

James P. Scanlan
Attorney at Law
1529 Wisconsin Avenue, NW
Washington, D.C. 20007
(202) 338-9224
jps@jpscanlan.com

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Electronically Transmitted

Jeffrey R. Sprague, Ph.D.
Claudia Vincent, Ph.D.
University of Oregon
Institute on Violence and Destructive Behavior
901 E. 18th Avenue
Eugene, OR 97403

Erik Girvan, Ph.D., J.D.
University of Oregon School of Law
Center for Dispute Resolution
1515 Agate Street
Eugene, OR 97403

Re: Misunderstanding of Statistics in Report Titled “Eureka City Schools School-wide Positive and Restorative Discipline Assessment and Intervention Project Assessment Results and Programmatic Recommendations”

Dear Professor Sprague, Dr. Vincent, and Professor Girvan:

I recently reviewed the report of The University of Oregon Institute on Violence and Destructive Behavior and The University of Oregon Law School Center for Alternative Dispute Resolution titled “Eureka City Schools School-wide Positive and Restorative Discipline Assessment and Intervention Project Assessment Results and Programmatic Recommendations,” noticing that it reflects the view that the approaches to school discipline in the report’s title, which tend generally to reduce overall discipline rates, will tend to reduce relative racial and other demographic differences in discipline rates. The purpose of this letter is to explain that the view is the opposite of reality. Generally reducing discipline rates, while tending to reduce relative differences in rates of avoiding discipline, tends to increase relative differences in discipline rates. I

I explain this matter fairly succinctly in “[Things government doesn’t know about racial disparities](#),” *The Hill* (Jan. 28, 2014),¹ “[The Paradox of Lowering Standards](#),” *Baltimore Sun*

¹ To facilitate consideration of issues raised in letters such as this by the addressees and others, I include links to referenced materials in electronic copies of the letters. Such copies may be found by means of the Institutional

(Aug. 5, 2013), and “[Misunderstanding of Statistics Leads to Misguided Law Enforcement Policies](#),” *Amstat News* (Dec. 2012). I explain the pertinent, and related, statistical issues more elaborately in “[Race and Mortality Revisited](#),” *Society* (July/Aug. 2014) and an October 8, 2015 letter to the [American Statistical Association](#). The latter two items also explain a method for quantifying differences in the circumstances of two groups reflected by their rates of experiencing some favorable or adverse outcome that is not affected by the frequency of the outcome.

Inherent in other than highly irregular risk distributions is a pattern whereby the rarer an outcome the greater tends to be the relative difference in experiencing it and the smaller tends to be the relative difference in avoiding it. The pattern can be easily illustrated with normally distributed test score data showing how lowering a test cutoff, while reducing relative differences in pass rates, increases relative differences in failure rates. Table 1 below (which also appears as Table 1 in the American Statistical Association letter (at 11)) illustrates the pattern in terms of the ratio of the pass rates of the advantaged group (AG) to the pass rate of the disadvantaged group (DG) and the ratio of the failure rates of DG to the failure rate of AG. Lowering the cutoff reduces the former ratio from 1.27 to 1.09 (a decrease in the relative difference in pass rates from 27% to 9%) while increasing the latter ratio from 1.85 to 2.60 (an increase in the relative difference in failure rates from 85% to 160%).

Table 1. Illustration of effects on relative differences in pass and fail rates of lowering a cutoff from a point where 80% of AG passes to a point where 95% of AG passes, with proportions DG comprises of persons who pass and of persons who fail (when mean scores differ by approximately half a standard deviation and DG comprises 50% of test takers)

Cutoff	AG Pass	DG Pass	AG Fail	DG Fail	AG/DG Pass Ratio	DG/AG Fail Ratio	DG Prop of Pass	DG Prop of Fail
High	80%	63%	20%	37%	1.27	1.85	44%	65%
Low	95%	87%	5%	13%	1.09	2.60	48%	72%

The final two columns of the table also show how lowering the cutoff tends to increase the proportion DG comprises of person who pass the test and persons who fail the test.²

Many other tabular or graphical illustrations of these patterns (and related patterns by which measures tend be affected by the frequency of an outcome) with regard to a great many

Correspondence subpage of the Measuring Health Disparities page of [jpscanlan.com](#). In this case, the letter is being transmitted electronically, with links included.

