

# Predicting Standardized Test Results at the District Level with the Living Wage Index

UCEA Convention  
November 17, 2017  
Denver, CO

Christopher H. Tienken, Ed.D.  
Associate Professor  
Seton Hall University  
Department of Education Leadership, Management, & Policy  
[www.christienken.com](http://www.christienken.com)  
[@christienken](mailto:@christienken)

&

Dale Caldwell, Ed.D.  
[dalecaldwell@aol.com](mailto:dalecaldwell@aol.com)

# Problem

As of 2016, school administrators in 38 states had 30% or more of their annual evaluations tied to student achievement on ESSA mandated state standardized tests and teachers in 43 states were evaluated in part by student results on such tests with 17 of those states using tests results as the deciding factor in teacher evaluations.

# Problem

- In February 2017, the Massachusetts Board of Education (BOE) became one of the most recent state BOE's to change their state's teacher evaluation framework.
- The new framework requires districts to measure whether educators demonstrated “expected impact” on student learning as measured by “state-wide student growth measures” that include state standardized test results.

# Problem

- The potential increase in the “stakes” of standardized test results in Massachusetts, and other states, runs counter to a growing number of studies in which the percentages of students scoring proficient or above at the school and district levels were predicted by variables related to family human capital and community social capital (variables outside the control of educators).
- (Angelillo, 2015; Darnell, 2015; Fox, 2015; Jones, 2008, Lynch, 2015; Maylone, 2002; McCahill, 2015; O’Leary, 2016; Sackey, 2014; Tienken ,et al., 2017; Tienken, 2015; Turmanian & Tienken, 2013; Wilkins, 1999; Wolfe, 2015).

# Problem

- Understanding more precisely the predictive accuracy demographic variables on standardized test results can aid in creating more transparent and fair educator evaluation systems.
- But, no empirical data exist on the influence and predictive accuracy of human and social capital variables on standardized test results in Massachusetts.

# Literature Touchstones

- **Public Policy and High-Stakes Testing**
  - Darling-Hammond (2004)
  - Amrein & Berliner (2002)
  - Hazi & Rucinski (2009)
- **Lone-Parent Household**
  - Amato & Keith (1991)
  - Dawson (1991)
  - Downey et al. (1998)
- **Parental Education**
  - Davis-Kean & Sexton (2009)
- **Luster, Rhoads & Haas (1989)**
- **Potter & Roksa (2013)**
- **District Expenditure Per Student**
  - Biddle & Berliner (2002)
  - Walker, Achilles & Frances (2002)
  - Stringfellow (2007)

# Literature Touchstones

- **Socioeconomic Status**
  - **Maylone (2002)**
  - **Tienken et al. (2013)**
  - **Coleman et al. (1966)**
- **Living Wage Index (LWI)**
  - **Smeeding, Rainwater & Burtles (2001)**
  - **Nadeau (2015)**
  - **Farrigan & Glasmeier (2002)**
- **Theoretical Framework: Ecological Systems**
  - **Bronfenbrenner (1979)**
- **Jeronimous et al. (2014)**
- **Variables Excluded**
  - **Hyde et al. (2008)**
  - **Braun, Chapman & Vezzu (2010)**
  - **Finn & Achilles (1997)**

# Variables

- Some results in the literature point to variables that represent social and human capital that influence student academic achievement at K-12:
  - (a) percentage of families in a community with income below 35K,
  - (b) percentage of people in a community with a BA degree,
  - (c) percentage of single families headed by a female, and
  - (d) percentage of households in a community with income over 200K.
- Have been demonstrated to predict, with a degree of accuracy, the percentage of students who would score proficient or above on state tests at the school and district levels in five states.

# Variables

- Other variables in the literature coalesce around income levels necessary to provide a family with what some have termed “basic needs” that can directly and indirectly influence student academic achievement.
- One such set variables was used by Glasmeier (2004) at MIT to develop the *Living Wage Calculator*.
- The variables go beyond the the traditional measure of student eligibility for free or reduced lunch to create a more inclusive view of how the ecosystem in which a child lives influences academic outcomes.

