Evaluating the Impact of Language Concordance on Coronavirus Disease 2019 Contact Tracing Outcomes Among Spanish-Speaking Adults in San Francisco Between June and November 2020

Amity Eliaz,[1,2] Alden H. Blair,[2] Yea-Hung Chen,[3] Alicia Fernandez,[1,2,4] Alexandra Ernst,[2] Joy Mirjahangir,[2] Jessica Celentano,[2] Darpun Sachdev,[5] Wayne Enanoria,[3,5] and Michael J. A. Reid[1,2,6]

[1]School of Medicine, University of California, San Francisco, San Francisco, California, USA, [2]Institute for Global Health Sciences, University of California, San Francisco, San Francisco, California, USA, [3]Department of Epidemiology and Biostatistics, University of California, San Francisco, San Francisco, California, USA, [4]Department of Medicine, University of California, San Francisco, San Francisco, California, USA, [5]San Francisco Department of Public Health, San Francisco, California, USA, and [6]Division of HIV, Infectious Diseases and Global Medicine, University of California, San Francisco, San Francisco, California, USA

We evaluated the impact of language concordance—clinician or public health worker fluency in a patient's primary language—on coronavirus disease 2019 (COVID-19) contact tracing outcomes among 2668 Spanish-speaking adults in San Francisco. Language concordance was associated with 20% greater odds of COVID-19 testing and 53% greater odds of support service referrals.

Keywords. contact tracing; COVID-19; language concordance.

Effective communication is essential to executing a robust public health response to the coronavirus disease 2019 (COVID-19) pandemic. Language concordance, defined as clinician or public health worker fluency in a patient's primary language, is an important factor in clinical practice and public health [1–4]. However, there is a paucity of data assessing its impact on public health actions related to COVID-19 in the United States.

In the city and county of San Francisco, COVID-19 disproportionately impacted Latinx immigrant communities. Among cases reported from April to June 2020, Latinx individuals were estimated to account for 70% of COVID-19 cases and 71% of close contacts despite representing only 15% of the San Francisco population [5, 6]. Approximately 85% of the cases spoke Spanish as a primary language [6]. In response, the San Francisco Department of Public Health (SFDPH) undertook concerted efforts to recruit contact tracers with Spanish language proficiency to reach contacts from the Latinx community and offer isolation and quarantine (I&Q) support services (such as food, housing, personal protective equipment, and cleaning supplies) that would allow contacts to safely quarantine [6–8]. To better understand the programmatic impact of language concordance on SFDPH's public health response, we sought to evaluate whether language concordance was associated with likelihood of contact tracing interview completion, follow-up COVID-19 testing, and access to I&Q support services among Spanish-speaking adults in San Francisco.

METHODS

We conducted a retrospective analysis of surveillance data collected by the SFDPH contact tracing program between June and November 2020. Individuals were considered eligible if they (1) met the Centers for Disease Control and Prevention definition of a close contact of a COVID-19 case, (2) resided in San Francisco, and (3) preferentially spoke Spanish [9]. Subjects aged <18 years were excluded, as were contacts who had already tested positive for COVID-19 prior to any contact tracing encounter. Contact tracing interviews were defined as language concordant when performed by a contact tracer self-reported as proficient in Spanish, and nonconcordant when performed by a tracer not proficient in Spanish, either using an interpreter service or speaking in English.

Main Outcomes and Measures

To assess the impact of language concordance, we determined odds of (1) contact tracing interview completion, (2) COVID-19 testing (determined by reconciliation with SFDPH's COVID-19 testing database), and (3) I&Q support service referrals among close contacts reached by language-concordant vs language-nonconcordant tracers. As availability and knowledge of COVID-19 testing and I&Q services varied over time, we used multivariate logistic regression to control for calendar time in months, using dummy variable adjustment for month. The model of best fit was chosen using Bayesian information criteria (BIC). Both unadjusted and adjusted odds ratios (ORs) were reported with their associated 95% confidence intervals (CIs), and $P < .05$ was considered statistically significant. Since close contacts were frequently called multiple times, the analyses utilized data related to the contact tracing interview of longest duration (as it was presumed to be the interview wherein

