Neuroethics (2021) 14 (Suppl 3):S295–S309
https://doi.org/10.1007/s12152-019-09398-4

ORIGINAL PAPER

Australian Psychotherapy for Trauma Incorporating Neuroscience: Evidence- and Ethics-Informed Practice

Rachael Holt · **Loyola McLean**

Received: 1 June 2018 / Accepted: 16 January 2019 / Published online: 31 January 2019

Abstract Currently there are several psychotherapy modalities utilising theory and research from neuroscience in treatment frameworks for mental health and recovery from trauma. In Australia this includes: (i) the Conversational Model of Psychodynamic Psychotherapy, a contemporary psychodynamic approach used for treating Borderline Personality Disorder and other trauma-related disorders; (ii) Electroencephalogram Neurofeedback, a brain training therapy which has been used as an adjunct to counselling/psychotherapy in traumatic stress and developmental trauma; and (iii) Somatic Experiencing, an integrative mind-body approach based on body responses to threat and fear, especially thwarted attempts to enact fight or flight in the face of threat. These modalities have a promising but still-limited evidence base. This paper explores the role of different types of evidence to frame a descriptive review of the current evidence base available for clinicians practicing in these three modalities. While large clinical trials can provide evidence of comparative effectiveness, case studies, observational, qualitative and practice-based enquiry can assist in discovering other aspects of therapy important for individual clients and practitioners. Existing frameworks of evidence- and ethics-informed health and clinical decision-making suggest an ethical approach can incorporate new, developing and evidence-building therapies. Recommendations include careful consideration of informed consent for therapy including disclosure of efficacy and safety, and specific to psychotherapies incorporating neuroscience, a need for practitioners to reflectively assess their own knowledge, competence, heuristic approaches and biases.

Keywords Neuroethics · Evidence-based practice · Practice-based evidence · Conversational Model Therapy · Neurofeedback · Somatic Experiencing

R. Holt (✉) · L. McLean
Brain and Mind Centre, Faculty of Medicine and Health, The University of Sydney, Camperdown, NSW, Australia
e-mail: r.holt@sydney.edu.au

L. McLean
e-mail: loyola.mclean@sydney.edu.au

L. McLean
Westmead Psychotherapy Program for Complex Traumatic Disorders, Discipline of Psychiatry, Faculty of Medicine and Health, The University of Sydney and Western Sydney Local Health District, Parramatta, NSW, Australia

Introduction

Currently in Australia, several psychotherapeutic modalities incorporate knowledge from neuroscience research and theory into therapeutic frameworks for mental health and trauma recovery. Three modalities have been chosen for discussion in this paper as examples of trauma-informed therapy in current clinical practice with a limited evidence base, selected as representative of 'mind', 'brain' and 'body' approaches to psychotherapy respectively. The discussion encompasses: 1)

available and suitable evidence for trauma-informed psychotherapy; 2) available evidence for clinicians choosing to work in these therapy frameworks; 3) how less than 'gold standard' evidence can be incorporated into an ethical framework for trauma therapy practice; and 4) potential next steps and recommendations for clinicians and member organisations involved in these modalities. The three modalities under discussion are the Conversational Model of Psychodynamic Psychotherapy (CM), a contemporary psychodynamic approach for self- and trauma-related disorders [1]; Electroencephalogram (EEG) Neurofeedback (NFB) which employs operant conditioning brain training and has been used as an adjunct to psychotherapy in traumatic stress and developmental trauma [2]; and Somatic Experiencing (SE), an integrative mind-body psychotherapy approach focusing on bodily responses to threat and fear [3, 4].

In Australia, around 11% of adults experience high or very high levels of psychological distress [5] with 6.4% experiencing post-traumatic stress [6]. Complex trauma (CT) - which is interpersonal, chronic, commences at an early age or includes multiple types of abuse or adverse relational experience - is now recognised as underlying many social and mental health issues [7]. Traumatic stress is associated over time with extensive psychological and physical health problems including retriggering of traumatic memories and stress responses, sensitisation and reactivity to cues of unsafety, somatic syndromes, hypertension and coronary heart disease; these likely stem from a major neuropsychophysiological disturbance [8].

