

## **Key Indicator Methodology Technical Note(2): The Dichotomization and Bi-Polarization of the Matrix Data Base**

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This latest technical note updates the thresholds for the high and low groups within the key indicator matrix. This technical note is based upon the latest studies during the early 2015 time frame in which very large data distributions were available to test certain criteria with the key indicator methodology. Because of the extreme skewness present in licensing/regulatory data, certain statistical adjustments need to be made so that the analyses performed reflect the distribution of data. One of these statistical adjustments is the dichotomization of data which is generally not suggested with the exception of very skewed data. Since licensing data are so skewed, this adjustment has been used throughout the key indicator methodology. However, an additional adjustment is now warranted given not only the skewness of data but also because of the data being nominal in nature. This additional adjustment I am calling the bi-polarization of data in order to accentuate the differences between the high and low groups within the key indicator matrix.

I have tested several data sets utilizing bi-polarization and found that the results are more significant with its use than without its use. Please keep in mind that licensing data is very different from other forms of data found in the early care and education (ECE) research literature. It is not like the ERS or CLASS data which is more normally distributed and lends itself to more parametric statistical analyses. Licensing data are nominal in nature and always very skewed which means that more non-parametric methods are warranted, such as phi coefficient and dichotomization of data. An example of how this actually works may help.

Licensing data are measured as either being in or out of compliance. There is no middle ground, it is not measured on a Likert scale. Therefore it is nominal in nature, either it is all there or it is not. Licensing data are also measured in the sense that all rules are created equally, in other words, they all have the same weight or importance, such as 1 = compliance; 0 = non-compliance. Being in full 100% compliance which means 0 violations is the goal of a regulatory/licensing system. One does not want to see many violations of the rules because this will place children at risk of harm and the purpose of an early care and education (ECE) licensing/regulatory system is to reduce the potential harm to children. In the licensing measurement literature, this 100% compliant group is generally labeled or considered the high

compliant group. With some licensing laws which allow substantial but not full 100% compliance with the full set of rules, it would then be allowable to have possibly 1 or 2 violations and still be considered in this high compliant group. The low compliant group has been generally any program that had any non-compliance or had 2 or more violations. When these two groups were compared to each individual rule utilizing the phi coefficient formula it was found that a more accurate approach was to accentuate or increase the difference between the high and low groups by eliminating the intervening violations in following manner: high group of 0 violations; 1-4 violations being eliminated; 5+ violations defined as the low group. This additional bi-polarization of data helped to accentuate the differences in calculating the phi coefficient and provided a more sensitive key indicator tool.

Another data distribution issue that should be addressed here that justifies the above cutoffs is that there is very little variance in licensing/regulatory data. Generally the frequency distribution is 20 or less and the average set of rules is over 200 rules. So the frequency distribution is extremely skewed within less than 10% of the potential data distribution. Also, the majority of programs are 100% in compliance with all the rules. And an additional complication is that the scoring of each rule is scored as if it had an equal risk value when in reality the rules can place children at either great risk to relatively little risk if found non-compliant. These measurement issues are very different than in other measurement systems such as ERS or CLASS. The important message to take from this is that rules are not a ruler, they do not measure things equally and cannot be analyzed or compared to other measurement systems that are more normally distributed.

Although licensing is part of the program quality continuum in establishing basic health and safety standards for children, it is a system with measurement limitations that can only be compared on a nominal basis making several statistical adjustments as suggested above necessary.