# Living Wage Calculator

- According to Glasmeier (2004):

“The living wage model is an alternative measure of basic needs. It is a market-based approach that draws upon geographically specific expenditure data related to a family’s likely minimum food, childcare, health insurance, housing, transportation, and other basic necessities (e.g. clothing, personal care items, etc.) costs [In a particular county].

The living wage draws on these cost elements and the rough effects of income and payroll taxes to determine the minimum employment earnings necessary to meet a family’s basic needs while also maintaining self-sufficiency.

The living wage model is a ‘step up’ from poverty as measured by the poverty thresholds but it is a small ‘step up’, one that accounts for only the basic needs of a family.”

# Living Wage Calculator Sample

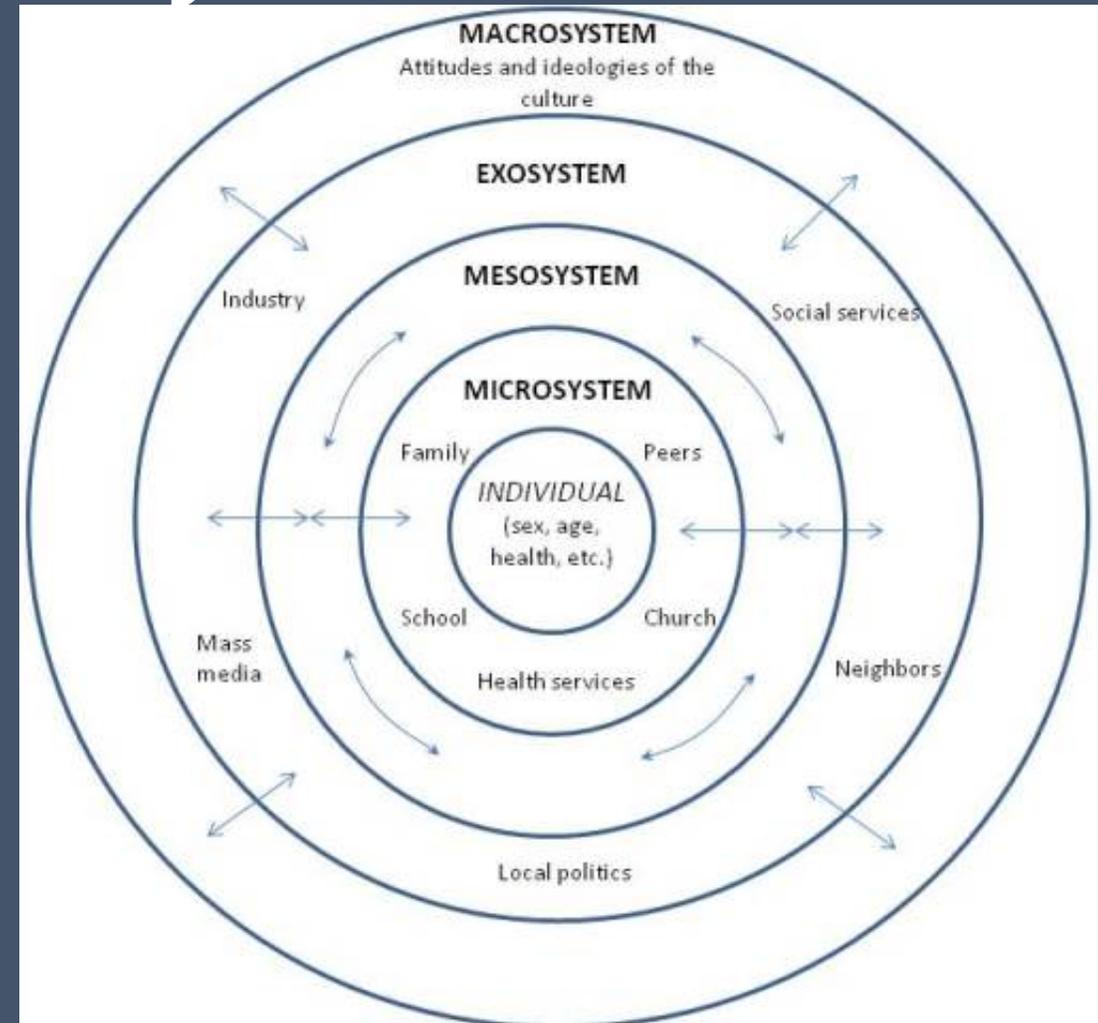
Annual Expenses	1 Adult	1 Adult 1 Child	1 Adult 2 Children	1 Adult 3 Children	2 Adults (1 Working)	2 Adults (1 Working) 1 Child	2 Adults (1 Working) 2 Children	2 Adults (1 Working) 3 Children	2 Adults (1 Working Part Time) 1 Child*	2 Adults	2 Adults 1 Child	2 Adults 2 Children
Food	\$3,464	\$5,244	\$7,806	\$10,314	\$6,351	\$8,037	\$10,321	\$12,541		\$6,351	\$8,037	\$10,321
Child Care	\$0	\$10,195	\$13,676	\$17,156	\$0	\$0	\$0	\$0		\$0	\$10,195	\$13,676
Medical	\$2,481	\$6,277	\$5,990	\$6,151	\$5,179	\$5,990	\$6,151	\$6,009		\$5,179	\$5,990	\$6,151
Housing	\$11,939	\$17,617	\$17,617	\$22,004	\$14,088	\$17,617	\$17,617	\$22,004		\$11,939	\$17,617	\$17,617
Transportation	\$3,568	\$6,775	\$8,850	\$9,655	\$6,775	\$8,850	\$9,655	\$9,687		\$6,775	\$8,850	\$9,655
Other	\$2,355	\$3,841	\$4,625	\$5,760	\$3,841	\$4,625	\$5,760	\$5,246		\$3,841	\$4,625	\$5,760
Required annual income after taxes	\$23,807	\$49,949	\$58,565	\$71,040	\$36,234	\$45,119	\$49,503	\$55,487		\$34,085	\$55,314	\$63,179
Annual taxes	\$3,271	\$6,863	\$8,047	\$9,761	\$4,979	\$6,200	\$6,802	\$7,624		\$4,684	\$7,601	\$8,681
Required annual income before taxes	\$27,078	\$56,812	\$66,612	\$80,801	\$41,213	\$51,319	\$56,306	\$63,112	\$62,915	\$38,769	\$62,915	\$71,861

