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

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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        | 206 (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 (70)                      | 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 (70)                      | 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)                       |         |
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 χ² 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 (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 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* OR (95% CI) |
|-------------------------|------------------------|-----------------------|
| Interview completion    |                        |                       |
| Language nonconcordance | Ref.                   | Ref.                  |
| Language concordance    | 1.04 (.84–1.29)        | 1.04 (.83–1.29)       |
| COVID-19 testing        |                        |                       |
| Language nonconcordance | Ref.                   | Ref.                  |
| Language concordance    | 1.20 (1.02–1.43)       | 1.19 (1.00–1.42)      |
| I&Q support service referrals |                 |                       |
| Language nonconcordance | 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.
*Adjusted for calendar time.
*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

Author contributions. A. El., M. J. A. R., A. F., D. S., W. E., and A. B. contributed to the concept and design of the study. M. J. A. R., J. C., A. Er., J. M., and A. El. contributed to acquisition of data. M. J. A. R., A. El., A. B., and Y. H. C. contributed to statistical analysis and interpretation of data. All authors contributed to drafting or revision of the manuscript. M. J. A. R., D. S., and W. E. contributed supervision for the study.

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