelation. Based on these criteria, bold print in the regression tables below indicates the models that we interpret in the main text.

The analyses described above are based on all available counties, even if county-level estimates reflected very few respondents and are thus statistically imprecise. Consequently, we assessed the robustness of our findings by repeating all analyses with counties that have at least 20 or, separately, 50 Project Implicit responses, which increases the statistical precision of the county-level estimates. We calibrate our confidence in findings to the extent that they generalize across different inclusion thresholds. Finally, we also report a series of discriminant tests that interrogate whether the geographic distribution of boarding schools is related to intergroup biases that were not central to the mission of the schools (i.e., age bias, disability bias).[1]

Results

Confirmatory Analyses

We pre-registered our confirmatory analyses on the OSF (https://osf.io/p5q4x/?view_only=6be7151e2d964cddb4f74126cecabe92).

[1] At the request of reviewers, we also ran analyses including only the responses of White participants, and including only counties where boarding schools were located. These analyses largely replicate the findings of the pre-registered analyses, and we report them on the OSF.

H1a: Presence of Boarding Schools in a County and Racial Prejudice

We assessed the relationship between the historical presence of a Native American boarding school in a county and racial prejudice against Native Americans. In one set of models, we operationalized racial prejudice in terms of responses on the preference measure, and in another set of models we operationalized racial prejudice in terms of the feeling thermometer difference score. All linear models showed spatial autocorrelation. We therefore estimated spatial models and interpreted all spatial models that successfully removed spatial autocorrelation (i.e. Moran's I $p > .05$).

We summarize the results of these analyses in Table 1. For the preference measure, a consistent pattern of results emerged across all log-transformed spatial error models, such that the presence of a boarding school is associated with weaker preferences for White over Native Americans. Across all inclusion thresholds (i.e., all data, $N > 20$, $N > 50$), log-transformed spatial error models consistently eliminated spatial autocorrelation, whereas raw spatial error models and both raw and log-transformed spatial lag models inconsistently eliminated spatial autocorrelation. Consequently, we interpret the results of the log-transformed spatial error models with the greatest confidence – though the sign and magnitude of effects is consistent across all spatial models and, thus, suggest the same conclusion.

A similar, but less consistent, pattern of results emerged for the feeling thermometer difference scores. Mirroring the preference measure, the presence of a boarding school is associated with relatively less negative evaluations of Native Americans relative to White US Americans. However, the presence of boarding schools consistently predicted feeling thermometer difference scores only in the context of log-transformed spatial models, and only for inclusion thresholds $N > 20$ and $N > 50$. Nevertheless, the sign and magnitude of effects is consistent across models.

Table 1

Summary of Statistical Models for H1a: Presence of Boarding Schools

DV	Inclusion Threshold	Analysis	Covariates	Coefficient	*SE*	Regression *p*-value	Moran's *I* *p*-value
Preference	All responses	Linear Model	Raw	0.011	0.010	.250	.001
		Linear Model	Log	0.037	0.010	<.001	.001
		Spatial Lag	Raw	-0.028	0.026	.274	.001
		Spatial Error	**Raw**	**-0.043**	**0.026**	**.099**	**.872**
		Spatial Lag	**Log**	**-0.053**	**0.027**	**.053**	**.131**
		Spatial Error	**Log**	**-0.061**	**0.028**	**.028**	**.652**
	20+	Linear Model	Raw	0.012	0.012	.327	.001
		Linear Model	Log	0.039	0.013	.002	.001
		Spatial Lag	Raw	-0.020	0.019	.295	.001
		Spatial Error	**Raw**	**-0.059**	**0.018**	**.001**	**.976**
		Spatial Lag	Log	-0.032	0.022	.143	.001
		Spatial Error	**Log**	**-0.053**	**0.021**	**.012**	**.860**
	50+	Linear Model	Raw	0.014	0.015	.369	.001
		Linear Model	Log	0.041	0.016	.010	.001

