Summary Report:

Validation Data for Terrace Metrics System

School Version (Grades 3 – 12)

Data Collection Dates:

October 2017 and September 2018

Overview

The following information summarizes the psychometric properties of each indicator assessed within the Terrace Metrics[©] framework, as well as the Total Function Score (TSF). This report covers the school version (grades 3 - 12). A detailed report is available by contacting Terrace Metrics (info@terracemetrics.org; 1-800-470-4401).

Terrace Metrics Indicators
Terrace Metrics incorporates the following indicators, which are determined by districts/schools based on grade level (see Table below: although out-of-grade level indicators can be chosen) and needs of the school/school district.

Risk, Resilience, and Supplemental Indicators

Resiliency Indicators	Interpretation
Global Satisfaction[1]	Higher Scores = Higher Levels of Positive Life Outlook
Positive School Experiences[1]	Higher Scores = Higher Levels of Positive Experiences with Teachers and Overall School Engagement
Hope[1]	Higher Scores = Higher Levels of Goal-Directed Behavior and Motivation
Grit	Higher Scores = Greater Tenacity to Achieve a Goal
Resiliency	Higher Scores = More External Resources to Overcome Adversity
Standards	Higher Scores = Higher Expectations of Personal Abilities
Leadership	Higher Scores = Greater Confidence to Influence Others

Risk Indicators	Interpretation
Ostracism[1]	Higher Scores = Higher Levels of Perceived Isolation
Anxiety	Higher Scores = Higher Levels of Anxiety Symptoms
Depression	Higher Scores = Higher Levels of Depression Symptoms

Supplemental Indicators*	Interpretation
Trauma	At Risk = High Level of Distress Regarding a Previous Trauma (which is not specified)
Drug/Alcohol	Higher Scores = Degree of Distress Around Drug/Alcohol Behaviors
School Violence	Higher Scores = Higher Tendency to Use Violence to Solve Problems at School

[1]Indicators that are administered to grades 3-5
*Supplemental indicators are separate from the Core resiliency/risk indicators. They are stand-alone and do not directly tie into the Terrace Metrics proprietary algorithm.

The Total Function Score
In addition to individual indicator data, Terrace Metrics also combines these indicators using a proprietary algorithm to compute a Total Function Score (TFS). The TFS is a fast, accurate, and easy-to-understand classification metric that best captures a student's overall behavioral health status.

Validation of the Terrace Metrics Instrument
Validation Sample
From a larger database, 18,931 students from grades 3 – 12 who completed the Terrace Metrics assessment in October 2017 were selected for this study. These students represented 4 school districts and 48 elementary schools (60% of total), middle schools (22%), and high schools (18%) across the Northern and Central regions of one Southeastern state. Ninety-four percent of the 2017 cohort again completed the assessment in September 2018. In addition, three districts/independent schools were chosen given that they represented different states and locations. The 2018 sample consisted of 19,984 students. Gender was evenly distributed across both time frames and the ethnic cultural background reflected the communities in which the districts were embedded (78% Caucasian, 9% African-American, 6% Hispanic-American, 7% other ethnic backgrounds). Thirty-seven percent of students qualified for free/reduced lunch status, which was slightly lower than the national average of 51% (see https://nces.ed.gov/programs/digest/d17/tables/dt17_204.10.asp).

Terrace Metrics also collects objective academic and behavioral data from schools (who volunteer) every 1-2 two years. Of the 2017 sample, academic (unweighted GPA) and behavioral data (number of tardies, unexcused absences, office referrals, total days missed) were collected on 8,773 students. Of the 2018 sample, unweighted GPA was against collected as well as standardized test scores (SAT and ACT scores, MAP reading and math scores) on 5,643 students.

