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Effects of Standard and Modular Psychotherapies in the Treatment of Youth With Severe Irritability

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Objective: To examine the preliminary effectiveness of a modular, transdiagnostic, behavioral/cognitive-behavioral intervention (MATCH) compared with standard manualized treatments (SMT) and usual care (UC) for treating youth with severe irritability. **Method:** We analyzed data from an effectiveness trial in which treatment-referred youths ($N = 174$; $M_{\text{age}} = 10.6$ years; 70% boys) were randomized to receive MATCH, SMT, or UC ($n_s = 53\text{--}62$). Masked assessments of irritability, diagnoses, impairment, and internalizing, externalizing, total, and top problems were collected from caregivers and youths at pre- and posttreatment, weekly during treatment, and quarterly through 2-year follow-up. Baseline measures of irritability and impairment were used to identify a subsample characterized by severe irritability and mood dysregulation (SIMD; $n = 81$; $M_{\text{age}} = 10.2$ years; 69% boys; $n_s = 24\text{--}31$ across conditions). Longitudinal multilevel models and ANOVAs were estimated to examine numerous clinical outcomes within and between conditions. **Results:** Among youth with SIMD, MATCH produced faster improvements than UC and SMT, with medium or large effect sizes in two thirds of all comparisons tested (Mdn ES = 0.60). Although SIMD youths in all conditions showed reductions in DSM diagnoses, only MATCH predicted significantly fewer posttreatment diagnoses than UC (averaging 1.0 fewer; ES = 0.93). Finally, among the entire sample, MATCH and SMT equivalently outperformed UC in reducing irritability (ES = 0.49) and the effects of each treatment condition on other outcomes were not moderated by baseline irritability. **Conclusions:** Extant behavioral/cognitive-behavioral psychotherapies—already well-established and widely used—may be helpful for treating youths with severe irritability. A transdiagnostic, modular format showed the most consistently favorable pattern of results across multiple outcomes, informants, and measurement schedules.

What is the public health significance of this article?

This study suggests that existing therapies for common youth emotional and behavioral problems are likely to also be effective for treating youth with severe irritability and mood dysregulation. These treatment strategies include behavioral parent training (BPT) and cognitive-behavioral therapy (CBT). Results also indicate that BPT and CBT may be most effective for severe irritability when delivered in a modular, transdiagnostic format, as in the *Modular Approach to Therapy for Children with Anxiety, Depression, Trauma, or Conduct Problems* (MATCH).

Keywords: effectiveness trial, empirically supported treatment, mood dysregulation, severe irritability, youth psychotherapy

Supplemental materials: <http://dx.doi.org/10.1037/ccp0000456.supp>

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Severe irritability is a common problem among treatment-referred children and adolescents¹ (Stringaris, Vidal-Ribas, Brotman, & Leibenluft, 2018). A feature of more than a dozen mental health diagnoses (American Psychiatric Association, 2013; e.g., oppositional defiant disorder [ODD], depressive and anxiety disorders), irritability is defined as a lowered threshold for experiencing anger, which can lead to aggression and impairment (Barata, Holtzman, Cunningham, O'Connor, & Stewart, 2016; Toohey & DiGiuseppe, 2017; Vidal-Ribas, Brotman, Valdivieso, Leibenluft, & Stringaris, 2016). Recent research has identified a syndrome of severe mood dysregulation (SMD), later adapted as disruptive mood dysregulation disorder (DMDD; Brotman, Kircanski, & Leibenluft, 2017; Evans et al., 2017; Leibenluft, 2011). Other studies have documented an irritable dimension of ODD symptoms, separable from defiant/spiteful features (Burke, Hipwell, & Loeber, 2010; Evans, Pederson, Fite, Blossom, & Cooley, 2016, 2017; Rowe, Costello, Angold, Copeland, & Maughan, 2010; Stringaris & Goodman, 2009a, 2009b). Collectively, these studies show the significance of severe irritability, linking it to anxiety, depression, ODD, and poor functional outcomes (Evans et al., 2017; Vidal-Ribas et al., 2016). With the addition of DMDD to the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (*DSM-5*; American Psychiatric Association, 2013; Leibenluft, 2011; Roy, Lopes, & Klein, 2014) and ODD with Chronic Irritability-Anger to the *International Classification of Diseases*, 11th revision (ICD-11; Evans et al., 2017; Lochman et al., 2015; World Health Organization, 2018), there are now even more entities defined by severe irritability and mood dysregulation (SIMD).²

Despite these advances, there remains relatively little research to guide the treatment of SIMD (Kircanski, Clayton, Leibenluft, & Brotman, 2018; Lochman et al., 2015; Stringaris & Taylor, 2015; Stringaris et al., 2018; Sukhodolsky, Smith, McCauley, Ibrahim, & Piasecka, 2016; Tourian et al., 2015). By way of comparison, reviews of empirically supported treatments (ESTs) in youth mental health routinely cover a range of problems and disorders such as anxiety, depression, ADHD, and PTSD, but offer virtually no attention to the treatment of SIMD (e.g., Southam-Gerow & Prinstein, 2014; Weisz & Kazdin, 2017; see also aacap.org, effectivechildtherapy.com). Thus, research to inform treatment of SIMD is sorely needed. The bulk of the available evidence is derived from research on disorders and problems with which irritability is associated, including ADHD, ODD, and aggression. This evidence, summarized in recent reviews (Kircanski et al., 2018; Stringaris et al., 2018; Sukhodolsky et al., 2016), suggests that two broad treatment approaches—Behavioral Parent Training (BPT) and Cognitive Behavioral Therapy (CBT)—may be particularly helpful in reducing behavioral presentations of severe irritability, and novel interventions are currently being developed, adapted, and evaluated.

Existing and Novel Psychotherapeutic Approaches

BPT involves working with parents to modify parent–child interactions that can maintain angry, defiant, and aggressive behaviors (Kircanski et al., 2018; Stringaris et al., 2018; Sukhodolsky et al., 2016). Based in operant conditioning, BPT seeks to promote desired behaviors and reduce undesired behaviors by teaching parenting skills, including effective praise, selective attention, special time, effective instructions, active ignoring, and timeout (Kazdin, 2017). Substantial evidence from randomized trials and meta-analyses indicates that BPT is effective, with medium to large effect sizes, in

treating disruptive behaviors; and benefits are often maintained through long-term follow-up (Comer, Chow, Chan, Cooper-Vince, & Wilson, 2013; Dretzke et al., 2009; Stringaris et al., 2018; Sukhodolsky et al., 2016; Weisz et al., 2017). Notably, similar results have been reported across a range of specific BPT programs (e.g., Drugli, Larsson, Fossum, & Mørch, 2010; Kaminski & Claussen, 2017; Sanders, 1999; Ward, Theule, & Cheung, 2016; Zisser, Herschell, & Eyberg, 2017). However, these BPT outcome studies have tended to focus on externalizing problems and disorders broadly; evidence regarding the effects of BPT on SIMD specifically remains limited.

