

AN ANALYSIS OF INTRA-INDIVIDUAL COGNITIVE VARIABILITY AND EMOTIONAL-BEHAVIORAL ISSUES

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ABSTRACT

This study explored how internalizing and externalizing scores differ based on cognitive variability (i.e., split between highest and lowest scores) while controlling for mean and age. Cognitive profiles of 168 children were examined, along with scores on instruments assessing emotional and behavioral functioning. Results indicated that cognitive variability explains a significant amount of variance in ratings of internalizing and externalizing problems, suggesting that best practices for the interpretation of cognitive data should be reconsidered.

INTRODUCTION

When it comes to determining a child's eligibility for services, schools and agencies often turn to formal cognitive assessment to guide their decision-making. A child's general intellectual functioning is most commonly thought to be represented by their full-scale score on an intelligence test (Weiss, Saklofske, Holdnack, & Prifitera, 2019). However, in many cases, the full-scale score fails to capture meaningful variability within a child's profile. When considering *significant* and *unusual* discrepancies between indices, base rates are often used to identify circumstances in which the discrepancy occurs in less than 15% of the population (see e.g., Pearson, 2014). However, in clinical practice, a lesser split often has meaningful implications. Given the vast and frequent utility of cognitive batteries, it is imperative that data are optimally utilized, in order to inform and guide clinical hypotheses and treatment planning.

There is current controversy among clinicians and researchers regarding cognitive profile analysis, a process that refers to interpretive methods encouraging practitioners to arrive at diagnostic conclusions and treatment recommendations based on the profile scores of cognitive assessments, such as the WISC-V (McGill, Dombrowski, & Canivez, 2018). Many empirical studies and scientific reviews have confronted the utility of such methods, but the majority of this literature is outdated. Given that cognitive profile analysis strongly influences diagnostic decision-making and eligibility for services, it is critical to evaluate the mechanisms of this practice that inform clinical opinion.

The current utilization of cognitive profile analysis does not support an individualized approach, particularly with respect to the consideration of significant variability within a single intellectual profile. With that said, a pattern being increasingly recognized within clinical environments suggests that children with a large split between their verbal, visual-spatial, and/or fluid reasoning index scores are also presenting with significant emotional and behavioral challenges. This pattern must be further explored, in order to ensure that appropriate clinical decisions are being made from the data available.

RESEARCH QUESTION

Does Intraindividual Cognitive Variability Matter?

More specifically, when controlling for other relevant variables (i.e., age, mean score, as determined by preliminary bivariate correlations), does the split between one's highest and lowest score on the VCI, VSI, and FRI explain variance in scores on parent- and teacher-rating scales measures of internalizing and externalizing problems?

METHODS

Following IRB approval, participants were drawn from a de-identified, archival database that includes data previously collected as part of normal clinical practice. Participants who had completed cognitive testing on the WPPSI-IV, WISC-V, or WAIS-IV were initially selected and the sample was then refined to include only those who also had CBCL and TRF data collected at the time of cognitive assessment. Statistical and visual analysis were used to identify any outliers and remove them from the data set. The total sample included 168 children and adolescents.

