

Assessing irritability and emotional dysregulation in children with oppositional defiant disorder | A pilot study investigating the ability of well-established measures in specifying chronic irritability-anger



UiO : University of Oslo

Thesis submitted for the degree of *Candidate of Psychology*

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October 2021

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Title: “Assessing irritability and emotional dysregulation in children with oppositional defiant disorder: A pilot study investigating the ability of well-established measures in specifying chronic irritability-anger”

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<http://www.duo.uio.no>

Print production: Reprosentralen, University of Oslo

Abstract

Objective: The overall aim of the present study was to gain a better understanding of irritability and emotional dysregulation among children with oppositional defiant disorder (ODD) with and without chronic irritability-anger as in the International Classification of Diseases, 11th Revision (ICD-11). Specifically, the purpose was to investigate the ability of measures from Child Behavior Checklist (CBCL) and Behavior Rating Inventory of Executive Function (BRIEF) in assessing irritability and emotional dysregulation. To the extent of the authors knowledge, no studies to date have examined ODD with chronic irritability-anger in a Norwegian sample. **Methods:** The sample in this cross-sectional study consisted of eleven children with ODD from an outpatient sample, ages seven to twelve (*Mdn* = 9), four girls and seven boys. Their scores on selected CBCL and BRIEF measures constituted the data material. Fulfillment of diagnostic criteria for ODD was determined by Schedule for Affective Disorders and Schizophrenia for School Age Children Present and Lifetime Version DSM-5. Those who met the criteria for co-occurring disruptive mood dysregulation disorder (DMDD) were grouped as ODD with chronic irritability-anger. Associations between CBCL and BRIEF measures were investigated, the two groups were compared along all measures, and the discriminatory ability of measures was assessed. The dataset is a subset from the research project *Severe Emotional Dysregulation in Children*, a collaboration between Nic Waals Institute and Oslo University Hospital. **Results:** The scales CBCL Irritability and BRIEF Emotional control were significantly associated. Children with ODD with chronic irritability-anger had notably higher scores on CBCL Internalizing than did children with ODD without chronic irritability-anger. The same scale showed significant predictive power in distinguishing between the two groups. **Conclusion:** First, correlational results support the notion of irritability and emotional regulation as related constructs and underlines the need for construct clarification and differentiation. Second, group differences in emotional problems indicate that the expansion of the ODD diagnosis is meaningful, while at the same raising questions about its conceptualization in ICD-11. Finally, CBCL Internalizing could be useful in identifying children with ODD with chronic irritability-anger, which could be valuable in diagnostic evaluations. Although caution is warranted in the interpretation due to the small sample size, measures from CBCL and BRIEF show promise in reflecting irritability and emotional dysregulation in children with ODD. The findings lay the grounds for applying the present design and methods on a larger sample.

Keywords: Irritability, emotional dysregulation, ODD, DMDD

Acknowledgements

First and foremost, I would like to thank my main supervisor Jan Stubberud at the Department of Psychology, University of Oslo, and co-supervisor Pål Zeiner at Oslo University Hospital. Thank you, Jan, for being a clear voice throughout the process, close to a year now, while at the same time encouraging me to stay true to mine. Thank you, Pål, for pushing me to evaluate and highlight the practical value of this thesis. Thank you both for your constructive feedback and encouragement, for being committed to the refining of the thesis' focus, for taking the time for regular meetings, and for being genuinely interested in the topic throughout our discussions. It has been a lot of hard work, but my interest in the topic has never faltered, much thanks to your involvement.

As the thesis uses data from the research project *Severe Emotional Dysregulation in Children*, a collaboration between Nic Waal's Institute and Oslo University Hospital, I would officially like to thank the whole research group for letting me use parts of their dataset.

A special thanks also goes to Marit Coldevin, my supervisor while I completed my 5-month practice period at Nic Waals Institute. Thank you for being a guiding light in my clinical development as a novice, soon-to-be psychologist, for being engaged and supportive in discussions of, not only my clinical practice, but also this thesis. You inspire me.

Lastly, I would like to give a few more personal thanks. Thank you, Marie, for being endlessly enthralling and clever, for your valuable input and support in working with this project, and for dragging me to cafes and bars for late night work sessions. Thank you, mom, for your knowledge of the English language. Being raised practically bilingual has been a great advantage throughout my studies. Your relentless optimism and grammar corrections are much appreciated. Thank you, dad, for your interest in this work and for your reading, but more importantly, thanks for being my go-to person for adrenaline release and fun. Thank you, dear sister, for cheering me on, and thank you, grandma, for your sharp-witted reading and reassurance.

Oslo, October 2021

Maia Daasvand

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1 Introduction

Irritability in children has been subject to thorough scrutiny the last couple of decades. Still, the field lacks clear consensus on how to best identify, define, and understand the construct (Brotman et al., 2017; Toohey & DiGuiseppe, 2017). Irritability is a transdiagnostic symptom occurring in a wide range of mental disorders and is one of few symptoms to cut across internalizing and externalizing disorders (American Psychiatric Association [APA], 2013; World Health Organization [WHO], 2020). The conceptualization of irritability as both an affective and behavioral symptom (Stringaris et al., 2018) demonstrates its transdiagnostic property. On the other hand, the definition of irritability as an elevated proneness to anger, relative to peers (Brotman et al., 2017), responds to the common placement of irritability within oppositional defiant disorder (ODD) (Leibenluft, 2017a). These two seemingly compatible descriptions of irritability illustrate the indefinite status of the construct. Moreover, how to effectively measure and meaningfully assess irritability diagnostically continues to be an important question, especially considering treatment response as an essential purpose of diagnoses (Cowen, Harrison, & Burns, 2012, p. 21).

Motivating a rapidly growing interest in irritability and its related constructs are concerns about the magnitude in which irritability is prevalent in clinical populations. Internationally, severe irritability is a common reason for referral to specialist health services among children and youths (Brotman et al., 2017; Stringaris, 2011; Stringaris et al., 2018). Data from the Norwegian Patient Registry from 2020 (Helsedirektoratet, 2020) indicates that the same might be true in Norway, as reflected by high rates of both disruptive and mood-related disorders. Evidence from longitudinal studies uncovering associations between severe irritability in childhood and disorders of anxiety and depression later in life, along with functional impairment (Althoff et al., 2010; Copeland et al., 2014; Dougherty et al., 2014; Freeman et al., 2016; Leibenluft et al., 2006; Stringaris et al., 2009; Stringaris et al., 2012; Stringaris & Goodman, 2009a), further highlighting the relevance of irritability is. The impact irritability can have on a child's life, both presently and subsequently, underlines the importance of clarifying its diagnostic status. It is therefore promising that irritability was given close attention in development of the International Classification of Diseases, 11th Revision (ICD-11) and Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). Specifically, these last revisions resulted in the expansion of ODD to include the specifier *with chronic irritability-anger* in ICD-11 and the establishment of the diagnosis *disruptive*

mood dysregulation disorder (DMDD) in DSM-5. However, the problem of construct clarification and differentiation of irritability poses a considerable hurdle within both diagnoses. Also, the boundaries between these two diagnostic entities, or possibly, lack thereof, are among the unsettled discussions emerging from recent research on irritability (e.g., Evans et al., 2017).

Taken together, it is imperative to narrow the gap between the scientific world of research and the clinical world of assessment and treatment. Specifically, we need an agreed-upon understanding of the irritability construct, purposeful ways of measuring it, and precise diagnostic criteria to evaluate symptomology along. The current study attempts to contribute to these imperatives by exploring ways to measure irritability and dysregulation that are easily applicable and practical for clinical evaluations, targeting children who fulfill the diagnostic criteria of ODD with and without chronic irritability-anger according to ICD-11. As the first of its kind in Nor, the study has the potential of adding to the discussion on the irritability construct, contribute to our understanding of ODD as a heterogeneous disorder, and provide basis for assessment of the boundary between ODD with and without chronic irritability-anger. Furthermore, the study lays ground for discussing categories diagnosing non-episodic irritability, namely ODD in ICD-11 and DMDD in DSM-5.

To create a meaningful background to view this study against, the subsequent sections will further elaborate on the irritability construct and introduce the related concepts of emotional regulation and dysregulation, and executive functions. Then, relationships between the constructs will be addressed before undertaking the diagnostic categories of ODD and DMDD, including how they represent different solutions to capturing severe irritability in meaningful diagnostic entities. Lastly, research questions and goals of the present study will be concretized.

1.1 Irritability

The definition of irritability as an increased proneness to anger, relative to peers, is a widely used definition (e.g., Brotman et al., 2017; Stringaris & Taylor, 2015, p. 5; Stringaris et al., 2018). However, irritability has been, and still is, defined in a multitude of ways (see Toohey & DiGuiseppe, 2017). Definitions vary in their understanding of irritability as a state or trait and in the emphasis they place on irritability as a behavioral tendency of temper outbursts,

anger, and reactive aggression (see Stringaris & Taylor, 2015, p. 5-8). Stringaris and colleagues (2018) underscore that irritability is not just a behavioral manifestation, but also an emotional problem. They are in line with most definitions of irritability as an increased reactivity to negative emotional stimuli with both affective and behavioral components (Leibenluft & Stoddard, 2013). In a review on the status of irritability in psychiatry, Vidal-Ribas (2016) and colleagues define irritability as “interindividual differences in proneness to anger that may reach a pathological extent.” Their definition asserts a broad and dimensional understanding of irritability ranging from normality and pathology (Vidal-Ribas et al., 2016). The authors argue that a broad definition is appropriate as it opens for discussions on the borders of the concept. At the same time, broad definitions of irritability arguably reflect the inconclusiveness status of how to best understand irritability. This inconclusiveness is accentuated by related constructs overlapping in their conceptualization, thereby making them difficult to differentiate from one another. When applied in research, such unclear associations complicate attribution of results to one or the other concept, warranting questions of validity (Deveney et al., 2019; Toohey & DiGuiseppe, 2017). Thus, one could also argue that there exists a need for a narrow and exhaustive definition of irritability (see Toohey & DiGuiseppe). The absence of a distinct and established definition of irritability is, inevitably, mirrored in the multitude of measures of it, many of them developed in the last few decades. The lack of unity in defining and measuring irritability is also reflected in the diagnostic systems ICD and DSM, where there exists no one conceptualization of irritability or clear lines distinguishing overlapping constructs from one another (Toohey & DiGuiseppe, 2017). Malhi, Bell, and Outhred (2019) accurately point out the “definitional quandary” as particularly bothersome because we are all familiar with the experience of irritability. They continue to discuss the possibility that irritability is a composite of emotions, which could explain why it is so difficult to agree on a definition (Malhi, Bell, & Outhred, 2019).