# Theoretical Framework

- Bronfenbrenner's Ecological Systems Theory Human Development
  - Microsystem – Direct influence on a child's development.
  - Mesosystem – Interaction between microsystem elements.
  - Exosystem – Living environment the child does not control.
  - Macrosystem – Culture in which the child lives.
  - Chronosystem – Environmental events and changes in a child's life.

# Ecological Systems Theory

- Previous studies included variables from the Micro, Meso, and Exosystems in terms of the social capital of the community and family human capital. (Distal and proximal variables)
- Current study used *Living Wage Index* related to *basic needs* of families primarily at the Microsystem level.



# Living Wage Index

- To get to the district level unit of analysis (town level ) from the county level of the *Living Wage Calculator*, we:
  - (a) analyzed the U.S. census data for each community in each county in Massachusetts
  - (b) calculated the percentage of households in each town that met or exceed the minimum living wage required in that county based on 2 adults 1 child (national average in U.S. Census data).
- That percentage was used as a town wide *Living Wage Index* and represented the independent variable.

# LWI Calculation Example

Natick Town: Middlesex County

Living Wage Index (LWI) = 10,021 households / 13,690 households = .7320 = 73.20%

Living Wage Calculator (2 Adults, 1 Child) - \$49,811 [Living Wage for county]

2013 Total Households = 13,690

35K = 9.0% = 1,232 x .0125 = 15

50K = 14.4% = 1,971

75K = 10.5% = 1,437

100K = 21.5% = 2,943

150k = 11.9% = 1,629

200k = 14.8% = 2,026

*Total = 10,021 people at living wage*

# Purpose of the Study

Our purpose for this study was to explain the predictive accuracy of the *Living Wage Index* on MCAS grade 4 language arts and mathematics test scores at the school level.

# Research Questions

**Research Question 1:** How accurately can the Living Wage Index (LWI) predict a school district's percentage of students scoring "Proficient" or above on the 2013 MCAS Grade 4 Language Arts test?

**Research Question 2:** How accurately can the Living Wage Index (LWI) predict a school district's percentage of students scoring "Proficient" or above on the 2013 MCAS Grade 4 Mathematics test?

