Clinical Implications of a Dimensional Approach: The Normal:Abnormal Spectrum of Early Irritability

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Objective: The importance of dimensional approaches is widely recognized, but an empirical base for clinical application is lacking. This is particularly true for irritability, a dimensional phenotype that cuts across many areas of psychopathology and manifests early in life. We examine longitudinal, dimensional patterns of irritability and their clinical import in early childhood.

Method: Irritability was assessed longitudinally over an average of 16 months in a clinically enriched, diverse community sample of preschoolers (N = 497; mean = 4.2 years; SD = 0.8). Using the Temper Loss scale of the Multidimensional Assessment Profile of Disruptive Behavior (MAP-DB) as a developmentally sensitive indicator of early childhood irritability, we examined its convergent/divergent, clinical, and incremental predictive validity, and modeled its linear and nonlinear associations with clinical risk.

Results: The Temper Loss scale demonstrated convergent and divergent validity to child and maternal factors. In multivariate analyses, Temper Loss predicted mood (separation anxiety disorder [SAD], generalized anxiety disorder [GAD], and depression/dysthymia), disruptive (oppositional defiant disorder [ODD], attention-deficit/hyperactivity disorder [ADHD], and conduct disorder [CD]) symptoms. Preschoolers with even mildly elevated Temper Loss scale scores showed substantially increased risk of symptoms and disorders. For ODD, GAD, SAD, and depression, increases in Temper Loss scale scores at the higher end of the dimension had a greater impact on symptoms relative to increases at the lower end. Temper Loss scale scores also showed incremental validity over *DSM-IV* disorders in predicting subsequent impairment. Finally, accounting for the substantial heterogeneity in longitudinal patterns of Temper Loss significantly improved prediction of mood and disruptive symptoms.

Conclusion: Dimensional, longitudinal characterization of irritability informs clinical prediction. A vital next step will be empirically generating parameters for the incorporation of dimensional information into clinical decision-making with reasonable certainty.

Key Words: irritability, dimensional, developmental psychopathology, normal:abnormal spectrum, longitudinal modeling

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Irritability is present in diverse forms of mental illness.[1-3] Prior research has generally focused on extreme irritability. However, because irritability falls along a spectrum and is an early-life precursor to psychopathology,[4,5] dimensional, developmentally specified approaches are needed. Here, we characterize the normal:abnormal spectrum of irritability in early childhood using developmentally informed quantitative methods. Specifically, we model how progression along the dimensional spectrum of irritability relates to subsequent clinical risk and impairment, characterize the variability of irritability over time, and test the value of this longitudinal variation for prediction.

Early identification of abnormal irritability would be of great value for the prevention of mental health disorders. However, irritable behavior is normative in early childhood, and its clinical significance varies based on its context, modulation, and pervasiveness.[5-7] Recent work lays the foundation for making such normal to abnormal differentiations in early childhood.[8,9] For example, we have defined a developmentally based irritability spectrum using the Temper Loss scale of the Multidimensional Assessment Profile of Disruptive Behavior (MAP-DB) questionnaire (this scale was originally titled the "Multidimensional Assessment of Preschool Disruptive Behavior" but has since been renamed to reflect its use and validation across a broader age range) in a prior unselected sample.[10,11] This psychometric work lays the foundation for the present clinical validation study.

Currently, empirical approaches for extracting clinically useful information from a dimensionally defined irritability spectrum are underdeveloped. Dimensions are based on the assumption that risk cannot be defined by a single, extreme threshold but instead manifests probabilistically.[4] Thus, a dimensional approach may enhance developmental sensitivity to prodromal phases of risk. Dimensional risk may increase linearly or nonlinearly, with different implications for clinical decision making. Little is also known about the clinical informativeness of longitudinal variation in dimensional patterns. This is of particular importance in early


Supplemental material cited in this article is available online.

