EVALUATING THE DESCRIPTIVE VALIDITY OF THE MINNESOTA MULTIPHASIC PERSONALITY INVENTORY-ADOLESCENT-RESTRUCTURED FORM AND THE YOUTH LEVEL OF SERVICE/CASE MANAGEMENT INVENTORY IN A RURAL SAMPLE OF JUVENILE OFFENDERS

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Broadband assessment of personality and psychopathology may identify problems of clinical significance (e.g., suicidality, self-injury, untreated mental illness) not assessed in popular juvenile risk assessment tools. To investigate this possibility, we conducted multi-source, multi-method assessments of 11 community-dwelling juvenile offenders in a rural Midwestern county. Minnesota Multiphasic Personality Inventory-Adolescent-Restructured Form (MMPI-A-RF) and Youth Level of Service/Case Management Inventory (YLS/CMI) scores were obtained for each youth and operationalized with a descriptive q-sort. Criterion q-sort descriptions of the youth were obtained from the youth, caregivers, probation officers, therapists, and school staff. Scores on both instruments produced similar, reliable, and valid youth descriptions. In regression analyses, YLS/CMI profiles accounted for more variance in the criterion descriptions than the MMPI-A-RF (M $\Delta R2 = .26$).

Keywords: Q-sort, MMPI-A-RF, YLS/CMI, test interpretation, multi-method assessment

Evaluating the Descriptive Validity of the Minnesota Multiphasic Personality Inventory-Adolescent-Restructured Form and the Youth Level of Service/Case Management Inventory in a Rural Sample of Juvenile Offenders

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The data and methods used in the analyses of this research will be made available upon requests emailed to the corresponding author. The research was not pre-registered with an independent, institutional registry. The study data and supporting materials have been made publicly available via Open Science Framework at https://osf.io/pr5xj.

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Although juvenile offenders have greater unmet mental health needs than their non-delinquent peers (Fazel & Baillargeon, 2011; Fazel, Doll, & Långström, 2008; Teplin, Abram, McClelland, Dulcan, & Mericle, 2002), only a minority of them receive treatment (Teplin, Abram, McClelland, Washburn, & Pikus, 2005). To address this concern, screening and assessment for mental health problems during juvenile justice system intake evaluations is widely recommended (Braverman et al., 2011; Penn & Thomas, 2005; Underwood, Warren, Talbott, Jackson, & Dailey, 2014). However, this recommendation has not been actualized within established juvenile offender assessment tools, possibly because they were adapted from measures designed for adults, for whom most mental health variables are not related to recidivism (Bonta, Blais, & Wilson, 2014; Bonta, Law, & Hanson, 1998). Outside of substance abuse and violent behavior, both of which are illegal (and directly related to general recidivism), juvenile risk assessment tools continue to discount clinically-significant variables in favor of criminogenic risk factors directly correlated with recidivism.

For example, popular instruments such as the Youth Level of Service/Case Management Inventory (YLS/CMI; Hoge & Andrews, 2011), Psychopathy Checklist: Youth Version (PCL:YV; Forth, Kosson, & Hare, 2003), and the Structured Assessment of Violence Risk for Youth (SAVRY; Bartel, Borum, & Forth, 2002) lack attention to many common targets of youth mental health treatment, including as depression, anxiety, posttraumatic stress, and disordered eating. This may contribute to the misidentification of youth in need of mental health services, which supports the mental health disparities among juvenile offenders. For those youth whose rehabilitation efforts include a psychological treatment component, absence of psychological variables among these tools also limits their usefulness for informing psychological treatment efforts (e.g., treatment planning or outcome measurement). Additionally, absence of adequate mental health screening potentially limits the predictive validity of these tools. Non-severe psychopathology (i.e., mood problems and anxiety) is perhaps the most noted absence in this regard considering that it is a more potent indicator of recidivism than most of the other factors featured more prominently in adult-derived criminogenic risk models (e.g., family problems, conduct problems, effective use of leisure time, and delinquent peers; Cottle, Lee, & Heilbrun, 2001).

Because mental health problems are prevalent among juvenile offenders, evaluators using established risk assessment instruments are left to evaluate mental health concerns based on their own judgment. Consequently, screening components have been added risk assessment tools such as the newest edition of the YLS/CMI (i.e., the YLS/CMI, 2.0). However, the available empirical research on the mental health assessment capabilities of probation officers and case managers indicates that they often miss critical indicators of internalizing problems in routine interactions with youth (Wasserman et al., 2008). On the other hand, promising research with the YLS/CMI indicates that its scores can be used to improve the accuracy of probation officers' risk predictions (Hilterman, Nicholls, & van Nieuwenhuizen, 2014; Perrault, Paiva-Salisbury, & Vincent, 2012) and reduce variability in decisions about placement, supervision, and mental health referrals (Vincent, Guy,

Gershenson, & McCabe, 2012; Vincent, Paiva-Salisbury, Cook, Guy, & Perrault, 2012). Further research is needed to replicate these results and to determine whether mental health screenings embedded within the YLS/CMI and other related tools can be used to adequately capture juvenile offenders' clinical presentation.

To further this line of research, we conducted a study comparing the completeness of the information obtained from the YLS/CMI and the Minnesota Multiphasic Personality Inventory–Adolescent–Restructured Form (MMPI-A-RF)—a broadband measure of youth psychopathology and personality. Specifically, we administered both measures to a group of juvenile offenders and used a descriptive q-sort to generate clinical descriptions of the youth based on their score reports. Given that the two instruments assess overlapping, but non-identical sets of constructs, we expected that descriptions would be similar; however, we anticipated that scores on the MMPI-A-RF would provide more useful clinical information than the YLS/CMI. As a criterion for the comparison, we used descriptive q-sorts completed by the juvenile offenders themselves, their caregivers, probation officers, school staff, and therapists. An overview of the q-sort methodology used to compare the two instruments is provided in the following section.