An understanding of the neuroscience underlying traumatic symptoms has been growing over time. For example, the field of social cognitive and affective neuroscience links brain regions and systems with trauma-induced changes in emotional awareness, social emotional processing and emotion regulation and proposes individuals with posttraumatic stress related to chronic trauma experience impairments in multiple cognitive and affective domains [9]. At the same time, developmental psychology researchers have explored the human attachment system and how early bonding experiences with an attuned caregiver can build the social brain and establish patterns of coping with stress [10, 11]. Dysregulated attachment, stemming from the disorganizing neurobiological consequences of relational trauma, neglect and loss can help explain psychoneurobiological deficits in stress management presenting in disorders such as posttraumatic stress disorder (PTSD) and CT [12]. Recent neurobiological models such as the Polyvagal Theory (PT) describe a hierarchical organisation of the autonomic nervous system (ANS) in response to trauma: from the most primitive withdrawal and immobilisation in the face of threat, to the fight and flight system, to the most evolved social engagement system for social communication and soothing mediated through the parasympathetic myelinated ventral vagal system and relevant cranial nerves such as those involved in facial expression [13, 14]. An understanding of the interconnected and multiple pathways of communication between body, brain and mind is now being applied to the clinical formulation of symptoms [15]. The implication of different social neurobiological responses to trauma is that trauma therapies potentially work best when targeting the system/s involved in traumatic mind-body states and may involve social, somatic, cognitive, top-down and bottom-up approaches [16]. Integrating neuroscientific understandings of trauma from affective, developmental and socio-neurobiological perspectives has the potential to better inform treatment interventions and provide an enriched environment for holistic improvement and recovery from trauma.

This paper explores the role of diverse types of evidence in psychotherapy to frame a description of the Australian practice of and evidence for the CM, NFB and SE that is available to clinicians choosing to work in these treatment frameworks. Strength of intervention evidence is usually visualised as a hierarchy or pyramid, with meta-analytic and systematic reviews of randomised control trials (RCT) at the top, progressing through other types of experimental or observational studies and case-based research to mechanism-based reasoning [17]. From the perspective of this model, the three modalities are building an evidence base but have yet to reach the apex. Ethical, evidence-based practice is usually assumed to be the translation of (good) evidence into clinical practice [18]. While guidelines which preference certain models and frameworks exist, movements of current practice in Australia are exploring and building evidence of alternative modalities. Therefore, this paper discusses how less than 'gold standard' evidence can be incorporated into an ethical framework for trauma therapy practice. Drawing on frameworks of evidence- and ethics-informed health and clinical decision-making, this paper discusses ethical practices for psychotherapists and clinicians with examples from the three modalities being appraised.

Evidence and Psychotherapy

Australian guidelines for the treatment of trauma recommend adults with PTSD should not be offered psychopharmacology as a first line treatment, but instead psychological therapies which engage with the traumatic memory using exposure or cognitive restructuring, such as trauma-focused cognitive behaviour therapy (TF-CBT) or eye movement desensitisation and reprocessing (EMDR) [19]. However, the evidence for these treatments centred around simpler cases of PTSD. In contrast, high drop-out rates from treatment have been reported for TF-CBT, for example among clients with complex childhood sexual traumas such as more frequent childhood abuse, higher perceived threat, greater injury, and clients reporting higher levels of depression and anxiety symptoms [20]. A survey of expert clinicians working with complex PTSD recommended narrative, emotion focused and emotion processing therapies as first line therapies and concluded memory processing treatments were inappropriate initially or before stabilisation in complex PTSD presentations [21]. The Cochrane Review of psychological therapies for chronic PTSD warned that the evidence it reviewed was low quality and findings should interpreted cautiously [22]. It was also unable to determine from the evidence whether psychological therapy is harmful. Therefore, optimal treatment choice for an individual with a chronic or complex trauma history and presentation can be a complicated proposition.

To inform clinical practice, it is important to consider what types of evidence are useful in psychotherapy. RCTs and the meta-analysis of well-designed RCTs have long been established as the gold standard research design for understanding treatment efficacy and ruling out causes of spurious therapeutic effectiveness, such as placebo effects, spontaneous remission and alternative explanations for improvement [23]. However, in psychotherapy research, RCTs have some limitations especially related to capturing important aspects individual differences and collaborative practice including:

- Difficulty capturing the complex inter-relationships between therapist and client, client factors such as social support and coping style, and contextual factors for therapy such as shared or non-shared cultural identity [24, 25];
- Difficulty adequately operationalising complex interventions with multiple components [26] and demonstrating discriminant validity of one particular therapy compared to another, as well as fidelity to a manualised therapy [24, 25, 27];
- Difficulty relying on patient diagnosis as an independent variable [24, 25, 27];
- Assumption that psychotherapy clients are given treatment by a therapist, rather than operating in a dyadic, collaborative and reciprocal therapeutic relationship [25, 27];
- Randomisation means that not all patients will be in the treatment they would most prefer or benefit from even if they are placed in a treatment arm based upon some evidence of benefit [28, 29];

There is often insufficient evidence of effectiveness in health research and some effective interventions may not be ethical or feasible [30]. In many situations the nature of working in health is that information from a variety of sources needs to be weighed up and interpreted to make good decisions. The American Psychological Association has released guidelines on an evidence-based approach to clinical decision-making which incorporates empirically supported therapies using the hierarchy of evidence model, clinical expertise and judgement, and client preferences [23]. Other types of evidence relevant to psychotherapy include (but are not limited to):