CBT may also be effective for SIMD (Kircanski et al., 2018; Stringaris et al., 2018; Sukhodolsky et al., 2016). In contrast to BPT, CBT focuses on working directly with youths, sometimes with a parent component. A broad framework, youth CBT integrates behavioral and cognitive techniques with developmental sensitivity, but the content and structure of specific CBT programs varies with the problem being targeted (Weisz & Kazdin, 2017). Numerous CBT programs exist for anxiety and depression (e.g., Higa-McMillan, Francis, Rith-Najarian, & Chorpita, 2016; Weersing, Jeffreys, Do, Schwartz, & Bolano, 2017), both of which can include irritability and are therefore relevant here. However, current recommendations for SIMD focus primarily on CBT for anger and aggression (Sukhodolsky et al., 2016). Grounded in social information processing theory, CBT for anger and aggression targets the social difficulties that irritable youths encounter with peers and adults. Treatment includes working directly with youths to develop problem-solving and emotion regulation skills as more adaptive responses to daily situations (Kircanski et al., 2018). Anger/aggression-focused CBT can be effective in reducing, and sustaining the reduction of, disruptive behaviors (Sukhodolsky et al., 2016), evidenced across a range of specific programs (e.g., Kazdin, 2017; Lochman & Wells, 2004; Sukhodolsky & Scahill, 2012). As with BPT research, these CBT trials have typically measured broad externalizing outcomes, with less attention to irritability and mood. This emphasis on behavioral over affective features is problematic because many externalizing problems are unrelated to irritability, and irritability does not always lead to aggression (Brotman, Kircanski, Stringaris, Pine, & Leibenluft, 2017). Thus, it is time to take a more focused look at the effects of these treatments for SIMD.

The few psychosocial treatments that have been *examined specifically for SIMD* have largely comprised BPT and/or CBT techniques. These include secondary analyses of previous studies and preliminary studies of newly developed or adapted interventions.

¹ Herein referred to as *youths*, except where intended to mean children or adolescents specifically.

² A variety of terms (e.g., severe/chronic irritability/anger, irritable mood, SMD, DMDD, ODD with chronic irritability-anger) have been used to dimensionally or categorically identify youths with severe irritability. Considering the high degrees of conceptual and empirical overlap among these terms, the transdiagnostic nature of irritability, and the need for research spanning various constructs, we use *SIMD* as shorthand to refer to a population with severe, chronic irritability (encompassing SMD, DMDD, ODD with chronic irritability-anger, and related categories). We use *irritability* to refer to the dimensional variable. In reviewing the literature, we have attempted to retain prior studies' original terminology as appropriate for accuracy. For more details regarding our operationalization of the SIMD shorthand in the present analysis, see the accompanying [online supplemental materials](#), "Identification, Validation, and Allocation of the Severely Irritable Subsample."

Regarding the former, Derella, Johnston, Loeber, and Burke (2019) reanalyzed randomized trial data and found that a CBT program for externalizing behaviors produced improvements in irritability indirectly via an increase in emotion regulation skills. Second, reanalyzing data from the Multimodal Treatment of ADHD (MTA), Fernández de la Cruz et al. (2015) found that for youths referred for ADHD, standard medication management with behavioral therapy was effective in reducing irritability, and ADHD symptom outcomes were not moderated by irritability. Lastly, Scott and O'Connor (2012) found that among oppositional children, those with emotional dysregulation were more responsive to an Incredible Years intervention compared with children with a headstrong presentation.

We are aware of only a few novel psychotherapies that have recently been *developed specifically for SIMD*, with preliminary empirical support. First, in a series of studies, Waxmonsky et al. (2008, 2013, 2016) accumulated evidence for the feasibility and effectiveness of a blend of BPT/CBT strategies and medication management, compared with community-based psychosocial treatment, for treating SMD in children with ADHD. This intervention involved eleven 105-min parent/child group sessions focused on emotion recognition, understanding overreactivity to stressors, and building coping and problem-solving skills. Second, Miller et al. (2018) conducted a small randomized pilot study of interpersonal psychotherapy adapted for adolescents with mood and behavior dysregulation (IPT-MBD), with evidence for feasibility and acceptability. This treatment consisted of 24 weekly sessions, to address interpersonal role transitions, role disputes, deficits and grief, with modifications for temper outbursts, social rhythms, and parental involvement. Third, Perepletchikova et al. (2017) conducted a randomized trial of age-adapted dialectical behavior therapy (DBT-C), in which therapists delivered 32 weekly 90-min sessions including child counseling, parent training, skills training with parents and children, phone coaching calls, and therapist team consultation. Compared with therapy as usual, participants in the DBT-C group showed greater session attendance, retention, satisfaction, and positive response and remission rates. Finally, Kircanski et al. (2018) developed a mechanism-based CBT protocol that incorporates parent-focused BPT techniques with child-focused irritability exposure techniques, which (like anxiety exposure) involves developing and working through individualized hierarchy of situations that elicit frustration, anger, and temper outbursts. Building on promising preliminary results in a small open trial, this research group continues to examine this intervention and others, such as a computer-based interpretation bias training (Stoddard et al., 2016). (For more comprehensive summaries, see recent reviews: Brotman, Kircanski, & Leibenluft, 2017; Kircanski et al., 2018; Stringaris et al., 2018; Sukhodolsky et al., 2016.)

Overall, these findings offer some evidence for the effectiveness of psychosocial interventions—particularly those grounded in BPT and CBT techniques—for treating SIMD. However, this evidence is preliminary, requiring further research and replication. Here, several limitations of the existing evidence should be noted. First, many of the above studies recruited their own samples and applied strict eligibility criteria based on diagnostic boundaries (e.g., ADHD + SMD or DMDD). This does not reflect the heterogenous way SIMD presents clinically; instead, SIMD may accompany a variety of diagnostic profiles in different children. In the present analysis, we address this gap by evaluating effectiveness in community outpatient settings. Second, some prior studies have included medication (particularly for

ADHD), so the extent to which clinical gains are due to psychotherapeutic techniques remains unclear, and findings may have limited clinical generalizability. In the present data, only psychotherapy was experimentally manipulated, and no single diagnosis (e.g., ADHD) was overrepresented. Third, prior studies have designed the experimental intervention condition such that all youths would receive both a novel treatment and an established treatment (typically BPT) in conjunction, leaving it unclear which approach is producing the gains. In the present sample, well-established treatments were compared with usual care, with only format of delivery being manipulated (i.e., modular vs. standard). Fourth, many novel SIMD treatments may be too bulky, time-consuming, and expensive for community settings (e.g., multiclinician teams, simultaneous parent and child components, 90-min sessions, in-between-session supports, 6-month-fixed treatment durations). The treatments examined here may have lower clinician training/supervision requirements, can be delivered by one clinician in 50-min weekly sessions, and are designed for streamlined but still effective treatment. Finally, these novel SIMD interventions may leave limited room for personalization, often integrating components (e.g., CBT + BPT) in a standard protocol for all youths. The present study tests whether youths may benefit from different sequences or subsets of treatment components, as opposed to more standardized fixed protocols.