THE Q-SORT AND PSYCHOLOGICAL ASSESSMENT

In a q-sort procedure, a judge organizes a set of descriptive stimuli into a set of categories, ordered according to how much the stimuli are believed to apply to a subject. For example, a q-sort consisting of psychological symptoms, equally distributed into three groups based on how much they apply to a client (e.g., from -1 [least applies] to +1 [most applies]), could be used to study how assessment results are integrated into an overall clinical impression. Coupling rank ordering and a fixed item distribution into one procedure is thought to provide a number of benefits over other item response formats (Block, 1961; McKeown & Thomas, 2013; Ozer, 1993). First, the forced-choice produced by the fixed distribution is thought to make the q-sort resistant to unwanted response biases such as a tendency toward extreme or conservative responding. Second, because items are rated relative to one another, differences in q-sort descriptions are less impacted by how raters interpret item response anchors such as "often" or "always". Third, the process of discriminating among the items also enhances raters' attention to the item content, thereby reducing the risk of careless responding. Finally, although the q-sort methodology is conceptually unique, quantitative analysis and interpretation of the results is relatively straightforward. Analyses typically focus on pairwise correlations among completed q-sorts by entering each of the q-sort items as cases and the raters as variables. Q-correlations among raters' q-sorts serve as indicators of their agreement.

For these reasons, q-sorts have been used to capture expert and layperson agreement on topics of interest across several disciplines, including political science, sociology, cross-cultural studies, and decision making research (Brown, 1996). In the context of psychological assessment, q-sorts have been used to study how psychologists interpret and integrate information from various sources, such as clinical interviews or standardized test results. Much of the seminal literature in this regard was conducted with the

MMPI and its derivatives (Aronson & Akamatsu, 1981; Meehl, 1959; Poythress & Blaney, 1978; Wiggins & Hoffman, 1968). More recently, q-sorts have been used to study and teach MMPI-2 profile interpretation (Deskovitz, Weed, Chakranarayan, & Williams, 2016; Deskovitz, Weed, McLaughlan, & Williams, 2016; Pant, McCabe, Deskovitz, Weed, & Williams, 2014; Weed, 2006). Although q-sort research has shown that the adult forms of the MMPI provide reliable clinical descriptions of examinees (Dodd, Courrégé, Weed, & Deskovitz, 2018), these results have not been replicated with the MMPI-A-RF. The present study was intended to expand this line of research into the context of juvenile offender assessment, by examining whether the MMPI-A-RF provides useful descriptive information beyond the YLS/CMI.

THE PRESENT STUDY

The present study was designed to evaluate whether standard practice juvenile risk assessments could be measurably improved by the concurrent assessment of juveniles' mental health. To do this, we assessed juvenile offenders with the YLS/CMI and the MMPI-A-RF and obtained q-sort descriptions of both measures' score profiles. Then, we compared the q-sorts describing participants' score reports with q-sort descriptions obtained from a validity criterion (in this case, the offenders themselves, as well as caregivers, probation officers, school staff members, and therapists who knew them). Based on the substantial empirical support for the use of both instruments with this population, we hypothesized that q-sort-derived profiles from both instruments would be positively and significantly correlated with one another (Hypothesis 1; Descriptive Similarity), as well as with the criterion q-sort descriptions obtained from the youth and adult informants (Hypothesis 2; Descriptive Validity). Additionally, based on the noted prevalence of mental health problems among juvenile offenders, we hypothesized that MMPI-A-RF profiles would provide incrementally valid descriptive information beyond the YLS/CMI (Hypothesis 3; Incremental Descriptive Validity), as measured by multiple regression with the criterion q-sorts.

METHOD

Participants

Youth and Caregivers. Thirteen community-dwelling juvenile offenders (n = 2 female) on probation within at least the past month, along with at least one caregiver (i.e., a parent or legal guardian), were recruited from a juvenile probation office in a rural Midwestern US county. The juveniles' offense histories varied greatly (e.g., violent offenses, property crimes, and substance use), and most reported histories of multiple offenses. Many were also enrolled in alternative school placements. All caregivers were female and included a mix of parents and grandparents. Two siblings participated and thus their caregiver was involved twice. After excluding two youth with MMPI-A-RF scores above the invalidity cutoffs specified in the administration guide (Archer, Handel, Ben-Porath, & Tellegen, 2016), the remaining MMPI-A-RF profiles had validity scale scores in the following ranges: Cannot Say (CNS; Raw < 10), Variable Response Inconsistency (VRIN-r; T

< 75), True Response Inconsistency (TRIN-r; T < 75), Combined Response Inconsistency (CRIN; T < 75), Infrequent Responses (F-r; T < 90), Uncommon Virtues (L-r; T < 80), and Adjustment Validity (K-r; T < 75). The final sample had 11 youth (n = 2 female) aged 14 to 16 years (M = 15.3, SD = .90).

Informants. Caregivers provided signed release forms permitting the research team to contact the youths' therapists, juvenile probation officers, and staff at their school. Informants representing each of these sources were contacted and requested to complete an online q-sort describing the participating youth. Therapists included psychologists, clinical psychology practicum students, and counselors. Probation officers were familiar with the youth, but the youth's court-assigned probation officers were not solicited because of their exposure to the youth's scores on previous administrations of the YLS/CMI. School staff included school counselors, social workers, and teachers at middle schools or high schools. Of the possible 33 informants, 30 (90.9%) participated in the study. Three informant q-sort descriptions are available for seven participants, and two descriptions are available for four participants. Informants were contacted within one-week of each youth's participation; however, delays between each youth's primary data collection and informant participation ranged from 2 to 119 days.

Materials

Information was obtained about the youth via self-report, caregiver-report, and the report of three sets of informants (i.e., therapists, probation officers, and school staff). These data included: (a) predictive information from the MMPI-A-RF and YLS/CMI, and (b) descriptive criterion information in the form of a q-sort. Specifically, the Juvenile Problem Q-Sort (JPQ) was used to gather descriptions of the youth from the five criterion sources noted previously. Later, independent descriptions of the youth were derived from their YLS/CMI and MMPI-A-RF score reports by a set of 15 graduate raters using the JPQ. An overview of the JPQ, the YLS/CMI, and the MMPI-A-RF follows.

Juvenile Problem Q-Sort (JPQ). To operationalize descriptions of the participating youth, a 36-item q-set was constructed using interpretive statements drawn from the administration and interpretation manuals for the MMPI-A-RF (Archer et al., 2016) and YLS/CMI, 2.0 (Hoge & Andrews, 2011). The JPQ was developed in a four-stage iterative process with the goal of representing the unique problem areas captured by both instruments. First, interpretive statements were drawn from each instrument's user manual, paraphrased for brevity, and combined to yield a 209-item pool. Second, items with redundant content were removed by the first author, leaving 85 items. In the third stage, items were rewritten to improve their readability for non-professional raters and to increase the number of positively stated items (e.g., "Has friends who are positive role models" instead of "Has few friends who are positive role models). Finally, the pool was further reduced to 36 items by a team of three clinical psychology doctoral students familiar with both instruments. In this stage, items were identified for removal based on content overlap, clinical utility, and observability or verifiability of the item's content. Removal was based upon consensus of the three clinicians. The resulting q-sort is completed via a web application that randomizes the presented item order and facilitates sorting of the items into six numerical categories

ranging from most (1) to least (6) characteristic of the identified youth. The 36 items are vertically arranged into a flat and symmetrical distribution, with six in each category. A list of the JPQ items is provided in the supplemental materials.