- $N = 1$ trials (or single-patient trials), which focuses in a systematic way on finding the optimal therapy for an individual. Replicated designs analysed by meta-analysis allow for results to be generalised to larger populations [31].
- Case studies, which allow for systematic exemplars of phenomena, investigate context-dependent knowledge and meaning, and allow for developing hypotheses and theory-building, as well as investigation of contradictory evidence and falsification or modification of theory through careful case selection [32, 33].
- Hermeneutic single-case efficacy design (HSCED), a specific type of naturalistic case study design, which collects qualitative and quantitative evidence longitudinally for one subject, and weighs up the affirmative and sceptical cases for proposed explanations of change [34, 35].
- Qualitative research such as interviews, focus groups and textual analysis, which can illuminate self-reflection, meaning-making, interpretation and

metacognitive processes as well as investigate "why" and "how" questions [36, 37].

Practice-oriented research (POR) can assist in discovering how discrete or combinations of interventions best suit and are most sustainable for individual patients in actual care, leading to research which is more relevant, actionable, and tailored [38, 39]. POR is conducted in naturalistic settings based on standardised measurement systems and encourages clinicians to be active participants in research that advances scientific knowledge, examine clinically relevant questions and use their data to inform their practice [40]. Australian allied health professionals have noted a high level of interest and perceived value in conducting research, but also requirements for support from their workplace, and constraints in time, staffing and funding [41, 42]. Using different evidence-gathering designs, without needing the resources for large-scale RCTs and population-based studies, allows for practitioner-based research to become part of the evidence base.

Three Current Modalities

The CM, NFB and SE are currently in clinical practice in Australia and overseas, and much of the evidence base is being built through this practice. These modalities have been chosen for discussion in this paper as examples of trauma-informed therapy in current clinical practice with a limited evidence base. The modalities are described below with a brief overview of their current evidence base. Together with organisations providing training and qualification standards, and practitioners' clinical experiences discussed with their fellow practitioners; this is the evidence base clinicians are drawing on to choose modalities they use and treatment options they discuss with their clients.

Communing Minds: The Conversational Model

The CM is a contemporary psychodynamic approach originally incorporating theory and research from neuroscience such as Hughlings Jackson's hierarchy of consciousness and Tulving's multiple memory systems, developmental psychology such as attachment theory, Trevarthen's work on the proto-conversation and linguistics and William James' duplex concept of self [1, 43, 44]. A healthy self is viewed as an organising system, emerging developmentally in relational experiences with care-givers and others, but can be broken down by trauma with dissociative experiences that lead to symptomatic disorders [1, 43]. The process of recovery involves a therapeutic conversation that supports the development or restoration of the regulating self, by means of empathic attunement and reflective conversation that fosters a positive sense of self. Self-regulation is seen as a complex hierarchical integration of personal systems, hence the interface with neurological, affective and cognitive aspects of mind.

The CM was developed in the UK in the mid-1960s, and training in the model has been active at the Westmead Psychotherapy Program (WPP) in Sydney since 1983 [45]. The therapy emphasises the relational moment-to-moment context for fostering both the positive development of self-regulation and reflective capacity in the client and the processing of trauma to foster recovery. It was originally developed by Robert Hobson and Russell Meares to treat patients who were disrupted by chronic complex (early relational) trauma including childhood sexual abuse, neglect and emotional forms of traumatic relatedness [43, 44]. Although more commonly known in Australia as a therapy for borderline personality disorder (BPD) and delivered as an evidence-based intensive long-term therapy [1], it was conceived as an approach to traumatic disruptions. The CM is a key therapy for BPD and other trauma-related disorders in Australian centres such as the WPP at Cumberland Hospital, the Blacktown Acute Mental Health Team and in Newcastle. It is taught through university-based programs and continuing education training for suitably qualified clinicians from a range of disciplines through the WPP and the Australian and New Zealand Association of Psychotherapy (ANZAP). The CM is also known as Psychodynamic Interpersonal Therapy (PIT) in the United Kingdom (UK) and applied in acute and short-term settings to work in mental health and medical psychology by Else Guthrie and colleagues [46, 47].

The case study of 'Sarah' and her daughter 'Jane' illustrates the short-term model of the CM used to target parental trauma within a broader family therapy framework [48]. Sarah presented for assistance in parenting Jane, who demonstrated challenging behaviours, anger and eating non-food substances (pica). Sarah had past experiences of sexual, physical and emotional abuse. Therapy was a combination of Parent-Child Interaction Therapy to give Sarah tools for building her attachment relationship with her child and the CM focusing on

connecting internal and relational states through attuned language techniques such as matching the client's language, responding to positive affect by amplifying it and co-creating representations of affective experience to aid the client's reflective capacity. The therapy was based on addressing disrupted attachment from unresolved trauma and involving right brain social and emotional processing to increase learned affect regulation and integrate disconnections between experience and awareness. In Sarah's case, the focus was on managing fear, rage, shame, guilt and hostility to build a more positive relationship with Jane leading to a reduction of challenging behaviours and increase in school performance [48].