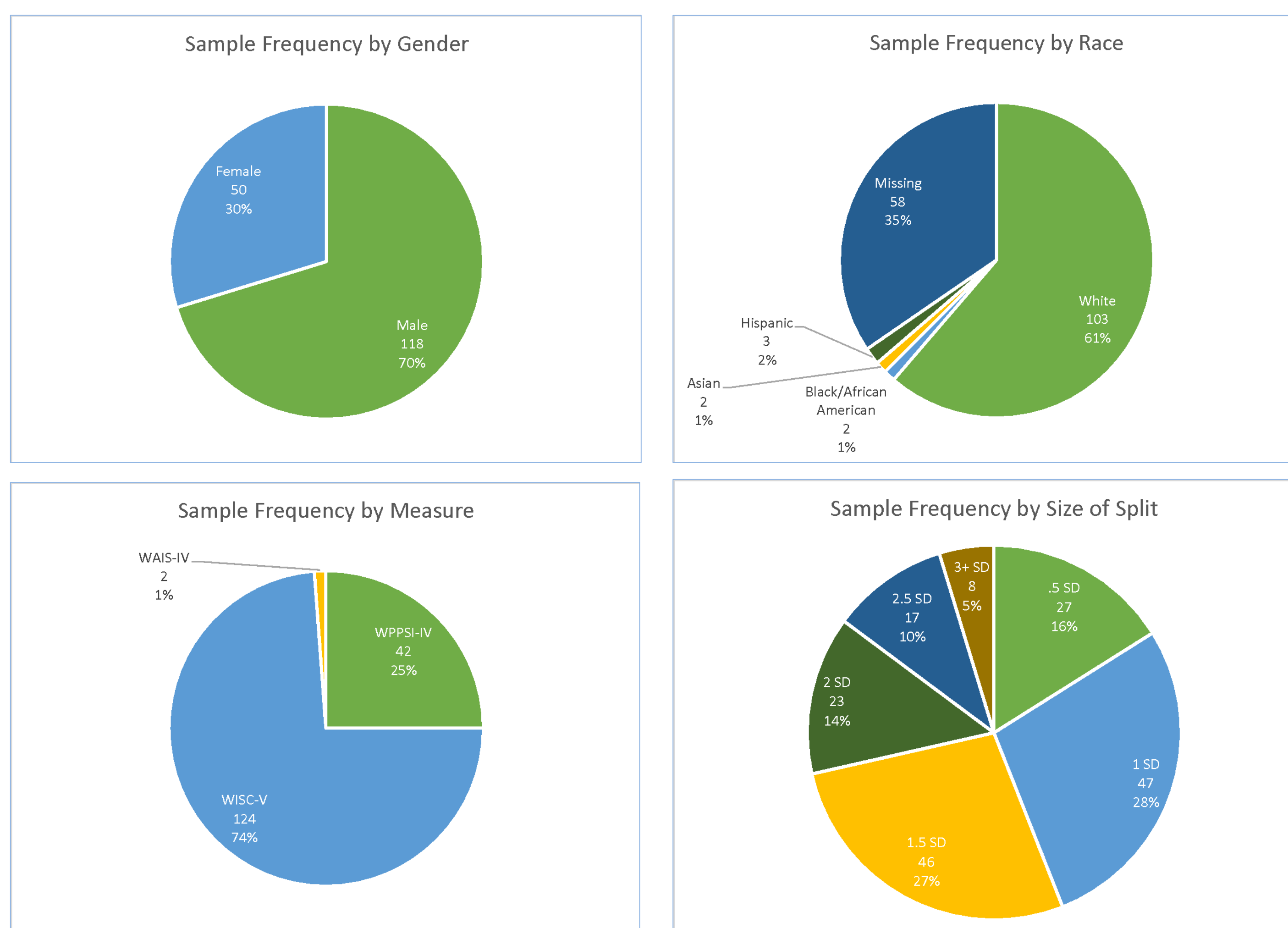


Figure 1. Sample Information: Demographics, Measures Administered, & Size of Split

RESULTS

Multivariate analysis of covariance was utilized to examine the impact of cognitive variability on parent and teacher ratings of emotional and behavioral challenges. Results indicated that when controlling for age and mean test score, the split between highest and lowest index scores accounts for a significant amount of variance in parent-rated externalizing challenges ($p < .001$), parent-rating internalizing challenges ($p = .091$), and teacher-rated externalizing challenges ($p = .080$). These data suggest that having significant personal strengths and weaknesses is a risk factor for emotional and behavioral challenges, above and beyond the difficulties that children and adolescents may face due to typical developmental transitions or specific cognitive weaknesses. Of note, cognitive variability did not explain a significant amount of variance in teacher-related internalizing behaviors.

Dependent Variable	p value	eta squared
Parent-Rated Internalizing Behaviors	.091	.057
Parent-Rated Externalizing Behaviors	< .001	.140
Teacher-Rated Internalizing Behaviors	.489	.027
Teacher-Rated Externalizing Behaviors	.080	.059

Table 1. Impact of Cognitive Variability on Parent & Teacher-Ratings of Emotional and Behavioral Challenges