		Spatial Lag	Raw	-0.018	0.20	.367	.001
		Spatial Error	**Raw**	**-0.063**	**0.018**	**<.001**	**.945**
		Spatial Lag	Log	-0.011	0.022	.624	.001
		Spatial Error	**Log**	**-0.046**	**0.020**	**.020**	**.796**
Feeling Thermometer	All	Linear Model	Raw	-0.058	0.027	.033	.001
		Linear Model	Log	0.019	0.028	.496	.033
		Spatial Lag	**Raw**	**-0.102**	**0.085**	**.228**	**.334**
		Spatial Error	**Raw**	**-0.112**	**0.086**	**.190**	**.676**
		Spatial Lag	**Log**	**-0.092**	**0.090**	**.308**	**.589**
		Spatial Error	**Log**	**-0.093**	**0.090**	**.300**	**.558**
	20+	Linear Model	Raw	-0.056	0.032	.084	.001
		Linear Model	Log	0.017	0.034	.614	.001
		Spatial Lag	Raw	-0.112	0.058	.052	.020
		Spatial Error	**Raw**	**-0.154**	**0.058**	**.007**	**.696**
		Spatial Lag	**Log**	**-0.170**	**0.065**	**.008**	**.170**
		Spatial Error	**Log**	**-0.175**	**0.065**	**.007**	**.647**
	50+	Linear Model	Raw	-0.049	0.039	.209	.001
		Linear Model	Log	0.027	0.040	.503	.001
		Spatial Lag	**Raw**	**-0.113**	**0.051**	**.026**	**.567**

Spatial Error	**Raw**	**-0.164**	**0.052**	**.002**	**.824**
Spatial Lag	**Log**	**-0.107**	**0.057**	**.059**	**.625**
Spatial Error	**Log**	**-0.122**	**0.057**	**.033**	**.778**

Note. "Analyses" refers to regression type. "Covariates" refers to the covariate transformation approach, with "Raw" indicating untransformed covariates and "Log" indicating log-transformed covariates. Bold indicates models with no evidence of spatial autocorrelation and, thus, that we interpret in the main text.

H1b: Number of Boarding Schools in a County and Racial Prejudice

We assessed the relationship between the historical number of boarding schools in a county and racial prejudice against Native Americans. All linear models showed spatial autocorrelation. We therefore estimated spatial models and interpreted all spatial models that successfully removed spatial autocorrelation.

We summarize the results of these analyses in Table 2. For the preference measure, a directionally-consistent pattern of results emerged across all log-transformed spatial error models, such that more boarding schools in a county is associated with weaker preferences for White over Native Americans. However, this relationship was only statistically significant in the model with full data, and was not significant (with *ps* > .07) in the models with inclusion thresholds N > 20 and N > 50. The sign, magnitude, and statistical significance of effects was inconsistent across all other models.

For the feeling thermometer difference scores, the number of boarding schools in a county is unrelated to evaluations of Native Americans. This pattern of null results is consistent across raw and log-transformed spatial error and spatial lag models.

Table 2

Summary of Statistical Models for H1b: Number of Boarding Schools

DV	Inclusion Threshold	Analysis	Covariates	Coefficient	*SE*	Regression *p*-value	Moran's *I* *p*-value
Preference	All Responses	Linear Model	Raw	0.0001	0.004	.972	.001
		Linear Model	Log	-0.013	0.003	<.001	.001
		Spatial Lag	Raw	0.004	0.008	.620	.001
		Spatial Error	**Raw**	**0.004**	**0.009**	**.676**	**.861**
		Spatial Lag	**Log**	**-0.019**	**0.008**	**.019**	**.153**
		Spatial Error	**Log**	**-0.021**	**0.008**	**.013**	**.664**
	20+	Linear Model	Raw	0.0004	0.005	.930	.001
		Linear Model	Log	-0.013	0.004	.001	.001
		Spatial Lag	Raw	0.007	0.006	.217	.001
		Spatial Error	**Raw**	**0.010**	**0.006**	**.084**	**.971**
		Spatial Lag	Log	-0.014	0.006	.019	.001
		Spatial Error	**Log**	**-0.011**	**0.006**	**.062**	**.859**
	50+	Linear Model	Raw	-0.001	0.006	.863	.001
		Linear Model	Log	-0.014	0.005	.004	.001
		Spatial Lag	Raw	0.007	0.006	.222	.001