² Increasingly discipline disparities are analyzed in terms of differences between the proportion a group comprises of students and the proportion it comprises of students who are disciplines. See letters to [Department of Health and Human Services and Department of Education](#) (Aug. 24, 2015) and [Texas Appleseed](#) (Apr. 7, 2015). There are problems in such analyses apart from those addressed in the text of this letter. See the [IDEA Data Center Disproportionality Guide](#) subpage of the [Discipline Disparities](#) page of [jpscanlan.com](#)

types of outcomes may be found in methods workshops I have given at American universities since 2012,³ in the various pages and subpages of jpscanlan.com related to measurement issues,⁴ and in many other letters to institutions or organization who activities, or whose members' activities, involve or are affected by analyses of demographic differences.⁵

Illustrations of the pattern by which the two relative differences tend to be affected by the frequency of an outcome in terms of the density function may be found in recent articles by University of Oregon Professor of Economics Peter J. Lambert.⁶

³ See "[The Mismeasure of Health Disparities in Massachusetts and Less Affluent Places](#)," Department of Quantitative Health Sciences, University of Massachusetts Medical School (Nov. 18, 2015); "[The Mismeasure of Discrimination](#)," Center for Demographic and Social Analysis, University of California, Irvine (Jan. 20, 2015); "[The Mismeasure of Demographic Differences in Outcome Rates](#)" Public Sociology Association of George Mason University (Oct. 18, 2014); "[Rethinking the Measurement of Demographic Differences in Outcome Rates](#)," Maryland Population Research Center of the University of Maryland (Oct. 10, 2014); "[The Mismeasure of Association: The Unsoundness of the Rate Ratio and Other Measures That Are Affected by the Prevalence of an Outcome](#)," Minnesota Population Center and Division of Epidemiology and Community Health of the School of Public Health of the University of Minnesota (Sept. 5, 2014); "[The Mismeasure of Group Differences in the Law and the Social and Medical Sciences](#)," Institute for Quantitative Social Science at Harvard University (Oct. 17, 2012); "[The Mismeasure of Group Differences in the Law and the Social and Medical Sciences](#)," Department of Mathematics and Statistics of American University (Sept. 25, 2012).

⁴ The principal measurement pages are: [Measuring Health Disparities](#), [Scanlan's Rule](#), [Mortality and Survival](#), [Statistical Reasoning](#), [Immunization Disparities](#), [Educational Disparities](#), [Disparate Impact](#), [Discipline Disparities](#), [Lending Disparities](#), [Employment Discrimination](#), [Feminization of Poverty](#), and [Vignettes](#). The pages have close to a hundred subpages.

⁵ Recipients of such letters, in addition to the American Statistical Association, include: [City of Madison, Wisconsin](#) (Mar. 12, 2016), [Stanford Center on Poverty and Inequality](#) (Mar. 8, 2016), [City of Boulder, Colorado](#) (Mar. 5, 2016), [Houston Independent School District](#) (Jan. 5, 2016), [Boston Lawyers' Committee for Civil Rights and Economic Justice](#) (Nov. 12, 2015), [House Judiciary Committee](#) (Oct. 19, 2015), [Chief Data Scientist of White House OSTP](#) (Sept. 8, 2015), [McKinney, Texas Independent School District](#) (Aug. 31, 2015), [Department of Health and Human Services and Department of Education](#) (Aug. 24, 2015), [Agency for Healthcare Research and Quality](#) (July 1, 2015), [City of Minneapolis, Minnesota](#) (June 8, 2015), [Texas Appleseed](#) (Apr. 7, 2015), [Senate Committee on Health, Education, Labor and Pensions](#) (Mar. 20, 2015), [United States Department of Justice and City of Ferguson, Missouri](#) (Mar. 9, 2015), [Vermont Senate Committee on Education](#) (Feb. 26, 2015), [Portland, Oregon Board of Education](#) (Feb. 25, 2015), [Wisconsin Council on Families and Children's Race to Equity Project](#) (Dec. 23, 2014), [Financial Markets and Community Investment Program, Government Accountability Office](#) (Sept. 9, 2014), [Education Law Center](#) (Aug. 14, 2014), [IDEA Data Center](#) (Aug. 11, 2014), [Institute of Medicine II](#) (May 28, 2014), [Annie E. Casey Foundation](#) (May 13, 2014), [Education Trust](#) (April 30, 2014), [Investigations and Oversight Subcommittee of House Finance Committee](#) (Dec. 4, 2013), [Mailman School of Public Health of Columbia University](#) (May 24, 2013), [Senate Committee on Health, Education, Labor and Pensions](#) (Apr. 1, 2013), [Federal Reserve Board](#) (March 4, 2013), [Harvard University et al.](#) (Oct. 26, 2012), [Harvard University](#) (Oct. 9, 2012), [United States Department of Justice](#) (Apr. 23, 2012), [United States Department of Education](#) (Apr. 18, 2012), [The Commonwealth Fund](#) (June 1, 2010), [Institute of Medicine](#) (June 1, 2010), [National Quality Forum](#) (Oct. 22, 2009), [Robert Wood Johnson Foundation](#) (Apr. 8, 2009).