The challenges characterizing the field of irritability are not unique and are accompanied by important findings moving forward our understanding of irritability. For example, strides are being made toward identifying diagnostic criteria for irritability (e.g., Wiggins et al., 2018; Toohey & DiGuiseppe, 2017). Also, irritability has been found to be a discrete and distinct dimension that is stable over time and can be differentiated from other symptoms, including anger and aggression (Chaarani et al., 2020; Deveney et al., 2019; Leibenluft et al., 2006; Toohey & DiGuiseppe, 2017; Vidal-Ribas et al., 2016; Wakschlag et al., 2015). Incidentally, a dimensional conceptualization of irritability also corresponds with the more general

tendency in nosology moving from discrete categories to quantitative specters (Plomin, Haworth, & Davis, 2009). Regarding irritability specifically, a dimensional understanding highlights the spectrum between pathological and normative irritability, the latter being common and decreasing with age (Copeland, Brotman, & Costello, 2015). Furthermore, a dimensional understanding corresponds with evidence for individual differences in neurocognitive mechanisms (e.g., Friedman & Miyake, 2017). In fact, the irritability construct has been extensively informed by research on neurocognitive and affective mechanism. This research indicates associations between irritability and neurocognitive phenomenon, such as poor frustration management, and underlying neural circuitry (Avenevoli, Blader, & Leibenluft, 2017b; Brotman et al., 2017; Leibenluft & Stoddard, 2013). In a review by Brotman and colleagues (2017), a translational model of irritability is proposed. The model combines evidence denoting a conceptualization of irritability as a low threshold for, and overreaction to, blocked goal attainment and as abnormal approach responses to threat. Representing possible neurobiological underpinnings are findings indicating that high irritability is associated with decreased activation in regulatory prefrontal regions during frustration (Grabell et al., 2018; Perlman et al., 2015). Recent work has been geared toward specifying the functional and structural foundation of irritability further (e.g., Mulraney et al., 2021; Nielsen, Wakschlag, & Norton, 2021).

1.2 Emotional regulation and dysregulation

As is the case with irritability, there exists no gold standard for conceptualizing and, consequently, measuring emotional regulation (Althoff & Ametti, 2021). However, a common intercept of definitions seems to refer to the skill of inhibiting maladaptive reactions when faced with emotional distress, including the ability of monitoring, evaluating, modulating, and maintaining emotional states (Kahn, Gusman, & Winter, 2019, p. 278). Simply put, emotional regulation points to the processes by which individuals influence which emotions they have, when, and how they experience and express them (Gross, 2014, p. 6). Emotional regulation can be understood within the overarching concept of self-regulation, which refers to meaningful, self-correcting adjustments necessary to achieve a certain goal, and which originates within the person (Carver & Scheier, 2016, p. 3). Definitions of emotional regulation and self-regulation vary in specificity and in their emphasis in movement toward goal-representations as a motivational source, characteristics of feedback and control, degree

of consciousness, and aspects of willed control versus automacy (e.g., Eisenberg & Zhou, 2016; Diamond, 2013; Thompson, 1994).

In reviewing the literature, emotional regulation seems reliant on the underlying neurobiology of limbic-frontal connectivity (Kahn, Gusman, & Winter, 2019, p. 283; Wagner & Heatherton, 2016, p. 112). Therefore, it should come as no surprise that impairment of emotional regulation is reflected by delayed prefrontal maturation (Schore, 1996; Versace et al., 2015; Vijayakumar et al., 2014). This brings us to the concept of *emotional dysregulation*, which stands in contrast to the adaptive nature of emotion regulation. Emotional dysregulation can be defined as lack of temper control, affective lability, and emotional overreaction (Reimherr et al., 2005). The neurobiological basis of emotional dysregulation, and its more adaptive counterpart, is inseparable from impact of contextual forces (Morris et al., 2007). The skillset, and impairments of it, develops through a lifetime and can be learned (Kahn, Gusman, & Winter, 2019, p. 278). Regulation and dysregulation of emotions is, in other words, no exception to the rule of interplay between genetic and environmental influences.

Emotional dysregulation has been given increased attention the last 20 to 30 years. This is partly due to its association to irritability but, as the term “dysregulation” is frequently used to describe irritability (as in DMDD; APA, 2013), it must not be mistaken as its equivalent. Followingly, the growing interest for emotional dysregulation should also be understood in light of what has been proposed as an ongoing historical shift in our theoretical understanding of childhood disruptive disorders with increasing emphasis on emotionality (Cavanagh et al., 2017). Emotional dysregulation is related to many mental health challenges and disorders (Kahn, Gusman, & Winter, 2019, p. 279). It has been investigated as a core component of ADHD (Barkley, 2015), PTSD (Keeshin et al., 2021) and borderline personality disorder (Sanislow, Grilo, & McGlashan, 2000). Early contributions also highlight emotional dysregulation as central to disruptive disorders (Cole & Zahn-Waxler, 1992), a line of thought that has been supported by a steadily growing body of empirical research, including the research preceding the DMDD diagnosis (e.g., Leibenluft, 2011).

1.3 Executive functions

Taking on the conceptualization of Friedman and Miyake (2017), executive functions are defined as “high-level cognitive processes that, through their influence on lower-level processes, enable individuals to regulate their thoughts and actions during goal-directed behavior.” While yet another concept widely differing in its conceptualizations, this definition is deemed sufficient for the purpose of this study. Executive functions have differential cognitive and biological underpinnings, but are commonly associated with prefrontal regions (Diamond, 2013; Friedman & Miyake, 2017). The development of executive functions is closely tied to growth of neural networks in preschool years, and pruning of these in adolescence, but continues to evolve into adulthood (Zelazo et al., 2003).

While a simplistic explanation to a complex phenomenon, an analogy could be made between executive functions and the Leatherman, or a similar multipurpose tool, where executive functions can be understood as an overarching term for several individual functions which can work separately, or in combination, depending on the complexity of the task at hand. Sticking to the work of Friedman and Miyake, three executive functions are considered as core processes, namely *shifting*, *updating*, and *inhibition* (Friedman & Miyake, 2017; Miyake et al., 2000, Miyake & Friedman, 2012). Shifting refers to the skill of switching between mental tasks (Miyake et al., 2000). Updating is the adding of relevant information to, and omitting irrelevant information from, working memory (Miyake et al., 2000). Inhibition denotes the ability to suppress or resist prepotent responses (Miyake et al., 2000). These processes show both diversity and unity (Friedman & Miyake, 2017), like the tools of the Leatherman being considered as separate while at the same time being recognized within the multi-purpose tool as one entity.

Executive functions are important in everyday aspects of life, including mental health, as impairments of executive functions are common for several mental disorders (Diamond, 2013). This includes disruptive disorders generally (Noordermeer, Luman, & Oosterlaan, 2016) and ODD specifically (Hobson, Scott, & Rubia, 2011). However, it should be mentioned that there are mixed findings considering the relative independence of ODD to common comorbid disorders, especially ADHD, when considering impaired executive function (Clark, Prior, & Kinsella, 2000; Coolidge, Thede, & Young, 2000; Ezpeleta & Granero, 2015; Kim et al., 2010; Melegari et al., 2015; Oosterlan, Scheres, & Sergeant, 2005).

1.4 Understanding irritability, emotional regulation, and executive functions together

The foregoing introductory segments on irritability, emotional regulation, and executive functions create a backdrop for the claim that these constructs are interrelated (e.g., Liuzzi et al., 2020; Perlman et al., 2015; Leibenluft, 2017b; Zelazo & Cunningham, 2007). However, how these concepts are defined have implications for how they are understood as more or less intertwined. While irritability is intuitively easier to separate from emotional regulation and executive functions, this is not the case for the latter two constructs. For example, some definitions of executive functions include emotional regulation, and others even equate the two (Eisenberg & Zhou, 2016), at least when the problem to be solved is modulating emotions or when effortful regulation serves as a means to solving another problem (Zelazo & Cunningham, 2007). While this assimilation may be meaningful in some cases, it seems more reasonable to claim that executive functions subserve or facilitate regulation (Hofmann, Schmeichel, & Baddeley, 2012). The importance of such a distinction becomes clear if we apply an understanding of irritability as an expression of emotional dysregulation (e.g., Vidal-Ribas et al., 2016), resulting in interpretations ranging from a direct relationship between executive functions and irritability to emotional regulation as modulating this relationship.

The above example demonstrates and underscores how conceptual issues complicate interpretation and the need for meaningful dividing lines between concepts. Still, irritability, emotional regulation, and executive functions are complex constructs, and the relationships between them are even more difficult to comprehend. In the following, an attempt is made to tie all three together in a simplified summation: Irritability includes both affective and behavioral components (e.g., Stringaris, et al., 2018), emotional regulation points to the ability to influence these components (e.g., Gross, 2014, p.6), and executive functions refer to the underlying mechanisms enabling regulation (Friedman & Miyake, 2017), which in turn influences increase or decrease in irritability (Liuzzi et al. 2020). While adopting such a streamlined contextualization is tempting and deemed adequate for the level of detail necessary in this study, it lacks references to what are, in truth, fine-grained and unintelligible relationships.

1.5 Diagnosing severe irritability

Neither irritability, emotional dysregulation, nor executive dysfunction are symptoms specific to any diagnostic entity. Still, the current diagnostic categorizations of severe irritability as the main presentation primarily involve oppositional defiant disorder (ODD) (APA, 2013; WHO, 2020) and the more recent disruptive mood dysregulation disorder (DMDD) (APA, 2013). These two diagnoses will be presented followed by a short commentary on the two diagnostic systems solutions.

1.5.1 Oppositional defiant disorder in ICD-11

ODD is characterized by “markedly defiant, disobedient, or spiteful behavior” (WHO, 2020). With the introduction of ICD-11 (WHO, 2020), the specifier *with chronic irritability-anger* was added to the ODD diagnosis, expanding the conceptualization of ODD to include manifestations of “prevailing, persistent angry or irritable mood that may be present independent of any apparent provocation.” The “negative mood” is often accompanied by severe temper outbursts (WHO, 2020). This development yielded two subdiagnoses of ODD, namely ODD with and without chronic irritability-anger. While not included as a focus for the current study, further specifications can be made as to whether children with ODD with chronic irritability-anger exhibit limited or typical prosocial emotions (WHO, 2020). A complicating factor in determining whether a child meets the criteria for ODD with chronic irritability-anger is, as mentioned, that there are no clear diagnostic criteria to evaluate symptomology along and the descriptive conceptualization relies on unclear definitions of constructs. This holds true for both ICD-11 and DSM-5, as both lack distinct guidelines as to how one should understand and distinguish between concepts such as irritability, anger, irritability-anger, irritable mood, negative mood, irritable behavior, aggression, and angry behavior (Toohey & DiGuiseppe, 2017).

