Support for Learning Te Reo Māori Increased from 2009-2015: Analysis of Data from the New Zealand Attitudes and Values Study

Correna M. Matika

Dr. Carla Houkamau

Associate Prof. Chris G. Sibley

University of Auckland

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www.psych.auckland.ac.nz/uoa/NZAVS

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Executive Summary

- We estimated the rate of increase in support for the statements "Teaching Māori language in New Zealand primary schools" and "Singing the national anthem in Māori and English" over the October 2009 – October 2015 period.
- We analysed data from 10,437 participants in the New Zealand Attitudes and Values Study (NZAVS), who completed at least three of six annual waves of data collection. The NZAVS is a national probability longitudinal study conducted each year. The sample frame is based on the electoral roll.
- We modelled rates of change for support in Te Reo using Latent Growth Curve Modelling. This is a robust statistical model for estimating the average rate of change across individuals.
- Support for teaching Māori language in New Zealand primary schools and singing the national anthem in Māori and English has increased steadily over the October 2009 – October 2015 period. The increase is gradual and significant.
- We offer forecasts for the continued increase in support for both teaching Māori language and singing the national anthem in Māori and English up until January 2018.
- Our model predicts a steady and gradual linear increase in support in the population over this timeframe. This forecast provides an index of the level of support for Te Reo in the New Zealand population in early 2018, assuming no major changes in society or policy relating to how Te Reo is promoted and taught in the meantime.
- Our model provides three key pieces of information. The model shows what the level of support is now, it tells us that support has been gradually and steadily increasing, and it also tells us where the expected level of support is likely to be in 2018.
- This forecast could be used as a potential baseline, and future change in policy may aim to improve levels of support beyond this baseline estimate.

Technical Report

Summary of sample

Analyses are based on data from the first six annual waves of the New Zealand Attitudes and Values Study (NZAVS), from October 2009-October 2015. The NZAVS is a national probability postal sample and uses the electoral roll as the sample frame. Full details about the sampling procedure for the NZAVS and copies of all materials are available on the NZAVS website (www.psych.auckland.ac.nz/uoa/NZAVS). Booster samples were conducted during Waves III, IV and V to help maintain the representation of the sample size and adjust for sample attrition. A technical analysis of sample attrition is published in Satherley et al. (2015).

Overview of analysis

We estimated separate Latent Growth Models assessing the rate of change in levels of support (rated on a Likert scale from 1-7) for the items "Teaching Māori language in New Zealand primary schools" and "Singing the national anthem in Māori and English" over the October 2009 – October 2015 period. The analysis included participants who had responded to 3 or more waves. The samples sizes on which our models are based are as follows: Wave I (n = 4,633), Wave II (n = 4,012), Wave III (n = 6,154, Wave IV (n = 9,518), Wave V (n = 9,433), Wave VI (n = 9,091).

Missing data among those completing at least 3 waves was estimated using Full Information Maximum Likelihood and assuming that data were missing at random. This method of missing data estimation weighted each individual-level trajectory based on its reliability, which is in turn a function that takes the number of observations into account.

Those who responded to all six time points contributed the most information to the estimation of the mean-level trajectory, while those who responded to three contributed the least.

To reflect the variation in response time to each wave between individuals, response time at each wave was then converted into yearly units and modelled as individually time-varying effects, with time = 0 being the 30th June 2009. This accounted for the fact that different individuals completed the surveys at different times throughout the year, and with different durations between each assessment, rather than fixing all responses in 2009 to 1, all responses in 2010 to 2, and so forth. Our models therefore provide a latent intercept representing estimated mean support at June 30th 2009. Residual variances, or disturbances, in the manifest ratings of Likert items were constrained to equality across waves. This therefore assumes that the amount of variation that is unexplained by the intercept and rate of change in our outcome measure is the same across waves (see Grimm & Widaman, 2010).