⁶ See Lambert PJ, Subramanian S ([Disparities in Socio-Economic outcomes: Some positive propositions and their normative implications](#). Soc Choice Welf 2014;43:565-576), and Lambert PJ, Subramanian S ([Group inequalities and "Scanlan's Rule": Two apparent conundrums and how we might address them](#). Working Paper 84/2014, Madras School of Economics (2014)).

Examples of situations where, in fact, recent general reductions in discipline rates have been accompanied by increased relative differences in discipline rates may be found in the following subpages of the [Discipline Disparities](#) page of [jpscanlan.com](#) (with jurisdictions indicated in the titles): [California Disparities](#), [Colorado Disparities](#), [Connecticut Disparities](#), [Maryland Disparities](#), [Minnesota Disparities](#), [Beaverton, OR Disparities](#), [Denver Disparities](#), [Henrico County, VA Disparities](#), [Los Angeles SWPBS](#), [Minneapolis Disparities](#), [Montgomery County, MD Disparities](#), [Portland, OR Disparities](#), [St. Paul Disparities](#).⁷ See also the [DOE Equity Report](#) subpage of the Discipline Disparities page, which discusses a Department of Education report showing that relative racial differences in expulsions are larger in school districts without zero tolerance policies than school districts with such policies.

Another useful example may found in an online paper co-authored by Dr. Vincent (with Tary Tobin, Rob Horner, and Jessica Swain-Bradway) titled [“If discipline referral rates for the school as a whole are reduced, will rates for students with disabilities also be reduced?”](#) I first note, however, that the title of the paper suggests the possibility that overall reductions in discipline referral rates might not be accompanied by reductions for students with disabilities. Rarely will an overall reduction in discipline rates (if substantial) not be accompanied by a reduction all groups.⁸ But in examining such changes one needs to understand that a corollary to the pattern whereby reductions in an outcome tend to be accompanied by increased relative differences in rates of experiencing the outcome, but reduced relative differences in rates of avoiding the outcome, is pattern whereby overall reductions in an outcome tend to be accompanied by larger proportionate reductions for groups with lower baseline rates for the outcome than groups with higher baseline rates for the outcome, but larger proportionate increases in the opposite outcome for groups with high baseline rates for the first outcome. For example, in the hypothetical shown in Table 1, lowering the cutoff caused failure rates to

⁷ These jurisdictions caught my attention as a result or news coverage of discipline disparity issues in the jurisdictions. There have no doubt also been cases where a general reduction in discipline rates was accompanied by a reduction in relative differences in discipline rates. But I have not seen news coverage of such situations. Reportage of declines in disparities during periods of general reductions in discipline rates has involved situations where disparities were measured in terms of absolute differences between rates.