CASE EXAMPLE

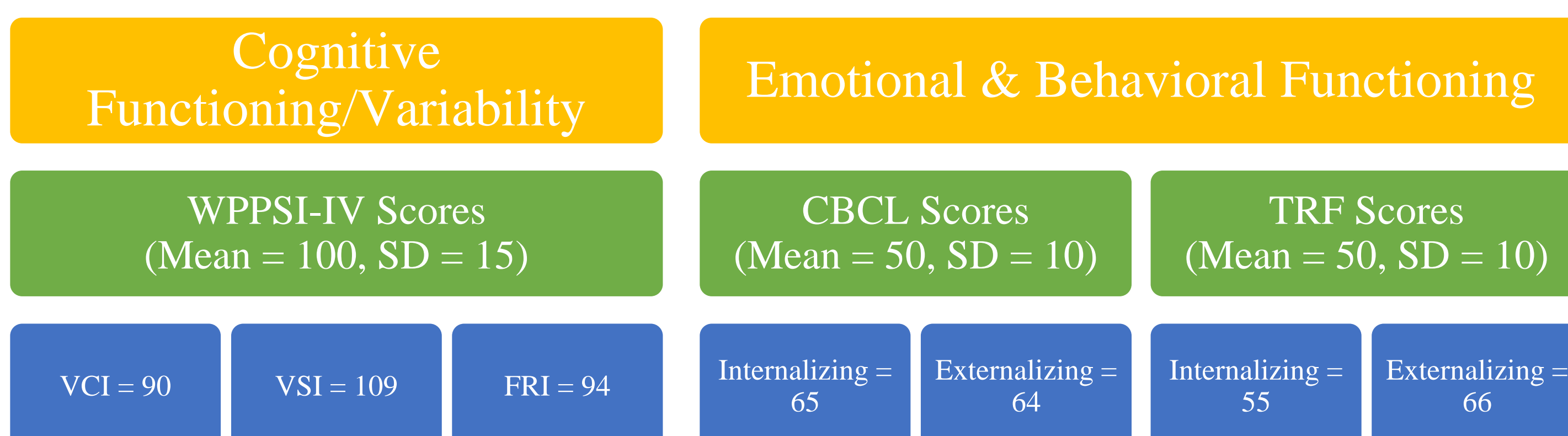


Figure 2. Profile of a 6-year-old white male assessed on the WPPSI

Questions to Consider:

- How may this student's relative verbal weaknesses impact functioning?
- How can this student's visual-spatial skills be used to fuel growth/achievement?
- In absence of formal acknowledgment of the split in the student's cognitive profile, will teachers know what circumstances/learning demands could result in greater emotional or behavioral reactivity?
- Are there signs or symptoms of internalizing challenges that are being missed in the school setting?
- Should students that display high variability be automatically flagged as at-risk?
- Does it matter where the split is within the cognitive profile? (i.e., which scores indicate the variability?)

DISCUSSION

Standard clinical care and best practice insist that practitioners take an individualized approach to evaluating and comprehending a child or adolescent's presentation. To illustrate this, if it is determined that 100 children all have FSIQ scores of 100, there are still many different patterns of strengths and weaknesses, demonstrating the need for an individualized conceptualization of each profile (Weiss et al., 2016). Weiss et al. (2016) proclaim that differences in cognitive abilities prompt considerable fluctuation in school achievement as well as other aspects of behavior that involve intelligence. This information further supports the idea that intra-individual differences within cognitive profiles warrant attention.

The variability among scores within a single cognitive profile is not yet recognized as a relevant factor for the conceptualization of a clinical presentation or the implementation of treatment interventions. When it comes to determining if a child qualifies to receive services, practitioners are often making decisions based on if the child's scores fall "below average", without considering variability within the profile. Accordingly, many of those with a large amount of cognitive variability in their profile are not receiving adequate support. However, these data would suggest that even those with average scores are predisposed to greater emotional and behavioral difficulty if they have a large split within their cognitive profile.

Despite being studied for over 60 years, research on subtest analysis remains subject to methodological flaws (Glutting et al., 1997). Although cognitive assessments provide unique information about the individual, the interpretation of this information may not be fairly portrayed due to the standardization of profile analysis. Existing literature illustrates cognitive profiles being assessed in a variety of populations, but there are no current studies that specifically address the degree of variability within an individual's profile. Given that these data highlight an important relationship between cognitive variability and internalizing and externalizing issues, reconsideration of best clinical practices is warranted.

Limitations

- One limitation of this study is that it had a rather small sample size. Additionally, the race of the participants was 61% white and 35% unknown. Therefore, it is not yet clear whether the results of this study hold true for more diverse samples of children and adolescents.
- This study was also limited in that the data reflects results from mostly WISC-V scores (74%), as opposed to the other cognitive assessments: WPPSI-IV (25%) and WAIS-IV (1%).

Directions for Future Research

- Future research on this topic should explore why there is less variance explained in teacher-reported ratings of internalizing challenges. Researchers should also consider if cognitive variability also explains self-reported ratings of emotional and behavioral challenges in adolescents.
- In the eyes of schools, clinics, and other mental health providers, what other data are needed to successfully result in policy change? This data, at minimum, must recognize cognitive variability as a meaningful data point inclusion in discussion about treatment planning and service provision.
- Future studies should also explore how demographic variables (e.g., race, gender, disability, etc.) play a role in mediating the relationship between cognitive variability and internalizing/externalizing issues.