Diagnostic challenges aside, the expansion of the ODD diagnosis is consistent with the fact that, historically, ODD has been the diagnostic home of children whose main problem is irritability (Leibenluft, 2017a; Sagar-Ouriaghli et al., 2018). Cavanagh and colleagues (2017) conclude that dysregulated affect, such as irritability, is not just a mere component, but a core deficit in ODD. Delineating subtypes of ODD also, and perhaps more importantly, represents a movement toward recognizing and emphasizing affective dimensions of ODD (Cavanagh et

al., 2017). The inclusion of the specifier is also a recognition of the heterogeneity among children with ODD. The two dimensions that best seem to reflect this heterogeneity are irritability and defiance (Leadbeater & Homel, 2015; Rowe et al., 2010). Others have argued for a three subdimensional model of ODD symptoms consisting of irritability, hurtful, and headstrong (Stringaris & Goodman, 2009b). Either way, irritability is a core part of ODD presentation (Burke, 2012; Burke et al., 2014; Evans et al., 2017; Stringaris & Goodman, 2009b). This is not to say that all children with ODD suffer from non-episodic irritability. In fact, children can meet the criteria for ODD based on oppositionality alone. Nevertheless, the multidimensionality of ODD implies that it cannot be reduced to a disorder of disruptive behavior. Supporting this claim are studies showing that irritability and defiance represent separate neurodevelopmental phenotypes and are associated with diverging phenotypic relationships (Stringaris, Maughan, & Goodman, 2010; Rowe et al. 2010; Wakschlag et al., 2018) and longitudinal trajectories (Ezpeleta et al., 2016; Stringaris & Goodman, 2009a; Stringaris et al., 2012). By extension, questions concerning the placement of irritability, considered a mood symptom (Snaith & Taylor; 1985; Toohey & DiGuiseppe, 2017), and defiance, a behavioral symptom, in one and the same diagnosis is raised, along with the categorization of ODD as a behavioral disorder (Leibenluft, 2017a). Underlining the relevance of questions like these are studies concluding that ODD is better understood as a disorder of emotional regulation (Cavanagh et al., 2017). The transdiagnostic feature of irritability and high comorbidity rates between ODD and other mental disorders (Boylan et al., 2007; Burke et al., 2005; Greene et al., 2002; Nock et al., 2007) further complicates the matter. The wide presence of irritability could inflate comorbidity rates (Rutter, 1997). The inclusion of the specifier, conceivably, acknowledges the discussions encompassing the irritability construct, but does not fully answer to the questions characterizing these discussions. Taken together, it seems necessary to establish a meaningful way to differentiate children with ODD who suffer from severe irritability from those who do not.

1.5.2 Disruptive mood dysregulation disorder in DSM-5

In 2013, DSM-5 introduced DMDD, a disorder marked by two core symptoms, namely severe, unproportionate, recurring temper outbursts and persistently irritable or angry mood between outbursts (APA, 2013). The diagnostic criteria specify temper outbursts as being inconsistent with developmental level and occurring three or more times per week (APA,

2013). Onset is set between 6-10 years, and diagnosis should not be made after age 18. When children concurrently fulfill the diagnostic criteria of DMDD and ODD, DMDD has precedence (APA, 2013). In this way, DMDD captures those with severe forms of ODD irritability (APA, 2013; Stringaris et al., 2018). Still, the exclusion criterion stimulates discussion on differences between DMDD and ODD, particularly after the expansion of the ODD diagnosis in ICD-11.

The introduction of DMDD was largely driven by driven by misdiagnosing of children with bipolar disorder between the mid-1990s and the early 2000s in the United States (Baweja et al., 2018; Blader & Carlson, 2007; Moreno et al., 2007; Roy et al., 2014). Severe irritability was misunderstood as a form of pediatric mania, even though a number of these children did not exhibit a pattern of episodic mood changes characteristic of bipolar disorders (Leibenluft, 2011). Thus, the need for more accurate diagnosing of children with mood changes of a chronic character became evident. The introduction of DMDD as a new category entity was established to answer this need (Roy et al., 2014) and turned the debate from boundary clarification between pediatric bipolar disorder and chronic irritability to DMDD as a new diagnostic category (Krieger et al., 2013).

1.5.3 Different solutions to the same issue

Although there were differentiating motivational forces behind the changes in ICD-11 and DSM-5 likely to influence the resulting diagnoses, the changes in both manuals were primarily driven by the need for accurately diagnosing children who struggle with non-episodic, or chronic, irritability-anger. The two diagnostic systems have different approaches to how they do so. DMS-5 delimits this group of children to those who primarily struggle with chronic irritability and temper outbursts. ICD-11 adds a specifier, carrying on the tradition of diagnosing severe irritability within ODD, and the manual does not make the marked distinction that DSM-5 does. ICD-11 was thus more conservative compared to DSM-5, basing its solution on the irritable dimension of ODD. This choice was also informed by limitations of the DMDD diagnosis and accompanying concerns about introducing a new standalone disorder (Evans et al., 2017). However, the above descriptions of the ICD-11 specifier and DMDD are undoubtedly similar (see Coldevin, Løvstad, & Brænden, 2021).

DMDD has been criticized for not being sufficiently different from ODD and that DSM-5 should, as ICD-11, include a specifier rather than a new diagnosis (Bruno et al., 2019; Burke

et al., 2014; Lochman et al., 2015; Malhi & Bell, 2019). This view is supported by high overlap between ODD and DMDD (Mayes et al., 2016) and ample evidence demonstrating that ODD symptoms can be divided into two (e.g., Leadbeater & Homel, 2015) or three (e.g., Stringaris & Goodman, 2009b) dimensions, including irritability as a core component. On the other hand, interpreting DMDD as labelling the most extreme cases of ODD irritability (APA, 2013; Stringaris et al., 2018) demonstrates its diagnostic value, particularly considering clinicians rarely use diagnostic specifiers (Stringaris et al., 2018). As for clinical utility, one study found that clinicians are better at diagnosing severe irritability and differentiating between boundary presentations when using ICD-11 than when using DSM-5 and ICD-10 (Evans et al., 2021). Still, the question of superiority of one or the other diagnosis is recent and cannot be reduced to clinicians' ability in diagnosing severe irritability. What is clear is that both DMDD and ODD with chronic irritability-anger focus on capturing those who struggle with severe irritability. While diverging in their solutions to do so, they are informed by the same research underlining irritability as having distinct longitudinal and genetic associations compared to defiance (Ezpeleta et al., 2016; Leadbeater & Homel, 2015; Stringaris & Goodman, 2009a, 2009b; Stringaris et al., 2012; Whelan et al., 2013). Runions and colleagues (2016) conclude that both ODD and DMDD require scrutiny as diagnostic categories. This conclusion seems reasonable and relates to the need for establishing consensus on the conceptualization and measurement of the core symptom of both ODD and DMDD, namely irritability.

1.6 The present study

The overall aim of this study is to gain a better understanding of irritability among children with ODD in a Norwegian sample by investigating the ability of measures from CBCL and BRIEF in assessing irritability and emotional dysregulation. The study explores measures from CBCL and BRIEF possibly reflecting some aspect of irritability and/or emotional dysregulation. The included measures are CBCL Irritability, CBCL Defiance, CBCL Total Problems, CBCL Internalizing, CBCL Externalizing, CBCL Dysregulation Profile, composed of the scales Anxious/Depressed, Attention Problems, and Aggressive Behavior, and lastly, BRIEF Behavioral Regulation Index and BRIEF Emotional Control scale. The study will investigate the following research questions:

1. Are there any associations between the CBCL measures Irritability, Defiance, Total Problems, Internalizing, Externalizing, Dysregulation Profile, Anxious/Depressed, Attention Problems, and Aggressive Behavior, and BRIEF Behavioral Regulation Index and BRIEF Emotional Control scale?
2. How do children who fulfill criteria for ODD score on the CBCL measures Irritability, Defiance, Total Problems, Internalizing, Externalizing, Dysregulation Profile, Anxious/Depressed, Attention Problems, and Aggressive Behavior, and BRIEF Behavioral Regulation Index and BRIEF Emotional Control scale compared to children with ODD with chronic-irritability anger?
3. Can CBCL measures Irritability, Defiance, Total Problems, Internalizing, Externalizing, Dysregulation Profile, Anxious/Depressed, Attention Problems, and Aggressive Behavior or BRIEF measures Behavioral Regulation Index and Emotional Control scale discriminate between children with ODD with and without chronic irritability-anger?

Based on the assumption that the included measures reflect irritability or aspects of it, the main hypothesis is that they can be useful in assessment of irritability and emotional dysregulation in children with ODD. This hypothesis is based on a few presumptions, making the main hypothesis threefold, each reflecting one of the three research questions. Regarding the first research question, it is hypothesized that there are associations between the included measures of CBCL and BRIEF. This could inform our understanding of the irritability construct. Second, it is presumed that children who meet the criteria for ODD with chronic irritability-anger will have higher scores on the included measures than children with ODD alone. If so, findings could further our understanding of ODD as a heterogeneous disorder and indicate that the specifier added to the ODD diagnosis in ICD-11 is a meaningful expansion. As for the third research question, it is hypothesized that characteristics of the distributions could indicate ways to distinguish between ODD with and without chronic irritability-anger as in ICD-11. This could contribute to asserting a boundary between the two groups.

2 Methods

2.1 Participants and design

This cross-sectional study presents baseline data derived from the project *Severe Emotional Dysregulation in Children*, a collaboration between Nic Waals Institute and Oslo University Hospital. The project was approved by the Regional Committee for Medical and Health Research Ethics (2017/135). The present sample was recruited from patients between the age of 6-12 years at Nic Waals Institute, part of Lovisenberg Diaconal Hospital. It is comprised solely of children who fulfill the diagnostic criteria for ODD according to Schedule for Affective Disorders and Schizophrenia for School Age Children Present and Lifetime Version for DSM-5 2016 (K-SADS-PL-5). Some of these children also met the criteria for DMDD according to K-SADS-PL-5. Following the diagnostic expansion of the ODD diagnosis in ICD-11 (WHO, 2020), these children were conceptualized as fulfilling the ICD-11 subdiagnosis ODD with chronic irritability-anger (ODD-I-A). The current group ascriptions will be further clarified in presenting K-SADS-PL-5 and considered in the discussion.

Eleven children were included in the study. The total sample consisted of seven boys (63.6%) and four girls (36.4%) between the ages 7-12 ($mdn = 9$, $IQR = 2$). Over half of the participants (72.7 %) fulfilled one or more diagnoses other than ODD and ODD-I-A. Most prevalent were ADHD (54.5 %) and anxiety disorders (36.4 %). One participant met the criteria for a depressive disorder (9.1 %). Seven children (63.6 %) met the criteria for ODD and the remaining four (36.4 %) met criteria ODD-I-A, as reflected by comorbid DMDD. The dispersal of age and comorbidity in the subgroups were near equivalent to that of the total sample. As for gender, there were fewer girls than boys in the ODD-I-A group, comparable to the dispersal in the total sample. The ODD group had a similar number of girls and boys.