		Spatial Error	**Raw**	**0.003**	**0.005**	**.604**	**.939**
		Spatial Lag	Log	-0.013	0.005	.018	.001
		Spatial Error	**Log**	**-0.010**	**0.005**	**.068**	**.814**
Feeling Thermometer	All	Linear Model	Raw	-0.017	0.010	.079	.001
		Linear Model	Log	-0.025	0.009	.005	.021
		Spatial Lag	**Raw**	**0.013**	**0.028**	**.641**	**.323**
		Spatial Error	**Raw**	**0.014**	**0.028**	**.626**	**.697**
		Spatial Lag	**Log**	**-0.020**	**0.027**	**.450**	**.592**
		Spatial Error	**Log**	**-0.021**	**0.027**	**.443**	**.552**
	20+	Linear Model	Raw	-0.018	0.002	.124	.001
		Linear Model	Log	-0.026	0.011	.013	.001
		Spatial Lag	Raw	0.026	0.017	.139	.026
		Spatial Error	**Raw**	**0.021**	**0.018**	**.254**	**.706**
		Spatial Lag	**Log**	**-0.022**	**0.017**	**.196**	**.197**
		Spatial Error	**Log**	**-0.022**	**0.018**	**.221**	**.623**
	50+	Linear Model	Raw	-0.023	0.015	.124	.001
		Linear Model	Log	-0.026	0.013	.038	.001
		Spatial Lag	**Raw**	**0.028**	**0.015**	**.056**	**.756**
		Spatial Error	**Raw**	**0.010**	**0.015**	**.535**	**.819**

Spatial Lag	**Log**	**-0.003**	**0.014**	**.808**	**.613**
Spatial Error	**Log**	**-0.008**	**0.015**	**.582**	**.766**

*Note. "*Analyses" refers to regression type. "Covariates" refers to the covariate transformation approach, with "Raw" indicating untransformed covariates and "Log" indicating log-transformed covariates. Bold indicates models with no evidence of spatial autocorrelation and, thus, that we interpret in the main text.

H2a: Presence of Boarding Schools and Racial Stereotypes

We assessed the relationship between the presence of a boarding school and racial stereotypes linking Native Americans versus White US Americans with US Americanness versus foreignness. All linear models showed spatial autocorrelation. We therefore estimated spatial models and interpreted all spatial models that successfully removed spatial autocorrelation.

We summarize the results of these analyses in Table 3. A consistent pattern of results emerged across all raw spatial error models, such that the presence of a boarding school is associated with stereotypes of Native Americans as more US American / less foreign. Across all inclusion thresholds, raw spatial error models consistently eliminated spatial autocorrelation, whereas log-transformed spatial error models and both raw and log-transformed spatial lag models inconsistently eliminated spatial autocorrelation. Consequently, we interpret the results of the raw spatial error models with the greatest confidence – though the sign and magnitude of effects is consistent across all spatial models and, thus, suggests the same conclusion.