The evidence base developed in Australia supporting the CM in BPD began with a pre-post study of 30 patients in the early 1990s, finding reductions in borderline symptoms and behaviours such as self-harm, medical visits and hospital admissions [49]. This was later followed by a study of 30 patients who received treatment as usual (TAU) including pharmacotherapy, supportive and cognitive therapy while on a waiting list for the CM, as a (non-random) comparison to the initial study [50]. The comparison found individuals receiving the CM decreased in diagnostic symptoms significantly more than the TAU group. Five-year follow up of the original the CM treatment group found the gains from this psychotherapy continued [51]. A replication study was conducted at the same centre with 29 patients undergoing 12 months of the CM psychotherapy compared to a waitlist, non-randomised TAU cohort [52]. The treatment group demonstrated both a significant reduction in BPD symptoms, and improvement in global functioning. A current non-control study of 44 patients referred with treatment-resistant depression (TRD), comorbid personality disorders and histories of early childhood trauma indicates significant improvements in symptoms, functionality and reduced suicidality [53]. A randomised control study based in Newcastle at the Centre for Psychotherapy is comparing Dialectical Behaviour Therapy (DBT) with the Conversational Model with early indications of comparative efficacy [46, 54]. Cochrane Review has recognised DBT as having a limited but most robust evidence base in this area [55] and thus is a suitable comparison modality. Current Australian POR includes tracking implementation and quality improvement at the Blacktown Acute Mental Health Service [56–58]. The case study of 'Janine', referred to the Blacktown service with Bipolar Disorder, serves as a reflective report on the role of the clinician and team in trauma-informed care and implementation of the CM approach as Janine becomes more cohesive and future-focussed [59].

In the UK, a RCT of brief PIT compared to TAU was conducted at a university hospital emergency department for 119 patients with deliberate self-poisoning and found positive significant differences at six-month follow up in suicidal ideation and self-harm attempts [60]. Further evaluations of this model, have been undertaken successfully in patients with depression and medically unexplained symptoms [46]. This has included evidence of equal efficacy to the gold standard treatment Cognitive Behaviour Therapy (CBT) in clinical trial and routine practice [61, 62].

Overall there is an evidence base developing, both with PIT in the UK and the CM in Australia, demonstrating clinical improvements in a number of client populations. There are potential limitations to the evidence base that can be gathered in a clinical environment and practice-based research situations where the recruitment pool is limited to referrals and there are only a certain number of practitioners available to conduct a therapy that in many instances unfolds over 12 or more months. Evidence from a randomised-controlled comparison to another well-established therapeutic modality, DBT, will be an important addition in the evaluation of evidence for this modality. At the same time, case study research has contributed to demonstration of and reflection on important aspects of how the model is applied in practice, as well as reflection on individual client gains and how they are linked to practice, theory, and underlying neurobiological concepts.

Training Brains: Neurofeedback

NFB is operant conditioning brain training which targets EEG-measured amplitudes and frequencies recorded in real time, and provides feedback to the client when they learn to increase or decrease these to improve neural function and regulation [63]. The feedback can be presented to clients as visual representations such as patterns of colour, actions in a game such as moving a spaceship, or audio cues such as the sound of ocean waves or tones. The discovery of humans being able to control electrical amplitudes in the brain began in the 1950s and 60s [64]. NFB has been studied as a potential therapy for attention deficit hyperactivity disorder, autism, learning disorders and other psychiatric morbidity [65, 66]. A body of literature has been established

showing EEG and neuroimaging abnormalities indicating changes in cortical arousal and brain structure and function in stress and trauma [67–70]. Early research in the psychophysiology of PTSD in Adelaide found event-related potential (ERP) differences in PTSD patients compared to a matched control group, indicating neurobiological differences in attention, concentration and memory [67]. Ongoing international research into EEG differences in PTSD continued to discover alterations in central nervous system functioning [71, 72]. A member organisation of practitioners, the Applied Neuroscience Society of Australasia (ANSA) was formed in 2006 [73] and more recently the Neurofeedback and Psychology Interest Group formed as a member group in the Australian Psychological Society (APS). Training in NFB is organised through private organisations with established practitioners serving as supervisors and mentors, and formal qualification in neurofeedback is certified through the Australian branch of the Biofeedback Certification International Alliance (BCIA). In Australia, NFB has been used alongside psychotherapy in assisting refugees impacted by torture, trauma, grief, separation and resettlement issues at the NSW Service for the Treatment and Rehabilitation of Torture and Trauma Survivors (STARTTS) as well as in private practice.