Youth Level of Service / Case Management Inventory, 2.0. The 42-item YLS/CMI, 2.0 (Hoge & Andrews, 2011) is a clinician-rated checklist of general recidivism risk. Using multiple sources of information, (e.g., clinical interview, record review, and collateral contact), the examiner rates the presence or absence of items divided into eight risk domains. A YLS/CMI score report contains the youth's age, gender, the normative subgroup used for scoring, and a narrative description of the results. A total risk score, calculated by summing risk factors present across all domains (range = 0-42), is translated into percentile rank and classified in terms of one of four risk level categorizations, from Low to Very High. Additional information about the youth's "Other Needs and Special Considerations" (e.g., individual and family mental health history, child welfare issues, and sociodemographic background factors) can be documented using a checklist included with the YLS/CMI protocol. The YLS/CMI items have been shown to have good internal consistency and interrater reliability (Hoge & Andrews, 2011), and meta-analytic results support the predictive validity of the YLS/CMI scores (Olver, Stockdale, & Wormith, 2014).

Minnesota Multiphasic Personality Inventory-Adolescent-Restructured Form. The 241-item MMPI-A-RF (Archer et al., 2016) is a self-report measure of adolescent personality and psychopathology rated in true-false format. It features 6 profile validity indicators and 42 substantive scales measuring a variety of constructs, including symptoms along the dimensions of internalizing, externalizing, and thought dysfunction. An MMPI-A-RF score report contains the youth's age, gender, and scores in both raw and T format. Due to its recent publication, the available evidence in support of the MMPI-A-RF comes from its predecessor, the MMPI-A. Several studies have demonstrated mean differences between delinquent and non-delinquent males on a variety of MMPI-A scales (Archer, Bolinskey, Morton, & Farris, 2002; Archer et al., 2002; Peña, Megargee, & Brody, 1996). Authors of a review of the literature concluded that the available evidence supported its use with adjudicated youth (Baum, Archer, Forbey, & Handel, 2009). Additionally, the MMPI-A-RF manual outlines research with juvenile offenders showing that the instrument's scores are predictive of outcomes such as probation violations, substance use history, and violent offenses (Archer et al., 2016, Tables G-17 to G-24).

Procedure

Youth and caregivers participated in a 2- to 4-hour primary data collection session, which took place in an outpatient therapy office. The assessments were conducted by one of three clinical psychology doctoral students under the supervision of a licensed clinical psychologist. Initially, the clinician described the research and obtained written consent from a legal guardian and assent from the youth. The youth and caregiver then completed the self-report measures (i.e., the MMPI-A-RF, YLS/CMI, and JPQ), followed by a semi-structured clinical interview conducted by the clinician according to the YLS/CMI, 2.0 Interview Guide. These interviews included both joint family and individual child components. Upon completion of the assessment, releases of information for the col-

lateral information sources were collected and youth and caregivers were compensated for their participation. Informants were later recruited via telephone and email and requested to complete the JPQ, and their participation ranged from 2 to 119 days post assessment. In total, 52 criterion q-sorts describing the 11 youth were collected: 11 from the youth themselves, 11 from caregivers, 11 from probation officers, 10 from school staff (one was for two staff rating one youth), and 9 from therapists. All research activities were approved by an Institutional Review Board.

Once the primary data collection was completed, the de-identified score reports for the YLS/CMI and MMPI-A-RF were assigned to a group of 15 doctoral students from three APA-accredited clinical and counseling psychology programs. Each profile was pseudorandomly assigned to four raters – a number shown to produce reliable MMPI-2 and MMPI-2-RF ratings in prior q-methodological research (Dodd et al., 2018). MMPI-A-RF score reports were assigned in an equivalent manner, with each profile being pseudorandomly assigned to four unique raters. At the time of the study, each rater had completed at least one graduate-level course in psychological assessment covering personality assessment and MMPI interpretation, and all the raters reported some experience administering and interpreting one of the MMPI instruments. However, since they varied in terms of their experience with both instruments, the publisher's administration and interpretation guide for both the YLS/CMI and MMPI-A-RF was made available to the raters based on the score reports they received.

To calculate interrater agreement, pairwise q-correlations were calculated (all using Pearson's r) between the raters of the YLS/CMI, MMPI-A-RF, and criterion ratings. Mean interrater q-correlations (MIRCs) were then calculated using Fisher's Z-to-r transformation formula for each youth (see online supplementary material, Table S1 for all interrater agreement values, https://osf.io/pr5xj). Across the 11 profiles, the mean interrater q-correlation was .66 (MIRC = .56–.74) for the YLS/CMI and .52 (MIRC = .27–.67) for the MMPI-A-RF. These values are consistent with those obtained from recent q-sort research with the MMPI-2 and MMPI-2-RF (Dodd et al., 2018).

For the criterion q-sorts, the mean interrater q-correlation was .34 (MIRC = .10–.50) among all sources, .38 (MIRC = .15–.50) when including only the caregiver and other informants, .41 (MIRC = -.01–.69) among the three informants, and .34 (MIRC = .10–.71) between the youth and the caregivers. This variable agreement among the criterion sources is comparable with results from previous research examining agreement of self- and other-report of youth psychological symptoms (Youngstrom, Findling, & Calabrese, 2003; Youngstrom, Loeber, & Stouthamer-Loeber, 2000). Further, these results suggest that the five criterion sources had overlapping but non-identical views of youth's most salient problems.

Analyses

The bulk of the analyses in the following section involve q-correlations (all using Pearson's r) among q-sorts provided by (a) the YLS/CMI raters, (b) the MMPI-A-RF raters, and (c) up to five criterion sources (i.e., the youth, caregivers, probation officers, therapists,

and school staff). To increase the reliability of the analyses (Block, 1961), a set of composite q-sorts was constructed for each participating youth. These composites were generated by taking the mean of each item from a group of completed q-sorts. Three composite q-sorts were generated for each youth: (a) a YLS/CMI q-sort composite (hereafter, YLS/CMI q-sort) from four raters, (b) a MMPI-A-RF composite (hereafter, MMPI-A-RF q-sort) from four raters, and (c) a criterion composite encompassing the q-sorts from the youth, their caregiver, a probation officer, a therapist, and a school staff member. Mean q-correlations among these composites were calculated from values transformed with Fisher's Z-to-r formula and back transformed to r.