⁸ The July 1, 2016 prefatory note to the Rhode Island Disparities subpage discusses a May 5, 2015 American Civil Liberties Union of Rhode Island press release titled [“ACLU Finds Increasing Racial Disparities in School Suspension Rates”](#) stating that the organization’s report titled [“Blacklisted: 2013-14”](#) found “that while white students experienced a ten-year low in suspensions during the 2013-2014 school year, the combined suspension rate for Hispanic, black and Native American students was at its highest level.” The fact that white rates decreased while minority rates increased, if true, would indicate that there occurred something other than an overall decrease in discipline rates of the type that would commonly increase relative differences in discipline rates while reducing relative differences in rates of avoiding discipline. The actual report reveals, however, that what the press release discusses as change in rates was actually a change in the proportions the various groups made up of persons discipline. A situation where substantial decreases in disparities were accompanied by decreasing rates for one group but increasing rates for another group would be an unusual. But, assuming there are just two groups and putting aside issue of changes in the proportion the groups comprise of the population, if the proportion one group comprises of persons experiencing the outcome reaches a low point, it necessarily follows that the proportion the other groups comprises of persons experiencing the outcome has reached a high point.

decrease by 75% for AG but only 65% for DG, while causing pass rates to increase by 38% for DG but only 19% for AG.

Figure 1 (at 4) of the paper indicates that, consistent with what one should expect in the circumstances, all students experienced a 16.5% reduction in referrals while students with disabilities experienced only a 11.4% reduction.⁹ One can also derive from the figure that the reduction for students without disabilities (a better group to compare with students with disabilities than all students) was 17.6%.¹⁰ The underlying data would likely also show that students with disabilities experienced a larger proportionate increase in rates of avoiding referral than all students (or students without disabilities).

The figure also indicates that the proportion students with disabilities comprised of suspended students increased from 17.6% to 18.7%. As shown in Table 1, the pattern is a corollary to the above described patterns of changes in relative differences and proportionate changes commonly effected by a general reduction in an outcome. See American Statistical Association letter at 9-10. Here, too, the underlying data would likely show an increase in the proportion students with disabilities comprised of students who were not referred.

Noting the increase in the proportion students with disabilities comprised of referred students during the period of general reductions in discipline rates, Dr. Vincent's paper (at 5) posits an explanation for such pattern. But hypotheses of this nature, whether plausible or not, are invariably without a statistical basis when uninformed by an understanding of the patterns by which measures tend to be affected by changes in the frequency of an outcome. See the section of "Race and Mortality Revisited" titled "Illogical Expectations and Flawed Inferences" (at 339-341) and the [Explanatory Theories](#) subpage of the [Scanlan's Rule](#) page of [jpscanlan.com](#). See also my "The Mismeasure of Health Disparities," *Journal of Public Health Management and Practice* (July/Aug. 2016).

I hope that you will carefully consider the points made above, and the more extended treatments of those points in the cited references, in your future work on issues concerning discipline policies and demographic differences in discipline rates or other matters involving the interpretations of data on demographic differences. And I suggest that careful consideration of this issue is especially important with regard to any future role of The University of Oregon Institute on Violence and Destructive Behavior and The University of Oregon Law School and Center for Alternative Dispute Resolution regarding discipline issues in Eureka City Schools.

⁹ Given that only numbers of referral are shown, there is a possibility that changes in the proportion students with disabilities made up of total students might affect these figures. But the effect is likely to be slight if not miniscule.

¹⁰ I note that the report on Eureka discusses ratios of discipline rates of various groups with overall discipline rates. Comparisons of rates of particular groups with overall rates have problems apart from the issues addressed in the text of this letter. See the [IDEA Data Center Disproportionality Guide](#) subpage of the [Discipline Disparities](#) page of [jpscanlan.com](#).

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Further, I am copying this letter to Fred Van Vleck, Superintendent of Eureka City Schools, and I suggest that you address with Eureka City Schools, and other entities to whom you have responsibilities regarding the settlement to which the report pertains, whether you agree with the letter's description of the likely effects of the policies recommended in the report on measures of demographic differences in school discipline.

Sincerely,

/s/ James P. Scanlan

James P. Scanlan

Cc: Fred Van Vleck, Ed.D.
Superintendent
Eureka City Schools