Table 3

Summary of Statistical Models for H2a: Presence of Boarding Schools

DV	Inclusion Threshold	Analysis	Covariates	Coefficient	*SE*	Regression *p*-value	Moran's *I* *p*-value
IAT	All Responses	Linear Model	Raw	-0.037	0.004	<.001	.001
		Linear Model	Log	-0.013	0.004	.002	.001
		Spatial Lag	**Raw**	**-0.056**	**0.013**	**<.001**	**.913**
		Spatial Error	**Raw**	**-0.057**	**0.013**	**<.001**	**.574**
		Spatial Lag	**Log**	**-0.021**	**0.014**	**.135**	**.653**
		Spatial Error	**Log**	**-0.021**	**0.014**	**.132**	**.502**
	20+	Linear Model	Raw	-0.018	0.005	<.001	.001
		Linear Model	Log	-0.013	0.005	.010	.001
		Spatial Lag	Raw	-0.032	0.009	<.001	.001
		Spatial Error	**Raw**	**-0.030**	**0.009**	**<.001**	**.820**
		Spatial Lag	Log	-0.030	0.009	.002	.001
		Spatial Error	**Log**	**-0.029**	**0.009**	**.002**	**.778**
	50+	Linear Model	Raw	-0.017	0.006	.003	.001
		Linear Model	Log	-0.012	0.006	.055	.001
		Spatial Lag	Raw	-0.029	0.008	<.001	.001
		Spatial Error	**Raw**	**-0.027**	**0.008**	**<.001**	**.766**
		Spatial Lag	Log	-0.022	0.009	.012	.001

Spatial Error	**Log**	**-0.021**	**0.008**	**.010**	**.703**	

Note. "Analyses" refers to regression type. "Covariates" refers to the covariate transformation approach, with "Raw" indicating untransformed covariates and "Log" indicating log-transformed covariates. Bold indicates models with no evidence of spatial autocorrelation and, thus, that we interpret in the main text.

H2b: Number of Boarding Schools and Racial Stereotypes

To complement our pre-registered analyses, we assessed the relationship between the number of boarding schools in a county and racial stereotypes linking Native Americans with perceptions of US Americanness versus foreignness. Because of an error on our part, these analyses were not pre-registered (see our transparency statement). We report the results of these analyses in Table 4. A consistent pattern of null results emerged across all spatial models, such that the number of boarding schools is unrelated to Native American stereotypes.

Table 4

Summary of Statistical Models for H2b: Number of Boarding Schools

DV	Inclusion Threshold	Analysis	Covariates	Coefficient	*SE*	Regression *p*-value	Moran's *I* *p*-value
IAT	All Responses	Linear Model	Raw	-0.004	0.002	.003	.001
		Linear Model	Log	-0.003	0.001	.03	.002
		Spatial Lag	**Raw**	**-0.004**	**0.004**	**.351**	**.919**
		Spatial Error	**Raw**	**-0.005**	**0.004**	**.282**	**.635**

	Spatial Lag	**Log**	**-0.003**	**0.004**	**.487**	**.640**
	Spatial Error	**Log**	**-0.003**	**0.004**	**.444**	**.508**
20+	Linear Model	Raw	-0.004	0.002	.832	.001
	Linear Model	Log	-0.003	0.002	.061	.001
	Spatial Lag	Raw	0.0006	0.003	.811	.001
	Spatial Error	**Raw**	**0.0005**	**0.003**	**.838**	**.826**
	Spatial Lag	Log	-0.004	0.003	.156	.001
	Spatial Error	**Log**	**-0.004**	**0.003**	**.177**	**.774**
50+	Linear Model	Raw	0.00005	0.002	.979	.001
	Linear Model	Log	-0.003	0.002	.153	.001
	Spatial Lag	Raw	0.003	0.002	.183	.001
	Spatial Error	**Raw**	**0.003**	**0.002**	**.228**	**.735**
	Spatial Lag	Log	-0.001	0.002	.574	.001
	Spatial Error	**Log**	**-0.0006**	**0.002**	**.787**	**.712**

Note. "Analyses" refers to regression type. "Covariates" refers to the covariate transformation approach, with "Raw" indicating untransformed covariates and "Log" indicating log-transformed covariates. Bold indicates models with no evidence of spatial autocorrelation and, thus, that we interpret in the main text.