Overall, these limitations are not surprising in part because SIMD cuts across diagnostic boundaries and is linked to internalizing and externalizing comorbidities that can limit the effectiveness of treatments targeting just one problem or using just one technique. Nonetheless, extant research does not provide a sufficient array of feasible, flexible, and empirically supported treatment options for SIMD. One final contribution of the present study is that the well-established existing interventions tested here are already in widespread use; thus, if found to be effective in the present analyses, a clinician already experienced with these interventions could act upon the present findings immediately. Novel treatments can take decades to translate into practice (Morris, Wooding, & Grant, 2011), but existing and widely used treatments—if found to be effective for SIMD—could help guide treatment today.

A Modular Approach for Severe Irritability

In light of the clinical heterogeneity of SIMD, modular approaches incorporating BPT and CBT techniques may be especially helpful. One such intervention is the *Modular Approach to Therapy for Children with Anxiety, Depression, Trauma, or Conduct Problems* (MATCH; Chorpita & Weisz, 2009). MATCH is a manualized treatment comprised of 33 modules covering CBT for depression, CBT for anxiety (including traumatic stress), and BPT for disruptive behavior. Each module reflects a practice element chosen to correspond to practices from the three standard, single-disorder treatment manuals for depression, anxiety, and disruptive conduct. These modules can be flexibly arranged so that the content, order, and dose is adapted to client characteristics (Park et al., 2015). For example, changes in treatment presentation such as comorbidity or emergent crises can be addressed as clinical interference within the MATCH protocol and resolved using modules designed to address the interference source. Thus, MATCH is more flexible than EST manuals that use relatively fixed sequences of treatment content; however, because the content of the modules and the recommended sequencing are based on the existing evi-

dence base, MATCH is more structured than the flexible approaches often employed in usual clinical care (Weisz, Krumholz, Santucci, Thomassin, & Ng, 2015). Indeed, it has been suggested that MATCH strikes a “balance between research-informed structure and locally informed adaptation” (Chorpita et al., 2015, p. 714). For more details about the architecture and rationale of MATCH, see Chorpita and Daleiden (2018).

To date, two randomized effectiveness trials, both conducted in everyday practice settings, have found MATCH to outperform usual clinical care on internalizing, externalizing, idiographic, and diagnostic outcomes per multiple informants (Chorpita et al., 2017; Weisz et al., 2012). Improvements associated with MATCH were greater than those of standard EST protocols (Chorpita et al., 2017; Weisz et al., 2012), and the benefits over usual care appeared to be sustained long-term (Chorpita et al., 2013). Therapists who participated in one of these trials reported that they found MATCH to be at once more effective than usual care, while also permitting more responsiveness to client needs than standard ESTs (Chorpita et al., 2015). These findings all lend support for MATCH being an effective, modular approach to blending CBT and BPT techniques. If CBT and BPT strategies are suspected to be the most helpful psychotherapies for SIMD—as suggested by the literature summarized above—then MATCH may be a useful vehicle for delivering these techniques in a feasible, transdiagnostic, personalized way. Indeed, given its design, its capacity to address comorbidity and flux, its integration of well-tested BPT and CBT components in a modular framework, and its empirical support in effectiveness trials, MATCH could be a particularly helpful way to organize treatment for severely irritable youths.

The present article examines what therapeutic formats might be helpful for addressing clinical symptoms among treatment-referred youths with SIMD. We analyzed data from a cluster-randomized effectiveness trial of MATCH (Chorpita et al., 2013; Weisz et al., 2012). Youths ages 7–13, referred for anxiety, depression, and/or conduct problems, were treated by a therapist using either (a) standard CBT/BPT treatment manuals for anxiety, depression, or disruptive behavior; (b) a modular approach, MATCH; or (c) their own preferred practices (i.e., usual care). In the present analyses, we examine each intervention’s effectiveness within a subsample of interest: youth with SIMD. Given irritability’s transdiagnostic nature, we investigated these questions broadly, considering change on internalizing, externalizing, total, and top problems outcomes per multiple informants and longitudinal schedules. In addition, we conducted full-sample analyses to examine each treatment’s effects on irritability as an outcome, and whether levels of baseline irritability moderated treatment effects on other outcomes.

Method

Participants and Procedure

Study procedures and sample characteristics are summarized here; for more detailed descriptions, see Weisz et al. (2012; primary results) and Chorpita et al. (2013; long-term follow-up). Participants were 174 youths (age $M = 10.6$ years, $SD = 1.8$, range 7–13; 70% boys), and their primary caregivers, referred for outpatient mental health treatment. Participants’ ethnicities were as follows: 45% White, 32% multiethnic, 9% African American, 6% Latino/a, 4% Asian American or Pacific Islander, 2% “Other,” and

2% no response. Fifty-five percent of the sample reported an annual family income of less than \$40,000, 28% reported \$40,000–80,000, 12% reported \$80,000–119,000, and 6% reported \$120,000+. Approximately half (53%) were single-parent households. Families were seeking treatment for problems related to anxiety, depression, or disruptive behavior. Co-occurring problems were common, with youths having multiple DSM diagnoses ($M = 2.74$, $SD = 1.52$) and elevated parent- or youth-reported scores in at least one, but typically several, internalizing or externalizing areas. Treatment was delivered by 84 therapists (80% female; $M_{age} = 40.6$ years, $M_{experience} = 7.6$ years) working in 10 outpatient clinical service organizations in community and school settings in Massachusetts and Hawaii. Forty percent were social workers, 24% were psychologists, and 36% identified as “other,” (e.g., licensed mental health counselor). Therapists saw an average of 2.07 study cases. All procedures were approved by the relevant institutional review boards. Informed consent and assent were collected prior to participation.

Experimental and Longitudinal Design

The study used a cluster randomization design, allocating clinicians to Usual Care (UC), Standard Manual Treatment (SMT), or MATCH using blocked randomization stratified for therapist education (Weisz et al., 2012). Figure 1 depicts participant flow from screening and assessment through allocation, treatment, and analysis. UC clinicians operated totally separately from study personnel and treated youths with procedures they typically used and believed to be effective, receiving supervision as usual from their own settings. SMT clinicians were trained by study staff in three standard protocols—*Coping Cat* for anxiety (Kendall, Kane, Howard, & Siqueland, 1990), *Primary and Secondary Control Enhancement Training* (PASCET) for depression (Weisz et al., 2005), and *Defiant Children* (Barkley, 1997) for disruptive behavior—and received weekly consultation. MATCH clinicians were trained by study staff in MATCH (Chorpita & Weisz, 2009) and received weekly consultation. Sessions were recorded, sampled, and coded for adherence to the prescribed practice elements. Adherence was 93% for SMT and 83% for MATCH, whereas only 8% of UC session content corresponded to prescribed manual content. On average, treatment lasted 32.1 weeks and 16.2 sessions.³ Trained research staff, masked to treatment condition, administered assessments with youths and caregivers per multiple longitudinal measurement schedules. First, *weekly progress-monitoring* assessments offered brief, frequent measurements of caregiver- and youth-reported internalizing, externalizing, and top problems, collected during active treatment. Second, *baseline, post, and quarterly* (i.e., 3, 6, 9, 12, 18, and 24 months postbaseline) assessments included more comprehensive and standardized instruments measuring internalizing and externalizing problems, impairment, and diagnoses.

Measures

Child Behavior Checklist and Youth Self Report. Caregivers rated youths’ emotional, behavioral, and social functioning

³ Number of sessions is based on MATCH and SMT conditions only; these data were not available for UC condition because of the separation from the research team (Weisz et al., 2012).

