# Measure Development and Person-Specific Analyses of the Developmental Continuum

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## INTRODUCTION

Variable-centered measures derive their significance from differences between individuals for a latent dimension. Using variable-centered measures, research has inferred individual-level findings from aggregated, population-level averages. However, such findings do not necessarily represent any individual in the sample. Resulting policy could thus be based on findings that represent nobody (Rose et al., 2013).

Developmental systems theories provide a framework in which findings are based on individuals. Cantor et al. (2018) and Osher et al. (2018) argue that youth develop within unique contexts, wherein multiple constructs contribute to the development of each person, and each person experiences these constructs in a unique manner. Thus, if development is specific to each person, as posited by Bornstein's (2017) Specificity Principle, **developmental research must use a nonergodic, person-specific approach.**

## THE STORY OF AVERAGE VS. INDIVIDUAL

Such an approach can be found in person-specific measurement, which assesses changes in variables within an individual, not across individuals. One key aspect of development is **Intentional Self-Regulation (ISR)**, which involves setting goals, monitoring one's behavior to ensure it is in line with those goals, and persisting until goals are reached. ISR has previously been measured by Selection, Optimization, and Compensation (SOC).

One example of a nonergodic, variable-centered study using SOC comes from the 4-H Study of Positive Youth Development (Lerner et al., 2005). The subsample average for each SOC measure tells a different story than the individual trajectories in the subsample. The average portrays a relatively stable, moderate trajectory, and, by definition, implies equifinality in the sample (see Figure 1).

In contrast, the individual trajectories portray a wide variety of non-linear trajectories, which reflect multifinality (see Figure 2). This contrast is important because practitioners, if assessing an average, may only create one policy that is not designed to adequately serve any one individual. But if the individual trajectories are analyzed, a more nuanced policy acknowledging multiple contexts and pathways can be applied, resulting in more positive outcomes for youth.

## THE STORY OF AVERAGE VS. INDIVIDUAL (continued)

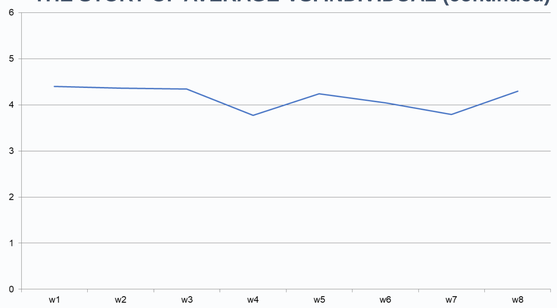


*Figure 1.* Optimization: Longitudinal Sample Average for Waves 1-8 (N=59).

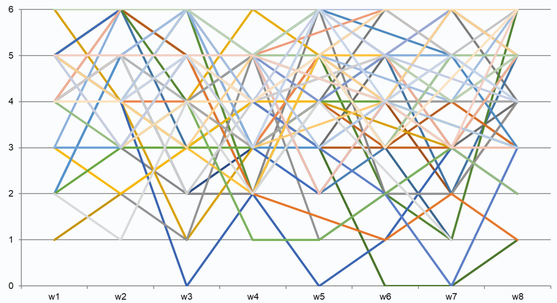


*Figure 2.* Optimization: Longitudinal Sample Trajectories for Waves 1-8 (N=59).

## PURSUIT OF PERSON-SPECIFIC MEASUREMENT

Observing individual trajectories across multiple years demonstrates the difference between person-specific and nomothetic trajectories. However, such "sparse" occasions of measurement do not provide the statistical power needed for robust within-person analysis. As such, additional occasions of measurement are required for such person-specific analysis.

The Science of Learning and Development (SoLD) Measures and Methods Across the Development Continuum (MMDC) project is currently attempting to address these methodological issues through the pursuit of person-specific measurement. The MMDC project is implementing **age-differentiated, short-term, longitudinal studies using intensive within-person measurement techniques**. One survey-based measure is of ISR, adapted from a measure with **basic psychometric properties required for person-specific measurement: reliability, validity, and measurement invariance**.

## DEVELOPMENT OF SELF-REGULATION MEASURE

We developed a self-regulation measure based on the Children's Self-Efficacy Scale (Bandura, 2006) and adapted the Freund & Baltes (2002) conceptual model of self-regulation. Items were primarily derived from the Bandura (2006) sub-scale of Self-Efficacy for Self-Regulated Learning. Items were adapted for relevant content and repeated use (multiple times per week) and categorized by the Freund and Baltes (2002) self-regulation constructs of selection and optimization. Self-Control items were adapted from the Child Trends (2014) measure of Self-Control.

***Selection:***

Today I finished my classwork on time

Today, I brought everything I needed for class

Today I set goals for my work

Today I started my classwork right away

Response options: *True, More True Than False, Neither True nor False, More False than True, False*

***Optimization:***

Today, I tried my hardest to do my classwork

Today, I listened carefully to the teacher's instructions

Today I tried hard to finish all my classwork

Today, I tried hard to pay attention

Response options: *True, More True Than False, Neither True nor False, More False than True, False*

***Self-Control:***

Today, I waited for my turn patiently

Today, I sat still when I was supposed to

Today, I waited my turn to talk in class

Response options: *True, More True Than False, Neither True nor False, More False than True, False*

We hope our project will enhance understanding and optimization of **each individual's** development.

## PILOT STUDY (IN PROGRESS)

**Three conditions:** Executive Function (EF), Relationship Skills (RS), and **Intentional Self-Regulation (ISR)**.

**Locations:** Public and charter primary and secondary schools in Washington, D.C.; New York, NY; Boston, MA; and Austin, TX.

**Three classrooms for each condition**: One for each of three grades – Grades 3, 7, and 10. Approximately **200 participants** representing a diverse sample of youth.

Surveys are available online and administered in classrooms near the end of the school day three times per week from October 30th, 2019 through April 15th, 2020.

We are collecting participant demographic information (e.g. age, gender, race/ethnicity, and parents' education) and additional measures (e.g. grades, standardized test scores, absences, and suspensions).

**Goals:** Identify the quality of the scales and sub-scales.

**Analyses:**

- Assessments of reliability, factorial validity, and convergent validity.
- Identification of meaningful patterns of development for each of the three conditions (i.e., EF, RS, and ISR) across all three age groups.

This work will involve conducting analyses of person-specific data across multiple occasions of measurement with a variety of time series analyses, most notably Dynamic Factor Analysis. In addition, we plan to test for measurement invariance across various conditions, such as grade level, gender, and socioeconomic status.

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