Discriminant Test: Age Bias

Native American boarding schools specifically targeted Native Americans. Therefore, the relationships we observed between Native American boarding schools and racial biases

towards Native Americans should not extend to other social groups. We tested this prediction using the 2002-2024 subset of the Project Implicit Age data, focusing specifically on the Age relative preference measure, feeling thermometers, and IAT. For the feeling thermometers, we calculated difference scores by subtracting feeling thermometer ratings of old people from ratings of young people. In total, the dataset contained 1,866,295 participants, 274,906 of whom lived in counties with a Native American boarding school and 1,591,389 lived in counties without a boarding school. We analyzed these data in the same way as we did for the measures of Native American bias reported above.

All linear models showed spatial autocorrelation, and we therefore conducted and interpreted the spatial regression models. No significant relationships emerged linking any measures of age bias with either the presence of or the number of boarding schools. Correspondingly, observed effect sizes were considerably smaller than were effect sizes observed for Native American biases. We report the results of these analyses in full in the supplement, and conclude that this discriminant test was successful in demonstrating that boarding schools are unrelated to current age biases.

Discriminant Test: Disability Bias

We conducted further discriminant tests using the 2004-2024 subset of the Project Implicit Disability data. In line with the reasoning that motivated our age bias discriminant tests, we did not expect for the historical legacy of Native American boarding schools to extend to current biases in favor of able-bodied people over disabled people. We tested this prediction using the 2002-2024 subset of the Project Implicit Disability data, focusing specifically on the Disability relative preference measure, feeling thermometers, and IAT. For the feeling thermometers, we calculated difference scores by subtracting feeling thermometer ratings of disabled people from ratings of abled people. In total, the dataset contained

822,739 participants, 122,712 of whom lived in counties with a Native American boarding school and 700,027 of whom lived in counties without a boarding school. We analyzed these data in the same way as we did for the measures of Native American bias reported above.

Almost all linear models showed spatial autocorrelation, and we therefore conducted and interpreted the spatial regression models. No significant relationships emerged linking either the disability preference measure or the disability IAT with the presence or the number of boarding schools. However, a significant relationship emerged linking the disability feeling thermometer difference score with the presence (but not the number) of boarding schools, such that the presence of a boarding school was associated with a more negative evaluation of disabled people relative to able-bodied people. Observed effect sizes were very similar for the feeling thermometers, but considerably smaller compared to the IAT and the preference measure. We report the results of these analyses in full in the supplement, and conclude that this discriminant test was partially successful in demonstrating that boarding schools are unrelated to two of three operationalizations of modern disability biases.

Exploratory Analyses

Self-Replication: Feeling Thermometers 2022-2024 Subset

In 2022, Project Implicit adjusted the labels in their Native American prejudice measures to reflect European Americans instead of White Americans. Here we seek to replicate the findings we report above from the 2004-2021 dataset in a new dataset. The preference measure in the 2022-2024 subset contains an error[2], hence we focus on the feeling thermometer difference scores, which assess how warm or cold participants feel towards Native Americans and, separately, European Americans on an 11-point scale ranging from 0

[2] The preference measure contained an error, in that some scale labels contrasted European Americans with Native Americans (e.g. "I like European Americans and Native Americans equally"), but other labels contrasted European Americans with White Americans (e.g., "I strongly prefer European Americans to White Americans"). Thus, preference measure responses collected between 2022-2024 are not interpretable.

("*Extremely Cold"*) to 10 ("*Extremely Warm"*). More positive scores reflect stronger pro-European American / anti-Native American prejudice. This dataset contains responses from 65,228 participants, 13,506 of whom live in counties with a Native American boarding school and 51,722 of whom live in counties without a boarding school. We repeated all analyses conducted for our main analyses. However, given the much smaller size of this dataset, we do not report additional robustness checks with $N > 20$ or $N > 50$ responses per county because those inclusion thresholds dramatically reduce the number of counties included for analysis. All linear models showed significant spatial autocorrelation, so we estimated and interpreted spatial models.

We summarize the results of these analyses in Table 5. In the first set of analyses, predicting modern racial prejudice from the historical presence of boarding schools, both raw spatial lag and spatial error models were related to feeling thermometer difference scores, such that the presence of a boarding school is associated with less negative evaluations of Native Americans relative to European Americans. The sign and magnitude of these effects is consistent across both log-transformed spatial lag and spatial error models and, thus, suggest the same conclusion.