Figure 1 presents a Structural Equation Model outlining our modelling approach. Our model estimated the fixed and random effect for the intercept, linear growth component, and quadratic growth component spanning Waves 1-6 of data collection. The intercept represents the mean score on the outcome (level of support) as of June 2009. The slope or linear component loads onto each measurement point as a function of the time score, or time at which the measurement was made (where in Figure 1, TS1 = day of survey completion during Time 1, TS2 = day of survey completion during Time 2, and so on).

Support for the items “Teaching Māori language in New Zealand primary schools” and “Singing the national anthem in Māori and English” were then estimated at 3 month intervals, during January, April, July, and October. That is, estimates were obtained every 3 months from October 2009 to October 2015. These months roughly coincide with peak times of data collection for each wave of the NZAVS.

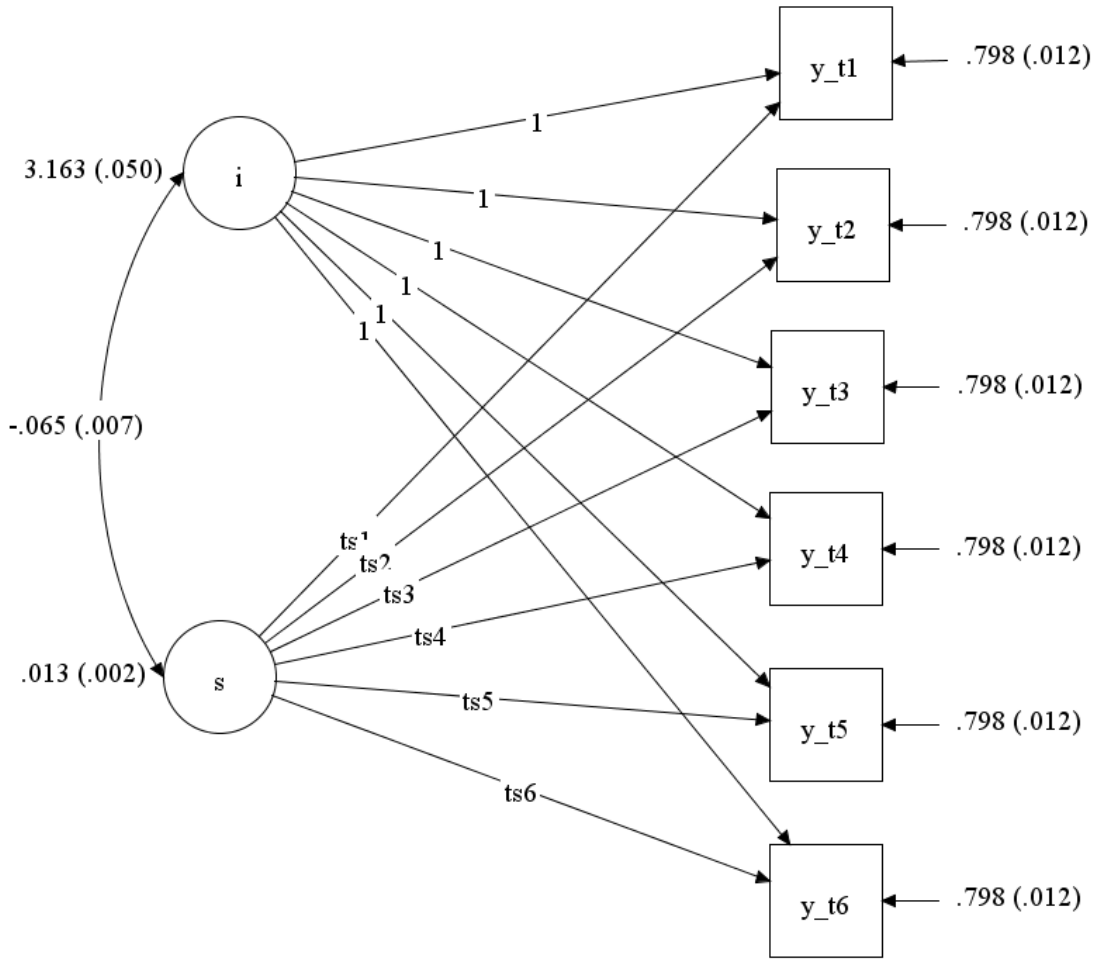

Figure 1. Graphical representation of the Latent Growth Models (Note. Values of TS represent the linear effect of time-varying values; *i* = intercept, *s* = linear growth component).