2.2 Procedure

Parents whose children were referred to Nic Waals Institute received a written invitation specifically soliciting participation in the study. In the case of a positive response, written informed consent was required from primary caregivers. Upon agreeing to participate, parents filled out several questionnaires and gave consent to use relevant information from their child's mental health records. The parents were interviewed with K-SADS-PL-5 by a

psychology specialist, in most cases together, but in some instances only one parent was interviewed. One parent of each participant filled out CBCL and BRIEF questionnaires, usually the mother. Sometimes both parents filled out the questionnaires and, in some cases, they completed them together. Results complemented standard clinical psychological assessment and were conveyed to the children and their parents together with their responsible therapist. The information was anonymized and stored securely.

2.3 Instruments and variables

2.3.1 K-SADS-PL-5

Schedule for Affective Disorders and Schizophrenia for School Age Children Present and Lifetime Version for DSM-5 2016 (K-SADS-PL-5) is a semi-structured diagnostic interview developed by Kaufman and colleagues, based on former versions of K-SADS-PL (Kaufman et al., 1997). As evident from its name, K-SADS-PL is used to evaluate current and past psychopathology in children and youths. The 2016 version corresponds with DSM-5 diagnoses. It consists of screening questions and probes that, together with additional supplement modules, translate to diagnostic criteria (Ambrosini, 2000). It provides broad diagnostic coverage. Symptom presence and severity is scored as *none*, *subthreshold*, or *threshold*. K-SADS-PL has good inter-rater and test-retest reliability and is widely used in both research and clinical practice (Kaufman et al., 1997; Ambrosini, 2000; Birmaher et al., 2009). Kornør and Skarphedinsson (2016) found good inter-rater reliability for the Norwegian version but concluded that there is a lack of studies on content and criterion validity. As Nordic countries are often compared, it is noted that a Swedish research group found good to excellent predictive validity for K-SADS-PL, apart from the diagnosing of autism (Jarbin et al., 2017). For disruptive disorders specifically, K-SADS-PL had very good sensitivity (93.9 %) and positive predictive value (93.9 %) (Jarbin et al., 2017).

As mentioned, when accounting for participants, K-SADS-PL-5 was used to decide group membership, namely ODD and ODD with chronic irritability-anger as in ICD-11 (WHO, 2020), the latter defined by co-occurring DMDD as in DSM-5 (APA, 2013). According to DSM-5, DMDD is an exclusion criterion for receiving the ODD diagnosis (APA, 2013). As the present study involves investigating possible differences between ODD with and without chronic irritability-anger, the guidelines of DSM-5 were not applicable, but rather contrary to

the study goals. Since the instrument is adapted to reflect DSM-5 diagnoses, presence of symptomatology cannot automatically be assumed to translate to ICD-11 diagnoses. Still, the diagnostic criteria of ODD in ICD-11 and DSM-5 are even more harmonized than were their predecessors (APA, 2013; WHO, 2020). Therefore, it is considered acceptable to use the two systems' ODD diagnose interchangeably. The same holds true for utilizing DMDD to define group membership to ODD-I-A, considering the overlap to the ICD-11 ODD specifier.

2.3.2 Child Behavior Checklist (CBCL)

CBCL is one of the questionnaires in Achenbach System of Empirically Based Assessment (ASEBA; Achenbach & Rescorla, 2001), a widely used instrument of social, emotional, and behavioral functioning in children up to 18 years old. Items are rated on a three-point scale of 0 (*not true*), 1 (*somewhat/sometimes true*), and 2 (*very/often true*) according to presence within the last six months. Response data is aggregated to problem T-scores reflected in syndrome scales (*Anxious/Depressed, Withdrawn/Depressed, Somatic Complaints, Social Problems, Thought Problems, Attention Problems, Rule-Breaking Behavior, Aggressive Behavior*) and DSM-oriented scales (*Affective Problems, Anxiety Problems, Somatic Problems, Attention Deficit/Hyperactivity Problems, Oppositional Defiant Problems, Conduct Problems*). Syndrome categories are arranged in two broadband scales, *Internalizing* and *Externalizing Problems*, and scores on all problem items are summarized the *Total Problems* scale. T-scores between 65-69 and above 69 delineate borderline and clinical range for syndrome scales and DSM-oriented scales, respectively. For *Internalizing, Externalizing, and Total Problems*, T-scores of 60 through 63 delineate borderline clinical range, and $T \geq 64$ indicates clinical range. The CBCL has high inter-rater and test-retest reliability (Achenbach & Rescorla, 2001, p. 106). It is standardized and validated cross-culturally, including studies on Norwegian samples (Achenbach et al., 2008; Nøvik, 1999; Rescorla et al., 2007). Chronbach's alpha for CBCL in the current study was .88.

In this study, CBCL is used to explore two different strategies for measuring irritability, hereunder CBCL Irritability and CBCL Dysregulation Profile. Additionally, CBCL Defiance is calculated as complementary to CBCL Irritability, reflecting a bifactor model of ODD (Burke et al., 2014; Evans et al., 2017). CBCL Irritability is defined using the items *stubborn, sullen, or irritable, sudden mood changes, and temper tantrums or hot temper*. CBCL Defiance is defined by the three items *disobedient at home, disobedient at school, and argues*

a lot. All items for these two scales are drawn from the DSM-oriented scale *Oppositional Defiant Problems* and the syndrome scale *Aggressive Behavior*. Item assignment to the two corresponding variables is based on reviews of previous studies, (e.g., Aebi et al., 2013; Evans et al., 2020; Stringaris et al., 2012; Tseng et al., 2017), and results on the scales range from 0 (low) to 2 (high). CBCL Dysregulation Profile is computed by summing up the T-scores for the syndrome scales Anxiety/Depression, Attention Problems, and Aggression Problems. Aggregate cutoff scores marking deficient self-regulation and severe dysregulation are > 180 but < 210 and ≥ 210 and, respectively (Biederman et al., 2012; Masi et al., 2015a, Masi et al., 2015b). CBCL Dysregulation Profile has been used extensively in studies examining problems with emotional regulation (Althoff & Ametti, 2021). It has been proven useful in determining severity of deficits in emotional regulation in children with disruptive behavior specifically (Aitken et al., 2019; Holtmann et al., 2011; McGough et al., 2008) and severity of psychopathology generally, including associations to longitudinal impairment (Althoff et al., 2010; Biederman et al., 2012; Dougherty et al., 2014; Masi et al., 2015b).

2.3.3 Behavioral Rating Inventory of Executive Functions (BRIEF)

BRIEF (Gioia et al., 2000a) is a standardized questionnaire measuring children's executive functions based on parent evaluation. It is composed of 86 problem focused items. Parents respond *never*, *sometimes*, or *often*, scored as 1, 2, or 3, respectively. There also exist versions for teacher report and self-report, but these are not used in the current study. Response data is aggregated to T-scores for eight clinical scales reflecting dimensions of executive functions (*Inhibit*, *Shift*, *Emotional Control*, *Initiate*, *Working Memory*, *Plan/Organize*, *Organization of Materials*, *Monitor*), further grouped into the three summary scores *Behavioral Regulation Index*, *Metacognition Index*, and *Global Executive Composite*. T-scores ≥ 65 are typically used to determine clinically notable dysfunction, while T-scores of 60-64 are within the mildly elevated range. The BRIEF has demonstrated high test-retest reliability and internal consistency with Cronbach's alpha between .80-.98 (Gioia et al., 2000b). Chronbach's alpha for BRIEF in the present study was .95. The Norwegian version of BRIEF has been found to be adequately valid and reliable, and that American norms are applicable on Norwegian samples (Fallmyr & Egeland, 2011; Sørensen & Hysing, 2014).

The current investigation utilizes the scale Emotional Control and Behavioral Regulation Index. The Emotional Control scale captures the impact problems with executive functions

has on emotional expression and the ability to modulate or control emotional responses appropriately (Gioia et al., 2000a, p. 18), and overlaps with the conceptualization of emotional regulation. Appropriate emotional control is described as absence of outbursts, sudden and/or frequent mood changes, or excessive periods of emotional upset (Gioia et al., 2000a, p.19). Behavioral Regulation Index is comprised of three scales, hereunder Inhibit, Shift, and Emotional Control. Behavioral Regulation Index measures the ability to uphold “appropriate regulatory control”, both behaviorally and emotionally (Gioia et al., 2000a, p. 20).

2.4 Statistical analyses

The analytic strategy consisted of three parts, the first being exploration of the sample to clarify assumptions. The second and third part were specifically aimed at answering the research questions and consisted of descriptive statistics and inferential statistical analyses, respectively.

Exploratory data analyses were conducted to examine normality of distributions, potential outliers, and missing values. Normality was assessed both graphically and statistically for the sample and for the two subgroups ODD and ODD-I-A. Potential outliers were identified by stem-and-leaf plots and box plots. Missing values were investigated by frequency tables and Little’s MCAR test.

Descriptive statistics were conducted to give a quantitative description of the data, including sex and age dispersion and comorbidity rates in the total sample and the two subgroups. Analyses were applied for all CBCL and BRIEF variables to investigate central tendencies and spread.

Inferential statistics were conducted, including correlational analyses, parametric and non-parametric tests of group differences, and lastly, Area Under the Curve (AUC) analyses of Receiving Operating Characteristic (ROC) curves were applied to test for screening ability of the included measures. A Pearson Product-Moment Correlation was conducted to examine associations between the variables. An Independent Samples T-test was conducted to investigate equity of means between children with ODD with and without chronic irritability-anger on all variables. Levene’s test was used to address equality of variances between groups on all variables. Taking findings from exploratory analyses into consideration, non-parametric

tests were also conducted to explore variance between distributions and compare medians of the ODD group and the ODD-I-A group. To evaluate diagnostic discrimination abilities, specifically the ability to discriminate children with ODD with chronic irritability-anger from children with ODD without the specifier, CBCL and BRIEF scales were subjected to AUC analyses of ROC curves. Confidence intervals of 95 % were calculated for the diagnosis ODD with chronic irritability-anger. The AUC analyses results were interpreted as having low diagnostic accuracy for AUC .50-.70, acceptable diagnostic accuracy for AUC .70-.80, excellent for AUC .80-.90, and outstanding diagnostic accuracy for AUC \geq .90 (Hosmer, Lemeshow, & Sturdivant, 2013, p. 177).

The level of expected probability was decided to $p < .05$. For correlational analyses, a more stringent probability of $p < .01$ was applied, bearing in mind possible conceptual overlap between measures. Correlations in the $p = .01$ -.05 range were interpreted as tendencies. The CBCL scales Irritability and Defiance are not standardized within CBCL. Moreover, as the population mean is unknown, T-scores could not be calculated. Therefore, the scales were excluded in norm comparison of group differences, and in AUC analyses of ROC curves.