In the second set of analyses, predicting modern racial prejudice from the historical number of boarding schools, both the log-transformed spatial lag and spatial error models were related to feeling thermometer difference scores, such that more boarding schools in a county are associated with less negative evaluations of Native Americans relative to European Americans. The sign and magnitude of these effects is consistent in both raw spatial lag and spatial error models and, thus, suggests the same conclusion. We conclude that the pattern of results that emerged in the 2004-2021 data replicates in the 2022-2024 data with a slightly different operationalization of feeling thermometer racial prejudice.

Table 5

Summary of Statistical Models: Exploratory Feeling Thermometers 2022 onwards

DV	Analysis	Covariates	Coefficient	*SE*	Regression *p*-value	Moran's *I* *p*-value
Exploratory: Presence of Boarding Schools						
Feeling Thermometer	Linear Model	Raw	-0.193	0.027	<.001	.002
	Linear Model	Log	-0.042	0.029	.136	.007
	Spatial Lag	**Raw**	**-0.239**	**0.094**	**.005**	**.419**
	Spatial Error	**Raw**	**-0.234**	**0.085**	**.006**	**.548**
	Spatial Lag	**Log**	**-0.148**	**0.090**	**.100**	**.577**
	Spatial Error	**Log**	**-0.144**	**0.090**	**.111**	**.527**
Exploratory: Number of Boarding Schools						
Feeling Thermometer	Linear Model	Raw	-0.034	0.009	<.001	.001
	Linear Model	Log	-0.024	0.008	.003	.006
	Spatial Lag	**Raw**	**-0.047**	**0.027**	**.088**	**.421**
	Spatial Error	**Raw**	**-0.045**	**0.028**	**.106**	**.569**
	Spatial Lag	**Log**	**-0.053**	**0.026**	**.044**	**.568**
	Spatial Error	**Log**	**-0.054**	**0.027**	**.044**	**.530**

Note. "Analyses" refers to regression type. "Covariates" refers to the covariate transformation approach, with "Raw" indicating untransformed covariates and "Log"

indicating log-transformed covariates. Bold indicates models with no evidence of spatial autocorrelation and, thus, that we interpret in the main text.

Discussion

We investigated the psychological legacy of Native American boarding schools, which were established by the federal government with the explicit purpose of extinguishing Native Americans' culture by assimilating them to White US American culture. Based on the majority of past findings linking historical inequalities with present-day intergroup biases, we hypothesized that the presence and number of Native American boarding schools in a county would be associated with higher levels of aggregated racial prejudice against Native Americans. However, we found the opposite pattern of results, such that the presence of boarding schools in a county was associated with lower levels of racial prejudice. We had competing predictions about how the presence and number of boarding schools would be related to stereotypes of Native Americans as US American versus foreign. If the perspective that Native Americans are insufficiently US American that motivated boarding schools persists in places where boarding schools were located, then we should expect modern stereotypes of Native Americans as more foreign and less American in counties where boarding schools had been located. However, if boarding schools succeeded at assimilating Native Americans to White cultural norms, then we should expect modern stereotypes of Native Americans as more US American and less foreign in counties where boarding schools had been located. Our findings support the latter perspective, such that Native Americans are perceived as more US American and less foreign in regions where a boarding school had been located compared to regions without a boarding school. Across all preregistered analyses, the number of boarding schools in a county was largely unrelated to Native biases. These findings support and extend situational models of bias that link prejudice and stereotypes with environments, and invite theoretical discussions about the conditions under

which historical inequalities exacerbate versus reduce present-day racial biases. Though the present research highlights a positive consequence of Native American boarding schools, we want to preempt any potential misinterpretation that boarding schools made an overall positive contribution to US society. Native American boarding schools erased Native American language and culture, and are associated with a multitude of negative consequences for attendees and their descendants, including increased illicit drug use, more posttraumatic stress disorder symptoms, higher levels of alcohol use disorder, and increased suicidal ideation (Brookie et al. 2024; Evans-Campbell et al., 2012). Our findings that boarding schools are associated with lower levels of regional intergroup bias in no way balances out the horrors the boarding school system inflicted on Native American children and society.

