



Innovations in the Study of Appraisals and PTSD: A Commentary

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Abstract

The purpose of our commentary is to underscore key take-home points of the 11 articles in this special series on appraisals and trauma. Two important take-home points relate to (i) the question of whether appraisals mediate the relationship between trauma and trauma-relevant symptoms, and (ii) the methodological innovations presented here. Further, we discuss three features characterizing this special issue. First, it includes papers examining the role of negative appraisals as a correlate, predictor, and potential causal risk factor of posttraumatic stress symptoms; second, the studies use a multifaceted approach to study negative appraisals; third, they range from theory-driven experimental research to applied clinical studies. We conclude by reflecting on challenges raised by these contributions and suggest directions for future research.

Keywords Cognitive appraisals · Posttraumatic stress disorder (PTSD) · Trauma

Introduction

The cognitive approach to psychopathology comprises two distinct methodological traditions (McNally 2001), one based on self-report measures assessing beliefs and appraisals, and the other based on laboratory measures (e.g., reaction times) assessing biases in attention, interpretation, and memory. For many years, both the first (e.g., McNally et al. 1987, 1990) and second (e.g., Ehlers et al. 1998; Foa et al. 1999) traditions have flourished in traumatology. Despite their differences, both presuppose that cognitive abnormalities likely figure in the etiology and maintenance of PTSD in people exposed to trauma.

The articles in this special issue of *Cognitive Therapy and Research* feature one systematic review and ten empirical studies that deepen our understanding of appraisals and trauma while showcasing novel methods of inquiry, by

using both self-report and laboratory measures. In our commentary, we touch upon the highlights, raising questions prompted by these stimulating articles, and present an outlook for future research.

A Comprehensive Review

Brown et al. (2019) systematically reviewed 65 studies addressing the role of negative cognitions concerning oneself, others, and the world following exposure to trauma. These “negative cognitions” signify the strength of belief in such propositions as “I am totally incompetent,” “Others cannot be trusted,” and “Nowhere is safe.” When trauma survivors cease to believe such things, symptoms of PTSD often diminish in frequency and severity. Some studies indicate that this cognitive change precedes and predicts symptomatic improvement, and some analyses imply that cognitive change mediates recovery from PTSD.

Yet Brown et al. note several puzzles. For example, a diversity of successful treatments has resulted in reductions in problematic beliefs and symptoms, including those that do not appear relevant to incorrect beliefs, such as mindfulness meditation. Some studies have reported reductions in PTSD symptoms in the absence of belief change, making one wonder whether these patients are at risk for relapse. From a qualitative phenomenological perspective, it would be interesting to ascertain the basis for therapeutic belief

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change from the perspective of patients. What is it about prolonged exposure therapy that persuades traumatized crime victims that not everyone in the world is untrustworthy?

A core assumption of cognitive therapy is that certain beliefs and appraisals are not only maladaptive, but also factually incorrect. When stated in extreme forms (e.g., “Nowhere is safe” or “No one can ever be trusted”), this is surely true. Yet as Botsford et al.’s (2019) study on stuck points in therapy with physically and sexually abused youngsters indicates, difficulty trusting others and a strong need for control do not seem so irrational in young people whose lives have been overshadowed by trauma.

Do Appraisals Mediate the Relation Between Trauma and Symptoms?

Building on studies discussed by Brown et al. (2019), the authors of several studies applied sophisticated statistical methods of assessing whether appraisal-related, cognitive processes mediate the association between trauma and PTSD symptoms. For example, Tran and Beck (2019) found that peritraumatic fear/life threat and negative self-referent emotions (guilt, shame) and self-blame predicted PTSD symptoms among women who had experienced domestic violence. Only 21.4% qualified for a diagnosis of PTSD; perhaps these women were those who experienced life threat in addition to “merely” fear.

Another study showed that a cognitive bias modification app reduced scores on Berntsen and Rubin’s (2006) Centrality of Event Scale (CES) among Belgian students who had experienced a “distressing event,” but it did not reduce PTSD symptoms relative to a placebo control training (Vermeulen et al. 2019). The authors found that posttraumatic cognitions and rumination mediated the relation between event centrality and PTSD symptoms. The results of this study are puzzling, given how strongly CES scores predict PTSD symptoms in people exposed to trauma (for a review, see Gehrt et al. 2018). As the authors emphasized, theirs was a student, not clinical, sample, and this fact may explain why reducing CES scores failed to diminish symptoms.