3 Results

3.1 Exploratory data analyses

3.1.1 Normality

For the total sample, Shapiro-Wilk significance values were $> .05$ for all measures except CBCL Total Problems, indicating acceptable normality for all measures but this. The specific normality test was chosen as it is considered good for smaller samples (Field, 2013, p. 188). A closer look at skewness and kurtosis shows a slightly different picture, indicating significant deviations from normality ($p < .05$) for CBCL Total Problems, as already established, but also CBCL Externalizing and CBCL Aggression, marked by z-scores for skewness and kurtosis greater than ± 1.96 (Field, 2013, p. 184). These deviations from normal univariate distributions were verified by histograms and normal Q-Q plots.

Considering the deviations from normality in the total sample, the same was expected for the two groups. Shapiro-Wilk significance values were $< .05$ for CBCL Total Problems in the ODD group and BRIEF Emotional Control in the ODD-I-A group. As for skewness and

kurtosis, only CBCL Total Problems had significant z-value for kurtosis > 1.96 (Field, 2013, p. 184), signifying departure from normality. Histograms and normal Q-Q plots were difficult to interpret due to the size of the subsamples.

3.1.2 Outliers

Descriptive analyses indicated that the CBCL measures Externalizing, Total Problems, and Aggression each had one extreme value in the total sample. The means of these measures did not vary much from the 5 % Trimmed Mean, so outliers were deemed to be within adequate range of their respective distributions. The outliers in the total sample all belonged to the same case in the ODD group. The decision to not leave out this outlier, or conduct transformations, was further supported by 5 % Trimmed Means in the ODD subgroup not deviating much from those of the respective means of CBCL Externalizing, Total Problems, and Aggression.

3.1.3 Missing values

There were missing values for both CBCL and BRIEF variables. For the ODD group, a subsample of originally 10, there were 3 missing values for CBCL and/or BRIEF variables. For ODD with chronic irritability-anger, a subsample originally of 9, there were 5 missing values for both CBCL and BRIEF variables. Little's MCAR test yielded $X^2(8, N = 19) = .838, p = .999$ which indicates that the pattern of missing values does not deviate significantly from randomness and should not influence the results in the analyses (Tabachnick & Fidell, 2007, p. 63). Still, based on a principle of transparency in research ethics, missing values were excluded since they could not contribute to the results. This resulted in a subsample of seven and four for the ODD group and ODD-I-A group, respectively.

3.2 Descriptive statistics

Table 1 presents characteristics of the total sample and the two subgroups concerning age, sex, and diagnoses concurrent with ODD and ODD-I-A according to diagnostics in K-SADS-PL-5. Comorbid ODD and DMDD (36.4 %) is represented in the ODD-I-A group. Including comorbid DMDD to the overall comorbidity rate, inflates comorbidity in the total sample from 72.7 % to 81.8 %.

Table 1

Characteristics of the total sample and the two subgroups ODD and ODD with chronic irritability-anger

Variable	Total sample <i>n</i> =11	ODD <i>n</i> =7	ODD-I-A <i>n</i> =4
Age			
Mean (<i>SD</i>)	9.18 (1.5)	9.14 (1.9)	9.25 (0.5)
Range	7-12	7-12	9-10
IQR	2	3	1
Median	9	8	9
Sex (%)			
Female	4 (36.4)	3 (42.9)	1 (25)
Male	7 (63.6)	4 (57.1)	3 (75)
Comorbidity (%)			
ADHD	6 (54.5)	4 (57.1)	2 (50)
Depression	1 (9.1)	1 (14.3)	0
Social anxiety	2 (18.2)	2 (28.6)	0
Anxiety NOS	1 (9.1)	0	1 (25)
GAD	1 (9.1)	0	1 (25)

Note. ODD-I-A = ODD with chronic irritability-anger, ADHD =Attention

Deficit/Hyperactivity Disorder (including subtypes and combined type), NOS = not otherwise specified, PTSD = Posttraumatic Stress Disorder

3.3 Inferential statistics

3.3.1 Associations between variables

Table 2 presents correlations between CBCL measures Irritability, Defiance, Anxious/Depressed, Attention and Aggression, and BRIEF Emotional Control. A large and significant statistical correlation (Cohen, 1992) was found between CBCL Irritability and BRIEF Emotional Control ($r(9) = .67, p = .033$). The finding indicates that higher levels of irritability is associated with greater difficulties with emotional control, and conversely, that lower levels of irritability is associated with less difficulty with appropriate emotional modulation. CBCL Defiance correlated strongly with CBCL Aggression ($r(9) = .72, p = .012$) indicating that higher levels of defiance is associated with higher levels of aggression, and conversely, the opposite for lower levels. Because measures belonging to a broadband measure or index are naturally highly correlated with the composite measure to which they belong, as were the case in the present study, broadband measures and indices were left out of table 2.

Table 2

Correlations between CBCL measures of Irritability, Defiance, Anxiety/Depressed, Attention, Aggression, and BRIEF Emotional Control (n=11)

Measure	M (SD)	1.	2.	3.	4.	5.	6.
1. CBCL Irritability	1.17 (.69)	.00					
2. CBCL Defiance	1.03 (.53)	.28	.00				
3. CBCL Anxious/Depressed	64.20 (11.99)	.48	-.02	1.00			
4. CBLC Attention	62.00 (10.15)	-.33	.59	.01	1.00		
5. CBCL Aggression	67.80 (7.91)	.58	.72*	.39	.26	1.00	
6. BRIEF Emotional Control	69.40 (10.87)	.67*	.03	.59	-.20	.42	1.00

Note. Indices and broadband scales are not included, as they are composed of measures already included in the correlational analysis.

* $p < .05$

3.3.2 Group differences

Table 3 presents descriptive statistics of the variables from CBCL and BRIEF, including sample sizes, central tendencies, and dispersion estimates in the groups ODD and ODD-I-A.

Overall, the ODD-I-A group scored higher than the ODD group, as reflected by means, on the CBCL measures Irritability, Total Problems, Internalizing, Externalizing, Dysregulation Profile, Anxiety/Depression, Attention, and Aggression. The opposite tendency was found for CBCL Defiance, BRIEF Emotional Control, and BRIEF Behavioral Regulation Index.

However, when considering median scores, it is noted that the two groups had equal scores on CBCL Defiance. Furthermore, the ODD group also had slightly higher median scores on CBCL Externalizing, CBCL Dysregulation Profile and CBCL Aggression. For BRIEF Emotional Control, the median scores showed the opposite tendency of the mean scores, namely that the ODD-I-A group scored higher than the ODD group.

For norm comparison, we look to caseness, as defined by clinical cutoff values for CBCL and BRIEF. Table 4 presents number and percentage of children in the ODD and ODD-I-A groups with scores in the clinical range. The general pattern resembles that of means and medians, as described above. There are notably higher percentages of children in the ODD-I-A group on CBCL Total Problems, CBCL Internalizing, CBCL Dysregulation Profile, CBCL Anxiety/Depression, and BRIEF Emotional Control. The opposite pattern, while not as prominent, was found for CBCL Externalizing and CBCL Aggression.

Regarding the significance of the described differences, we look to mean differences between the two groups, reported in table 3. Levene's test was not significant for any measures and equal variance between groups was assumed. The four children in the ODD-I-A group ($M = 72$, $SD = 6.98$) compared to the seven children in the ODD group ($M = 61.42$, $SD = 6.58$) demonstrated significantly higher scores on CBCL Internalizing, $t(10) = -2.5$, $p = .03$. The groups did not differ significantly on any of the other variables. Given differences between medians and means, as defined by skewness values, and described above, non-parametric tests were conducted. Independent Samples Mann-Whitney U Tests and Median Tests were not significant, indicating that medians and distributions are the same for ODD and ODD-I-A. Simply put, results from the non-parametric tests are in line with those of the t-tests.

Table 3

Measures of central tendency and dispersion in children with ODD and children with ODD with chronic irritability-anger, and mean differences between the two groups

Measure	ODD <i>n</i> =7				ODD-I-A <i>n</i> =4				t	p
	Mean (<i>SD</i>)	Range	IQR	Median	Mean (<i>SD</i>)	Range	IQR	Median		
CBCL Irritability	1.14 (.72)	0.00-2.00	1.25	1.33	1.25 (.63)	.33-1.67	1.09	1.50	-.24	.81
CBCL Defiance	1.05 (.62)	0.00-2.00	.00	1.00	1 (.27)	.67-1.33	.50	1.00	.14	.89
CBCL Total Problems	55.43 (19.38)	50-73	24	60	69 (2.94)	66-73	6	68.50	-1.36	.21
CBCL Internalizing	61.43 (6.58)	50-69	10	60	72.00 (6.98)	63-78	13	73.50	-2.5	.03*
CBCL Externalizing	65.14 (11.34)	43-78	18	68	66.75 (3.69)	62-71	7	67.00	-.27	.79
CBCL-DP	190.57 (21.76)	160-213	41	203.00	203.50 (15.59)	187-223	30	202.00	-1.04	.38
CBCL Anx./Dep.	61.29 (10.08)	51-75	15	57.00	71.75 (12.84)	50-81	22	76.50	-1.51	.17
CBCL Attention	62.14(10.57)	53-81	19	57.00	63.00 (9.63)	51-74	19	63.50	-1.33	.90
CBCL Aggression	67.14 (9.41)	50-81	15	68.50	68.75 (2.99)	66-73	5	68.00	-.33	.75
BRIEF EC	69.63 (12.44)	62-83	17	70.50	66.75 (14.57)	45-76	23	73.00	.61	.56
BRIEF BRI	67.63 (11.93)	52-83	22	71.00	64.75 (10.40)	51-75	20	66.50	.61	.56

Note. ODD-I-A = ODD with chronic irritability-anger, CBCL-DP = CBCL Dysregulation Profile, BRIEF EC = BRIEF Emotional, Control, BRIEF BRI = BRIEF Behavioral Regulation Index. Smaller font size for readability.

* = $p < .05$

Table 4

Overview of caseness, defined by clinical range, among children with ODD and children with ODD with chronic irritability-anger

Measure	Clinical cutoff T-score	ODD <i>n</i> =7	ODD-I-A <i>n</i> =4
		<i>n</i> (%)	<i>n</i> (%)
CBCL Total Problems	≥64	3 (42.9)	4 (100)
CBCL Internalizing	≥64	3 (42.9)	3 (75)
CBCL Externalizing	≥64	4 (57.2)	2 (50)
CBCL-DP			
Deficient self-regulation	>180 and <210	3 (42.9)	3 (75)
Severe dysregulation	≥210	1 (14.3)	1 (25)
CBCL Anxiety/Depression	≥69	2 (28.6)	3 (75)
CBCL Attention	≥69	2 (28.6)	1 (25)
CBCL Aggression	≥69	3 (42.9)	1 (25)
BRIEF Emotional Control	≥65	4 (57.2)	3 (75)
BRIEF BRI	≥65	3 (42.9)	2 (50)

Note. ODD-I-A = ODD with chronic irritability-anger, BRIEF BRI = BRIEF Behavioral Regulation Index. See section 2.3.2 for definitions of cutoff values.