An example of NFB with a trauma survivor assisted at STARTTS is 'BN' [74]. 'BN' was a male refugee presenting with chronic PTSD despite a year of treatment, dysthymia, insomnia and panic disorder after a history of early childhood abuse in the context of political persecution. Alongside trauma-informed therapy, NFB was commenced using protocols designed to reduce hyperarousal through targeted training in areas of resting rhythm in sensory-motor region and alpha activity in the parietal and temporal regions. As arousal decreased, BN's ability to engage in therapy increased, he also became more self-reflective and able to engage self-regulation activities such as breathing techniques. BN's panic attacks ceased, his sleep normalised, mood improved, and he reduced psychotropic medications [74].

Other Australian case studies of refugee trauma and torture survivors such as 'Pablo Diego', "Ismat' and 'AP' continue to demonstrate NFB embedded in trauma-focused psychotherapy reducing PTSD symptoms and improving the ability to engage in life, as well as documenting NFB treatment protocols and quantitative EEG changes [74–76].

The evidence base for NFB as a trauma therapy has mostly developed in the United States (US). The foundational randomised control study of EEG NFB in trauma was conducted in Colorado, with 29 Vietnam veterans with PTSD allocated to alpha-theta monitored neurofeedback training or TAU (medication and psychotherapy) [77]. The study found significant change in the NFB group on multiple indications of posttraumatic stress as well as a reduction in medication use and much lower rate of relapse in PTSD symptoms at 30-month follow up. More recent research studies overseas include a pre-post study of NFB in children with complex trauma removed from their homes by Child Protective Services and displaying a range of behavioural and self-regulatory difficulties, which improved significantly [78]. A pilot study aiming to be an ecologically valid trial with minimal exclusion criteria recruited participants from the Boston area presenting to psychotherapy as early trauma survivors [79]. They attended 40 sessions of NFB training while continuing psychotherapy and medication and demonstrated a significant decrease in traumatic symptoms post therapy. A recent randomised, waitlist control study of 12 weeks of NFB with 52 treatment resistant individuals who had experienced multiple trauma exposures of interpersonal abuse found the treatment group improved significantly more than the waitlist group, and 73% of the NFB group no longer met criteria for PTSD [80]. Other studies have demonstrated changes in brain network connectivity in abuse survivors after 30 min of NFB training, including changes in regions involved in fear processing [81, 82].

Qualitative research in this field (one study) focused on using a grounded theory approach, interviewing ten NFB clinicians about the factors they could identify that influenced treatment outcomes in clients impacted by trauma [83]. Themes identified for practitioner factors included openness to new ideas and risk-taking, inner drive for more than just competence, the importance of drawing on clinical experience, understanding both neuroscience and trauma, and the importance of the therapeutic process and environment for NFB. Themes identified for the therapeutic process included importance of the environment and therapeutic alliance, and NFB changing people rather than brain waves. Client factors such as culture, family system and motivation also featured, as did external factors such as the degree of acceptance by medical professionals and current state of research in NFB [83].

The experimental evidence base for NFB, measuring both changes on EEG and symptomatic outcomes is growing. However, with the number of different training

paradigms possible, and the need to understand how particular outcomes are related to NFB coupled with other types of psychotherapy, this is an area that requires further replication and studies examining the contribution of therapy to particular symptom and neurobiological changes. Practice-based research here could continue to explore optimal training protocols for individuals. The qualitative research study in NFB indicates that client factors, such as family, culture and motivation also need to be considered in understanding the efficacy of a brain-training modality in individuals. Further research with an active control condition, preferably a well-devised sham NFB condition, as well as longitudinal follow up and further investigation of how improvements in symptoms relate to EEG changes is yet to occur [80]. This is vitally important given current discussion of NFB in ADHD, where studies have found no greater effect for NFB over a sham condition but have in turn been criticised for using inadequate or self-defeating NFB paradigms in the comparison [84–86].

Healing Mind-Bodies: Somatic Experiencing

SE, developed by Peter Levine, is an integrative mind-body approach based on how the body responds to threat and fear, especially thwarted attempts to enact fight or flight in the face of threat [3, 4]. This started from a clinical encounter in the late 1960s and Levine's study of the role of overwhelming stress on the body and link to disease, and the therapy was described in his 1997 book *Waking the Tiger* [4]. Levine drew from MacLean's triune model of instinctual, emotional and rational aspects of the brain, as well as Damasio's neural circuitry of emotions and LeDoux's emotional brain processing memory and feelings [87]. He proposed that while the neocortex was unable to override the instinctual fight/flight/freeze responses in a traumatic situation, it could override the instinctual response to release the trauma through bodily expressions of release such as trembling [3, 4]. Many of the ideas behind this model came from Damasio's work on the link between the self and awareness of bodily states and Critchley's pathways between bodily organs and the cortex, and focuses on the networks between the ANS, the emotional motor system, reticular arousal systems and the limbic system named the Core Response Network (CRN) [88]. Therapy works with the ANS, which was prepared for active response (fight/flight) in the face of danger but unable to act, to unlock these thwarted movements and bodily memories of stress and experience biological completion [88, 89]. In practice, somatic experiencing encourages clients to develop a sense of management of internal somatic states by using imagery and increasing attention to an acceptance of inner sensations [3, 4, 87]. It also incorporates understanding of the flight/fight and immobility responses mediated by the vagal system [88, 90].

