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Joy Markowitz, Director
Tom Fiore, Co-Director
Julie Bollmer, Deputy Director
IDEA Data Center
Westat
RA 1200
1600 Research Bulletin
Rockville, MD 20850-3129

BY EMAIL

Re: Measurement Issues Pertaining to Activities of the IDEA Data Center

Dear Drs. Markowitz, Fiore, and Bollmer:

On occasion I write to institutions whose activities involve the interpretation of data on demographic differences in the law or the social and medical sciences alerting them to ways in which their activities are undermined by the failure to recognize patterns by which standard measures of differences between favorable or adverse outcome rates of advantaged and disadvantaged groups tend to be systematically affected by the overall prevalence of an outcome. Other recipients of letters involving the statistical issues discussed in this letter include [Robert Wood Johnson Foundation](#) (Apr. 8, 2009), [National Quality Forum](#) (Oct. 22, 2009), [Institute of Medicine](#) (June 1, 2010), [The Commonwealth Fund](#) (June 1, 2010), [United States Department of Education](#) (Apr. 18, 2012), [United States Department of Justice](#) (Apr. 23, 2012), [Federal Reserve Board](#) (March 4, 2013), [Harvard University](#) (Oct. 9, 2012), [Harvard Medical School and Massachusetts General Hospital](#) (Oct. 26, 2012), [Senate Committee on Health, Education, Labor and Pensions](#) (Apr. 1, 2013), [Mailman School of Public Health of Columbia University](#) (May 24, 2013), the [Investigations and Oversight Subcommittee of House Finance Committee](#) (Dec. 4, 2013), [The Education Trust](#) (April 30, 2014), [Annie E. Casey Foundation](#) (May 13, 2014), [Institute of Medicine II](#) (May 28, 2014).¹

This letter is prompted by the recent request of the Department of Education for comment on whether it should provide a standard approach to measuring “significant disproportionality”

¹ To facilitate consideration of issues raised in letters such as this I include links to referenced materials in electronic copies of the letters. All such letters may be found by means of the Institutional Correspondence subpage of the Measuring Health Disparities page of jpscanlan.com. If the letter is corrected after it is first posted on the website, such fact will be noted on the final page.

under the Individuals with Disabilities Education Act and by my creation of a web page discussing the guidance currently provided by the IDEA Data Center (IDC) on the significant disproportionality issue.

In quite a few places since 1987, I have explained the patterns by which standard measures of differences between outcome rates tend to be systematically affected by the prevalence (frequency) of an outcome. Most notably, 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. For example, lowering test cutoffs (or improving test performance) tends to increase relative differences in failure rates while reducing relative differences in pass rates; relaxing discipline standards tends to increase relative differences in discipline rates while reducing relative differences in rates of avoiding discipline. Similarly, in areas or among populations where adverse outcomes are comparatively rare, relative differences in adverse outcomes tend to be larger, while relative differences in favorable outcomes tend to be smaller, than in areas or among populations where adverse outcomes are more common.

One corollary to the pattern by which 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 is a pattern whereby the rarer an outcome the larger tend to be the proportion the group most susceptible to the outcome comprises of those experiencing the outcome and the proportion that group comprises of those failing to experience the outcome. Thus, the less common an outcome, the greater will tend to be both the relative and absolute difference between the proportion the group comprises of persons potentially experiencing the outcome (the pool) and the proportion it comprises of persons experiencing the outcome, and the smaller will tend to be both the relative and absolute difference between the proportion the group comprises of the pool and the proportion it comprises of persons failing to experience the outcome.

Absolute differences between outcome rates also tend to be affected by the prevalence of an outcome, though in a more complicated way than the two relative differences. Roughly, where outcomes are generally uncommon (less than 50 percent for both of two groups being compared), the less common the outcome, the smaller tends to be the absolute difference; where outcomes are generally common (greater than 50 percent for both groups), the less common the outcome, the larger tends to be the absolute difference between rates of experiencing the outcomes. As the prevalence of an outcome changes, the absolute difference between rates tends to change in the same direction as the smaller of the two relative differences. As the prevalence of an outcome changes, difference measured by odds ratios tend to change in the opposite direction of absolute differences.

The key thing to understand from these patterns is that none of the standard measures of differences between outcome rates effectively quantifies the strength of the forces causing the outcome rates of advantaged and disadvantaged groups to differ. Such quantification can only be accomplished by a measure that remains constant when there occurs a general change in the prevalence of an outcome akin to that effected by the lowering of a test cutoff. Such a measure involves deriving from the favorable or adverse outcome rates of advantaged and disadvantaged groups the difference between means of the underlying distributions.

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Recent, extensive explanations of the patterns by which measures tend to change as the prevalence of an outcome changes, and the implications of those patterns with respect to interpreting data on group differences, include my article "[Race and Mortality Revisited](#)," *Society* (July/Aug. 2014), my November 2013 Federal Committee on Statistical Methodology 2013 Research Conference paper "[Measuring Health and Healthcare Disparities](#)," my September 2013 University of Kansas School of Law faculty workshop paper "[The Mismeasure of Discrimination](#)," and my October 2012 applied statistics workshop at Harvard's Institute for Quantitative Social Science "[The Mismeasure of Group Differences in the Law and the Social and Medical Sciences](#)." Recent, relatively succinct explanations of these patterns, with a focus on disparities in school discipline outcomes and the mistaken view that reducing adverse discipline outcomes will reduce relative racial and ethnic differences in rates of experiencing those outcomes, may be found in my "[Things government doesn't know about racial disparities](#)," *The Hill* (Jan. 28, 2014), "[The Paradox of Lowering Standards](#)," *Baltimore Sun* (Aug. 5, 2013), and "[Misunderstanding of Statistics Leads to Misguided Law Enforcement Policies](#)," *Amstat News* (Dec. 2012). Perceptions about differences in discipline outcomes are also the subject the section titled "Lending and Discipline Disparities" of the recent *Society* article (at 14-16).

Also pertinent to the subjects with which IDC deals are the [Educational Disparities](#) and [Discipline Disparities](#) pages of [jpscanlan.com](#), including the seven subpages to the former and the twenty-two subpages to the latter. Among the subpages to the Discipline Disparities page is the recently-created [IDEA Data Center Disproportionality Guide](#) subpage, which discusses, inter alia, the bearing of the patterns described above on the IDC's technical assistance guide titled "Methods for Assessing Racial/Ethnic Disproportionality in Special Education."

I hope you find the references of interest and consider the points they make both with regard to issues addressed in the technical assistance guide and with regard to other issues with which IDC deals. I will be giving a methods workshop on these issues at the Maryland Population Research Center of the University of Maryland, titled "Rethinking the Measurement of Demographic Differences in Outcome Rates," in case you believe your staff might benefit from attending.²

Sincerely,

/s/ **James P. Scanlan**

James P. Scanlan

² There is not yet an abstract for the workshop. But the [abstract](#) for a like workshop to be given in a September 5, 2014 workshop to the demography and epidemiology arms of the University of Minnesota gives a fair impression of the subject to be addressed in the Maryland Population Research Center Workshop.