Brake et al. (2019) assessed mental contamination (Rachman 1994) in an online study of community participants who had been exposed to trauma. Their aim was to test whether posttraumatic mental contamination was related to heightened suicide risk via PTSD symptom clusters and perceived burdensomeness to others and thwarted belongingness—two psychological variables deemed to increase risk for suicide. Given that Fairbrother and Rachman (2004) found that 60% of 50 female sexual assault victims experienced mental pollution when thinking about their trauma, one might suspect that the rate of mental contamination would be rather low in a trauma sample, such as Brake et al.’s, where sexual

assault victims were rare relative to survivors of other traumatic events. Another puzzle concerns the relation between perceived burdensomeness and thwarted belongingness. Although one can easily imagine that each variable *alone* would heighten risk for suicide, it is unclear how both could do so simultaneously. That is, how can people with no social connections perceive themselves to be a burden on others? Perceived burdensomeness seemingly presupposes important social connections.

Despite persuasive calls for predictive research in psychology via machine learning algorithms (Yarkoni and Westfall 2017), many of the contributors to this series are keen to identify the (cognitive) mechanisms that mediate the association between exposure to trauma and PTSD symptoms. Although the contributors acknowledged the well-known limitations of testing for mediation on cross-sectional data, statistical specialists have been issuing additional caveats about mediational analyses. Their purpose is not to debunk it, but rather to help researchers calibrate their confidence in the inferences they draw.

For example, mediation analysis can test the statistical significance and possibly the effect size of a candidate mediator *if it is a mediator* (Fiedler et al. 2011). Unfortunately, a significant finding does not confirm that the candidate is a mediator. Moreover, mediation analysis does not even allow us to estimate the probability that our candidate is a mediator as long as we are in the dark about the likelihood distribution of other candidate mediators and other causal models. Unmeasured causal variables omitted from the analysis can be driving the effects, unbeknownst to the investigator.

Inferential challenges are not confined to observational studies; experimental ones have them, too. For example, an experimental manipulation should affect one candidate mediator (e.g., cognitive appraisal of the world as unsafe) without affecting other, potentially linked mediators. Although this can be done in gene knockout studies, it is much harder to do in psychology when the mediator is cognitive and not directly observable (Bullock et al. 2010).

Methodological Innovations

The series includes studies featuring methodological innovations and advances. Woud et al. (2019) developed a scenario-based method for assessing trauma-relevant appraisals that complements conventional self-report measures such as the Posttraumatic Cognitions Inventory (PTCI; Foa et al. 1999).

Rattel et al. (2019) compared three smartphone-based methods of assessing intrusive thoughts and images for 4 days following exposure to analogue trauma film clips. Although such technological advances of recording data in real time show promise over pen and paper diary methods, it remains unclear how researchers should assess symptoms

in everyday life. One group used the app to record intrusions immediately after they occurred; a second group recorded intrusions that occurred in the period immediately preceding one of five prompts (e.g., 12 p.m.–3 p.m.); and a third group recorded their daily intrusion data at 9 p.m. each evening. The authors discussed the strengths and weaknesses of each method, but surprisingly the groups did not differ in terms of number of intrusions recorded, distress, or data-recording compliance. One lingering question concerns variation in intrusion duration. All three methods involve event recording, but intrusions need not occur as discrete quanta of equal duration. Persistent intrusive brooding about a trauma can last far longer than a brief sensory flashback of the event.

Clinicians have noted that PTSD patients tend to have negative appraisals of other people (e.g., Foa et al. 1999). Sachschal et al. (2019) devised an innovative method of studying this phenomenon in the laboratory. Trauma survivors and participants without trauma exposure viewed target photographs of strangers, rating each in terms of perceived kindness. When the experimenters provided participants with negative information about a target, both groups rated the target more negatively, but the PTSD group did so more dramatically than the comparison group did. When participants then received incongruent information, the PTSD group's subsequent ratings tended to be weighted more by negative than positive information relative to the ratings of the comparison group.