An example of SE in practice can be seen in the case study of Simon who was traumatised by a motor vehicle accident (MVA) [88]. Simon presented as depressed and anxious, experiencing irritability and bursts of anger as well as a panic attack while driving. He also had somatic symptoms such as cold hands and feet, pounding heart and a sensation of cognitive fuzziness. Therapy initially focused on soothing the CRN: comprising of the autonomic nervous system, emotional, motor, arousal and limbic systems; and conveying a sense of safety. These systems remained in an activated state after the MVA, as if the danger was ongoing. Therapy was initiated through social engagement such as eye contact and voice, accessing the ventral vagal system. Continuing therapy focused on inner bodily sensations, titrating the level of arousal to release stress without overloading him with traumatic sensations, and when ready reliving the physical sensations of the traumatic experience by allowing him to imaginally complete the action of turning the steering wheel and evading the accident (the flight/fight defensive response blocked in the situation of the accident). This led to feedback in the nervous system that the danger was over. Simon was able to regain normal sleep patterns, improve concentration, drive without anxiety and experienced an increased sense of vitality and openness [88]. A series of case studies have also been carried out and reported at Gartree Therapeutic Community in England, a Category B maximum security men's prison [91]. A case study in the US describes therapy for 'Jill', a female soldier who received unwanted sexual advances and complained, leading to harassment by her unit, and who was later raped [92]. SE assisted Jill to recover her sense of safety, to be in a (sexual) relationship and feel part of the world again.

In Australia, the organisation Somatic Experiencing Australia & New Zealand (SE Australia) formed to bring training in SE. Training occurs over 3 years and provides accreditation with Somatic Experiencing Trauma Institute in the US. In Australia and overseas SE is very much associated with private practitioners,

however body-based interventions including breathing, grounding, somatic tracking (from Levine) and other types of touch and movement therapies are used with somatising children and their families at the Children's Hospital at Westmead [93]. An Australian case study, recently published, describes SE with Rescue Role Play for a toddler who experienced post-surgical trauma and disrupted attachment with the primary attachment figure (PAF) [90]. 'LB' was diagnosed with childhood PTSD, had self-inflicted bite marks and disorganised attachment with his mother at initial presentation. He was physically restrained after surgery to prevent interference with a drip. SE therapy (five sessions) involved 'running to' the PAF for comfort. LB later had a minor head wound needing stitches and was able to sustain examination and treatment without disruption of attachment security [90].

Internationally, SE therapy outcomes have been reported in brief and longer forms in natural disaster situations. A group of adult and child survivors of the 2004 tsunami in Thailand were offered 1–2 sessions of an early-intervention Trauma First Aid model of SE 1 month after the event, focusing on self-regulation and tracking bodily symptoms [94]. 67% participants reported improvement in their symptoms after the sessions, and 1 year later 20 of the 22 participants who could be located reported partial or complete improvement in symptoms. A second field study with tsunami survivors in India, measured 150 adults before and after one session of SE therapy for traumatic symptoms reported significant self-report and questionnaire improvements lasting to eight-month follow up [95]. Field observations indicated a positive link between practice and improvement, but this was not measured. A matched comparison group field study with a stabilisation-focused brief form of SE used with 91 social service workers after Hurricanes Katrina and Rita found significant differences in PTSD symptoms, psychological distress and resiliency for the treatment sample compared to the 51 in the non-treatment group [96].

RCTs of SE have been conducted in a clinical environment, as the main therapy at a psychological trauma treatment centre, or as an adjunct therapy for comorbid PTSD symptoms for patients with physical pain. A waitlist controlled randomised study at an Israeli psychotrauma centre for chronic PTSD found symptoms significantly decreased after 15 sessions of SE [97]. Effect size for the treatment was large (Cohen's $d > 0.8$) and 44% no longer met criteria for PTSD. A trial at a large Danish spine centre of patients with chronic lower back pain and co-morbid clinical or subclinical PTSD randomised 91 participants to TAU (supervised exercises) or additional 6–12 sessions of SE therapy [98]. SE therapy demonstrated medium effects in reducing PTSD symptoms and kinesiophobia, but not pain or disability.

These studies provide developing evidence of SE in relieving recent and chronic psychological traumatic symptoms. Specific limitations of the evidence base include natural cohorts with brief therapies, basic measures and limited follow up. However, there is some evidence in the more controlled clinical environment that SE is a promising therapy for trauma. Further evaluations would benefit from reporting on adherence to a therapy protocol as well as comparison to established trauma psychotherapies.