Results

Reliability Estimates
Reliability estimates for each indicator are above standards typically set for research ($\alpha = 0.70$) and/or clinical purposes ($\alpha = 0.80$). Across both time frames, internal consistencies ranged from 0.75 to 0.94 at the high school level (grades 9 – 12) and from 0.73 to 0.95 at the middle school level (grades 6 – 8). Reliability estimates ranged from 0.76 to 0.86 at the elementary level (grades 3 5). These estimates were highly stable over a 1-year time frame; differences in estimates did not vary by more than 0.02. Finally, there was no significant differences in reliability estimates with respect to gender, race/cultural background, lunch status, or school location at either time frame.

Correlations Between Each Indicator and TFS Over Time
All correlations were in the expected directions and significant at $p < .05$ (most were significant at $p < .001$). All indicators correlated significant with the TFS, which itself yielded moderate stability regardless of grade level (the TFS intercorrelation ranged from 0.53 at the high school level to 0.51 at the elementary level). Each indicator also yielded solid temporal stability over the 1-year time frame (ranging from 0.41 to 0.65). Finally, cross-correlations were primarily in the moderate range, lessening concerns regarding multi-collinearity. No significant differences in correlations were found with respect to gender, school location, lunch status and race/cultural background across time frames.

Correlations with Supplemental Indicators
Supplemental indicators were introduced to high schools and middle schools in 2018. Correlations between each indicator and the supplemental indicators were negative and significant at $p < .05$ (93% of the correlations were significant at $p < .001$). As expected, the correlations between the TFS and each supplement indicator was significant (at $p < .001$) and moderate at both school levels, ranging between -0.30 to -0.42.

Regression Analyses: Individual Indicators Predicting TFS
For grades 6-12, the hierarchical regression captured 53% of the variance and all individual indicators were significant predictors of the TFS (at $p < .001$). Using Cohen's f^2 formula, the overall regression resulted in a large effect size. Standardized coefficients ranged from .056 to -0.43. Results of the 2018 regression yielded similar results and captured 53.2% of the variance, with each indicator again adding unique variance to the TFS at roughly the same magnitude.

A separate hierarchical regression was conducted on elementary school students. Results paralleled those found with older students: the overall solution captured 54.3% of the variance (also resulting in a large effect size) and each indicator was a unique predictor of the TFS. Standardized coefficients ranged from .15 to -.44. Results from the 2018 sample found that the solution captured 62.2% of the variance, and each indicator again was a significant predictor of the TFS at roughly the same magnitude.

Relationship Between the TFS and Academic/Behavioral Outcomes
All correlations at both time frames were significant at $p < .05$ (97% were significant at p < .001). Regardless of school level, students having a higher TFS also had higher academic outcomes and displayed more positive behaviors, while those reporting a lower TFS had poorer academic outcomes and were more likely to engage in negative behaviors at school.

Regression Analyses: TFS Predicting Academic/Behavioral Variable
In a series of hierarchical regression analyses, specific 2018 academic/behavioral variable was treated as a dependent variable. Controlling for gender and school location, both the 2017 and the 2018 TFS were significant predictors of each dependent variable (data for the 2018 analysis is reported below). In general, an increase in TFS contributes to a substantial increase in academic outcomes and a decrease in behavioral difficulties that hinder optimal school and interpersonal functioning.

2018 Variable	B (SE$_b$)	β
Unweighted GPA	.15 (.10)**	0.19
MAP Reading Results	.96 (.36)*	0.06
MAP Math Results	2.03 (.46)**	0.11
Total Behavior Incidents	-.73 (.22)**	-0.14
Unexcused Absences	-.59 (.08)**	-0.17
Days Absent	-.96 (.14)**	-0.15

*$p < .05$.
**$p < .001$.

Summary

Results show that regardless of grade level, school location, lunch status, gender, and ethnic background, all indicators assessed by Terrace Metrics provide a psychometrically sound "snapshot" of a student's behavioral health. In addition, all indicators as well as the TFS demonstrate strong temporal stability, meaning that the system can be used over time with meaningful results, thus providing a valid "portrait" of their health status over time. Most important, data reported herein illustrates how information obtained from the assessment significantly correlates with key objective academic and behavioral indicators.