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UCLA CENTER FOR HEALTHIER CHILDREN, FAMILIES AND COMMUNITIES

Orange County Early Development Index (EDI) Predictive Validity Study
Do Scores from the EDI Predict Third Grade Achievement?

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Purpose

As part of a broader system-building effort, the Children and Families Commission of Orange County has successfully met its 3-year goal to establish a countywide snapshot of children's health, development and school readiness using the Early Development Index (EDI). As a population level measure of child developmental status, the EDI has been found in both Canada and Australia to predict later school success. In Orange County (OC), the EDI has now been collected from every school district with a kindergarten population and reported out for every neighborhood, representing the largest and most complete and actionable picture of children's development of any community using the EDI in the United States. The Commission has begun to use this resource both internally, to inform its own strategic direction, as well as externally to support local communities, school districts and researchers with their efforts to both understand and improve the overall development of children before they reach kindergarten and to support children as they progress through the school years.

The Commission has now partnered with the University of California Los Angeles (UCLA) and the University of California Irvine (UCI) to conduct the first predictive validity study of the EDI for a US population of children. The goal of this report is to provide background on the rationale for the OC EDI Predictive Validity Study and to share the preliminary results of the analysis. Similar with other studies of the EDI conducted in Canada and Australia, the preliminary results of the OC EDI Predictive Validity Study show that the EDI is strongly associated with the likelihood of being proficient on later academic achievement. This report will also outline the next steps as they relate to engaging school districts and cross-sector community stakeholders in the process of using the study results to support the development of improved services and systems for young children.

Background

The skills that children have when they enter kindergarten are strong indicators of later educational and developmental outcomes. In order to develop better systems to prepare children for school and to better target groups of children that need extra resources early in their school years where they have the most potential for impact, valid and reliable population level data on children's developmental status are needed. The EDI provides a snapshot of kindergarteners' skills in the following five developmental domains: Social competence, Emotional maturity, Physical health & well-being, Language & cognitive development, and Communication skills & general knowledge. This comprehensive and holistic assessment, completed by kindergarten teachers, allows for a novel look at how children's developmental status during the kindergarten year relates to later educational outcomes. By connecting, a comprehensive measure of child health, development and school readiness to later education outcomes, this study provides information to early childhood leaders from health, education and family support sectors who are

interested in working collaboratively to improve systems for children before they enter school. Second, this study provides school administrators information on which groups of children are at risk for not meeting expectations later in school in order to support and mitigate those outcomes. Third, this study provides researchers information on how well the EDI works for its intended purposes of predicting later outcomes.

Study Aims & Methods

The aim of the OC EDI Predictive Validity Study is to understand associations between the developmental status of children in kindergarten, as measured by the EDI, and children's later educational outcomes, as measured by administative data from participating school districts. Specifically, the study focuses on understanding which groups of children (as characterized by the five EDI developmental domains) are most likely to struggle academically, be grade retained, be placed into special education, fail to transition from English language learners (ELL) status in a timely manner, and have greater rates of absenteeism. The primary objective is to use a variety of statistical methods to better understand how the EDI is related to these key educational outcomes. Ultimately, the intended purpose is for the EDI to aid in identifying groups of children that are most likely to have increased costs later in school, and therefore, where targeted early investments and interventions may be most cost-effective.

Connecting EDI scores with administrative datasets from OC school districts creates this project's unique value. Although the EDI has had extensive validation work in other countries (e.g., Canada, Australia), it is important to make sure the EDI has predictive validity in U.S. populations. The OC population has a diverse student-body, and therefore, it is of particular importance that the EDI can serve as a reliable and valid tool for kindergarteners throughout the county. Previous EDI validation studies in Canada and Australia have also not considered the range of key educational outcomes being examined in the current study. Although focusing on achievement scores is of high interest, the study is also considering how the EDI relates to other important education outcomes as well, such as: grade retention, special education placement, ELL transitions, and absenteeism.

The OC EDI Predictive Validity Study is meant to inform the districts in multiple ways. By identifying which groups of children are most likely to require later additional costs to the districts (e.g., due to grade retention, absenteeism, etc.), the potential of early interventions and investments in cost-effective ways can be considered. The hope is that school districts will continue to partner with researchers to answer valuable questions related to the EDI and key educational outcomes. Furthermore, early childhood educators can gain a deeper understanding of how particular developmental domains are related to multiple educational outcomes. These results have the potential to help understand population level early development outcomes informed through broader cross sector analyses of early childhood community systems.