# Design and Methodology

- Utilized a correlational, explanatory, cross-sectional design with quantitative methods.
- Included school districts that had 25 or more valid test scores, were not charter/selective schools or regional schools (n=210 out of a population of 299).
- Schools had to enroll students from the community for best match of LWI at the town level with the students who attended the school district.
- Dependent Variables were the 2013 MCAS Grade 4 Language Arts and Mathematics Test Scores.
- *Living Wage Index* was independent variable in predictive regression model.

# Design and Methodology

- The Methodology included running:
  - Skewness – normality
  - Pearson Correlation Matrices
  - Simultaneous Multiple Regression Models
  - Determining the Predictor Model of Best Fit
  - Calculating the Percentage School District Test Scores that were accurately predicted

# Limitations

- **The correlational design cannot determine cause.**
- **Language Arts and Mathematics scores were taken from 2013 which was the latest year of data for all of the independent variables.**
- **Research applied only to data generated from the specific districts in Massachusetts in 2013.**
- **It was impossible to include all potential variables that influence student achievement in this study.**
- **Can't generalize results beyond the 210 schools in the sample for grade 4.**

# Research Question 1 Findings

- LWI predicted accurately, within the standard error of the estimate (11.79), the percentage of students who scored proficient or higher on the 2013 MCAS Language Arts test for 72% (n=151) of the districts in the sample.
- Accounted for 38% of the variance in the scores.

# Research Question 2 Findings

- LWI predicted accurately, within the standard error of the estimate (11.78), the percentage of students who scored proficient or higher on the 2013 MCAS mathematics test for 74% (n=155) of the districts in the sample.
- Accounted for 37% of the variance.

# Results

- Similar to results from other states and grades (3-8 and 11)
- CT, IA, VA, NJ, MI
- Family human capital and community social capital variables from the U.S. Census used in those studies.

# Policy Considerations

- Do not use state standardized test results as part of school administrator or teacher evaluation schemes.
- Limit the percentage that standardized test results count toward teacher and school administrator formal evaluation ratings so that they are not the deciding factor for an evaluation. ESSA allows state officials the freedom to set evaluation targets.

# Suggestions for Future Research

- **Conduct a similar quantitative study using LWI:**
  - in other subject areas, grade levels and states
  - combine LWI with family human capital and community social capital variables used in previous studies (i.e. % of families in a community living in poverty, % of people in a community with BA degrees, % of households with income + 200K)
- **Conduct a qualitative study:**
  - of selected districts in the study that were outside the predictive error.

# References

- Jones, M. (2008, May). *The influence of variables on school report cards regarding the passing rates for students taking the high school proficiency assessment (HSPA) in New Jersey's comprehensive high schools* (Doctoral dissertation). ProQuest LLC. Retrieved from <http://gradworks.umi.com/33/19/3319531.html>
- Maylone, N. (2002). *The relationship of socioeconomic factors and district scores on the Michigan educational assessment program tests: An analysis*. (Unpublished doctoral dissertation). Eastern Michigan University, Ypsilanti, MI.
- Sackey, A. N. L., Jr. (2014). *The influence of community demographics on student achievement on the Connecticut Mastery Test in mathematics and English language arts in grade 3 through 8* (Unpublished doctoral dissertation). Seton Hall University, South Orange, NJ. Retrieved from <http://scholarship.shu.edu/cgi/viewcontent.cgi?article=3033&context=dissertations>
- Turnamian, P. G., & Tienken, C. H. (2013). Use of community wealth demographics to predict statewide test results in grade 3. In B. J. Alford, G. Perrerault, L. Zellner, & J. W. Ballenger (Eds.), *2011 NCPEA Yearbook: Blazing Trails: Preparing Leaders to Improve Access and Equity in Today's Schools* (pp. 134-146). Lancaster, PA: DEStech Publications, Pro>Active Publications.
- Wilkins, J. L. M. (1999). Demographic opportunities and school achievement. *Journal of Research in Education*, 9(1), 12-19.

# Contact Information

**Christopher Tienken**  
**[www.christienken.com](http://www.christienken.com)**  
**@christienken**  
**[christienken@gmail.com](mailto:christienken@gmail.com)**

**Dale Caldwell**  
**[dalecaldwell@aol.com](mailto:dalecaldwell@aol.com)**