Ethical Practice and Novel Psychotherapy

The CM, NFB and SE are grounded on extensive theory deriving from behavioural and neuroscientific investigation and are progressively building their evidence base over decades of practice and investigation. Nonetheless their application in the clinic could still be considered relatively novel compared to therapeutic approaches established through large clinical trials and scrutinised through meta-analytic review, limited though these are in trauma psychotherapy.

Trauma psychotherapy in Australia is usually undertaken by a mix of practitioners such as psychiatrists, psychologists, social workers, counsellors and psychotherapists [99]. Practitioners would usually belong to a professional organisation such as the Royal Australian and New Zealand College of Psychiatrists (RANZCP), Australian Association of Social Workers (AASW), APS or the Psychotherapy and Counselling Federation of Australia (PACFA). Each of these organisations have clinical guidelines translating well-established principles of ethical health practice such as autonomy, justice, beneficence, and non-maleficence [100]. Such guidelines usually include imperatives for informed consent, care around power imbalances between therapist and client, duty to practice within knowledge and competence, duty to keep skills and knowledge updated through continuing education. For example, a framework for ethical informed consent includes an initial assessment of the client's capacity, their level of

understanding about the therapy they are undertaking and their motivation to consent [101]. Practitioners must make clear their education, experience and training in a specific area, and the reasonable expectation or outcome for therapy [102]. The therapist needs to take care in their approach to unproven but popular treatments, mindful of their own biases, as clients should be informed about efficacy, efficiency and safety as well as treatment alternatives [103]. Informed consent empowers clients to participate more actively in their recovery and protects them from unequal power relationships and dependency [103, 104]. Inadequacies in informed consent in psychotherapy have been described as failure to treat disclosure as an ongoing exchange of information as therapy progresses, discuss the efficacy and effectiveness of specific techniques and neglect of negative effects, all of which strongly depends on practitioner knowledge [105]. Utilising the best research-based treatment and an evidence-based approach to treatment is considered of great importance to ethical decision-making in health [18, 23].

An alternative way of conceptualising this is to re-examine the roles of evidence and ethics in decision making in psychotherapy. There are various models that integrate evidence and ethics in decision making. In (public) health improvement, the Decision Making Triangle (DMT) model described a triangle of decisions, evidence and theory interacting with defined ethical principles relevant to the service or intervention [30]. Good decision-making involves weighing up available evidence and plausible theory to judiciously apply the ethical principles. This model accepts research evidence is necessary for good judgement and actions, but the conventional evidence hierarchy should not be translated unquestioningly into policy or practice without considering when and to what extent the evidence pyramid is most appropriate, and whether it needs to be supplemented with other frameworks to use it most ethically [106]. A similar but more integrated framework from public health promotion argued that rather than considering ethical principles as prior to evidence or theory as in the DMT model, there is need to evaluate evidence in an iterative relationship with ethics [107]. This framework includes ethical and evidential reasoning; ethical and evidential values; and identifies specific trade-offs required in integrating these components. An example from SE practice that fits this model is the justification of early, brief trauma first aid therapies developed from SE for natural disaster survivors who may relocate quickly, that can be enacted in difficult field situations, with self-regulation skills that can be quickly learned and continued by the client on their own [94–96]. Researcher/clinician Laurie Leitch also argued there is the need for deeper consideration of cultural issues in non-Westernised country disaster responses [94]. Western mental health interventions often use 'top down' approaches such as CBT, drawing on talk, insight, and emotions - however these approaches may not adequately translate to a cultural group where community is more important than the individual; alternatively 'bottom up' approaches with somatic stabilisation could be less culture-specific due to the focus on common human biological responses [94].

A different framework for evidence- and ethics-informed practice is the 'bricoleur' or 'jack-of-all-trades' approach to professional clinical practice, differentiating from a one-size-fits-all application of research and theory to practice, but instead solving each problem with whatever methods or tools are at hand in the moment [108]. These tools include knowledge of the particular details of the client, social interactions with the client, and 'pre-scientific' knowledge of human characteristics. In psychotherapy, the decision making process can often be made 'on the fly', face to face in the privacy of the counselling room with the client, without time for extended decision-making and relying on professional and personal knowledge developed through years of professional training and subsequent experience with patients and colleagues [109, 110]. For example, describing working with young people in remote Victoria, the CM practitioner Anne Bannerman reflects on paying attention to her counter-transference: the urge to parent; but in the context of client experiences of violence, abandonment, neglect, abuse and social, emotional and economic deprivation, her realisation that they are seeking therapy not parenting [111]. Using the CM, she relies on the tools of close observation of the micro-processes of language to aid empathic attunement with the client. In this way she is negotiating the ethical boundaries of role in therapy through applying knowledge, experience and judgment, and responding to need in a more profound way. Clinical decision-making involves understanding the (theoretical and evidential aspects of) therapy and an appreciation of human characteristics to produce an ethical and individualised practice, including judicious choices regarding interventions and their adaptations.