Latent growth parameters

The growth parameters modelling the rate of change in support for the items "Teaching Māori language in New Zealand primary schools" and "Singing the national anthem in Māori and English" are presented in Table 1. The linear parameters modelling rates of change for both items were significant and indicated an increase over time. In both cases, the random effects for the intercept were also significant, indicating that there were significant individual differences in New Zealand residents' overall levels of agreement with both statements. Likewise, the significant random effects for the slopes indicate that people differed in the extent to which their support altered over time for both "Teaching Māori

language in New Zealand primary schools" and "Singing the national anthem in Māori and English." We estimated separate growth models assessing change in support for teaching Te Reo Māori in primary schools and singing the national anthem in Te Reo Māori and English. Our analysis thus provides a reliable estimate of the rate of change in agreement with each independent of the rate of change in the other.

Table 1. Fixed and random effects for Latent Growth Models predicting change in support (on a scale from 1 to 7) for "Teaching Māori language in New Zealand primary schools" and "Singing the national anthem in Māori and English" for New Zealand residents over the October 2009 – October 2015 period.

	"Teaching Māori language in New Zealand primary schools"	"Singing the national anthem in Māori and English"
Fixed effects (means)		
Intercept	4.401 (.021)**	5.264 (.020)**
Linear growth parameter	.052 (.003)**	.014 (.003)**
Random effects (variances)		
Intercept	3.163 (.050)**	2.562 (.054)**
Linear growth parameter	.013 (.002)**	.018 (.002)**
Covariances		
Intercept-linear parameter	-.065 (.007)**	-.070 (.008)**

Note: *p < .05, **p < .01. Models estimated using Maximum Likelihood with robust estimation of standard errors. Standard errors reported in parentheses. Disturbances of the manifest indicators were constrained to equality over time. Participants who completed less than 3 of the 5 waves were excluded from the model. Missing data among participants who completed 3 or more waves were estimated using Full Information Maximum Likelihood and assuming data were missing at random. Fit indices: Te Reo in Schools: loglikelihood = -70766, AIC = 141544, BIC = 141588. Anthem: loglikelihood = -69584, AIC =139181, BIC = 139225.

We integrated the parameters for the fixed effects in our models to generate the model-implied rate of change in support over the period from October 2009 – October 2015. The regression equation used to estimate this model-implied rate is presented in Equation 1.0, where y_t is the predicted level of support at time t, c is the intercept, or model-predicted mean level of support when $t = 0$ (i.e., the 30th June 2009), and s is the fixed effect for the linear growth component of the model. Values of t are distributed in this model so that 1.0 unit represents a change of one year.

$$y_t = c + st \quad (1.0)$$

We used the parameters reported in Table 1 to derive model-implied levels of support (on a scale from 1 to 7) for "Teaching Māori language in New Zealand primary schools" and "Singing the national anthem in Māori and English" for values of *t* ranging from .25 (October, 2009) to 6.25 (October, 2015) in quarterly increments.

We extended the model to forecast the linear rate of change in support for "Teaching Māori language in New Zealand primary schools" and "Singing the national anthem in Māori and English" into the future up until January 2018. Care must always be taken with making forecasts, however barring other changes and if things keep going as they are, this provides an estimate of where levels of support will be in early 2018.