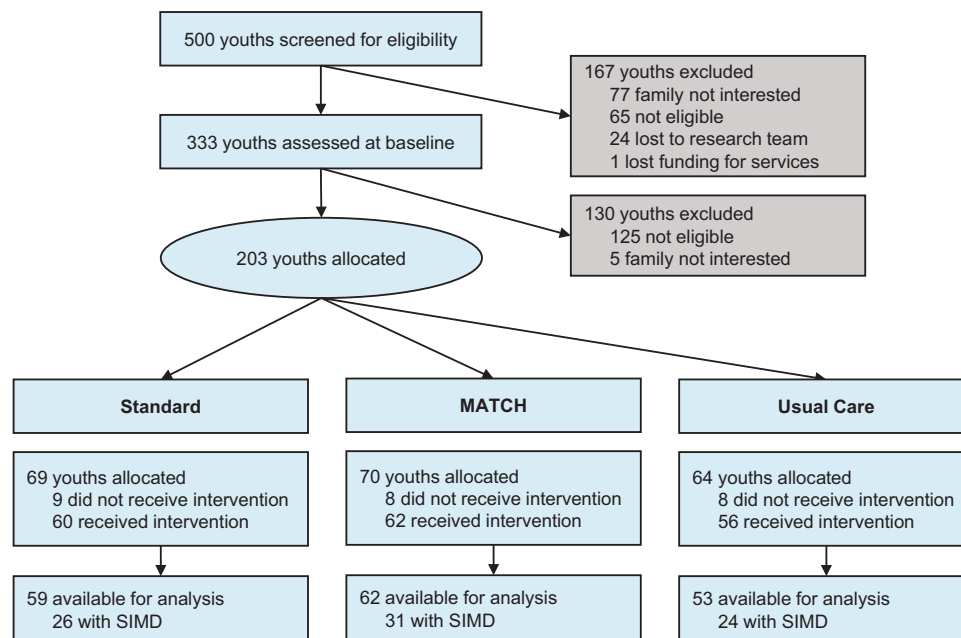


Figure 1. Brief CONSORT diagram showing participant flow from original study recruitment through data used for analysis. Data were drawn from Weisz et al. (2012) and Chorpita et al. (2013). See the online article for the color version of this figure.

using the Child Behavior Checklist (CBCL). The CBCL consists of 113 items with broadband scales measuring total, internalizing, and externalizing problems, and narrowband subscales measuring more specific problems (e.g., anxious/depressed, aggressive behavior). The Youth Self Report (YSR) is the youth equivalent of the CBCL, with parallel scales and similar psychometric properties. All items are rated on a 3-point Likert scale from 0 (*not true*) to 2 (*very true or often true*). The CBCL and YSR were given at baseline, posttreatment, and quarterly. Total, Internalizing, Externalizing, and *t* scores were used in analyses. The CBCL and YSR have demonstrated high test–retest reliability, internal consistency, and content, criterion, and construct validity (Achenbach & Rescorla, 2001).

Irritability. Irritability was measured by averaging three CBCL items: (a) *tantrums or hot temper*, (b) *sudden mood changes*, and (c) *stubborn, sullen, or irritable*. More than 10 studies have used and provide psychometric support for this brief CBCL scale for measuring irritability in youths (Aebi, Plattner, Metzke, Bessler, & Steinhausen, 2013; Roberson-Nay et al., 2015; Tseng et al., 2017; Wiggins, Mitchell, Stringaris, & Leibenluft, 2014). Recent analyses support this scale’s factor structure, invariance across age and gender, internal consistency, test–retest reliability, and convergent, discriminant, and criterion validity among community youth mental health samples (Evans et al., 2019). This CBCL irritability scale also showed superior psychometric properties to the corresponding YSR irritability items, supporting its use in this analysis. In the present sample baseline internal consistency of the CBCL irritability scale was good ($\alpha = .78$).

Brief Problems Checklist. Derived from the much longer CBCL and YSR, the Brief Problems Checklist (BPC) is a brief nomothetic progress-monitoring measure for parent and youth

report. Items ask about the child’s emotions and behaviors this week using a 3-point Likert scale from 0 (*not true*) to 2 (*very true*). The BPC contains scales measuring internalizing and externalizing problems (6 items each; score range 0–12), which are summed to form a total problems score (12 items; range 0–24). This measure was administered to youths and caregivers weekly during treatment. The BPC shows large correlations with corresponding CBCL and YSR scales, and high internal consistency and test–retest reliability (Chorpita et al., 2010).

Youth top problems. Top Problems is a brief idiographic, progress-monitoring measure developed by Weisz and colleagues (2011) as a means of identifying and repeatedly assessing the problems identified as most important to the family. At baseline, youths and caregivers were interviewed separately to each identify up to three problems that they considered the most important to address in treatment. Then, weekly ratings of each problem’s severity were collected on a Likert scale from 0 (*not a problem at all*) to 10 (*very big problem*). A mean top problems severity score was calculated for each informant at each occasion. Top Problems shows strong test–retest reliability, convergent/discriminant validity, and sensitivity to change over time during treatment (Weisz et al., 2011).

Brief Impairment Scale (BIS). The BIS is a 23-item caregiver instrument that assesses impairment in functioning across the domains of interpersonal relations, school/work functioning, and self-care/self-fulfillment over the past year. Items are rated from 0 (*no problem*) to 3 (*a serious problem*; although some have item-specific anchors). A total sum score is computed. The BIS has shown high internal consistency, test–retest reliability, and convergent and concurrent validity (Bird et al., 2005). Analyses from three large clinical and community samples led Bird et al. (2005) to recommend a total score cutoff of ≥ 14 to identify youths who

are impaired and in need of services. The BIS was administered at the baseline, 12-month, and 24-month quarterly assessments.

Children's Interview for Psychiatric Syndromes (ChIPS). The ChIPS structured diagnostic interview was administered both before and after treatment to ascertain youths' *DSM-IV* diagnoses. Separate caregiver- and youth-reported interviews were conducted. Data were synthesized to form composite diagnoses using Silverman and Nelles (1988) method for reconciling discrepancies. A series of studies summarized by Weller, Weller, Fristad, Rooney, and Schecter (2000) documented the reliability and validity of the ChIPS in community, outpatient, and inpatient samples. Diagnoses were summed (number of diagnoses) and categorized (e.g., presence of any anxiety disorder) for analysis.