First, to characterize the sample, descriptive statistics from the YLS/CMI and MMPI-A-RF are summarized. Second, to examine the overall level of similarity between results on the YLS/CMI and the MMPI-A-RF (i.e., Hypothesis 1), q-correlations were calculated between the composite q-sort ratings of both sets of profiles. Third, to examine accuracy of the problem descriptions generated from the YLS/CMI and MMPI-A-RF results (i.e., Hypothesis 2), q-correlations between the rater composite q-sorts and the criterion q-sorts were calculated. Finally, a series of multiple regression analyses were conducted to examine the incremental descriptive validity of both instruments (i.e., Hypothesis 3).

RESULTS

Predictive and Criterion Measure Descriptive Statistics

Relative to other community-dwelling offenders, YLS/CMI total scores (M = 13.91, SD = 5.03, range = 6–21) were, on average, in the Moderate overall risk range (66th percentile, range = 31–81; see online supplementary material Table S2 for a summary of the YLS/CMI scores). Ten youths' scores were in the Moderate overall risk range and the remaining profile was in the Low overall risk range. Additionally, the complete range of score classifications (i.e., Low, Moderate, and High) was observed for seven of the eight domains of risk. Specifically, on the Personality/Behavior domain, eight profiles had scores in the Moderate range and the remaining three profiles had scores in the High range.

Scores on the MMPI-A-RF were variable on the Higher Order (H-O) scales of Emotional/Internalizing Dysfunction (M = 53, SD = 10, range = 39–69), Thought Dysfunction (M = 53, SD = 14, range = 48–86), and Behavioral/Externalizing Dysfunction (M = 55, SD = 10, range = 51–72; see online supplementary material Table S3 for a summary of the MMPI-A-RF scores). Across all MMPI-A-RF profiles, mean score elevations in the clinical range ($T \geq 60$) were observed on four of the Substantive Scales: Negative School Attitudes (NSA; M = 60), Anger Proneness (ANP; M = 61), Cognitive Complaints (COG; M = 63), and Conduct Problems (CNP; M = 65). No MMPI-A-RF score means were less than or equal to a T score of 40, and there was considerable variability within the scores ($SD \geq 10$) for 30 of the 42 (71%) the Substantive Scales. Taken together with the YLS/CMI scores, these results indicate that the youth varied both in terms of their criminogenic risk and psychological symptom profiles.

Descriptive Similarity

As displayed in Table 1, the mean correlation between the YLS/CMI and MMPI-A-RF q-sorts was .47 (r = .07–.75). Of the 11 matched pairs of profiles, the cross-instrument correlations were statistically significant in 8 cases ($p < .01$), suggesting that there 3 pairs of YLS/CMI and MMPI-A-RF score reports were dissimilar (Profiles 2, 6, and 10). In one of these nonsignificant cases (Profile 10), the low cross-instrument correlation could have been explained by the low agreement among the MMPI-A-RF raters (MIRC = .27), which produced a less reliable rater composite. However, since there was substantial agreement among the other YLS/CMI and MMPI-A-RF raters for the other two cases (Profile 2 MIRC = .69 and .63, respectively; Profile 6 MIRC = .62 and .55), it appears that there was significant dissimilarity in minority of cases. Taken together, these results provide partial support for our hypothesis that the two measures would be significantly and positively correlated with one another.

Descriptive Validity

Table 1 also contains the correlations among the YLS/CMI q-sorts, the MMPI-A-RF q-sorts, the criterion composite (i.e., self, caregiver, probation officer, school staff, and therapist) q-sorts, and the individual criterion q-sorts. For the composite q-sort including all five sources, the mean criterion correlation with the YLS/CMI q-sort was .63 (r = .41–.83). All correlations between the YLS/CMI and the composite criterion were statistically significant ($p < .01$). Comparatively, for the composite q-sort including all five sources, the mean criterion composite correlation with the MMPI-A-RF q-sort was .42 (r = .15–.68). Six of the 11 correlations between the MMPI-A-RF and the composite criterion were statistically significant ($p < .01$). These results indicate that both instruments provided valid problem descriptions for the youth in the study, when the descriptions of all five criterion sources were included.

Table 1: Correlations Among YLS/CMI, MMPI-A-RF, and Criterion Q-Sorts

		Criterion Composite		Self		Caregiver		Probation Officer		School Staff		Therapist	
Profile	YLS-ARF	YLS	ARF	YLS	ARF	YLS	ARF	YLS	ARF	YLS	ARF	YLS	ARF
1	**.42**	**.67**	**.68**	**.39**	**.57**	.13	.29	**.64**	**.39**	**.58**	**.51**	**.58**	**.58**
2	.30	**.71**	.29	**.44**	.32	**.60**	.31	**.45**	.08	**.46**	.30	**.70**	.15
3	**.55**	**.49**	**.44**	**.45**	**.41**	.23	.09	**.49**	**.43**	.38	**.48**	--	--
4	**.49**	**.63**	**.46**	.23	.33	.36	**.45**	**.69**	.32	**.57**	.26	--	--
5	**.75**	**.53**	**.49**	**.49**	.18	**.67**	**.53**	-.25	-.03	**.49a**	**.52**[a]	**.40**	.38
6	.38	**.67**	.32	**.40**	.30	**.43**	.30	**.60**	.09	**.67**	**.50**	.24	-.04
7	**.55**	**.78**	.37	.25	.26	**.56**	.16	**.67**	.37	**.55**	.33	**.45**	.06
8	**.59**	**.59**	**.51**	.14	**.46**	.29	.12	**.75**	**.58**	.18	.05	**.59**	**.49**
9	**.40**	**.83**	.35	**.42**	.13	**.71**	.27	**.70**	**.49**	**.67**	.25	**.50**	.11
10	.07	**.46**	.15	.18	.22	.38	.19	.08	-.17	--	--	**.42**	.11
11	**.46**	**.41**	**.46**	.23	**.42**	.21	.24	.27	.32	--	--	.37	.24
M	.47	.63	.42	.33	.33	.44	.27	.50	.27	.52	.36	.48	.24
Mdn	.46	.63	.44	.39	.32	.38	.27	.60	.32	.55	.33	.45	.15

Notes. All values significant $p < .01$ are in boldface. Mean correlations were calculated using Fisher's Z-to-r formula. YLS = YLS/CMI. ARF = MMPI-A-RF. YLS-ARF = Correlation between YLS/CMI and MMPI-A-RF composite q-sorts.

a For profile 5, the criterion correlation was calculated using a mean-item composite from two school staff members who completed the q-sort.