Table 1. Sociodemographic and Clinical Characteristics of Spanish-Speaking Close Contacts Reached by Language-Concordant or Language-Nonconcordant Contact Tracers

Characteristic	Total, No.	Language Concordance, No. (%)	Language Nonconcordance, No. (%)	P Value
Total	2668	1877	791	
Race/ethnicity				
Hispanic or Latinx	2043	1481 (78.9)	562 (71.1)	.60
American Indian and Alaska Native	3	3 (0.2)	0 (0)	
Asian and Pacific Islander	1	0 (0)	1 (0.1)	
Black or African American	0	0 (0)	0 (0)	
White	1	1 (0.1)	0 (0)	
Multiethnic	2	2 (0.1)	0 (0)	
Other	10	7 (0.4)	3 (0.4)	
Missing	608	383 (20.4)	225 (28.4)	
Age, y				
18–34	556	405 (21.6)	151 (19.1)	.15
35–49	920	649 (34.6)	271 (34.3)	
50–64	428	290 (15.5)	138 (17.4)	
65–79	116	82 (4.4)	34 (4.3)	
≥80	319	242 (12.9)	77 (9.9)	
Missing	329	209 (11.1)	120 (15.1)	
Gender				
Female	1194	862 (45.9)	332 (42.0)	.22
Male	1410	979 (52.2)	431 (54.5)	
Transgender man	0	0 (0)	0 (0)	
Transgender woman	3	3 (0.2)	0 (0)	
Other	3	3 (0.2)	0 (0)	
Missing	58	30 (1.6)	28 (3.5)	
Socioeconomic status				
Low	1075	781 (41.6)	294 (37.2)	.11
Medium-high	1281	891 (47.5)	390 (49.3)	
Missing	312	205 (10.9)	107 (13.5)	
Housing status				
Stable	2019	1461 (77.8)	558 (70.5)	.57
Congregate	12	10 (0.5)	2 (0.3)	
Temporary	23	15 (0.8)	8 (1.0)	
Unhoused	1	1 (0.1)	0 (0)	
Other	42	34 (1.8)	8 (1.0)	
Missing	571	356 (19.0)	215 (27.2)	
Household size				
1	44	32 (1.7)	12 (1.5)	.17
2–4	818	571 (30.4)	247 (31.2)	
5–9	1008	751 (40.0)	257 (32.5)	
≥10	179	131 (7.0)	48 (6.1)	
Missing	619	392 (20.9)	227 (28.7)	
Availability of a private bathroom				
Yes	354	282 (15.0)	72 (9.1)	.21
No	161	131 (7.0)	30 (3.8)	
Unknown	27	18 (1.0)	9 (1.1)	
Missing	2126	1446 (77.0)	680 (86.0)	
Contact type				
Household	2223	1561 (83.1)	662 (83.7)	.83
Nonhousehold	132	96 (5.1)	36 (4.6)	
Other	166	117 (6.2)	49 (6.2)	
Missing	147	103 (5.5)	44 (5.6)	
Symptoms				
Yes	658	479 (25.5)	179 (22.6)	.90
No	1335	977 (52.1)	358 (45.3)	
Missing	675	421 (22.4)	254 (32.1)	

Table 1. Continued

Characteristic	Total, No.	Language Concordance, No. (%)	Language Nonconcordance, No. (%)	P Value
Preexisting medical conditions				
Yes	524	364 (19.4)	160 (20.2)	.07
No	1538	1134 (60.4)	404 (51.1)	
Missing	606	379 (20.2)	227 (28.7)	
Cigarette smoking				
Yes	113	80 (4.3)	33 (4.2)	.73
No	1949	1418 (75.5)	531 (67.1)	
Missing	606	379 (20.2)	227 (28.7)	
Calendar time				
June	229	144 (7.7)	85 (10.7)	<.01
July	806	543 (28.9)	263 (33.2)	
August	759	502 (26.7)	257 (32.5)	
September	394	269 (14.3)	125 (15.8)	
October	227	201 (10.7)	26 (3.3)	
November	253	218 (11.6)	35 (4.4)	

most communication occurred). We also performed bivariate analyses to explore the relationship of language concordance with sociodemographic and clinical characteristics. Categorical variables were analyzed using χ^2 or Fisher exact tests, and continuous variables were analyzed using t tests or Wilcoxon rank-sum tests. Analyses were completed utilizing the R statistical package version 4.0.2 (R Foundation for Statistical Computing).