Severely Irritable Subsample

We applied cutoff criteria to identify youths with elevated scores for both irritability (CBCL irritability mean score ≥ 1.33) and functional impairment (BIS ≥ 14) at baseline. The resulting SIMD subsample included 81 youths who did not differ from non-SIMD youths ($n = 93$) in age, gender, ethnicity, site, or allocation to study conditions ($ps > .05$; see Table S1 in the online supplemental materials). In line with prior research approximating DMDD in clinical samples (e.g., Axelson et al., 2012; Copeland, Angold, Costello, & Egger, 2013; Freeman, Youngstrom, Youngstrom, & Findling, 2016), our SIMD subsample represented a sizable minority of referred youths (46.6% of the full sample), and exhibited more DSM diagnoses ($M = 3.27$; $p < .001$); higher rates of ODD/CD (90.1%; $p < .001$), ADHD (75.3%; $p < .001$), and depression (50.6%; $p < .05$); and higher CBCL internalizing, externalizing and total problems (t score M s = 69.51–71.23; $ps < .001$) relative to non-SIMD youth (Table S1 in the online supplemental materials). Further, those with SIMD were evenly allocated across conditions ($ns = 24$ – 31 ; 44.1–50.0%; $p > .05$), with baseline equivalence testing supporting assumptions of random assignment (Table S2 in the online supplemental materials). That is, there were no differences across treatment conditions in CBCL or YSR scores, impairment, age, gender, ethnicity, problem area, or number or types of diagnoses ($ps > .05$). Thus, the SIMD subsample appears to be both *clinically representative* of severely irritable youths and *methodologically representative* of random assignment across conditions. Hence, analyses can be interpreted as a preliminary study of the effectiveness of MATCH, SMT, and UC for treating SIMD in youths. See the online supplemental materials for more information.

Analytic Plan

Generally, analyses mirrored those of the initial (Weisz et al., 2012) and long-term (Chorpita et al., 2013) outcome studies. Here, we report only new results relevant to treatment effectiveness for irritability. The primary analyses, using data from only the SIMD subsample ($n = 81$), examined (a) trajectories modeled from brief measures administered weekly during treatment; (b) trajectories modeled from more extensive measures administered at 3- or 6-month intervals from baseline to 2-year follow-up; and (c) diagnostic and functional outcomes observed at posttreatment and at 1 and 2 years after starting treatment. We also conducted full-sample analyses examining irritability as an outcome, and as a predictor and moderator of other outcomes, among all 174 youths.

Trajectories were estimated through longitudinal multilevel models, with intercept and time (log days + 1 since baseline) treated as random effects (Chorpita et al., 2013; Weisz et al., 2012). Previous full-sample analyses have shown that virtually zero variance was accounted for by therapist or clinic (average intraclass correlation < 0.01), and results were not moderated by site or medication status (Chorpita et al., 2013; Weisz et al., 2012); accordingly, these terms were omitted from the present models. All available observations of all cases were included. Outcomes of interest were the treatment by time interaction terms, specifically planned contrasts (e.g., MATCH \times Time vs. UC \times Time) testing whether two conditions predicted significantly different rates of change. Effectiveness is evaluated based on the extent to which one treatment condition predicts faster rates of improvement compared with the others. Following Weisz et al. (2012) and Chorpita et al. (2013), standardized effect size (ES) estimates for these comparisons were calculated as two treatments' slope difference divided by overall slope variance. We also report more clinically meaningful interpretations of these same models. Within each condition, we report whether there was evidence of *any* change over time (i.e., negative slope, $p < .05$), as well as the model-implied outcome estimates for each condition at 1- and 2-years postbaseline, and whether these outcomes reached could be considered clinically reliable change (Jacobson & Truax, 1991).⁴ Interaction models were specified to test baseline irritability as a direct predictor and moderator of treatment outcomes in the full sample. Diagnostic and functional outcomes were examined via ANOVAs of observed posttreatment and 1- and 2-year scores, controlling for baseline. The ES for these models was calculated as the observed between-groups differences in change divided by overall pretreatment standard deviation.

Consistent with Cumming's (2014) recommendations, we interpret ES over null-hypothesis significance testing. With only 81 SIMD youths across three conditions ($ns = 24$ – 31), most analyses were underpowered. For example, quarterly models were powered to detect large effects (at $1 - \beta = 0.8$, ES = 0.80) but not medium (at ES = 0.5, $1 - \beta = 0.42$). In interpreting ES results, we refer to standard guidelines (large ≥ 0.90 or $0.80 >$ medium ≥ 0.50 or 0.45 small > 0.20 or 0.15 ; Cohen, 1988; Lipsey, 1990). Following Durlak's (2009) recommendations, we also turn to relevant research for context and note that a recent broad meta-analysis of randomized youth psychotherapy trials (Weisz et al., 2017) found a mean ES of 0.46. Based on these considerations, we flag notable effects at ES ≥ 0.45 , marginal trends at $p < .1$, and significance at varying levels ($< .05$, $< .01$, $< .001$), to highlight results that may warrant further research. Given our low power and emphasis on effect magnitude over null-hypothesis p values, we did not correct for multiple comparisons; therefore, the possibility of some chance results must be acknowledged. Rather than drawing strong inferences from individual test results, we examine patterns of results in consideration of significance, magnitude, and reliable change. Multilevel models were estimated in SAS using restricted

⁴ Reliable change thresholds calculated as $s\sqrt{(1-r)^*1.96}$, using standard deviations (s) from the present sample ($N = 174$) and reliability coefficients (r) from psychometric publications for the CBCL/YSR (Achenbach & Rescorla, 2001), BPC (Chorpita et al., 2010), Top Problems (Weisz et al., 2011), and CBCL Irritability (Evans et al., 2019).

maximum likelihood estimation; all other analyses were conducted in SPSS.

Results

Weekly Progress-Monitoring Trajectories

The top portions of Tables 1 and 2 describe trajectories of change in BPC and Top Problems scales collected weekly during treatment. As shown, youths with SIMD who received MATCH evidenced rates of change in most caregiver- and youth-reported measures that were statistically significant and clinically meaningful (i.e., all slopes negative at $p < .001$, producing substantial and reliable reductions; see Table 2). The outcome slopes for the other two conditions were less consistently favorable, often showing significant improvement on caregiver-reported measures (UC $ps < .01$, SMT $ps < .05$) but not youth-reported measures (UC all $ps < .05$, but externalizing *ns*; SMT all *ns*). These patterns consistently resulted in MATCH significantly or marginally outperforming UC (*Mdn ES* = 0.48, range: 0.20 to 0.84) and/or SMT (*Mdn ES* = 0.70, range: 0.13 to 0.98), including medium to large effects for both informants (see Table 1). In clinical terms, one year after starting treatment, youths who received MATCH showed reductions in caregiver/youth top problems severity of 5.27/6.42 points, as compared with 4.82/1.99 for SMT and 2.76/2.61 for UC. Similarly, results showed caregiver/youth BPC Total Score reductions of 10.68/5.77 points for MATCH as compared with 5.13/1.19 for SMT and 6.89/3.93 for UC. Results of BPC parent- and youth-

reported internalizing and externalizing scores followed a similar pattern, with MATCH predicting 1-year score reductions roughly twice as large as those of UC and SMT (see Table 2).