Criterion correlations for each individual source are also provided in Table 1 to examine the degree to which each source contributed to the composite descriptive validity estimates for both the YLS/CMI and the MMPI-A-RF. For the youth self-report criterion q-sorts, the mean criterion correlation was .33 (r = .14–49) for the YLS/CMI q-sorts and .33 (r = .13–.57) for the MMPI-A-RF q-sorts. For the caregiver q-sorts, the mean criterion correlation was .44 (r = .13–.67) for the YLS/CMI and .27 (r = .09–53) for the MMPI-A-RF. For the probation officer q-sorts, the mean criterion correlation was .50 (r = -.25–.75) for the YLS/CMI and .42 (r = -.03–.58) for the MMPI-A-RF. For the school staff q-sorts, the mean criterion correlation was .52 (r = .18–67) for the YLS/CMI and .36 (r = .05–.52) for the MMPI-A-RF. For the therapist q-sorts, the mean criterion correlation was .48 (r = .25–.70) for the YLS/CMI and .24 (r = -.04–.58) for the MMPI-A-RF. Although there was similarity between the YLS/CMI and MMPI-A-RF profiles when compared to the criterion sources' descriptions, these results suggest that, one average, the YLS/CMI profiles were most similar to descriptions provided school staff and the MMPI-A-RF profiles were most similar to descriptions provided by the probation officers.

Incremental Descriptive Validity

To examine whether the MMPI-A-RF captured unique descriptive information about the youth beyond what is provided by the YLS/CMI, a set of hierarchical regres-

sion analyses were conducted, predicting the criterion composite from the YLS/CMI and MMPI-A-RF composites, one over the other. A summary of these results is contained in Table 2. When both instruments were included in the model, they captured an average of 48% (R2 = .23–.80) the variance in the criterion composite q-sort. The model including both instruments was statistically significant ($p < .01$) in 10 of the 11 cases. The MMPI-A-RF incremented the YLS/CMI in its prediction of the criterion composite for one youth ($\Delta R2 = .19$, $p < .01$), whereas the YLS/CMI significantly incremented the MMPI-A-RF in seven cases ($\Delta R2 = .18–.58$, $p < .01$). In four of the cases, there were no significant differences between the amount of descriptive information captured in the criterion composite.

Table 2: Summary of Hierarchical Regression Analyses Predicting Criterion Composite Q-Sorts from YLS/CMI and MMPI-A-RF Q-Sorts

	Criterion Correlation				ΔR^2	ΔR^2
Profile	YLS	ARF	*R*	R^2	ARF Over YLS	YLS Over ARF
01	**.67**	**.68**	**.80**	**.80**	**.19**	**.18**
02	**.71**	.29	**.72**	**.52**	.01	**.43**
03	**.49**	**.44**	**.53**	**.28**	.04	.09
04	**.63**	**.46**	**.66**	**.43**	.03	**.22**
05	**.53**	**.49**	**.55**	**.30**	.02	.07
06	**.67**	.32	**.67**	**.45**	.01	**.34**
07	**.78**	.37	**.78**	**.61**	.01	**.48**
08	**.59**	**.51**	**.62**	**.39**	.04	.13
09	**.83**	.35	**.84**	**.70**	.00	**.58**
10	**.46**	.15	.48	.23	.02	**.21**
11	**.41**	**.46**	**.52**	**.27**	.09	.05
M	.63	.42	.67	.48	.04	.26
Mdn	.63	.44	.66	.43	.02	.21

Notes. All values significant at $p < .01$ are in boldface. Mean correlations were calculated using Fisher's Z-to-r formula. YLS = YLS/CMI. ARF = MMPI-A-RF.

Across all cases, the MMPI-A-RF uniquely accounted for about 4% ($\Delta R2 = .04$) of the variance in the criterion composites while the YLS/CMI uniquely accounted for about 26% ($\Delta R2 = .26$). In the one case where the MMPI-A-RF incremented the YLS/CMI, the YLS/CMI also incremented the MMPI-A-RF ($\Delta R2 = .18$, $p < .01$), indicating that both were needed to capture the maximum amount of descriptive information provided by the criterion sources. These results indicate that, although there was some redundancy between the descriptions generated from the two instruments, inclusion of the MMPI-A-RF only provided additional valid descriptive information in one case.

A similar set of regression analyses was also conducted for each informant source, predicting the probation officer, therapist, school staff, and self-report criterion q-sorts from the YLS/CMI and MMPI-A-RF composites, one over the other. A summary of these

results is displayed in Table 3. In four cases (i.e., the caregiver and informant reports), the YLS/CMI accounted for more unique variance in the criterion at the mean level (ΔR2 = .15–.22), than the MMPI-A-RF (ΔR2 = .03–.04). Consistent with the correlational analyses (Mr = .33 for both), the two instruments accounted for equivalent amounts of unique variance in the self-report cases (ΔR2 = .08 for both). These results indicate that the YLS/CMI provided more valid descriptive information than the MMPI-A-RF across all sources (except for self-report) to a relatively uniform degree.

Table 3: Summary of Hierarchical Regression Analyses Predicting Criterion Q-Sorts from YLS/CMI and MMPI-A-RF Q-Sorts

	Mean Criterion Correlation			Mean ΔR^2	Mean ΔR^2
Source	YLS	ARF	Mean *R*	ARF Over YLS	YLS Over ARF
Composite	.63	.42	.67	.04	.26
Self	.33	.33	.44	.08	.08
Caregiver	.44	.27	.47	.03	.15
Probation Officer	.50	.27	.57	.03	.22
School Staff	.52	.36	.56	.04	.17
Therapist	.48	.24	.52	.03	.18

Notes. Mean correlations were calculated using Fisher's Z-to-r formula. YLS = YLS/CMI. ARF = MMPI-A-RF.