3.3.3 Variable screening ability

Of the included CBCL and BRIEF measures, only CBCL Internalizing showed significant predictive power ($p = .03$) in discriminating ODD with chronic irritability-anger from ODD without said specifier. Area under the curve was .92 (95 % CI = .73-1.00) indicating outstanding diagnostic accuracy (Hosmer, Lemeshow, & Sturdivant, 2013, p. 177). An optimized cutoff point at $T = 64$ yielded high sensitivity (.75) and low specificity (.33), resulting in few false negatives, but many false positives. AUCs and p -values for all scales are reported in Table 5.

Table 5

ROC analysis of screening ability of CBCL and BRIEF measures for ODD with chronic irritability-anger

Measure	AUC	p-value	Cutoff point	95 % CI	Sensitivity	Specificity
CBCL Total Prob.	.75	.20	-	-	-	-
CBCL Internalizing	.92	.03*	64	.73-1.00	.75	.33
CBCL Externalizing	.42	.67	-	-	-	-
CBCL-DP	.71	.29	-	-	-	-
CBCL Anx./Dep.	.77	.17	-	-	-	-
CBCL Attention	.54	.83	-	-	-	-
CBCL Aggression	.50	1.00	-	-	-	-
BRIEF EC	.42	.67	-	-	-	-
BRIEF BRI	.33	.39	-	-	-	-

Note. AUC = area under the curve, ROC = receiver operating characteristic, CBCL-DP = CBCL Dysregulation Profile, BRIEF EC = BRIEF Emotional Control, BRIEF BRI = BRIEF Behavioral Regulation Index.

* = $p < .05$

4 Discussion

There were three main findings in this study on irritability and emotional dysregulation in children with ODD. These each reflect the three research questions and the hypotheses belonging to them. The first finding confirms the hypothesis that there are associations between the CBCL and BRIEF scales, specifically between the scales CBCL Irritability and BRIEF Emotional Control. This result relates to our understanding of the irritability construct. The second result somewhat supports the hypothesis that children with ODD with chronic irritability-anger have higher scores on measures reflecting irritability than children with ODD without this specifier, as the ODD-I-A group had significantly higher scores on CBCL Internalizing, but no other measures. This finding could further our understanding of ODD as

a heterogeneous disorder. It also shows that the ODD expansion in ICD-11 represents a meaningful diagnostic development. The third finding, namely that CBCL Internalizing showed discriminatory ability in distinguishing between ODD with and without chronic irritability-anger, supports the hypothesis that measures included in this study could contribute toward describing a boundary between the two. Taken together, these findings support the overarching hypothesis that CBCL and BRIEF measures could be useful in assessment of irritability and emotional dysregulation in children with ODD. They suggest that it is possible to utilize well-established measures in clinical evaluations, specifically considering the expansion of the ODD diagnosis in ICD-11 (WHO, 2020) with the addition of the specifier *chronic irritability-anger*. The three main findings will be discussed in light of research relevant to the findings at hand. Subsequently, considerations will be addressed regarding diagnosing irritability and emotional dysregulation within the ODD diagnosis, as in ICD-11 (WHO, 2020) versus the U.S. equivalent, namely DMDD (APA, 2013). Lastly, statements on the study's strengths and limitations will be made, followed by a discussion of practical implications and future research, before ending in a conclusion about the study's findings and their relevance.

4.1 An association related to the irritability construct

Construct clarification was not the primary issue addressed in this study. Still, the findings contribute to the ongoing discussion on how irritability should be understood by exploring how CBCL Irritability is associated with other measures assumed reflecting some aspect of the irritability construct. BRIEF Emotional Control, a scale reflecting emotional regulation as understood within the framework of executive functions as in BRIEF (Gioia et al., 2000a), is a by its association to CBCL Irritability a contender in broadening our understanding of irritability. While interpreted as a tendency, this correlational result is in line with research indicating that irritability reflects trouble with regulating one's emotions (Cavanagh et al., 2014; Stringaris et al. 2017; 2018). It substantiates the argument of irritability as an expression of emotional dysregulation (Vidal-Ribas et al., 2016) and the theoretical and empirical basis of irritability and emotional dysregulation as related constructs (e.g., Leibenluft, 2011; Stringaris et al., 2018). However, there is a degree of content overlap between the two scales, possibly explaining the significant correlation between them. On the other hand, this may also simply reflect irritability and emotional regulation as possible

inextricably linked constructs. Relevant to this discussion is the fact that BRIEF Emotional Control scale, but not the broadband index BRIEF Behavioral Regulation Index, was significantly associated with irritability. This points toward the specificity of emotional regulation, as compared to general regulation issues, in relation to the irritability construct.

The core symptom of irritability in ODD seems related to the executive functions of emotional regulation, as indicated by its association to BRIEF Emotional Control.

Considering ODD is highly comorbid with ADHD (Greene et al., 2002; Nock et al., 2007), a disorder where executive dysfunction constitutes a core component (Barkley & Murphy, 2011; Willcutt et al., 2005), a few words on the possible influence of comorbidity on the association between CBCL Irritability and BRIEF Emotional Control is warranted. Some studies on ODD and ADHD conclude that executive function deficits are accounted for by ADHD alone (Clark, Prior, & Kinsella, 2000; Ezpeleta & Granero, 2015; Oosterlan, Scheres, & Sergeant, 2005). Others argue that the two disorders might share a predisposition for executive function deficits (Coolidge, Thede, & Young, 2000). There is also evidence for ODD being related to executive functions independent of comorbid ADHD (Hobson, Scott, & Rubia, 2011; Noordermeer, Luman, & Oosterlaan, 2016). Studies utilizing CBCL, rather than measures of executive functions specifically, conclude that the emotional and behavioral profiles of ODD are independent of ADHD, but that there also seem to be some shared features between their respective profiles (Kim et al., 2010; Melegari et al., 2015). Mixed findings like this illustrate a degree of uncertainty regarding how ADHD may have influenced findings.

In sum, the association between irritability and emotional control, arguably emotional regulation, accentuates the matter of interplay or overlap between the two. The finding demonstrates the heterogeneity of the irritability construct and underlines the need for clarity regarding emotional regulation and executive functions in an extensive conceptualization of irritability. Independent of how one chooses to consider these arguments, it should be clear that finding an association between a CBCL and a BRIEF measure could have great practical value, as it invites to comparing results on both. Such cross-referencing might solidify clinical evaluations of irritability and emotional regulation in children with ODD. It provides an opportunity to extend the foundation of knowledge guiding assessment of children with ODD, which is paramount knowing they struggle with both irritability and emotional dysregulation (Cavanagh et al., 2017; Greene & Doyle, 1999; Tonacci et al., 2019). This underscores the importance and potential value of exploring the ability of well-established measures to assess

these symptoms. As both CBCL and BRIEF are routinely used in diagnostic assessment of children in psychiatric health clinics, using scales from these measures provides an accessible way of optimizing assessment, without having to administer additional measures. What is still unanswered is the issue of distinguishing between those with expected levels of irritability when dealing with ODD and those with severe irritability as specified in the ICD-11 subdiagnosis. To answer this question, we need to understand more about how these two groups differ.

4.2 Differences between ODD and ODD with chronic irritability-anger

Ideally, we would be able to determine the boundary between children with ODD with and without chronic irritability-anger by employing a standardized instrument based on an agreed-upon definition of irritability. Although many measures of irritability have been developed, none of them live up to this standard, which would be asking a lot, as the discussion of construct clarification and differentiation is ongoing. Nevertheless, given the considerable effort invested in this issue, optimism is warranted. However, the inability to distinguish the two diagnostic groups in this study based on a standardized definition and measure of irritability called for a different solution, namely turning to DSM-5 (APA, 2013) and comorbid DMDD. DMDD was used as a demarcation between the main diagnosis ODD and the specified extension emphasizing marked problems with irritability, namely ODD with chronic irritability-anger. Possible boundaries and overlaps between ODD as in ICD-11 (WHO, 2020) and DMDD as in DSM-5 (APA, 2013) will, as mentioned, be addressed separately. For now, taking this group assignment into account, results representing opportunities in distinguishing between ODD and ODD with chronic irritability-anger are discussed.

The present results indicate that children with ODD with chronic irritability-anger have a greater degree of internalizing problems than do children with ODD without this additional symptom. The difference between the two groups indicates that the expansion of ODD with the specifier chronic irritability-anger is a meaningful specification of ODD symptomology and falls in line with the well-founded conceptualization of ODD as a heterogeneous disorder. The specificity of this difference also addresses the dichotomy of internalizing and externalizing disorders. Considering the issue of comorbidity, as discussed above, it is of

relevance in discussion of differences between ODD with and without chronic irritability-anger that levels of concurrent diagnoses were comparable between the two groups in this study. This could possibly zero out potential effects of comorbidity in statistical tests on group differences.

4.2.1 Validation of the ODD specifier

ICD-11 (WHO, 2020) offer no clear clinical criteria of what constitutes chronic irritability-anger to guide evaluations of whether a child fulfills the ODD diagnosis with the specifier. While not uncommon, the lack of measurable criteria and subdiagnostic divisions poses a hurdle in clinical evaluations. Therefore, the finding that the ODD-I-A group have greater internalizing problems than the ODD group deserves recognition. It reflects that children with ODD with chronic irritability-anger indeed have greater emotional problems than children with ODD alone. While not utilizing the same boundary qualifiers, other studies have concluded similarly (e.g., Cavanagh et al., 2017). For example, Tonacci and colleagues (2019) found that children with ODD with high scores on CBCL Dysregulation Profile (T-scores ≥ 210) show increased emotional reactivity compared to children with lower scores and argue for a clinically relevant subgroup within the ODD diagnosis. Together with findings like this, the results of the present work validate the expansion of the ODD diagnosis in a Norwegian sample as a meaningful development. This conclusion is important as it gives greater context to ODD as a heterogeneous disorder. It signifies that some children with ODD struggle with severe irritability to an extent that is significantly differentiable from the expected levels of irritability in ODD. This brings us to the question of why CBCL Internalizing was the only measure in which the two groups differed considerably. In line with the hypotheses of the current study and based on the diagnostic criteria differentiating between the ODD main diagnose and subdiagnosis, one would expect the ODD-I-A group to score higher than the ODD group on all measures reflecting irritability. Surprisingly, in this sample, no such clear tendency was found. This could be due to a small sample, considering ODD is a heterogeneous disorder (Greene & Doyle, 1999; Evans et al., 2017), or be explained by methodological limitations that will be discussed separately. While not significant here, but perhaps reflecting a trend, the ODD-I-A group had higher mean scores than the ODD group on all CBCL measures, except CBCL Defiance, but not on BRIEF measures Emotional Control scale or Behavior Regulation Index. It cannot be ruled out that some of these

measures could be found useful in assessment and clinical evaluations of children with ODD in a larger sample. For example, CBCL Dysregulation Profile is considered a contender in capturing children with severe mood dysregulation (e.g., Aitken et al., 2019) and in reflecting a central characteristic in the psychopathology of ODD (Masi et al., 2015a).