Quarterly Long-Term Outcome Trajectories

The lower portions of Tables 1 and 2 describe patterns of change in CBCL/YSR measures collected quarterly through 2 years post-baseline. Youths with SIMD who received MATCH showed significant improvements (negative slopes, $ps < .001$) on all outcomes, while the patterns for SMT and UC were not as consistent (see Table 2). Those who received SMT showed significant reductions on all CBCL scales and on YSR total and internalizing problems ($ps < .001$), but not YSR externalizing problems. Those receiving UC showed significant reductions on all caregiver ($ps < .001$) and youth ($ps < .05$) measures. CBCL irritability declined significantly in all three groups ($ps < .001$), with MATCH and SMT outperforming UC. Overall, MATCH consistently outperformed UC according to both informants (*Mdn ES* = 0.60, range: 0.45 to 0.65), and it outperformed SMT per youth report (*Mdn ES* = 0.62, range: 0.59 to 0.97), with small and mixed effects by parent report (*Mdn ES* = 0.01, range: -0.42 to 0.04). In contrast, SMT outperformed UC on CBCL total (*ES* = 0.56), externalizing (*ES* = 0.64), and irritability (*ES* = 1.02), but not on internalizing (*ES* = 0.30) or any YSR outcomes (*Mdn ES* = -0.14, range -0.33 to -0.08, favoring UC). Across conditions, SIMD youths showed meaningful CBCL *t* score reductions, with MATCH and SMT gains (e.g., dropping 14–16 points after 2

Table 1
Coefficient Estimates for Condition by Time (Log-Day) for Youth With SIMD

Outcome	SMT versus UC		MATCH versus UC		MATCH versus SMT	
	Estimate	ES	Estimate	ES	Estimate	ES
Weekly measures						
Caregiver report						
BPC Total	-.298	-.27	.643⁺	.58	.941^{**}	.85
BPC Internalizing	-.265	-.33	.269	.33	.534[*]	.66
BPC Externalizing	-.051	-.08	.357⁺	.58	.408⁺	.66
Top problems	.349⁺	.61	.425[*]	.74	.077	.13
Youth report						
BPC Total	-.464	-.45	.313	.30	.776[*]	.76
BPC Internalizing	-.250	-.40	.124	.20	.374[*]	.60
BPC Externalizing	-.215	-.37	.216	.37	.431[*]	.74
Top problems	-.105	-.14	.645^{**}	.84	.750^{**}	.98
Quarterly measures						
Caregiver report						
CBCL Total	.713	.56	.764⁺	.60	.052	.04
CBCL Internalizing	.341	.30	.575	.50	.235	.20
CBCL Externalizing	.777⁺	.64	.756⁺	.63	-.021	-.02
CBCL Irritability	.064[*]	1.02	.038	.60	-.026	-.42
Youth report						
YSR Total	-.108	-.08	.710	.54	.818	.62
YSR Internalizing	-.337	-.33	.666	.65	1.002[*]	.97
YSR Externalizing	-.209	-.14	.656	.45	.865⁺	.59

Note. SIMD = severe irritability and mood dysregulation; BPC = Brief Problems Checklist; CBCL = Child Behavior Checklist; MATCH = modular approach to therapy for children with anxiety, depression, trauma, or conduct problems; SMT = standard manualized treatment; UC = usual care; YSR = Youth Self Report. Positive contrast estimates indicate that the condition labeled first showed a faster score reduction than the condition labeled second; negative estimates reflect the opposite. For ease of interpretation, effect sizes greater than .45 are denoted in bold. Sample sizes for each condition are as follows: SMT $n = 26$; MATCH $n = 31$; UC $n = 24$. See Table 2 for slope and change estimates by condition. ES = effect size.

⁺ $p < .1$. ^{*} $p < .05$. ^{**} $p < .01$.

Table 2
Slope, 1-Year, and 2-Year Change Estimates by Condition for Youth With SIMD

Outcome	SMT			MATCH			UC		
	Slope	1-year change	2-year change	Slope	1-year change	2-year change	Slope	1-year change	2-year change
Weekly measures									
Caregiver report									
BPC Total	-.87**	-5.13 [†]	—	-1.81***	-10.68 [†]	—	-1.17***	-6.89 [†]	—
BPC Internalizing	-.43*	-2.55	—	-.97***	-5.70 [†]	—	-.70***	-4.12	—
BPC Externalizing	-.43**	-2.52	—	-.83***	-4.92 [†]	—	-.48**	-2.82	—
Top problems	-.82***	-4.82 [†]	—	-.89***	-5.27 [†]	—	-.47***	-2.76 [†]	—
Youth report									
BPC Total	-.20	-1.19	—	-.98***	-5.77 [†]	—	-.67**	-3.93 [†]	—
BPC Internalizing	-.15	-.90	—	-.53***	-3.11 [†]	—	-.40**	-2.38 [†]	—
BPC Externalizing	-.05	-.27	—	-.48***	-2.81 [†]	—	-.26 ⁺	-1.53	—
Top problems	-.34 ⁺	-1.99	—	-1.09***	-6.42 [†]	—	-.44*	-2.61	—
Quarterly measures									
Caregiver report									
CBCL Total	-2.42***	-14.31 [†]	-15.99 [†]	-2.48***	-14.62 [†]	-16.33 [†]	-1.71***	-10.10 [†]	-11.29 [†]
CBCL Internalizing	-2.22***	-13.10 [†]	-14.64 [†]	-2.45***	-14.49 [†]	-16.18 [†]	-1.88***	-11.09 [†]	-12.39 [†]
CBCL Externalizing	-2.17***	-12.78 [†]	-14.28 [†]	-2.15***	-12.66 [†]	-14.15 [†]	-1.39***	-8.20 [†]	-9.16 [†]
CBCL Irritability	-.17***	-.98 [†]	-1.09 [†]	-.14***	-.82 [†]	-.92 [†]	-.10***	-.60	-.67 [†]
Youth report									
YSR Total	-1.41***	-8.34 [†]	-9.32 [†]	-2.23***	-13.17 [†]	-14.72 [†]	-1.52***	-8.98 [†]	-10.04 [†]
YSR Internalizing	-1.56***	-9.20 [†]	-10.28 [†]	-2.56***	-15.12 [†]	-16.89 [†]	-1.90***	-11.19 [†]	-12.50 [†]
YSR Externalizing	-.72 ⁺	-4.23 [†]	-4.73 [†]	-1.58***	-9.34 [†]	-10.44 [†]	-.93*	-5.47 [†]	-6.11 [†]

Note. SIMD = severe irritability and mood dysregulation; BPC = Brief Problems Checklist; CBCL = Child Behavior Checklist; MATCH = modular approach to therapy for children with anxiety, depression, trauma, or conduct problems; SMT = standard manualized treatment; UC = usual care; YSR = Youth Self Report. All estimates are derived from models reported in Table 1. Slope coefficients represent change per log-days since baseline. Weekly outcomes were measured throughout treatment (averaging 6–9 months in duration), whereas quarterly outcomes were measured out to two years postbaseline; thus, 2-year change estimates are reported for quarterly measures but not for weekly measures. Sample sizes for each condition are as follows: SMT $n = 26$; MATCH $n = 31$; UC $n = 24$.

⁺ $p < .1$. * $p < .05$. ** $p < .01$. *** $p < .001$; [†] Surpasses threshold for reliable change (Jacobson & Truax, 1991).

years) outpacing UC (9–12 points). Irritability scores followed a similar pattern, with 2-year reductions reaching 0.92 for MATCH and 1.09 for SMT, as compared with 0.67 for UC. Per youth report, the improvements associated with MATCH (e.g., 2-year t score reductions of 10–17 points) were large and superior to SMT (5–11 points) and UC (6–13 points).