TABLE 1 Differences in Temper Loss Score[a] by *DSM-IV* Disorder

Disorder	Prevalence (%)[b]	Mean (SE)		Significance
		Meets Criteria	Does Not Meet Criteria	
Disruptive Disorders				
ODD	14.24	1.00 (0.11)	−0.07 (0.05)	$t(394) = 8.32^{***}$
CD	5.15	0.89 (0.28)	0.04 (0.05)	$t(393) = 2.91^{**}$
ADHD	6.18	0.90 (0.22)	0.02 (0.05)	$t(390) = 3.80^{***}$
Any disruptive disorder	17.94	0.87 (0.11)	−0.10 (0.05)	$t(389) = 7.81^{***}$
Mood Disorders				
GAD	21.22	0.63 (0.10)	−0.07 (0.06)	$t(378) = 5.85^{***}$
SAD	10.55	0.64 (0.20)	0.01 (0.05)	$t(384) = 2.96^{**}$
Depressive disorders[c]	2.41	1.23 (0.38)	0.06 (0.05)	$t(399) = 3.06^{**}$
Any mood disorder	26.59	0.53 (0.10)	−0.09 (0.06)	$t(377) = 5.09^{***}$
Both disruptive and mood disorders	33.88	0.56 (0.08)	−0.17 (0.06)	$t(377) = 6.66^{***}$

Note: ADHD = attention-deficit/hyperactivity disorder; CD = conduct disorder; GAD = generalized anxiety disorder; ODD = oppositional defiant disorder; SAD = separation anxiety disorder; SE = standard error.
[a]*Calibrated item response theory scores (mean = 0, SD = 1).*
[b]*Adjusted for clinical enrichment via sampling and response weights.*
[c]*Combines depression and dysthymia.*
$^{**}p < .01$; $^{***}p < .001$.

childhood, when the capacity for self-control improves dramatically across relatively short time intervals.[12,13] Dimensional, longitudinal approaches also hold promise for elucidating the substantial heterogeneity in outcomes among young children exhibiting early high irritability (i.e., which young children who are irritable will go on to develop clinical problems and which will not). For example, recent trajectory modeling suggests that more than 25% of young children with high early irritability develop normally when followed longitudinally.[14]

Here we draw on a large, clinically enriched sample of preschoolers to establish the validity of the dimensional Temper Loss scale for clinical prediction and explicate the shape of its relation to clinical outcomes. The goals of this article are as follows: to establish the validity of the Temper Loss scale, including convergent/divergent, clinical, and incremental validity; to characterize the short-term longitudinal variation in Temper Loss scale score; and to test the incremental validity of this variation for clinical prediction.

METHOD

Participants

The Multidimensional Assessment of Preschoolers (MAPS) Study includes a large, diverse sample of preschoolers recruited from the waiting rooms of multiple pediatric clinics in a large urban area of the United States. This unselected sample (N = 1,857) was seen only at baseline and is the sample on which the psychometric modeling of the Temper Loss scale is based.[15] The primary analytic sample for the present study is an intensive subsample of this MAPS pediatric cohort (n = 497), which was clinically enriched by oversampling for child disruptive behavior and parental intimate partner violence. The mean age of the sample at baseline was 4.2 years (T0: mean = 4.2 years, range = 2.9–6.0 years; T1: mean = 4.8 years, range = 3.1–7.7 years; T2: mean = 5.54 years, range = 3.8–8.5 years). Approximately half of the sample were boys and were living in poverty. Participants were predominantly African American, Hispanic, and non-Hispanic white. (For additional sample details, see Supplement 1 and Table S1, available online, and prior published descriptions.[10,11]) All clinical validity analyses used sampling weights that accounted for both unequal probabilities of selection and differential nonresponse rates in this subsample.

Procedures

Procedures were approved by institutional review boards, and parental informed consent was obtained. The clinical subsample participated in 3 longitudinal assessments over an average period of 15.8 months (SD = 5.7 months; for overview, see Figure S1, available online). At baseline (T0), mothers completed the Temper Loss scale. At T1 (~6 months later), they took part in an intensive clinical and neurocognitive assessment. At T1, 80% also completed the Temper Loss scale again (20% were missing because the MAP-DB was added to the T1 assessment after this phase was underway). At T2 (~9 months later), participants completed the Temper Loss scale and survey measures of clinical symptoms and impairment (94% response rate).

Measures

Irritability. Irritability was assessed via the MAP-DB Temper Loss scale at T0, T1, and T2. The Temper Loss scale measures key features of irritability including mood and tantrums. The 22 Temper Loss scale items capture variations in quality, intensity, and context along an objective frequency scale (ranging from never during the past month to many times each day). There were no significant differences in the structure of the Temper Loss scale from the prior independent sample[11] based on differential item function (DIF) estimations using a weighted least squares approach ($\chi^2[109] = 128.95$, $p = .09$). Confirmatory factor analyses also indicated a unidimensional factor (Comparative Fit Index [CFI] = 0.96,[16] Tucker Lewis Index [TLI] = 0.95,[17] and root mean square error of approximation [RMSEA] = 0.09).[18] Unidimensionality was evident across