These findings echo the conclusions of Baumeister et al. (2001) that “bad is stronger than good” (p. 323), but especially for PTSD patients. Yet inconsistent with the authors' hypothesis, the initial appraisals of kindness at baseline were no lower in the PTSD group than in the comparison group. Sachschal et al.'s patients experienced a diversity of traumatic events (e.g., traffic accidents, sudden traumatic death of a significant other), and only 8 of 22 of them were victims of an interpersonal trauma. One might conjecture that their novel paradigm would have produced results more strongly in support of their hypotheses had the PTSD group included only victims of interpersonal trauma and had the photographs of strangers been solely men—the sex of most perpetrators.

Addressing rumination and thought suppression, Rosebrock et al. (2019) found that depressed veterans with and without comorbid PTSD were indistinguishable in terms of rumination, whereas those with PTSD were more prone to use thought suppression. It would be interesting to examine these transdiagnostic processes via the network analytic perspective on comorbidity (Cramer et al. 2010). Network analysis provides computational methods for revealing functional relations among symptoms constitutive of PTSD (e.g., McNally et al. 2015, 2017) and depression (e.g., Cramer et al. 2012; Fried et al. 2016) as well as unpacking the

functional relations among the elements of rumination itself (Bernstein et al. 2017).

Studying combat veterans with and without PTSD in an emotion regulation experiment, Butler et al. (2019) used functional magnetic resonance imaging (fMRI) methods to clarify differences between these groups when they were instructed to feel, reappraise, or suppress their emotional responses to images of combat. Relative to healthy veterans, patients with PTSD exhibited lower medial prefrontal neural activity while preparing to view the image and reappraise their emotional response, but higher activity while viewing it. This seems to suggest that healthy (resilient?) combat veterans recruit brain regions when anticipating a stressful stimulus, whereas those with PTSD only do so in the presence of the stimulus. The authors mention that the pattern of the PTSD group in the reappraisal condition mimics that of healthy comparison participants in previous research when these individuals attempt to suppress their emotional reaction to aversive images.

Experimental psychopathologists keen to discover the mechanisms mediating the connection between trauma and PTSD encounter practical and ethical limitations. They need to administer a laboratory stressor capable of producing temporary symptoms as an analogue to PTSD in healthy volunteers. Yet ethical guidelines forbid researchers from using an unacceptably strong stressor. Indeed, no person, after providing written informed consent, should regret having participated in an experiment. The upshot is that many analogue stressors are not especially stressful. Among these have been filmed footage of the aftermath of motor vehicle accidents (e.g., Brewin and Saunders 2001; Steil 1996; Tsai and McNally 2014), segments from frightening Hollywood suspense films (e.g., Liu and McNally 2017), brief, but stressful, televised public service announcements (e.g., Holmes et al. 2009; Tadmor et al. 2016, and for a review on the trauma film paradigm, see; James et al. 2016), or imagery-based procedures aiming at re-activating a distressing, autobiographical life event (e.g., Woud, Zlomuzica et al. 2018).

Improving on these early efforts, Schweizer et al. (2019) devised an ingenious virtual reality stressor far more sophisticated than those of most analogue trauma studies. In their paradigm, participants become immersed in a multisensory virtual underground parking lot where they witness and experience—see, hear, and smell—a parked automobile suddenly explode into flames. They hear an injured man trapped within the burning car crying out for help as they smell smoke. The virtual environment enabled Schweizer et al. to track peritraumatic heart rate and skin conductance activity as well as self-report measures (e.g., anxiety, guilt, arousal, shame, stress, helplessness). Strikingly, self-blame predicted analogue symptoms 1 week later.

A growing body of studies confirms the efficacy of virtual reality therapy for anxiety and related disorders, including PTSD (Powers and Rothbaum 2019). Schweizer et al.'s multisensory virtual reality may play an increasingly important role in the treatment of PTSD especially for patients with limited imagery abilities or who otherwise fail to respond to prolonged imaginal exposure therapy.

Appraisals as a Correlate, Predictor, and Causal Risk Factor

Cognitive models hold that negative appraisals are causal risk factors for PTSD in people exposed to trauma (e.g., Ehlers and Clark 2000). Such appraisals of the trauma, its consequences, or acute symptoms presumably foster dysfunctional cognitive processing that triggers intrusive recollections and other features of PTSD. Kraemer et al. (1997) provide excellent guidelines for determining whether a variable is, indeed, a causal risk factor for a disorder. First, it must correlate with the disorder. Second, it must precede the disorder's emergence. Third, changing the variable must change the symptoms it presumably causes.