Following the argument of heterogeneity, one could look to studies affirming the complexity of ODD as a multifaceted disorder (e.g., Burke et al., 2014; Evans et al., 2017; Stringaris & Goodman, 2009b) where irritability and defiance are considered main components. By this, we would expect both groups to score higher on measures reflecting irritability than children without ODD or with diagnoses where irritability is not a central feature. The multidimensionality of ODD also seems to come through in the correlation analysis of the present study, as CBCL Irritability and CBCL Defiance diverge in their associations to BRIEF Emotional Control and CBCL Aggression, respectively. Although it cannot be inferred, this claim is supported by the small correlation between CBCL Irritability and CBCL Defiance ($r = .28, p = .397$). Incidentally, the difference in internalizing problems between ODD and ODD-I-A could also be interpreted within the rationale of ODD as a multifaceted disorder, particularly considering that the irritable and defiant dimensions are developmentally distinct (e.g., Rowe et al., 2010) and differ in their associations to subsequent emotional and behavioral problems, respectively (e.g., Whelan et al., 2013). Specifically, the irritable dimension is associated with internalizing disorders, such as depression and anxiety (Stringaris & Goodman, 2009b), which makes the present finding of differences on CBCL Internalizing even more interesting considering ODD is conventionally considered within the externalizing specter.

4.2.2 ODD as an externalizing disorder?

Oppositional defiant disorder has traditionally been conceptualized as a disorder characterized primarily by externalizing problems, marked by behavioral problems as reflected by conflicts with people and their expectations (Achenbach & Rescorla, 2001, p. 93). Still, diagnostic descriptions of ODD in ICD-11 account for irritable or angry mood manifestations (APA, 2013; WHO, 2020), acknowledging concurrent emotional problems. While not explicitly stated, this acknowledgement connects to the internalizing specter, a grouping of problems within the self (Achenbach & Rescorla, 2001, p. 93). Together with studies underlining the heterogeneity of ODD (e.g., Stringaris & Goodman, 2009b), the finding that the present

sample differed significantly on CBCL Internalizing sheds light on the dichotomy of internalizing-externalizing problems, which is a dichotomy deserving of nuance.

CBCL Internalizing is an aggregate measure of emotional problems largely corresponding and associated with depressive and anxiety disorders, but not ODD (Mesman & Koot, 2001; Petty et al., 2008). In fact, disruptive disorders, including ODD, have been found largely associated with the contrasting scale, CBCL Externalizing, reflecting a cluster of behavioral problems (Mesman & Koot, 2001; Petty et al., 2008). This is not to say that these two scales are mutually exclusive nor entirely independent of one another (Achenbach & Rescorla, 2001, p. 96). Children who have high problem scores in one of the two areas generally have some degree of problems in the other area as well (Achenbach & Rescorla, 2001, p. 97). In a meta-analysis on 693 peer-reviewed articles on internalizing and externalizing problems, Achenbach and colleagues (2016) recommend acknowledging the moderate correlation between the two scales and including evaluation of both broadband groupings in clinical assessment. This is in adherence to the finding that children with ODD with and without chronic irritability-anger differ on CBCL Internalizing as it underlines the interplay between externalizing and internalizing problems even in disorders characterized by one or the other grouping.

On one hand, the current findings are in line with the conceptualization of ODD as related to externalizing problems as reflected by central tendencies and caseness for both groups. However, it is noteworthy is that the ODD-I-A group, particularly, score above the clinical cutoff on CBCL Internalizing as well, thereby challenging the convention of ODD as an externalizing disorder. The co-occurrence of externalizing and internalizing problems in children with ODD with chronic irritability-anger challenges the conceptualization of ODD as a behavioral disorder, specifically a disruptive disorder, grouped together with conduct-dissocial disorder (WHO, 2020). Taking the argument of ODD as a heterogeneous disorder one step further, the findings of the current study emphasize the importance of specifically evaluating internalizing problems in children with ODD. These problems represent difficulties which should be addressed with the same attentiveness as their externalizing counterparts. The fact that ODD with chronic irritability-anger differs from ODD without this additional challenge in its co-occurrence of externalizing and internalizing problems raises the need for reliably distinguishing between these two groups.

4.3 Assessing a subdiagnostic boundary with CBCL Internalizing

The main reason we need to be able to evaluate diagnostic boundaries, both between and within psychiatric diagnoses, is primarily to provide treatment as indicated (Cowen, Harrison, & Burns, 2012, p. 21). Although preliminary, there are studies with promising findings regarding treatment of severe, chronic irritability (Stringaris et al., 2018). For example, adaptations of exposure-based CBT and parent management training (PMT) have gained empirical support (Kircanski et al., 2018). In addition, Dialectic Behavioral Therapy for Children (DBT-C) shows promise in treating persistent irritability and temper outbursts as in DMDD (Perepletchikova et al., 2017). The commonality of parent training seems evident, a principle also proven central in a Norwegian sample of children with disruptive disorders (Larsson et al., 2009). Although systemic thinking is in some respects a basic principle in treatment of children, those who are functionally impaired by severe irritability may benefit from comprehensive and multilevel treatment. This is an important consideration, not only concerning treatment of symptomatology at present, but also in relation to longitudinal risk prevention. Therefore, it is encouraging to find that CBCL Internalizing could be a contender in denominating children with ODD with chronic irritability-anger as in ICD-11 (WHO, 2020).

There are two central arguments to be made about the discriminatory ability of CBCL Internalizing. The first relates to the convenience of utilizing a well-established and extensively used measure, as previously discussed. Accessibility should increase the probability of including this variable in an integrated evaluation. Second, specifically evaluating internalizing problems before making diagnostic decisions, and consequent treatment decisions, poses an opportunity to extend the foundations on which clinical evaluations about children with ODD are made. Evaluating CBCL Internalizing could thereby better evaluations that could be vital for these children's wellbeing. In extension of this second argument, evaluating broadband groupings of problems, such as internalizing and externalizing, is already recommended (Achenbach et al., 2016). What is new here is the specificity of what such considerations could entail, namely diagnostic differentiation. The preliminary property of the present finding lays ground for considering T-scores ≥ 64 on CBCL Internalizing as a guiding principle indicating severe irritability in children with ODD, which consequently should result in specifying the ODD diagnosis *with chronic irritability-anger*.

4.4 Different solutions to the same issue (again)

In preparation for the current investigation, children who met the criteria for DMDD, but not ODD, were excluded. As the US professional association alone produces DSM, the fact that children in a Norwegian sample fulfill the DMDD diagnosis is by itself an interesting finding. It could be taken as indication that DMDD and ODD are not the same. Thus, one could argue that this supports DMDD as a standalone disorder. On the other hand, it could be interpreted as DMDD constituting an unspecific transdiagnostic syndrome (Carlson, 2021), given its high comorbidity rates across diagnostic categories (Copeland et al., 2013). This is exactly how some researchers have argued that we could understand DMDD: that it represents the psychiatric equivalent to fever in somatics (Carlson, 2021) and that a specifier, such as for ODD in ICD-11, would be a better solution (e.g., Lochman et al., 2015).

The present study utilized of DMDD to classify children with ODD with chronic irritability-anger. While the precision of DMDD as a fitting descriptor for the demarcation between ODD with and without chronic irritability-anger cannot be inferred, it is intriguing. If DMDD is a reliable discriminator and thereby representative for the diagnostic differences between these two groups, it could help our understanding of the ODD specifier. Specifically, it would implicate that children with the ODD subdiagnosis have severe temper outbursts three or more times per week and that mood between outbursts is “persistently irritable or angry, most of the day, nearly every day, and observable by others” (APA, 2013). These descriptors are overall overlapping with those of ODD with chronic irritability-anger (WHO, 2020). This again raises the question of equivalence between the two diagnoses.

The study by Evans and colleagues (2021) applied a practical solution to evaluating the diagnostic classification of chronic irritability and oppositionality, concluding that ICD-11 was superior to ICD-10 and DSM-5 in accurately identifying severe irritability and guiding differential diagnostic considerations. Such findings underline improvement from ICD-10 to ICD-11 by the expansion of the ODD diagnosis, but in comparing ICD-11 and DSM-5, it should be noted that DMDD is a relatively new diagnostic category, and findings could be influenced by lack of familiarity with DSM-5 guidelines generally, and DMDD specifically. Furthermore, preferring development of already existing categories to new ones is not surprising, and it does not take away from the importance of accurately capturing core symptoms of diagnoses as indicative of treatment decisions. To expand on this reasoning, it is relevant to consider that research on irritability in ODD and DMDD represents two bodies of

research (Evans et al., 2017). This naturally influences conclusions on which diagnosis is preferred over the other. Moreover, the differences between the two solutions to diagnosing children and youths with severe irritability as their main presentation may not reflect natural boundaries in child psychopathology. Rather, they could be subject to cultural and historical differences, and thus, be arbitrary (Evans et al., 2017). Integrative work, such as that of Vidal-Ribas et al. (2016), should further our understanding of irritability as in ODD, severe irritability as in DMDD and the ODD subdiagnosis, and the relevance to the boundaries between these conceptualizations.

While there are still no clear answers as to how to best capture children with severe irritability, the categorical placement of ODD in ICD-11 and DMDD in DSM-5 represents an important difference between the two diagnoses, and by extension, the diagnostic systems. In ICD-11, ODD is placed under disruptive behavior and dissocial disorders, which is arguably a more nuanced grouping than the ICD-10 conduct disorders (WHO, 1993; 2020). DMDD as in DSM-5 is categorized as a mood disorder (APA, 2013) which, depending on how one regards ODD with chronic irritability-anger in relation to DMDD, accentuate nosology considerations. Together with the multidimensionality of ODD, particularly when considering irritability as a mood symptom, it seems reasonable to question the placement of ODD (Leibenluft, 2017a). This question was raised even before the discussion on the equivalence between ODD and DMDD made it relevant again. Close to 30 years have passed since Cole & Zuhl-Waxnler (1992) proposed thinking of disruptive disorders in line with mood disorders, challenging the traditional segregation of disorders with core components of emotional versus behavioral problems. They base this argument on the importance emotional regulation plays in development and maintenance of disruptive disorders (Cole & Zuhl-Waxnler, 1992). From a developmental perspective, this is intuitively meaningful, considering the role of emotional and behavioral exchange shifts from relative dependence upon adult caregivers toward self-regulation. Raising the question of ODD as a behavioral versus a mood disorder also relates to evidence for diverging antecedents of the dimensions of ODD (e.g., Rowe et al., 2010) and the prognostic outcome of these dimensions longitudinally (e.g., Whelan et al., 2013). While there are no conclusive answers as to how to best conceptualize ODD, diagnostic expansions and new diagnostic entities keep pushing this question, thereby gradually refining our understanding of the role of emotionality in disruptive disorders.