An interesting conundrum currently exists in the literature on situational models of bias. Most research published in this domain indicates that the presence of historical inequalities in a region is associated with higher levels of aggregated racial bias (Payne et al., 2019; Primbs & Calanchini, 2025; Vuletich et al., 2023) – a pattern of results that aligns with existing theory. However, Primbs and colleagues (2024b) observed lower racial bias in areas with historical Ku Klux Klan presence and argued that this finding reflects a contrast effect: Liberal White residents sought to distance themselves from the Klan and, consequently, shift their attitudes away from the hate the Klan champions (see Kurdi et al., 2023 for a related argument). Connecting this rationale to the present research, the Klan and boarding schools shared the same goal of racial dominance, but they each went about doing so in different ways. Racial violence at boarding schools largely took place behind closed doors, whereas the Klan was much more public with their terror. People with more egalitarian attitudes therefore should not feel as strong a need to distance themselves from the boarding schools, which is why we did not predict a contrast effect. However, the pattern of results that emerged in the present research does not align with our predictions. Instead, we observed that

the presence of a Native American boarding school is associated with lower levels of bias. Considering that boarding schools do not seem to reflect a context in which contrast effect should occur, our findings suggest that existing theory on situational models of bias is incomplete.

That said, we can turn to contact theory (Allport, 1954) for a potential explanation for why our findings contrast with predictions that can be derived from situational models of bias. In the present research, we found that modern-day residents of areas with a boarding school evaluated Native Americans more positively, and viewed them as more US American / less foreign. The explicit purpose of boarding schools was to assimilate Native Americans to White culture, and one way they did so was through summer programs in which Native American children worked in the communities surrounding the boarding schools (Landis, 1996). The intergroup contact created by these programs was likely positive for the White population: it included many of the markers identified by Allport (1954) as fostering positive contact, such as support from authorities, common goals, and intergroup cooperation (i.e., shared work). Native Americans who were educated in boarding schools and interacted with the local communities may have behaved more in line with White US American culture than Native Americans in other areas – and consequently, White US Americans interacting with these Native Americans would have more positive intergroup contact, eventually leading to more positive evaluations of Native Americans. These relatively more positive evaluations, in turn, may have persisted over time, continually reinforced by contact with the descendants of the Native Americans who attended boarding school. Integrating contact theory with situational models of bias, and examining predictions of contact theory from a situational perspective, therefore would seem to be a fruitful direction to continue the present line of research (for a related perspective, see Stier et al., 2024).

Contact theory would also seem to provide an explanation for our finding that the presence of a Native American boarding school in a region was a stronger predictor of bias than the number of Native American boarding schools. This pattern of results aligns with a previous finding that the presence of a sundown town in a county is a stronger predictor of racial bias against Black people than is the number of sundown towns in a county (Primbs & Calanchini, 2025). Together, these findings imply that historical inequalities are not simply additive. Instead, the mere presence of a single sundown town or boarding school seems to be sufficient to influence the local environment, with additional towns or schools having little effect beyond that baseline. This pattern of results dovetails with a robust finding in the intergroup contact literature: contact must achieve a certain threshold to have positive outcomes, and additional contact has diminishing returns once that threshold is reached (MacInnis & Gould, 2015). From this perspective, a single boarding school might be sufficient to reach this contact threshold, and the effects of additional boarding schools are too small to be picked up in the present sample.