Many studies show that negative appraisals both correlate with and precede the emergence of PTSD (e.g., Bryant and Guthrie 2005, 2007; Ehling et al. 2008). Further, several analogue studies indicate that manipulating negative appraisals affects PTSD symptoms accordingly (e.g., Cheung and Bryant 2017; Woud et al. 2012, 2013).

Turning to the articles included in this special issue, we find that most examined the correlational and predictive nature of negative appraisals. For example, Woud et al. (2019) found that negative appraisals were positively associated with levels of posttraumatic stress (Posttraumatic Stress Disorder Checklist for DSM-5; Krüger-Gottschalk et al. 2017), and Tran and Beck (2019) found that self-blame, guilt, and shame were predictive of PTSD symptoms. The findings of Schweizer et al. (2019) provide additional support for the key role of negative appraisals, showing that negative appraisals were predictive of PTSD symptoms when controlling for psychophysiological responses. Only Vermeulen et al. (2019) tested a potentially causal relation. Specifically, they examined whether modifying event centrality via a cognitive bias modification (CBM) procedure (cf. Woud and Becker 2014) reduced PTSD symptoms. Although CBM training did diminish appraisals of event centrality, this had no training-congruent effect on PTSD symptoms. Further experiments that modify appraisals are vital for testing the causal claims of the cognitive models.

Applying a Multifaceted Approach

Although the studies in this special issue have a specific focus on the role of negative appraisals in trauma, they are also highly diverse. Such methodological diversity underscores the importance of a multifaceted approach. For example, Butler et al. (2019) refined our understanding of the neural dynamics accompanying reappraisal, demonstrating differential neural patterns when investigating the combination of different strategies (i.e., emotion regulation vs. expressive suppression) during different task phases (i.e., task preparation versus image preparation). Further, Schweizer et al. (2019) showed that participants exhibited higher levels of psychophysiological reactivity during the virtual reality stressor compared to the control condition, with large effect sizes for e.g., arousal and heart rate. Importantly, however, psychophysiological stress response did not significantly predict participants' analogue trauma symptoms. Although this may reflect the subtle, boundary conditions surrounding such responses, it may also reflect the analogue nature of their approach. This likely entails less intense responses, with perhaps limited predictive power. Regarding studies investigating the association between negative appraisals and other trauma-relevant, cognitive processes, Tran and Beck (2019) found that peritraumatic perceptions of both fear/life threat and negative appraisals/emotions were independently associated with PTSD symptoms. However, the finding regarding the role of fear/life threat was surprising. This further highlights the role of non-specific, trauma-relevant factors potentially relevant for the emotional and cognitive conceptualization of PTSD. Finally, Brake et al. (2019) investigated the association between posttraumatic mental contamination and cognitions related to suicide risk, a highly novel research avenue in the context of appraisals and trauma. Results showed that posttraumatic mental contamination was associated with suicide risk in all PTSD symptom clusters, with negative appraisals playing an important role in explaining these associations. Hence, these findings add a novel dimension to negative appraisals, namely, that negative appraisals may prefigure elevated risk of posttraumatic suicide.

The multifaceted character of the studies concerns the diversity of samples as well as methods. PTSD symptoms seldom occur in isolation, and comorbidities are common (e.g., depression and substance abuse disorders). Consequently, patient groups with and without comorbidities can show different cognitive patterns, which, in turn, may affect short and long-term treatment outcomes. The study by Rosebrock et al. (2019) provides a good example of why we need to consider comorbidities. They found different associative patterns between thought suppression

and rumination for patients with comorbid depression and PTSD compared to those with depression alone. As the authors suggest, these findings may be indicative of potential multiple functions of rumination, depending on the type of disorder. An additional complication is that symptoms of PTSD and depression partly overlap, rendering it difficult to study their unique, cognitive pathways. Hence, systematic follow-up work is needed that includes samples with and without comorbidities to clarify the complexities of PTSD with and without comorbidities.