The two different solutions to diagnosing children with severe irritability mirror the inconsistency in interpretation of research on irritability, and, incidentally, nosology.

Diagnostics is a disputed topic, which is, frankly, far less worrying than would be the opposite. Continually evaluating the epistemology of diagnoses captures a core aspect of clinical research. This underlines the importance of the study at hand, as it addresses the reciprocity between symptomology and nosology, thereby joining into the longstanding epistemological discussion on how we recognize and give meaning to psychological issues and delimitation to disorders. The discussion is ongoing and continuous, as it should. How we perceive clusters of symptoms has implications, not just for our clinical understanding, but also for how society as a whole understands illness and disorders. Specific to the present matter is our understanding of children with ODD. They are not characterized only by oppositionality or defiance, but just as much by irritability, and in some, this presentation is predominant (WHO, 2020; APA, 2013). This acknowledgment is manifested diagnostically by the expansion of the ODD diagnosis in ICD-11 to include presentations marked by severe irritability. Substantiated by results in the present study, the author offers her support to the expansion, as it provides children in much need of being understood correctly with a diagnostic home.

4.5 Strengths and limitations

4.5.1 Sample

The main limitation of this investigation is the small sample size, which influences precision by which one can make inferences (Field, 2013, p. 44) as the sampling distribution does not resemble that of the population. Although small, the sample consists of Norwegian children on which, to the authors knowledge, no studies have addressed ODD with chronic irritability-anger as in ICD-11. Using DMDD as in DSM-5 as a parting between ODD with and without the chronic irritability according to ICD-11 also represents the much-needed correspondence between the two systems' solutions to capturing severe irritability and dysregulation. As the sample is drawn from a larger one, studies from the overarching project could further enlighten the preliminary findings of this pilot study.

4.5.2 Instruments and measures

Considering the lack of consensus on how to define the irritability and dysregulation constructs, all measures of said constructs have different strengths and limitations regarding validity. Most relevant are the measures not already established within their respective instruments, namely CBCL Irritability, CBCL Defiance, and CBCL Dysregulation Profile. Still, these measures all have support in existing literature (e.g., Evans et al., 2020; Tseng et al., 2017). CBCL Dysregulation Profile is the most acknowledged and frequently used (Althoff & Ametti, 2021) of the three conceptualizations. Regardless, validity of all three constructs is to some extent conditional to a field of research with indefinite definitions of the constructs they aim to measure. Concerning K-SADS-PL-5, the question of equivalence between diagnoses across diagnostic systems is most central, as it was used to establish group membership for ICD-11 diagnoses based on DSM-5. The most recent restructuring of both diagnostic systems focused on uniformity in corresponding diagnoses (Clark et al., 2017; Reed et al., 2019). Even in ICD-10 and DSM-IV, ODD was only slightly different and has been proposed as interchangeable (Sørensen, Mors, & Thomsen, 2005). Though it is unknown what diagnosis the participants ended up receiving, using K-SADS-PL-5 to establish ODD group membership for the purpose of exploring the diagnosis is both convenient and applicable. Conceivably more controversial is using the DSM-5 diagnosis DMDD to denote the ICD-11 ODD specifier *with chronic irritability-anger*. On the other hand, one could argue that it is as good as any starting point, as DMDD in many ways reflect the central contents of this specifier.

Following the discussion of validity are a few notes on reliability where there are two central considerations to be made, namely the source of information and the interpretation of this information. K-SADS-PL data is dependent on clinicians' ability to adequately assess the child's symptoms in the diagnostic interview and those assessments are based on the parents' reports. However, the same clinician, a psychology specialist undergone extensive training in K-SADS-PL, conducted all interviews contributing to consistency in interpretation. Results from CBCL and BRIEF solely rely on parent reports without the influence of the clinicians' interpretation. Evans and colleagues (2020) underline the need for multi-informant assessment. On the other hand, there seems to be generally low to modest correlations between parent and teacher report (Achenbach, McConaughy, & Howell, 1987; Achenbach et al., 2008). As no self-report measures were available, using data from the same respondents, namely parents, makes interrater reliability impossible, but enables comparing data from

different instruments as it originates from the same source. As a general statement, normative evaluations considering CBCL and BRIEF could be limited due to the lack of established norms from a Norwegian sample representative to the population (Nøvik et al., 1999; Fallmyr & Egeland, 2011). Lastly, it is noted that there is a definite strength in employing K-SADS-PL-5, CBCL and BRIEF as that they are standardized instruments developed in clinical settings. They have the great benefit of being easily accessible and cost-effective as they are routinely used in diagnostic assessment of children in psychiatric health clinics.

4.6 Practical implications and future directions

Clinicians strive toward making well-founded decisions in their everyday work by synthesizing professional knowledge and clinical expertise with abbreviated information. There are no clear-cut lines by which these processes can be categorized, but the importance of evaluating the relevance and significance of different types of information, preferably from several sources, is indisputable. While the data in the present study is restricted to parental reports, the findings have practical implications regarding information potentially diagnostically valuable in clinical decisions regarding children struggling with symptoms of ODD, including severe irritability. As diagnostic decision-making is conditional to the diagnostic manual employed in national health services, in Norway ICD-11, the results in this study also point toward implications for future development and clarification of the diagnostic category of ODD.

The finding that CBCL Irritability and BRIEF Emotional control are associated, points to the possible significance of utilizing both measures. It enables cross-referencing scores in evaluation of irritability and emotional dysregulation, thereby broadening the foundation on which clinical decisions are made. The association established here calls for continued exploration in larger samples in an effort toward establishing professional consensus on meaningful measures of irritability within instruments that are already established and much used. The association between irritability and emotional regulation also pinpoints the need for construct clarification and differentiation regarding irritability and its related constructs. Moreover, the study highlights the great potential of CBCL Internalizing in clinical evaluations. This broadband measure of emotional problems within the self represents a significant difference between children with ODD with and without chronic irritability-anger and seems to reflect the irritability dimension captured by the ICD-11 ODD specifier. This

contributes to expanding our understanding of the phenomenological qualities of the difficulties experienced by children with ODD, namely that some of these children struggle with severe irritability. The findings also point to the ability of CBCL Internalizing in differentiating ODD-I-A from ODD with high diagnostic accuracy. The identification of internalizing problems as a discriminating factor stresses the necessity of considering CBCL Internalizing in assessment of irritability in children with ODD, as the finding validates the expansion of the ICD-11 ODD diagnosis. The discriminatory ability of CBCL Internalizing demands attention from clinicians when making differential diagnostic decisions.

Specifically, T-scores ≥ 64 could indicate diagnostic fulfilment of the ODD specifier *with chronic irritability-anger*. The author recommends always applying the specifier when the irritable dimension of ODD is considered within clinical range in the child's symptomology. Only then can the specifier serve its intended purpose, namely attaining a more precise understanding of the individual child's challenges. This is important because it impacts what are considered adequate treatment options (Cowen, Harrison, & Burns, 2012, p. 21).

In a greater perspective, utilization of the diagnostic specifier could in time foreground the symptoms of irritability and dysregulation in children with ODD and thereby impart nuance to this behaviorally grouped diagnosis. However, the question of whether such nuancing, or specifying, is the appropriate way to handle the issue of severe irritability in children is still unclear. This question accentuates that the implications of this study go beyond the practical value in everyday clinical diagnostic processes. On this note, the author takes the liberty to request the sustained effort by WHO in evaluating the ODD diagnosis. While it has existed as a diagnostic category much longer than DMDD, neither diagnoses are free from further revision (Runions et al., 2016). Special regards should be made to the implementation of ODD subdiagnoses. As children with ODD can have both internalizing and externalizing symptoms in the clinical range, attention to the categorical placement in the manual should also be upheld. These requests loan support from the dimensional conceptualization of ODD where irritability represents a core dimension associated with internalizing disorders and exhibits a developmental trajectory which differs from other core dimensions of ODD (Ezpeleta et al., 2016; Leadbeater & Homel, 2015; Rowe et al., 2010; Stringaris & Goodman, 2009a). This foreshadows a question of whether severe irritability might most purposefully be placed within a standalone disorder, such as in DSM-5 with DMDD. The question is among many still unanswered, but there seems to exist a tension between the emphasis on emotional and behavioral symptoms considering what category is appropriate. This calls for further

exploration to inform diagnostic improvements, both regarding the ODD diagnosis in ICD-11 and the DMDD diagnosis in DSM-5, and integration of the two bodies of research from which these two diagnostic solutions have emerged. Lastly, future directions should clarify the possibility of a transdiagnostic syndrome of severe irritability. This would have consequences for how we understand divides and overlaps between diagnoses and substantiate the discussion on the diagnostic status of irritability.

5 Conclusion

The ambition of this work was to explore the ability of easily applicable measures in assessing irritability and emotional dysregulation in a group of children with ODD with and without chronic irritability-anger as in ICD-11. The findings are therefore encouraging as they have both practical relevance and broaden our understanding of irritability in children with ODD. First, there seems to be great potential for understanding severe irritability and emotional dysregulation as overlapping constructs. This finding extends our understanding of irritability, but also demonstrates the definitional quandary encompassing the construct. The results of the present study also illustrate that the expansion of the ODD diagnosis is meaningful in that children with ODD with chronic irritability-anger indeed have greater emotional problems than children without this specifier. This conclusion is in line with a heterogeneous understanding of ODD. At the same time, finding that internalizing problems is a prominent descriptor for the differences between ODD with and without chronic irritability-anger raises questions about the conceptualization of ODD in ICD-11 and calls for synthesizing European and U.S. research on non-episodic irritability. The present study also puts forward CBCL Internalizing as a contender in answering to the need for reliable identification of children with ODD who struggle with severe irritability. This finding justifies the proposition of specifically evaluating internalizing problems and, consequently, the ODD specifier in cases deemed within clinical range. While CBCL Internalizing was the only scale warranting a clear clinical recommendation, other measures within the well-established instruments CBCL and BRIEF could be found useful in furthering our understanding of irritability in children with ODD and identifying those with ODD with chronic irritability-anger. Considering the nature of pilot studies, caution is warranted in the interpretation due to the small sample size. The present findings need replication in larger samples for them to hold, but they also encourage such extended exploration.

The extensive consequences, including subsequent difficulties, for children struggling with severe irritability emphasize the importance of studies that contribute to upholding the continuous exchange between practice and research. Herein lies the relevance of the present study, as it aligns with studies advocating such a dialogue. The current work draws on theoretical discussions, such as construct clarification and differentiation and diagnostic conceptualization. At the same time, it answers to the practical challenges of identifying children with severe irritability, specifically children with ODD with chronic irritability-anger.

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