Though contact theory offers a sensible post hoc explanation for our findings, a reviewer suggested another (non-mutually exclusive) compelling explanation that would seem to align with situational models of bias. As reflected in the quote from a boarding school superintendent that opens this manuscript, two prominent views on Native Americans existed in 19th century America: to either assimilate them to White culture, or to exterminate them altogether. Today we recognize the harm caused by boarding schools and other assimilationist efforts, but in the 19th century assimilation was offered as the egalitarian alternative to exterminating Native Americans. From this perspective, boarding schools may have been located in relatively more egalitarian areas and employed relatively more egalitarian staff – with that legacy of (paternalistic) egalitarianism persisting across time. Thus, we recognize that psychological meaning can vary with historical context: assimilation

was considered to be more humane in the past than it is viewed today. In doing so, our findings along with the work of Primbs and colleagues (2024b) join other calls to further integrate psychological science with the historical sciences (Muthukrishna et al., 2021).

Our findings that the presence of Native American boarding schools is associated with less bias against Native Americans dovetails with previous research demonstrating the same relationship between white supremacist activity and bias against Black US Americans (Primbs et al., 2024b). Though generalizability is a desirable characteristic in a robust area of research, at the same time we should not expect the same patterns of results to persist across theoretically-unrelated domains. Consequently, in the present research we conducted two discriminant tests. We consistently found that the presence of Native American boarding schools was unrelated to regional age biases, and was unrelated to two of three operationalizations of disability bias. The relationship between boarding schools and one operationalization of disability bias goes against our predictions, but it does align with other research that has found relationships between disability bias and white supremacist activity (Primbs et al., 2024b) and between disability bias and sundown towns (Primbs & Calanchini, 2025). One potential explanation for this pattern of results is generalized prejudice: the tendency for people who are biased against one group to also be biased against other groups (Hodson & Dhont, 2015; Hodson & Puffer, 2025). However, to date, generalized prejudice has only been studied as an individual difference. Together with recent previous research, the present work suggests the intriguing possibility of regional generalized prejudice, such that places that are biased against one group are also biased against other groups – and merits further investigation.

Contributions and Limitations

The present research contributes to the existing literature on regional intergroup bias by investigating the relatively understudied domain of bias against Native Americans (but see Jimenez et al., 2021, 2022). Moreover, we operationalized bias in the forms of both prejudice and stereotypes, which adds further evidence of generalizability to this literature. That said, the present research is characterized by three main limitations – limitations that are shared by most work in this domain. First, we rely on data from Project Implicit, which is an opt-in sample that does not represent the general population. However, some regional demographics of the Project Implicit participants correlate very strongly with the US census (Hehman et al., 2019) and previous research using both representative samples and Project Implicit data have found converging results (e.g., Ofosu et al., 2019; Primbs et al., 2024b).

Second, we cannot make strong causal claims based on the present data. Though psychological theory makes clear causal predictions about the relationship between intergroup biases and behavior (Payne et al., 2019; Payne & Hannay, 2021), the observed correlational findings may nevertheless be the result of unobserved confounders – which is a fundamental weakness of the approach we applied here, and of studies of regional differences more generally.

Third, and finally, our work includes data from participants of all races, which bolsters the generalizability of our findings, but at the same time might obscure important differences between social groups. Specifically, the present research cannot speak to the impact of boarding schools on Native American communities. Though our racial bias data reflects the responses of nearly 300,000 participants, only a very small percentage of them are Native Americans, which mirrors the very small proportion of Native populations living in America today. Consequently, the present research lacks the statistical power to contribute to the body of research documenting the psychological impact of boarding schools and

intergenerational trauma on modern Native Americans (e.g., Brockie et al., 2024; Evans-Campbell et al., 2012). Future research should rise to this important challenge.

Conclusion

Native American boarding schools intended to *"Kill the Indian… and save the man*." (Pratt, 1892). As survivors of boarding schools, their descendants, and society reckon with the legacy of boarding schools, we provide evidence that the historical presence of boarding schools casts a shadow on communities that persists today. Though the findings of the present study are ostensibly positive, they do not address the trauma and pain caused by the boarding schools that persist in Native communities. Children forced from their parents. Cultures destroyed. Languages lost. The effects of discriminatory practices may remain long after the practice has ended, still shaping local culture and people today.

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