To conduct this study, school districts were invited to participate if they

- Collected EDI data in 2009-2010 and could provide the 2011-2012 2nd grade Standardized Testing and Reporting (STAR) scores and/or the 2012-2013 3rd grade STAR scores; and/or
- Collected EDI data in 2011-2012 and could provide the 2014-2015 3rd grade Smarter/Balanced scores (SBAC).

Preliminary Results

The preliminary results focus on the connection between the five EDI domains in 2011-2012 kindergarteners and 2014-2015 3rd grade SBAC proficiency levels. Though additional achievement scores will also be assessed in relation to the EDI, the preliminary results are limited to these data because: 1) the majority of school districts that provided data for this study had 3rd grade SBAC Math and English Language Arts/Literacy (ELA) proficiency levels (6 of the 7 total); 2) achievement scores on the SBAC Math and ELA scores tend to be of the highest interest to school administrators, researchers, and the public; 3) the 3rd grade SBAC Math and ELA were recently collected (during the 2014-2015 academic year); and 4) the 3rd grade SBAC Math and ELA scores were some of the most consistently coded variables for combining across administrative datasets provided by the participating school districts.

For this report, EDI records are linked with 3rd grade SBAC Math and ELA proficiency levels to better understand the association between kindergarten EDI and 3rd grade achievement. The four categories associated with SBAC proficiency levels were reduced into two categories: not meeting the standards (coded as 0) versus nearly meeting the standards, meeting the standards, or exceeding the standards (coded as 1). Therefore, a score of 0 represents academic difficulties and a score of 1 represents children who are performing near expectation or better on the SBAC subtests. Analyses show the association between EDI levels (i.e., vulnerable, at risk, on track middle, on track top) and domains (i.e., social competence, emotional maturity, physical health & well-being, language & cognitive development, and communication skills & general knowledge), with the dichotomous proficiency codes for SBAC Math and ELA in 3rd grade.

The sample for this study included 2,916 children that had at least one SBAC assessment in 3rd grade. Of the 2,916 children, 34% were from Santa Ana Unified, 31% were from Anaheim City, 13% were from Centralia, 10% were from Garden Grove, 6% were from La Habra, and 5% were from Huntington Beach City. In total, 62% were coded as proficient in SBAC Math and 56% were coded as proficient in SBAC ELA. Across norming studies, the EDI was developed to capture the 10th percentile or below as *vulnerable*, the >10th-25th percentile as *at risk*, the >25th-75th percentile as *on track middle*, and the 75thpercentile or above as *on track top*. Across the domains for our sample, the proportion of children falling into each category roughly reflected this breakdown (e.g., around 10% were coded as vulnerable for each domain).

For SBAC Math and ELA assessments, each EDI domain was closely associated with proficiency. The EDI domain that was most predictive of proficiency on the SBAC Math and ELA in 3rd grade was the *language & cognitive development* domain (see Figure 1). Specifically, children in kindergarten coded as *vulnerable* on the language & cognitive development domain were only 19% (Math) and 15% (ELA) likely to be proficient on 3rd grade SBAC tests (i.e., the furthest columns to the left in Figure 1). As children received better ratings on the language & cognitive development domain (i.e., moving to the right in the graph), the likelihood of being proficient on 3rd grade SBAC increases dramatically. That is, children coded as at risk were 44% (Math) and 35% (ELA) likely to be proficient, children coded as on track middle were 71% (Math) and 64% (ELA) likely to be proficient, and coded as on track top were 87% (Math) and 83% (ELA) likely to be proficient (i.e., the furthest columns to the right in Figure 1). In other words, children's ratings on the language & cognitive development domain are extremely

predictive of the likelihood of being proficient on 3rd grade SBAC Math and ELA tests. This finding is consistent with prior research identifying that language and cognition skills in early childhood are closely associated with math and ELA performance throughout the schooling years (i.e., these associations would likely maintain beyond the 3rd grade year; Duncan et al., 2007). The language & cognitive development domain includes items that tap children's basic literacy and numeracy skills and children's interest in activities that promote these skills.