DISCUSSION

We conducted a study comparing the descriptive information obtained from the YLS/CMI and MMPI-A-RF in a sample of juvenile offenders. Descriptions of the instruments' score reports were obtained from doctoral student raters using a q-sort, and criterion q-sorts were obtained from the youth and their caregivers, probation officers, school staff, and therapists. Although this study was the first of its kind to examine q-sort descriptions of the YLS/CMI and the MMPI-A-RF; the interrater reliability of the descriptions for both instruments was comparable with what was obtained in previous q-sort research with the MMPI-2 and MMPI-2-RF (Dodd et al., 2018). Comparatively, there was less agreement among the criterion sources, which is consistent with the long history of research documenting discrepancies between sources on a range of factors related to child functioning (Achenbach, Dumenci, & Rescorla, 2002; Achenbach, McConaughy, & Howell, 1987; Kolko & Kazdin, 1993; Youngstrom et al., 2003, 2000).

Consistent with our first hypothesis, the q-sort descriptions of the YLS/CMI and the MMPI-A-RF profiles from the same youth were correlated (Mr = .47). This indicates that the results from the two instruments provided similar but non-redundant problem descriptions for the participating youth. This outcome was expected because of the overlap in the content domains assessed by the two instruments, particularly around externalizing prob-

lems (e.g., substance abuse, family problems, antisocial attitudes, and negative peer associations). Similarly, and consistent with our second hypothesis, YLS/CMI and MMPI-A-RF descriptions were both positively and significantly correlated with the criterion q-sorts. This result was expected because of the substantial evidence for the predictive validity of both instruments. Taken together with the descriptive similarity results, these findings provide support for the criterion validity of both instruments at the whole-profile level of which they are used in practice.

Contrary to our third hypothesis, results from regression analyses predicting the criterion composite q-sorts provided support for the incremental descriptive validity of the YLS/CMI over the MMPI-A-RF. At the mean level, the YLS/CMI accounted for more unique criterion composite variance (Mean $\Delta R2 = .26$) than the MMPI-A-RF (Mean $\Delta R2 = .04$). Moreover, the YLS/CMI outperformed the MMPI-A-RF at the mean level in virtually all correlational and regression analyses except for the prediction of the youth's self-report, where the two accounted for equivalent levels of criterion information (Mean $\Delta R2 = .08$ for both). These results indicate that, although scores the two instruments provided comparably valid descriptions of youth in some cases, administration of MMPI-A-RF is unlikely to provide unique and valid descriptive information over the YLS/CMI. In fact, in most cases, administering the MMPI-A-RF in lieu of the YLS/CMI is likely to result in the loss of a considerable amount of valid descriptive information. This result was unexpected, since most of the youth had seen therapists, presumably for concerns of a psychological nature. Given that the composites from the two instruments were moderately correlated, it could be the case that the unique content assessed by the MMPI-A-RF lacks practical utility insofar that it is unlikely to be observed by adults who know the youth. It is also possible that the "Other Needs and Special Considerations" section of the YLS/CMI adequately screens the content areas assessed by the MMPI-A-RF.

Additionally, individual correlational and regression analyses were conducted to explore the relative contributions of the five criterion q-sort sources (i.e., self, caregivers, probation officers, school staff, and therapists) to the correlations with the YLS/CMI and MMPI-A-RF composite q-sorts. Based on these results, the YLS/CMI appears to produce problem descriptions more like those provided by adults who know the youth (i.e., caregivers, probation officers, school staff, and therapists; Mr = .44–.52) than those provided by the youth themselves (Mr = .33). Nearly the opposite was true for the MMPI-A-RF profiles, whose descriptions were more like the youths' self-descriptions (Mr = .33) were than all adults (i.e., caregivers, probation officers, and therapists) except school staff (Mr =.36).

One implication from this set of findings is that the superiority of multi-source assessment over youth self-report cannot be denied. For example, the range of criterion correlations across the five sources for the YLS/CMI (Mr = .33–.52) and for the MMPI-A-RF (Mr = .24–.36) were all below their respective mean criterion composite correlations (YLS/CMI Mr = .63, MMPI-A-RF Mr = .42). Moreover, this effect occurred even though the criterion raters had modest levels of agreement. Not only does this support the aggregation of information across sources when possible, but it also supports the practice of using standardized assessment tools across sources of information. Although this can be done

with conventional norm-referenced measures that include self- and other-report forms, the current research highlights how the q-sort method can be used to efficiently integrate or compare assessment data from multiple sources. In the same vein, the multi-source data collection embedded within the YLS/CMI could explain its incremental descriptive validity over the MMPI-A-RF, which is limited to self-report.

Finally, when examining the variable pattern in magnitude of the criterion correlations among all sources, descriptions produced from the score reports of both the YLS/CMI and MMPI-A-RF were most correlated with those provided by a staff member at the youth's school (YLS/CMI Mr = .52, MMPI-A-RF Mr = .36). This finding suggests that school staff may possess important information about the youth's problems across a variety of domains, even with youth who may not explicitly have significant problems in the school setting. Combined with the observation that the magnitude of the criterion correlations was enhanced by the cross-informant aggregation process, this result suggests that juvenile offender assessments may be improved by routinely including data obtained from teachers, school counselors, or school administrative staff. This is consistent with what is recommended in the YLS/CMI, 2.0 manual, which encourages the user to incorporate information from school staff, among others, when conducting an administration of the instrument (Hoge & Andrews, 2011).

Limitations

The results of the current study should be considered in the context of its limitations. First, the generalizability of the results is limited by the small sample size (N = 11) and number of profile raters (K = 15). Since small sample sizes are common in the research on MMPI interpretation (Aronson & Akamatsu, 1981; Deskovitz, Weed, McLaughlan, & Williams, 2016b; Pant et al., 2014b), and do not limit the statistical power of q-sort methodology directly (Ozer, 1993), the main limitation of this small sample and convenience sampling method is that the full range of youth psychopathology and criminogenic risk was not observed. Although these considerations would not have favored either instrument in the analyses, results of this study are most likely to generalize to uses of the YLS/CMI and MMPI-A-RF with low-to-moderate risk juvenile offenders in rural settings.

Similarly, the use of doctoral student raters for generating q-sort descriptions of the YLS/CMI and MMPI-A-RF profiles may have favored one instrument over the other in terms of either the validity or interrater reliability of the q-sort descriptions. Although the interrater reliability coefficients were within the ranges previously reported in q-sort literature with the MMPI instruments, it is unclear how the YLS/CMI q-sort descriptions compare with uses of the instrument in applied settings. Conclusions from this study, consequently, may be best generalized to professionals in psychology with recent training in the use of both instruments. Additionally, since neither invalid MMPI-A-RF nor professional override YLS/CMI profiles were included in the analyses, the present results on their relative and absolute descriptive reliability and validity could be considered inflated.