Diagnostic and Functional Outcomes

At baseline, youths with SIMD showed no between-groups differences in number of diagnoses, $F(2, 78) = 0.122$, $p = .885$, with each group meeting criteria for > 3 DSM categories on average ($M = 3.27$, $SD = 1.46$). By posttreatment, however, significant differences in diagnoses had emerged among the three conditions when controlling for baseline, $F(2, 64) = 3.267$, $p = .045$. Pairwise LSD comparisons from this model showed that at posttreatment, youths who had received MATCH had one less diagnosis than those in UC (model-adjusted $M[SE]$: MATCH = 1.46[0.24]; UC = 2.45[0.31]), a large, significant difference ($p = .014$, $ES = 0.93$; Figure 2). Those receiving SMT fell in the middle (1.96[0.30]), neither significantly better than UC ($p = .277$, $ES = 0.38$) nor significantly worse than MATCH ($p = .194$, $ES = 0.06$).

Similarly, there were no group differences in BIS impairment at baseline, $F(2, 77) = 1.474$, $p = .235$; all SIMD youths were functionally impaired ($M = 23.68$, $SD = 6.91$). Consistent with Chorpita et al.'s (2013) results, we found no significant group differences in functioning at 1-year, $F(2, 68) = 1.917$, $p = .155$ or

2-years, $F(2, 36) = 1.535$, $p = .229$ postbaseline; however, interesting trends did emerge. The 1- and 2-year change patterns were small to medium favoring MATCH over UC ($ES = 0.28$ and 0.66 , respectively), and small, negligible, or mixed for SMT in compar-

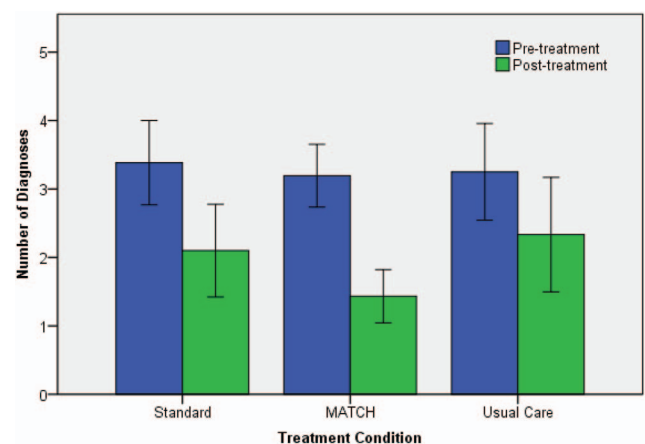


Figure 2. Average number of diagnoses for severely irritable youths in each condition at pre- and posttreatment. Between-groups differences were nonsignificant at baseline ($p = .885$) but significant at posttreatment ($p = .045$), with MATCH producing a significantly greater reduction than UC ($p = .014$). Error bars represent 95% confidence intervals. See the online article for the color version of this figure.

ison to UC (ES = 0.04 and 0.26) and MATCH (ES = -0.14 and 0.30). Model-adjusted results showed better functional outcomes (~10-point BIS reductions) for MATCH ($M[SE]$: 1-year = 14.42[1.36], 2-year = 13.79[1.87]) and SMT (1-year = 13.74[1.71], 2-year = 11.64[2.52]) as compared with UC (~6-point reduction; 1-year = 17.80[1.52], 2-year = 18.14[2.79]). Notably, MATCH and SMT produced 1- and 2-year scores hovering around the cutoff of 14, suggesting clinically meaningful improvement, whereas UC plateaued about 4 points above this threshold.

Irritability Outcomes and Moderation in the Full Sample

Lastly, we examined irritability as an outcome and as a moderator of other outcomes in the entire sample ($N = 174$). All three conditions showed significant improvements in irritability over time. Notably, MATCH (slope = -0.10, $p < .001$) showed significantly faster improvement than UC (slope = -0.06, $p < .001$), with a medium effect (slope contrast = 0.038; $p = .047$; ES = 0.49). The SMT irritability trajectory (slope = -0.10, $p < .001$) did not differ from MATCH ($p = .994$, ES = 0.002), and SMT showed the same magnitude of superiority over UC but did not reach significance (slope contrast = 0.037; $p = .051$; ES = 0.49). Translated into clinical change, those in the MATCH or the SMT condition showed equivalent reductions of 0.57 points at 1-year postbaseline and 0.64 points after 2 years (a considerable change on the 0-2 CBCL irritability mean score scale), compared with 0.35 and 0.39 points, respectively, for UC. Thus, compared with UC, MATCH and SMT both produced medium meaningful reductions in irritability among the full sample.

To explore the effects of dimensional irritability on other treatment outcomes, we tested mean-centered baseline irritability a moderator, both overall (Irritability \times Time) and by condition (Irritability \times Time \times Condition). Across models, no evidence for three-way interactions was found (Type III F s < 2.39 , p s $> .096$). Regarding two-way interactions, irritability moderated only two of the 14 slopes tested: CBCL Total, $F = 6.17$, $p = .014$ and Externalizing Problems, $F = 25.89$, $p < .001$. Probing these effects at high and low ($M \pm 1 SD$) levels revealed that higher baseline irritability predicted faster improvements in both outcomes over time, a pattern consistent with regression to the mean (i.e., higher scores are likely to decline faster than lower scores). The absence of three-way interactions indicates that irritability did not moderate the effect of condition on any caregiver- or youth-reported internalizing, externalizing, total, or top problems. This result suggests that previously reported findings (Chorpita et al., 2013; Weisz et al., 2012) can be interpreted applying similarly for youths irrespective of their baseline level of irritability.

Discussion

Severe irritability is a common and impairing problem among treatment-referred youths. Existing behavioral and cognitive-behavioral therapies—already well-established and widely used in youth mental health settings—could be readily helpful for addressing severe irritability and mood dysregulation (SIMD), but this question has not been empirically examined; nor is it clear what format of treatment delivery may work best. We examined the

effectiveness of two formats of ESTs—a modular transdiagnostic approach (MATCH) and standard linear EST protocols (SMT)—as compared with UC, in addressing irritability-related problems among clinically referred youth. Results were most favorable for the two EST conditions in general, and for MATCH in particular. Across multiple variables, informants, measures, and measurement schedules, youths with SIMD who received MATCH, as compared with the other two conditions, exhibited the most robust and pronounced patterns of clinical improvement over time. Further, in the full sample, SMT and MATCH were similarly effective in reducing irritability overall, and tests of moderation suggested that MATCH's effectiveness (Chorpita et al., 2013; Weisz et al., 2012) was not moderated by baseline irritability.

Among youth with SIMD, the benefits of MATCH were evident in three key respects. First, SIMD youths in the MATCH group exhibited statistically significant and reliable *within-group improvement* per all measures and both informants. In contrast, UC and SMT both tended to show within-group improvement on caregiver-reported measures but not consistently on all youth-reported measures. Second, when these within-group trajectories were evaluated in between-groups contrasts, MATCH tended to produce *faster rates of improvement* relative to UC or SMT, or both. These contrasts showed a consistent pattern of medium to large ESs which often reached significance in the present analyses, and would be uniformly significant if estimated from an adequately powered sample. Third, while both MATCH and SMT led to meaningful reductions in functional impairment relative to UC, only MATCH also predicted *significantly fewer diagnoses* at posttreatment. Although impairment was collected as a caregiver-report measure, diagnoses notably offer a single, reliably ascertained, clinically meaningful and transdiagnostic outcome integrating caregiver and youth perspectives by a trained examiner.