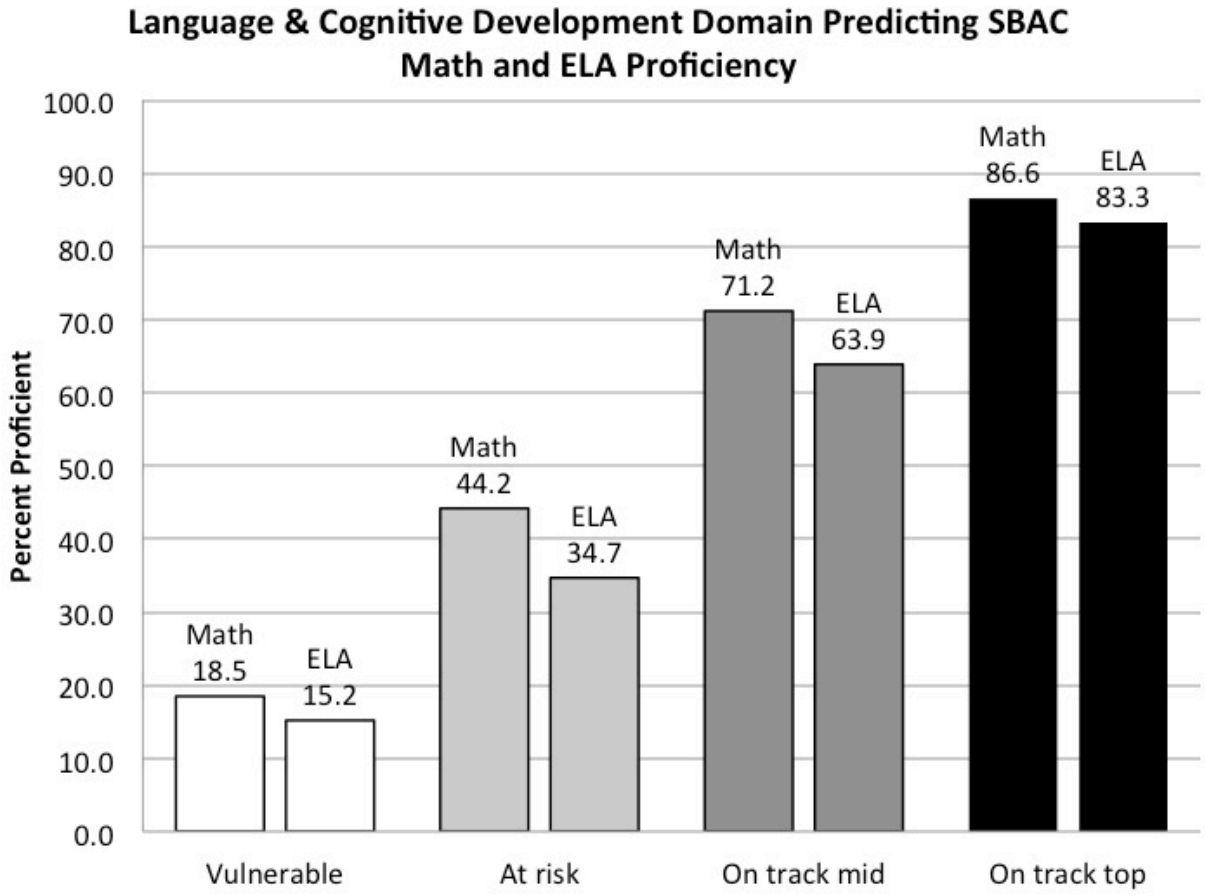

Figure 1. *Predicting SBAC Math and ELA proficiency from the Language & Cognitive Development domain of the EDI.*

Although the language & cognitive development domain was the most closely associated EDI domain with later proficiency, each EDI domain was strongly associated with the likelihood of being proficient on the SBAC Math and ELA (see Figures 2 & 3). In Figures 2 and 3, the black outlined box shows the same information presented in Figure 1 for language & cognitive development, but there are now columns representing each developmental domain of the EDI. In general, children coded as vulnerable on the EDI in kindergarten were relatively unlikely to be proficient on achievement at 3rd grade and children coded as on track top were relatively likely to be proficient on achievement at 3rd grade. After language & cognitive development, the communication skills & general knowledge domain was next most closely associated with both achievement proficiency outcomes. The domains of emotional maturity and physical health & well-being were relatively less associated with both outcomes, though still predictive.