Lastly, as is often the case with child psychological assessment research involving multiple sources of information, agreement among the sources of criterion information in

the study was lower than what was obtained among the raters of the YLS/CMI and MMPI-A-RF, which potentially attenuated the observed criterion correlations. Considering the variability in delays between the primary data collection and the informants' participation (2–119 days), the reduced agreement among the criterion sources may have been the result of them rating the youth at differing time points. However, this conclusion appears doubtful given that correlations between the caregiver and youth q-sorts, completed at the same time, were low (Mr = .28).

Directions for Future Research

The current results did not indicate that the descriptive information obtained from the YLS/CMI was made more valid by information from self-report measurement of psychological variables with the MMPI-A-RF. To support the use of instruments such as the MMPI-A-RF in settings where measures like the YLS/CMI are standard practice, more research is needed to evidence their clinical utility at the whole profile level, especially with larger and more diversified juvenile offender samples. Such research may also identify types of cases where the MMPI-A-RF can reliably deliver incremental descriptive information over the YLS/CMI. Contrarily, future research could provide further support that the YLS/CMI sufficiently captures these and other important psychological constructs, particularly with its "Other Needs and Special Considerations" section.

Relatedly, a promising area of research could explore the specific aspects of the YLS/CMI that could signal when administering the MMPI-A-RF might offer incrementally valid information about the youth. This research is important because the YLS/CMI administrator has no a priori way of knowing if information has been missed or underreported in their assessment. For example, perhaps discrepancies among total risk and specific domain or item-level scores could indicate cases where MMPI-A-RF administration is likely to yield incremental descriptive information. Moreover, there might be a certain population of offenders for whom administration of both the YLS/CMI and MMPI-A-RF is indicated. For instance, the MMPI-A-RF could be more likely to provide useful information beyond the YLS/CMI for substance abusers or youth with severe mental illness. Although the results of this study indicate that this may only be the case for a small (<10%) subset of youth, improving the treatment and placement outcomes of even a small percentage of youth would have a substantial impact given the number of juveniles on probation in the US.

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APPENDIX

Juvenile Problem Q-Sort Items

1. Feels hopeless
2. Has low self-esteem
3. Feels incapable of dealing with difficult situations
4. Performs compulsive rituals
5. Acts anxious
6. Is angry or irritable
7. Has a negative view of authority
8. Breaks rules
9. Abuses drugs or alcohol
10. Has delinquent friends
11. Acts aggressive
12. Has a family that argues a lot
13. Avoids social situations
14. Does not trust others
15. Feels sad or depressed
16. Has many physical health complaints
17. Does not enjoy the activities he or she used to
18. Has strange thoughts or hallucinations
19. Has an unusually good mood or high energy level
20. Acts without thinking
21. Has disengaged or inconsistent caregivers
22. Has problems at school
23. Has few friends who are a positive influence
24. Is not involved in positive activities outside of school
25. Has an exaggerated sense of self-esteem
26. Feels no remorse when his or her behavior causes harm
27. Does not accept help
28. Refuses to follow directions
29. Shows little concern for the feelings of others
30. Has a family history of criminal behavior, mental illness, or substance abuse
31. Is experiencing financial or housing problems
32. Has problems related to cultural, ethnic, or religious adjustment
33. Has experienced neglect, physical abuse, or sexual abuse

34. Has a diagnosed communication, learning, or intellectual disorder
35. Suffers from a physical disability or illness that interferes with daily life
36. Has a history of suicide attempts, suicidal thoughts, or self-harm

ONLINE SUPPLEMENTARY MATERIAL

Table S1: Q-Sort Interrater Agreement for Each Profile by Source

		Coefficient Alpha					Mean Interrater Correlations					
Profile		YLS	ARF	Y+C+I	C+I	I	YLS	ARF	Y+C+I	C+I	I	Y+C
1		.85	.89	.72	.65	.74	.58	.67	.34	.20	.49	.31
	k	4	4	5	4	3	4	4	5	4	3	2
2		.90	.87	.78	.73	.64	.69	.63	.41	.40	.37	.71
	k	4	4	5	4	3	4	4	5	4	3	2
3		.83	.82	.80	.75	.76	.56	.54	.50	.50	.62	.28
	k	4	4	4	3	2	4	4	4	3	2	2
4		.85	.77	.71	.73	.81	.59	.46	.38	.48	.69	.40
	k	4	4	4	3	2	4	4	4	3	2	2
5		.92	.83	.77	.82	.77	.74	.54	.36	.48	.46	.22
	k	4	4	6	5	4	4	4	6	5	4	2
6		.87	.83	.75	.71	.59	.62	.55	.37	.37	.32	.44
	k	4	4	5	4	3	4	4	5	4	3	2
7		.91	.87	.63	.73	.73	.72	.63	.25	.40	.47	.25
	k	4	4	5	4	3	4	4	5	4	3	2
8		.91	.79	.68	.69	.59	.71	.48	.30	.36	.32	.25
	k	4	4	5	4	3	4	4	5	4	3	2
9		.89	.73	.77	.76	.73	.68	.40	.40	.45	.48	.43
	k	4	4	5	4	3	4	4	5	4	3	2
10		.89	.60	.30	.34	-.02	.67	.27	.10	.15	-.01	.18
	k	4	4	4	3	2	4	4	4	3	2	2
11		.88	.78	.56	.62	.28	.66	.47	.24	.35	.16	.10
	k	4	4	4	3	2	4	4	4	3	2	2
M		.88	.80	.68	.68	.60	.66	.52	.34	.38	.41	.34
Mdn		.89	.82	.72	.73	.73	.67	.54	.36	.40	.46	.28
Range		.83–.92	.60–.89	.30–.80	.34–.82	-.02–.81	.56–.74	.27–.67	.10–.50	.15–.50	-.01–.69	.10–.71

Notes. Means were calculated using Fisher's Z-to-r formula. k = the number of raters. YLS = YLS/CMI. ARF = MMPI-A-RF. Y = Youth. C = caregiver. I = Informants.