From the Lab to the Clinical Context

The papers presented in this special issue range from experimental, lab-based work to studies conducted with clinical samples. Both research lines are needed to advance our understanding of negative appraisals in trauma, and translating insights from lab-based, basic science to the clinical context holds great potential for both theory and treatment development. The studies by Rattel et al. (2019) and Schweizer et al. (2019) are prototypical examples of lab-based research in the context of trauma, both using analogue stressors in healthy samples. The approach taken by Woud et al. (2019) approach should be considered as analogue, but since this online study required participants to have experienced a negative, distressing life event, it is likely that the sample also included at-risk individuals, e.g., when considering the individual scores on the PCL-5 (Krüger-Gottschalk et al. 2017). In any case, with all three studies, it would be important to test whether results would replicate in clinical samples, and whether the investigated processes are, for example, predictive of therapy outcome, one of the ultimate indices in applied, clinical research. The study by Sachschal et al. (2019) provides a nice example of bridging lab and clinical work, in that a lab-based, experimental paradigm was applied in a clinical context, namely, to trauma survivors and participants without trauma exposure. Indeed, differential effects between the two groups were found. In this latter study, the translational process was thus successful and therefore provides valuable information about how appraisals may contribute to the maintenance of PTSD.

Although the study by Vermeulen et al. (2019) did not find the expected transfer effects of their CBM training, this research area nevertheless offers exciting avenues. That is, should the causality hypothesis concerning negative appraisals can be robustly verified, it may be worthwhile to carefully move this idea to the clinical context by testing whether a computerized appraisal training (e.g., as a therapeutic add-on, see Woud, Blackwell et al. 2018) yields beneficial effects (e.g., for a first example in a clinical context, see Nickerson et al. 2017). Generally, it must be noted that extant interventions specifically focusing on negative appraisals are

effective (e.g., Cognitive Therapy, Ehlers and Clark 2000; Cognitive Processing Therapy; Resick and Schnicke 1992). However, there is nevertheless room for improvement. Further, a systematic, computerized appraisals training may target different processes compared to the techniques therapists use during therapy. To illustrate, from the perspective of (a simplified version of) the dual presentation theory by Brewin et al. (1996), it may be that negative appraisals are associated with two types of processing styles: a relatively slow, deliberate, and intentional processing style, and a rather automatic processing style, whereby negative appraisals are activated quickly and automatically, outside an individual's control and awareness. Such a conceptualization may indicate different approaches when aiming to modify negative appraisals, e.g., a reflective approach for tackling the slower and more deliberate appraisals, and a systematic, repetitive computerized approach for reducing the relatively fast and automatic appraisals. However, there are two caveats to note here. First, in relation to computerized training paradigms, we clearly need additional evidence for their effectiveness, on both an experimental and a clinical level (e.g., Fox et al. 2014). Second, dual-system approaches are not without criticism. For example, the evidence for a strict separation of automatic versus reflective systems of processes is modest, at best. According to Gladwin and Figner (2014), although the distinction between reflective and automatic modes of processing may be useful at an informal, global level of description, this does not necessarily imply that the underlying processes can be neatly divided into reflective ones and automatic.

Regarding the transition from the lab to the clinic, we note that the special issue also includes several studies involving clinical samples. Not all clinical studies were preceded by analogue studies. Indeed, the sequence of analogue research preceding clinical research is not invariably essential; some questions do not require prior analogue work. For example, it would be hard to find a meaningful analogue for the study by Botsford et al. (2019), testing the role of stuck-points during the therapeutic process. However, when striving to advance the theoretical and applied field in the context of negative appraisals in trauma, a systematic research agenda combining both lab-based, experimental and applied, clinical research in a stepwise and reciprocal manner is likely to provide the surest route to further progress.

Challenges and Recommendations

In the previous sections, we presented the key take-home points of the articles included in this special issue and discussed the three features of the special issue in more detail. In this section, we focus on the challenges for the field,

together with recommendations for research directions the presented studies may stimulate.

The first issue relates to the role of appraisals as a potential mediator. While mediation analyses can provide valuable insights, there are important theoretical, statistical, and methodological considerations to keep in mind when interpreting and attempting to generalize their results, as discussed earlier.