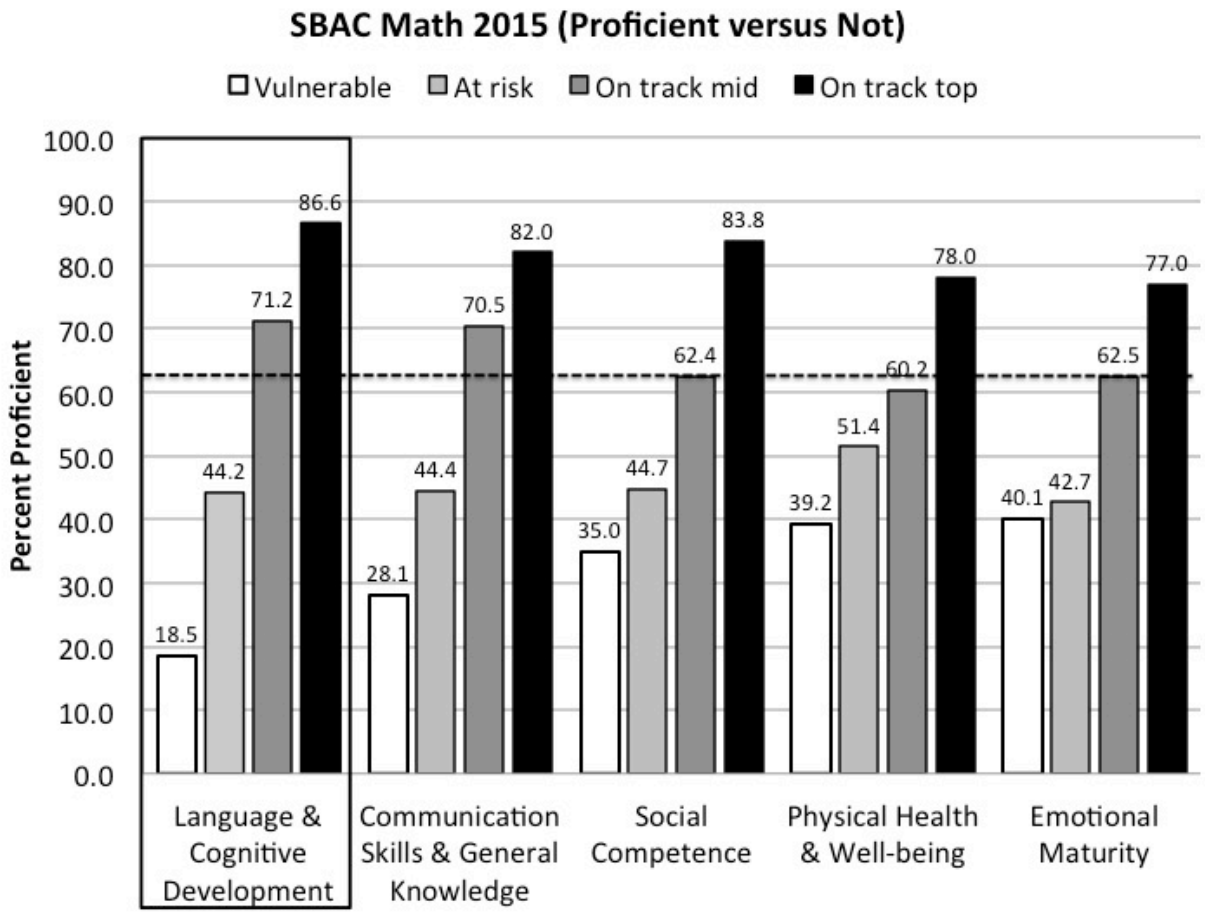

Figure 2. *Predicting SBAC Math proficiency from kindergarten EDI-levels and subdomains.* The black dashed line is the overall average and the black box shows the most predictive domain.