Table S2: *YLS/CMI Score Profile Descriptive Statistics*

	1	2[a]	3	4[a]	5	6	7	8	9	10	11	*M*	*SD*
Total Score	12	9	6	19	17	11	21	15	11	11	21	13.91	5.03
Total Score, Percentile	61	49	31	87	78	57	88	72	57	57	88	65.85	18.42
Offenses/Dispositions	2	0	0	1	1	0	3	3	0	2	2	1.27	1.19
Family/Parenting	3	1	2	1	1	0	3	1	2	2	2	1.64	0.92
Education/Employment	2	2	2	6	3	3	3	5	2	0	4	2.91	1.64
Peer Relations	2	2	1	2	3	2	4	2	2	2	3	2.27	0.79
Substance Abuse	0	0	0	2	0	2	0	1	0	0	0	0.45	0.82
Leisure/Recreation	0	2	0	2	3	0	1	0	3	1	3	1.36	1.29
Personality/Behavior	3	2	1	5	5	4	4	2	2	4	6	3.45	1.57
Attitudes/Orientations	0	0	0	0	1	0	3	1	0	0	1	0.55	0.93

Notes. All scores are raw unless denoted in the row. Scores with values classified in the Moderate risk range are displayed in yellow and scores in the High range are in Red.
[a] Female offenders, whose scores have different classification cutoffs than for males.

Table S3: *MMPI-A-RF Score Profile Descriptive Statistics*

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11
CNS - Cannot Say (Raw Score)	0	0.6	0	0	0	0	2	0	0	0	0	0	0
VRIN-r - Variable Response Inconsistency	50	8	52	47	47	42	52	37	52	42	57	52	67
TRIN-r - True Response Inconsistency	55	3	57	57	57	67[a]	57	59[a]	50	59[a]	59[a]	50	57
CRIN - Combined Response Inconsistency	48	6	50	47	47	47	50	40	47	43	54	47	61
F-r - Infrequent Responses	51	7	51	59	44	51	48	55	62	41	48	48	59
L-r - Uncommon Virtues	58	5	61	61	56	61	56	61	44	56	61	61	56
K-r - Adjustment Validity	49	9	60	43	39	48	48	39	43	56	56	68	43
EID - Emotional/Internalizing Dysfunction	53	10	39	59	62	59	50	52	64	41	50	41	69
THD - Thought Dysfunction	53	14	51	61	57	54	57	57	86	37	43	37	48
BXD - Behavioral/Externalizing Dysfunction	55	10	53	47	53	51	56	62	72	53	42	42	72
RCd - Demoralization	54	11	37	57	67	55	57	47	60	43	52	40	74
RC1 - Somatic Complaints	53	10	49	57	41	53	55	75	55	41	57	41	55
RC2 - Low Positive Emotions	49	5	44	57	44	57	49	44	44	44	53	53	53
RC3 - Cynicism	54	11	52	68	52	52	52	59	77	48	37	42	59
RC4 - Antisocial Behavior	58	9	58	50	58	53	64	58	78	53	52	50	68
RC6 - Ideas of Persecution	53	14	53	70	64	58	58	49	76	37	45	37	37

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11
RC7 - Dysfunctional Negative Emotions	49	10	46	57	63	49	53	63	49	40	32	40	46
RC8 - Aberrant Experiences	54	13	52	52	42	52	52	64	86	42	42	42	64
RC9 - Hypomanic Activation	47	8	50	45	50	42	42	66	50	39	39	39	56
MLS - Malaise	48	11	35	73	42	52	35	47	47	47	58	35	52
GIC - Gastrointestinal Complaints	54	12	44	44	58	67	44	76	58	44	44	44	67
HPC - Head Pain Complaints	55	12	58	68	41	51	58	78	58	41	58	41	58
NUC - Neurological Complaints	52	10	39	58	39	48	66	58	53	39	66	48	53
COG - Cognitive Complaints	63	12	72	61	61	61	72	84	72	53	53	40	61
HLP - Helplessness/Hopelessness	53	13	43	54	51	54	54	51	80	47	36	43	73
SFD - Self-Doubt	51	11	36	53	74	53	53	44	48	48	62	36	53
NFC – Inefficacy	53	10	47	47	61	52	52	61	61	39	52	39	74
OCS - Obsessions/Compulsions	48	10	38	65	53	38	53	65	47	38	38	47	47
STW - Stress/Worry	51	8	45	55	64	64	49	49	55	49	45	38	49
AXY - Anxiety	50	10	41	59	51	51	41	72	59	41	41	41	51
ANP - Anger Proneness	61	12	74	61	52	61	74	74	74	47	47	47	61
BRF - Behavior-Restricting Fears	49	11	43	70	43	43	70	43	57	43	43	43	43
SPF - Specific Fears	48	8	45	50	60	37	50	60	45	45	50	37	45
NSA - Negative School Attitudes	60	11	55	64	55	64	73	45	83	64	55	50	50
ASA - Antisocial Attitudes	54	12	73	39	61	47	47	61	61	39	52	43	73
CNP - Conduct Problems	65	7	71	64	64	56	71	64	79	64	56	56	71
SUB - Substance Abuse	47	7	42	42	42	53	42	53	53	42	42	42	61
NPI - Negative Peer Influence	54	12	54	40	54	49	62	62	81	40	49	40	62
AGG - Aggression	49	12	45	40	40	48	68	45	77	48	40	40	53
FML - Family Problems	49	9	41	56	48	41	62	48	45	45	41	45	68
IPP - Interpersonal Passivity	52	14	50	50	83	40	59	40	40	40	71	50	50
SAV - Social Avoidance	51	10	46	68	38	68	55	38	55	46	46	46	51
SHY - Shyness	48	7	43	61	48	48	61	48	45	48	39	45	45
DSF – Disaffiliativeness	51	7	41	51	51	58	51	51	58	41	58	41	58
AGGR-r - Aggressiveness-Revised	54	15	53	46	41	53	78	53	85	46	44	41	59
PSYC-r - Psychoticism-Revised	54	12	40	57	54	50	61	61	81	40	50	40	61
DISC-r - Disconstraint-Revised	57	10	63	44	63	53	56	56	70	51	56	42	73
NEGE-r - Negative Emotionality/ Neuroticism-Revised	51	9	40	60	66	55	51	60	55	48	40	38	51
INTR-r - Introversion/Low Positive Emotionality-Revised	53	9	40	67	44	67	54	44	54	47	49	58	54

Note. T score cells are filled from red to blue based on the maximum value of 90, a midpoint of 50, and minimum of 30.

[a] TRIN-r scores in the false direction.