An interesting theme is that MATCH seemed to produce especially pronounced effects by youth report, significantly better than SMT and with medium to large effects. Perhaps the ability to apply practice elements from ESTs in a more flexible, adaptive, and personalized nature, as in MATCH, is particularly helpful from the youth's perspective. This result may be partially explained by the reality that it is generally caregivers, not youths, who initiate treatment. In this light, it seems possible that youths—who may be brought into treatment without understanding why, or even against their will—would respond better to a flexible, multiproblem, highly personalized EST as compared with a more standardized, linear EST. Treatment-seeking caregivers, on the other hand, may be equally engaged with either format.

Our results are similar to those reported by Weisz et al. (2012) and Chorpita et al. (2013), and suggest that those earlier findings—where MATCH consistently outperformed UC, and SMT in some cases outperformed UC—are not moderated by baseline irritability. Notably, SIMD youths in this analysis showed *larger* improvements than those reported previously for the full sample. Some of this pattern may be an artifact of regression to the mean. However, the larger score reduction in our SIMD subsample, as compared with MATCH and SMT, argues against the regression to the mean hypothesis, suggesting that MATCH and SMT produced clinical gains above and beyond what would be expected by chance or even in routine care. The comparison of these current and previous outcomes analyses also supports the view that ESs and marginal trends interpreted as potentially promising in the present analyses

parallel previous findings that reached significance in the expanded sample. Thus, future research examining MATCH and SMT for severely irritable youths is warranted.

These results are in line with reviews suggesting BPT and CBT are likely to also be helpful for SIMD (Kircanski et al., 2018; Stringaris et al., 2018; Sukhodolsky et al., 2016). However, our results showing that MATCH outperformed SMT on some measures suggest that there may be an advantage to combining BPT and CBT techniques together in the treatment of youths with SIMD, and combining them in unique ways personalized to each youth. In other words, perhaps because of their higher severity, comorbidity, and impairment, youths with SIMD would benefit from a wide array of BPT + CBT treatment strategies woven together into a flexible, personalized, measurement-based treatment sequence. Such a conclusion is not necessarily specific to SIMD; it may be that youths with greater *overall* severity respond better to more individualized treatments generally. Similarly, it remains unclear what mechanisms may be underlying psychotherapeutic change in youths with SIMD. Given the representation of mood, anxiety, and behavioral problems in the present sample and treatments, it is possible that a range of different mediators may be implicated, such as changes in coping efficacy (Kendall et al., 2016), parenting skills (Elizur, Somech, & Vinokur, 2017), or cognitions (Webb, Auerbach, & Derubeis, 2012). Brotman, Kircanski, Stringaris, et al.'s (2017) translational model of irritability allows that there may be multiple processes (across individuals or within the same individual) contributing to the development, maintenance, and treatment of SIMD. In line with therapy research advances (Kazdin, 2007) as well as NIMH's RDoC (Meyers, DeSerisy, & Roy, 2017) and experimental therapeutics (Insel & Gogtay, 2014) frameworks, it will be important for future research to evaluate candidate mechanisms of change in symptoms within and across different irritability-related conditions.

Several limitations should be noted. First, this was a secondary analysis of a trial that originally evaluated treatment approaches for depression, anxiety, and disruptive behavior. Accordingly, we were limited to the available data, and results cannot be viewed as a direct test of the effectiveness of MATCH or SMT used *specifically and solely* to treat SIMD. With that limitation noted, our findings do indicate that relative to UC and SMT, MATCH showed evidence of reducing a variety of multiinformant problems among youth with severe irritability and impairment. It would be useful in future research to test the impact of MATCH when used by therapists specifically targeting SIMD. A second and related concern is that our formation of the SIMD group was based on a three-item scale combined with a general impairment measure. The irritability scale, adapted from CBCL items, has shown adequate evidence of reliability and validity (e.g., Evans et al., 2019; Tseng et al., 2017), but it may not offer as comprehensive a picture as alternative irritability instruments that have recently become available (e.g., the Affective Reactivity Index [ARI]; Stringaris et al., 2012; see also Haller et al., 2019).

Third, subsample models were underpowered to identify small or medium effects as significant. Based in part on these considerations, we did not correct for multiple comparisons. Nevertheless, many contrasts did reach significance with medium or large effects (see Table 1), often producing meaningful and reliable change (see Table 2). Even if it is granted that 1 in 20 results are Type I errors, the overall results pattern would

remain. Fourth, because of the transdiagnostic design of the interventions and study, these data cannot clarify the effectiveness of specific BPT/CBT strategies. Rather, we focused on combinations of BPT/CBT techniques available in MATCH and SMT, with results lending support to considering these techniques (BPT for conduct problems, CBT for anxiety, and CBT for depression) as a menu of treatment options that might be helpful for treating SIMD. This support is strongest for the modular design and structured adaptation offered by MATCH. Finally, the SIMD subsample was clinically heterogeneous, not representing one specific syndrome or disorder such as SMD, DMDD, or ODD. To approximate this population broadly, we identified a SIMD subsample using cutoffs for irritability and impairment, which limits replicability and generalizability in some respects. However, our approach informs the treatment of youths with severe irritability, broadly defined, including those with ODD, DMDD, and multiple other diagnoses, as they occur and co-occur in community-based, outpatient service settings.

With these limitations in mind, certain strengths also warrant attention. First, despite being a secondary analysis, the data and results do resemble the hallmark features of a strong cluster-randomized effectiveness trial for SIMD in many ways: (a) a clinically and sociodemographically diverse youth sample referred for outpatient mental health treatment; (b) therapists already working in community settings who received training and consultation in study treatments; (c) comparison of multiple active treatment conditions; (d) a double-randomized design, with evidence of successful randomization (Table S1 in the online supplemental materials); (e) evidence for the validity of the operationalization and composition of the SIMD subsample (Table S2 in the online supplemental materials); (f) rigorous masked assessments collected via converging measures, informants, and schedules through treatment and follow-up; and finally, (g) evidence of manual adherence in MATCH and SMT conditions. These design features lend support to the validity of our findings regarding the effectiveness of MATCH, SMT, and UC among youths with SIMD.

In summary, results suggest that, for addressing the spectrum of irritability seen in a heterogeneous outpatient care, standard CBT/BPT protocols and MATCH may be helpful intervention options. For the treatment of youth with a severe and impairing pattern of irritability and mood dysregulation, transdiagnostic modular approaches such as MATCH may offer additional advantages beyond those of standard protocols. These advantages appear to translate into increased treatment benefit overall, especially in terms of lower levels of youth-reported problems and fewer DSM diagnoses. Because these findings build on an effectiveness framework concerning treatments that are already widely used and well-supported, they offer promise to help inform the treatment of SIMD sooner rather than later, thus helping to fill an important gap in the clinical evidence base. Further research on the effectiveness of MATCH specifically for severe irritability and mood dysregulation is warranted.

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