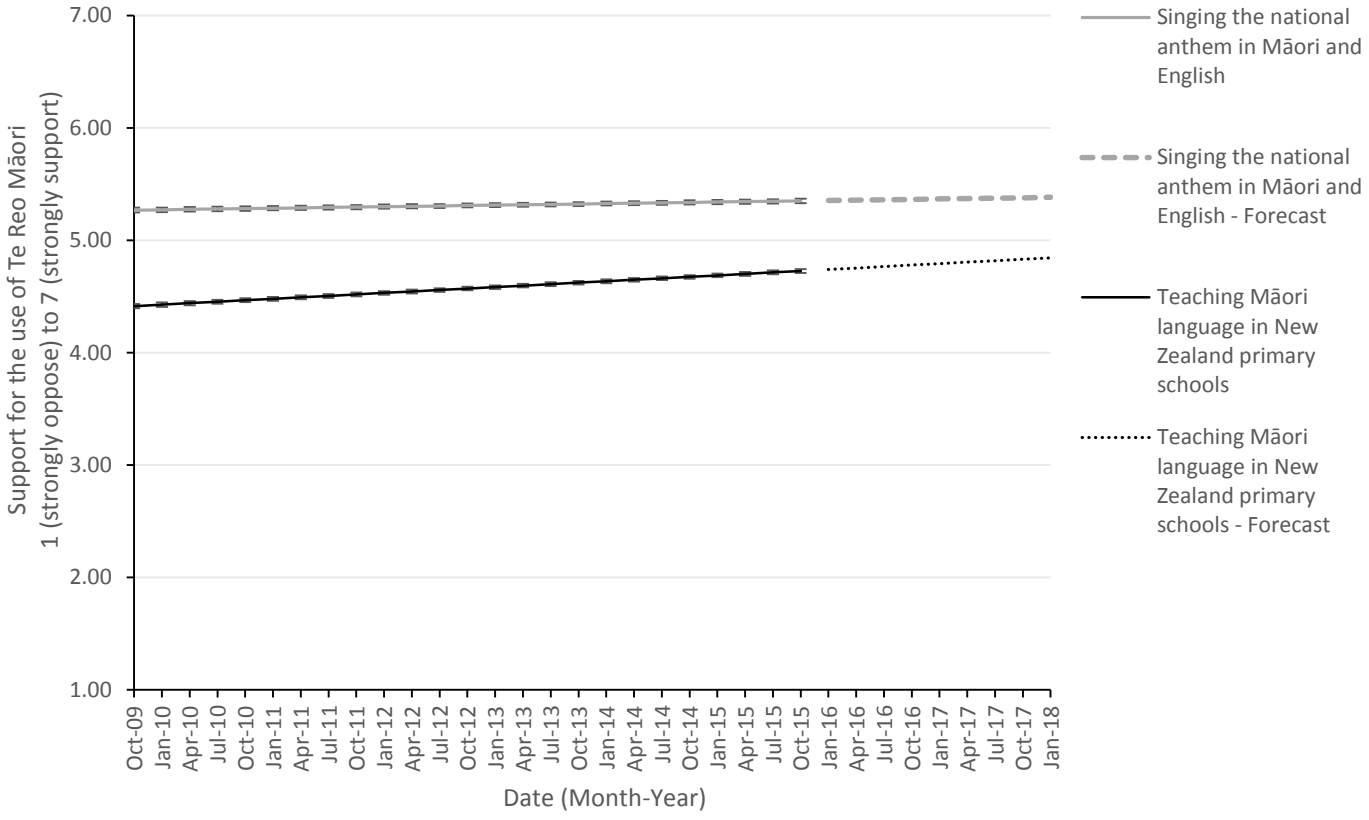

Figure 2. Model-implied rates of change in support (on a scale from 1 to 7) in response to the items for New Zealand residents over the October 2009 – October 2015 period printed in bold. Curves are based on predicted points from the latent growth parameters reported in Table 1. Error bars represent the standard error of point estimates. Forecasts based on this model into the future are shown by the dashed lines.

References

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Satherley, N., Milojev, P., Greaves, L. M., Huang, Y., Osborne, D., Bulbulia, J., & Sibley, C. G. (2015). Demographic and Psychological Predictors of Panel Attrition: Evidence from the New Zealand Attitudes and Values Study. *PLoS ONE 10(3)*, e0121950. doi:10.1371/journal.pone.0121950.