Ethical Considerations

This work was conducted as part of SFDPH's COVID-19 surveillance; institutional review board approval and informed consent from contacts were not required.

RESULTS

In total, 2668 close contacts were included in the analysis. Of these, 1877 (70.4%) were reached by language-concordant tracers and 791 (29.6%) by language-nonconcordant tracers. Additionally, 2142 (80.2%) contacts completed full interviews, 1170 (43.9%) subsequently completed COVID-19 testing during the 2-week quarantine period, and 944 (35.4%) received I&Q support service referrals.

There was no evidence of association between language concordance and sociodemographic or clinical characteristics of close contacts (Table 1). Type of contact (household vs nonhousehold) and presence of COVID-19 symptoms were not associated with language concordance. However, there was an association between language concordance and calendar time ($P < .01$), with the proportion of contacts reached by language-concordant tracers increasing over the study period.

There was no evidence of an association between language concordance and interview completion in the unadjusted model (OR, 1.04 [95% CI, .84–1.29]) or after adjusting for calendar time (OR, 1.04 [95% CI, .83–1.29]) (Table 2). Contacts reached by Spanish-speaking contact tracers had 1.20 times greater odds of undergoing COVID-19 testing (95% CI, 1.02–1.43) and 1.19

times greater odds after adjusting for time (95% CI, 1.00–1.42). Odds of referral to I&Q support services were 1.53 times higher among contacts reached by language-concordant tracers (95% CI, 1.29–1.86) and 1.49 times higher after adjusting for time (95% CI, 1.24–1.79). The model of best fit was determined to be the unadjusted model for both COVID-19 testing (unadjusted BIC, 3612.1; adjusted BIC, 3641.9) and I&Q support service referrals (unadjusted BIC, 3459.7; adjusted BIC, 3486.5).

DISCUSSION

To our knowledge, this is the first study evaluating the relationship between public health worker language concordance and COVID-19 contact tracing outcomes. We found that Spanish-speaking contacts had 20% higher odds of completing COVID-19 testing and 53% greater odds of receiving I&Q support service referrals if they were interviewed by a Spanish-speaking contact tracer.

Table 2. Unadjusted and Adjusted Odds of Interview Completion, Coronavirus Disease 2019 Testing, and Isolation and Quarantine Support Service Referrals Among Spanish-Speaking Close Contacts Reached by Language-Concordant or Language-Nonconcordant Contact Tracers

Contact Tracing Outcome	Unadjusted OR (95% CI)	Adjusted[a] OR (95% CI)
Interview completion		
Language nonconcordance[b]	Ref.	Ref.
Language concordance	1.04 (.84–1.29)	1.04 (.83–1.29)
COVID-19 testing		
Language nonconcordance[b]	Ref.	Ref.
Language concordance	1.20 (1.02–1.43)	1.19 (1.00–1.42)
I&Q support service referrals		
Language nonconcordance[b]	Ref.	Ref.
Language concordance	1.53 (1.29–1.86)	1.49 (1.24–1.79)

Abbreviations: CI, confidence interval; COVID-19, coronavirus disease 2019; I&Q, isolation and quarantine; OR, odds ratio; Ref., reference.

[a]Adjusted for calendar time.

[b]Reference level.

These findings highlight the importance of language concordance to effective contact tracing, especially among communities in which English is not the primary language, and who often require I&Q resources in order to safely quarantine. The findings validate existing evidence highlighting the importance of language concordance in establishing rapport and clearly communicating guidance [1, 3, 10–12]. Moreover, given the importance of COVID-19 testing and I&Q support services in tracing the spread of COVID-19 and allowing contacts to safely quarantine, the findings are likely to have important epidemiologic implications.