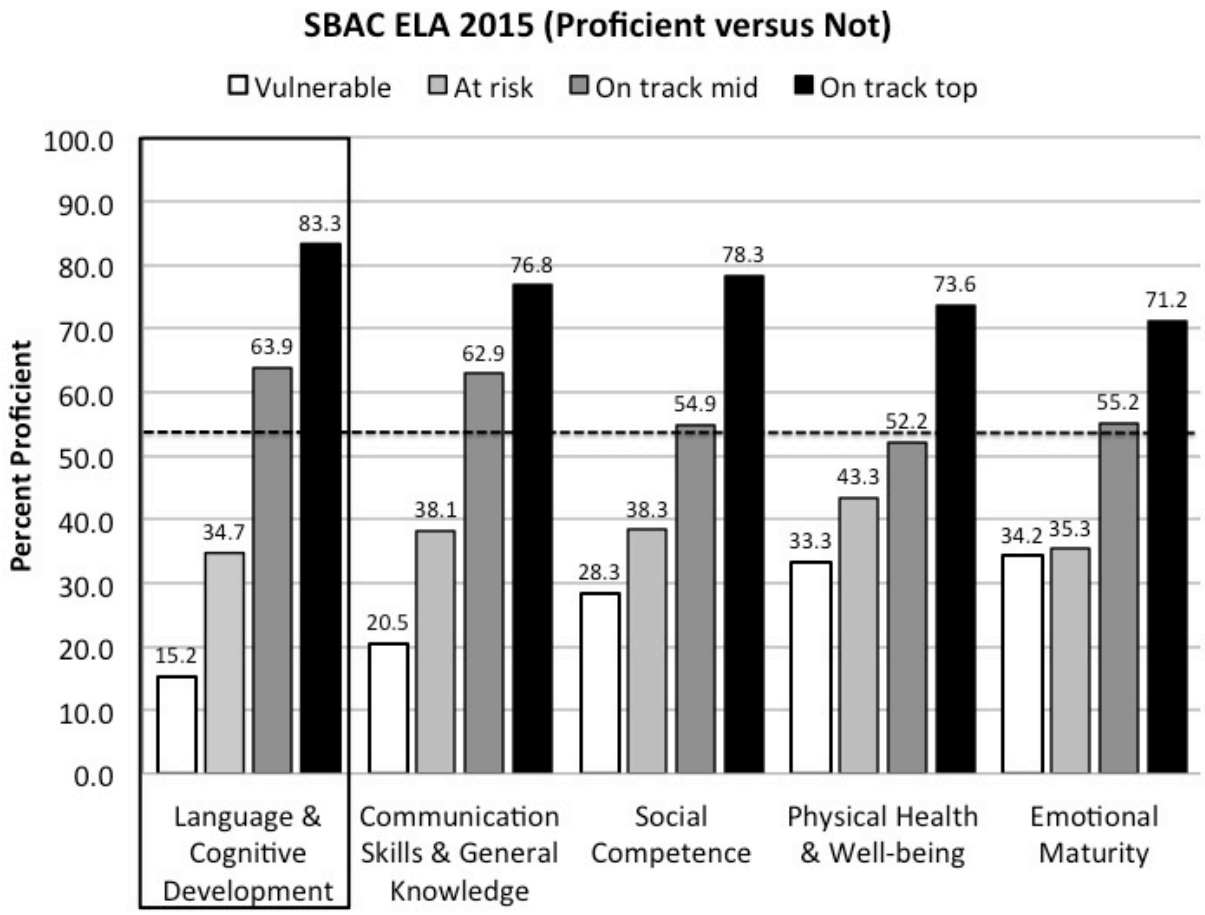

Figure 3. *Predicting SBAC ELA proficiency from kindergarten EDI-levels and subdomains.* The black dashed line is the overall average and the black box shows the most predictive domain.

These results are from analyses that only examined the associations between the EDI and 3rd grade SBAC Math and ELA, therefore additional analyses have been run to examine the robustness of these findings using a variety of statistical control methods. Commonly used control variables of child gender, ethnicity, and English language learner status in kindergarten did not have a meaningful impact on the size of these estimates. Additionally, when controlling for children's kindergarten classroom or their residential neighborhood during their kindergarten year, the effects of the EDI on SBAC proficiency levels maintained a similar magnitude. Thus, and of most importance, the observed associations presented do not appear to be driven by other measured socio-demographic factors associated with the child, the classroom, or the neighborhood.

Next Steps

This report on the preliminary results for the OC EDI Predictive Validity Study represents the first step in the broader plan to share these results with other early childhood stakeholders who have a role to play in improving school readiness and to engage with school district leaders and other key partners in considering how the data can be used to advance their educational mission. After some additional fine-tuned analysis, district level reports are expected

to be sent out in fall 2017 to each participating school district with an invitation to participate in a meeting where we can share results, answer questions and engage in a discussion around the interpretation and use of the results to support the development of best practices. After that, the County level findings will be submitted to peer-reviewed journals for publication and shared more broadly with other key stakeholders in Orange County to support the continued use of the EDI as a valid population level tool to monitor and inform the early childhood service system.

Ultimately, the study is intended to validate the EDI as a population level measure that can inform collective and cross sector efforts to monitor and improve local early childhood systems. This study is an excellent example of how the Commission can partner with researchers to fully leverage the analytic potential of the EDI to gain a more nuanced understanding of the risks and protective factors as well as best practices to improve conditions for children living in Orange County.

References

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P. et al. (2007). School readiness and later achievement. *Developmental Psychology, 43*(6), 1428-1446. doi: 10.1037/0012-1649.43.6.1428