The research field of negative appraisals is dominated by studies examining appraisals as a correlate and predictor of posttraumatic stress symptoms, and this is reflected in the current special issue. However, many cognitive models also assign a causal role to negative appraisals. The study by Vermeulen et al. (2019) is the only study included in this special issue testing a causal hypothesis. We consider such causal research to have particularly important potential, especially for clinical applications. Only if certain variables play a causal role in the etiology, maintenance, or improvement of PTSD symptoms should they serve as therapeutic targets. One important challenge is thus to devise tests of causal hypotheses that are both valid and ethically acceptable.

We also earlier highlighted the multifaceted approach taken by studies in the special issue, and hope that this can stimulate further research incorporating behavioural, psychophysiological, and somatic indicators of trauma-relevant symptoms in samples with and without comorbidities. This seems especially important considering the broad range of symptom clusters in PTSD, and the breadth of symptoms even within each individual cluster. To illustrate, the B-criterion of the Diagnostic and Statistical Manual of mental disorders (DSM-5; American Psychiatric Association 2013) includes cognitive (e.g., intrusive memories), emotional-behavioral (e.g., distress and dissociation), and bodily symptoms (e.g., increased arousal). Hence, studying only one, isolated aspect may only provide a snapshot of an in fact very heterogeneous yet interlinked set of symptoms. A related issue here concerns the passage of time. Most studies in the special issue investigated negative appraisals at one, single time point or over a relatively short period of time (e.g., 1 week). However, to obtain an in-depth and reliable understanding of negative appraisals and their potential fluctuations, studies with repeated assessments and longer follow-up periods are needed.

Translating fundamental, lab-based work to clinical contexts is of great importance, especially given the ever-increasing global burden presented by mental health problems. However, this translational process also poses many challenges. First, as stated earlier, lab-based stressors must and can be only be pale proxies of genuine traumatic stressors, for obvious ethical reasons. Second, the translational process takes time and resources, and an optimal temporal match between lab and clinical research is almost impossible. Finally, results do not always replicate

in clinical contexts, leaving us with the unsatisfactory situation that we do not know whether this is due to methodological issues or whether the concept of interest is simply not clinically manifested, and, in turn, clinically relevant. Hence, close cooperative work between people across the whole spectrum from basic science to clinical application is desirable to facilitate successful translational research.

One complicating feature of negative appraisals that may render such close links between clinical and basic science particularly valuable is the need to navigate between generalizations relating to appraisals in PTSD, and idiosyncrasies in appraisals that may result from both the nature of the trauma, and the traumatized individual. That is, although it may be possible to make generalized statements about the role of appraisals in PTSD (e.g. within a specific cognitive model), certain kinds of trauma may pre-dispose to characteristic kinds of appraisals, and the specific appraisals of a certain individual are most probably influenced by their pre-existing beliefs and life history. Further, these two factors likely interact. As such, there will be always a need for new methodologies and therapeutic interventions able to detect and account for these idiosyncrasies within broader models of the maintaining role of negative appraisals.

Cognitive aspects of PTSD extend beyond negative appraisals to biases in attention and memory (for reviews, see Vasterling and Hall 2018; Woud et al. 2017). For example, Ehlers and Clark (2000) suggest that the negative appraisals that co-occur with the experience of trauma-related memories may result in hyperaccessibility of the latter. Hence, from a theoretical perspective, it may be important to also study the interaction of trauma-relevant, cognitive processes. This approach, i.e., studying the interaction among cognitive processes, has its origins in the social anxiety literature ('combined cognitive hypothesis', e.g., Hirsch et al. 2006). None of the studies reported in the special issue investigated this cognitive interplay; however, we consider this as an important point for future research because negative appraisals do not operate in 'cognitive isolation'.

Conclusions

Negative appraisal is a multifaceted, cognitive phenomenon in trauma and clearly promote and maintain the distress experienced by individuals suffering from posttraumatic stress. The articles included in this special issue provide an update and a fresh look at new developments in this area. In this commentary, we have highlighted and discussed the methodological, theoretical, and clinical issues raised by the included papers, and we hope to provide inspiration for exciting future research avenues.

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Compliance with Ethical Standards

Conflict of Interest Richard J. McNally and Marcella L. Woud declare that they have no conflict of interest.

Informed Consent This article does not contain any studies with human participants performed by any of the authors.

Animal Rights No animal studies were carried out by the authors for this article.

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