The study also underscores the need to ensure that public health departments recruit personnel that reflect the populations they seek to serve. While SFDPH took active steps to mobilize a language-concordant contact tracing workforce during the COVID-19 pandemic, the epidemiologic impact may have been greater if a larger proportion of the public health workforce spoke the languages of the communities most impacted by COVID-19 from the outset [8]. As health jurisdictions respond to the ongoing challenges presented by COVID-19, including responding to new variants and promoting vaccine uptake, investing in a language-concordant public health workforce should remain a high priority.

Limitations
Our analysis has several limitations. As with all cross-sectional data, we can only assume causality; however, in informal interviews with language-nonconcordant contact tracers, significant challenges were reported due to language barriers—even when interviewing with the assistance of professional interpreters. In addition, while we were able to determine if a contact was subsequently tested for COVID-19, we could only determine referrals for I&Q support services and not direct utilization. Finally, we were unable to directly evaluate the epidemiologic impact of language concordance on contact tracing efforts.

Programmatic and Policy Implications
In summary, language-concordant contact tracing was associated with greater likelihood that Spanish-speaking contacts completed COVID-19 testing and received referrals for I&Q support services, both of which are critical to prevent onward COVID-19 transmission. These findings highlight the importance of language concordance in the ongoing COVID-19 public health response. The study underscores the importance of mobilizing a culturally humble, language-concordant public

health workforce to address health disparities impacting communities with limited English proficiency.

Notes

References

1. García P, Sanchez J, Mora J, Ronda E. Assessment of 16-year retrospective cohort study of factors associated with non-compliance with a tuberculosis contact tracing programme at a Spanish hospital. J Eval Clin Pract **2018**; 24:758–66.
2. Fernandez A, Schillinger D, Grumbach K, et al. Physician language ability and cultural competence: an exploratory study of communication with Spanish-speaking patients. J Gen Intern Med **2004**; 19:167–74.
3. Fernandez A, Schillinger D, Warton EM, et al. Language barriers, physician-patient language concordance, and glycemic control among insured Latinos with diabetes: the Diabetes Study of Northern California (DISTANCE). J Gen Intern Med **2011**; 26:170–6.
4. Jih J, Vittinghoff E, Fernandez A. Patient-physician language concordance and use of preventive care services among limited English proficient Latinos and Asians. Public Health Rep **2015**; 130:134–42.
5. Reid MJA, Prado P, Brosnan H, et al. Assessing testing strategies and duration of quarantine in contact tracing for SARS-CoV-2: a retrospective study of San Francisco's COVID-19 contact tracing program, June–August 2020. Open Forum Infect Dis **2021**; 8:ofab171.
6. Sachdev DD, Brosnan HK, Reid MJA, et al. Outcomes of contact tracing in San Francisco, California: test and trace during shelter-in-place. JAMA Intern Med **2020**; 181:381–3.
7. Reid M, Enanoria W, Stoltey J, et al. The SARS-CoV-2 pandemic: the race to trace: contact tracing scale-up in San Francisco—early lessons learned. J Public Health Policy **2021**; 42:211–21.
8. Celentano J, Sachdev D, Hirose M, et al. Mobilizing a COVID-19 contact tracing workforce at warp speed: a framework for successful program implementation. Am J Trop Med Hyg **2021**; 104:1616–9.
9. Centers for Disease Control and Prevention. Operational considerations for adapting a contact tracing program to respond to the COVID-19 pandemic. https://www.cdc.gov/coronavirus/2019-ncov/global-covid-19/operational-considerations-contact-tracing.html. Accessed 14 February 2021.
10. Cook VJ, Shah L, Gardy J. Modern contact investigation methods for enhancing tuberculosis control in Aboriginal communities. Int J Circumpolar Health **2012**; 71:18643.
11. Schenker Y, Karter AJ, Schillinger D, et al. The impact of limited English proficiency and physician language concordance on reports of clinical interactions among patients with diabetes: the DISTANCE study. Patient Educ Couns **2010**; 81:222–8.
12. Diamond L, Izquierdo K, Canfield D, et al. A systematic review of the impact of patient–physician non-English language concordance on quality of care and outcomes. J Gen Intern Med **2019**; 34:1591.