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Nancy A. Hubley, Esq., Managing Director
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429 Fourth Avenue, Suite 702
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BY EMAIL

Re: Measurement Issues Pertaining to Activities of the Education Law Center

Dear Ms. Hubley and Ms. Kleinman:

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), [Education Trust](#) (April 30, 2014), [Annie E. Casey Foundation](#) (May 13, 2014), [Institute of Medicine II](#) (May 28, 2014), and [IDEA Data Center](#) (Aug. 11, 2014).¹

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.

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This letter is prompted by the response of the Education Law Center (ELC) to the request of the Department of Education for comment on whether the agency should provide a standard approach to identifying “significant disproportionality” under the Individuals with Disabilities Education Act.

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 uncommon, relative differences in adverse outcomes tend to be greater, while relative differences in the corresponding favorable outcomes tend to be smaller, than in areas or among populations where adverse outcomes are comparatively 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 greater tend to be both the proportion the group most susceptible to the outcome comprises of persons experiencing the outcome and the proportion that group comprises of persons failing to experience the outcome. That is, for example, lowering a test cutoff will tend to cause the lower-scoring group to comprise both a larger proportion of those who fail the test and a larger proportion of those who pass the test. Thus, the less common an adverse outcome, the greater will tend to be the relative and absolute difference between the proportion a disadvantaged group comprises of persons potentially experiencing the outcome (the pool) and the proportion the group comprises of persons experiencing the outcome, and the smaller will tend to be 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 between rate of experiencing the outcome; 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, the difference measured by odds ratios tend to change in the opposite direction of the absolute difference.

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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.

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, may be found in 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 of the United States Departments of Education and Justice that reducing adverse discipline outcomes will tend to 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 the relationship between the frequency of discipline and relative differences in discipline rates are also the subject the section titled "Lending and Discipline Disparities" of the recent *Society* article (at 14-16).

Most of the discussion or illustrations in these references involve outcome rates. One may infer from those outcomes rates the points made above about the effect of the prevalence of an outcome on the proportion a group comprises of persons experiencing and failing to experience the outcome. But explicit information on the effects of the prevalence of an outcome on the proportion a group comprises of persons experiencing and failing to experience the outcome may be found in Table 1 of "[Divining Difference](#)," *Chance* (Spring 1994) and Table 1 of "[Can We Actually Measure Health Disparities?](#)," *Chance* (Spring 2006).

Particularly pertinent to the subject of the ELC's response to the Department of Education request for comment is the recently-created [IDEA Data Center Disproportionality Guide](#) subpage to the Discipline Disparities page of [jpscanlan.com](#), which discusses, inter alia, the bearing of the patterns described above on the IDEA Data Center's technical assistance guide titled "Methods for Assessing Racial/Ethnic Disproportionality in Special Education."

I note that the ELC comment attempts to quantify disproportionality with respect to certain educational outcomes in terms of the absolute difference between the proportion a group

comprises of the pool and the proportion the group comprises of persons experiencing the outcome, and the complaint attached to the comment does so in terms of both (1) the absolute difference between the proportion a group comprises of the pool and the proportion the group comprises of persons experiencing the outcome and (2) the ratio of the proportion the group comprises of persons experiencing the outcome to the proportion the group comprises of the pool. As discussed above, and illustrated in the web page on the IDEA Data Center guide (with respect to what are identified on the page as measures (c) and (d) of the guide), both measures (1) and (2) tend to exhibit reverse correlations with the frequency of the outcomes. Thus, school districts that are more cautious in sending students to alternative educational programs will tend to show larger disproportionality according to both measures than school districts that are less cautious in doing so. And general decreases in rates of alternative placements will tend to increase disproportionality according to both measures. Further, neither measure effectively quantifies the strength of the forces causing alternative placement rates of advantaged and disadvantaged groups to differ.

In addition, as explained on the web page on the IDEA Data Center guide with reference to Section C of the Kansas Law paper mentioned above, information on the proportion a group comprises of the pool and the proportion the group comprises of persons experiencing an outcome does not provide a useful basis for appraising the strength of the forces causing outcome rates to differ. By way of further explanation, I note that in the case of the situation noted in the ELC comment where African-Americans comprised 15 percent of Pennsylvania public school students but 35 percent of students placed in alternative education programs, one can derive from such information that the African-American rate of placement is 3.05 times that of other persons. But depending on the underlying placement rates, that rate ratio could reflect substantially varying strengths of the association between race and placement. See Table 7 of the Kansas Law paper (at 29). See also Table 1 (slide 14) of the 2009 Royal Statistical Society presentation [“Measuring Health Inequalities by an Approach Unaffected by the Overall Prevalence of the Outcomes at Issue.”](#)

One must always have the actual outcome rates to reasonably interpret data on group differences. But, as explained in the references above, neither the relative nor the absolute difference between those rates effectively quantifies the strength of the forces causing the rates of advantaged and disadvantaged groups to differ.² Thus, one must appraise the strength of the forces reflected by those differing rates by a method such as that described in the “Race and Mortality Revisited” and the other longer references identified above.

I am not familiar with the full range of ELC activities involving demographic differences in outcome rates. But the statistical points discussed above pertain to a range of issues regarding

² As explained in the web page on the IDEA Data Center guide (with respect to the measured identified as (a) and (b) on that page, relative differences will tend to show reverse correlations with the frequency of the outcome and do so regardless of the rate ranges at issue, while with respect to the rate ranges at issue for the outcomes addressed in the guide, absolute differences will tend to show direct correlations with the frequency of the outcome.

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demographic differences in educational outcomes, as discussed on the [Educational Disparities](#) and [Discipline Disparities](#) pages of [jpscanlan.com](#), including the subpages to both pages.

I hope you find the above material and references of interest and consider the bearing of the points they make on the activities of the ELC regarding demographic differences in educational outcomes.

Sincerely,

/s/ James P. Scanlan

James P. Scanlan

cc:

Rhonda Brownstein, Esq., Director, Education Law Center – PA
David Lapp, Esq.
Nancy Potter, Esq.
Marnie Kaplan – Stoneleigh Fellow