These frameworks offer ways for an ethical approach to psychotherapy to include the integration of new, developing and evidence-building therapies combined with experienced clinical judgement and response to specific needs. It also aligns with the value of POR in developing theory and evidence for practice. Implications for informed consent include the disclosure of theoretical or clinical stance, training, experience and knowledge, and expectations of outcomes or a therapy including known aspects of efficacy and safety.

There are other potential ethical concerns in the evidence- and ethics-informed practice of psychotherapy, including the concern that psychotherapy can harm. Potential harms of psychotherapy include therapist factors such as insensitivity and criticism, increasing stigma, client deterioration or lack of progress explained as refusal or lack of motivation, and adverse effects on partners and families when the client changes [112, 113]. There have been estimates of 3–10% of patients worsening after psychotherapy, however there is difficulty determining how many of those would worsen regardless of psychotherapy and side effects are hard to measure and link to psychotherapy [112]. Hobson and Meares in fact identified specific harmful therapist factors and their impact on clients which should be avoided, and incorporated solutions into the developing CM [114]. It is important to note these concerns could be equally applied to any ongoing clinical engagement between a health professional and client, not only psychotherapy. Difficulties of detecting harms in therapies include: different views of the same outcome by different impacted parties; difficulty in detecting and measuring harm; as with efficacy research, outcomes can be confounded with natural course, placebo, and other co-occurring changes or therapies [113].

The Australian human ethics process for research mandates the identification of potential adverse events ahead of approval and the reporting on any adverse effects during the research [115]. Therefore, Australian research conducted through universities and health institutions have an existing framework for monitoring and reporting harms of psychotherapy research. General recommendations to address potential harms of psychotherapy have been described in literature, including: systematic monitoring of untoward events in individual practice instead of expecting clients to complain to monitoring committees; encouragement to report adverse events in case studies and qualitative research which can spark discussion between professionals; and use of RCTs to examine negative effects including specific therapeutic ingredients, mechanisms and moderating factors [113]. For example, a qualitative study on negative effects with CBT identified causal factors such as incompetence of therapist or bad judgement or conduct; inadequately applied methods or application of known harmful treatments; early termination; insufficient therapeutic alliance; external factors and client factors that suggested the individual was at higher risk [116]. The study also found that clinicians were unaware of current research findings into negative effects and methods or criteria for identifying and preventing them. There are however a number of assessment tools for negative psychotherapy effects, although not widely used [117].

There are neuroscience-specific ethical concerns in the way that psychotherapy incorporates neuroscience knowledge and evidence into practice. Clients can be attracted to the neuroscience aspect: the "seductive allure" of neuroscience has demonstrated that people without expertise in neuroscience are more likely to judge explanations including neuroscience as more satisfying, and including neuroscience can enhance the credibility of poorly reasoned arguments [118–120]. Practitioners need to be aware this "seductive allure" can also impact them, leading to neurocentric or neuroessentialist views reducing clients to their neurobiology rather than holistic, subjective individuals with integrated minds and bodies operating in rich biopsychosociocultural fields [104, 121, 122]. Therapists therefore still need to reflectively consider their own and their clients' limitations in decision-making in a situation of treating trauma-related disorders, where motivation to recover is high and the desire to help is large. Case studies and qualitative research are valuable tools here, providing frameworks for a deeper reflection on client and therapist factors such as values, motivations, self-knowledge and self-efficacy. An example of this is the qualitative study noting the theme of NFB changing people rather than brain waves [83].

Future Approaches for Evidence- and Ethics-Informed Therapy

Current guidelines for trauma disorders recommend particular therapies or therapeutic approaches with a level of research evidence behind them. The CM, NFB

and SE are all undertaking research to determine efficacy, rule out potential alternative factors, and benchmark against current supported therapies including: the RCT in progress comparing the CM with DBT [54]; the first RCT for NFB compared to TAU specifically looking at its impact in trauma disorders [80]; and the waitlist comparison RCT with SE [97]. These studies are still limited by relatively small numbers of participants and will need replication and further benchmarking against more recognised therapies or sham controls to demonstrate their equivalent or superior efficacy. Cost, cultural and consumer considerations in providing therapy are also important.

There are particular ways practitioner and therapeutic-specific organisations such as ANZAP, ANSA and SE Australia can support ethical approaches to new psychotherapies and mental health interventions. They can promote and explain the current evidence base and its limitations to practitioners, discuss issues of informed consent, encourage ongoing research that builds on areas insufficiently explored, develop clinical guidelines or decision-making tools specific to modalities and promote current national or international guidelines. While Australia has a formal process for human ethics approval of clinical trials and research projects in clinical settings such as hospitals and research settings such as universities, there could potentially be a role of organisations and member associations to: develop an ethics and governance process for POR; facilitate access for clinician-researchers in smaller practices to research bodies and ethics processes already in place; develop a register of treatment outcomes and adverse effects. Organisations can also promote more qualitative and case study research which addresses negative and adverse effects alongside moments of treatment successes as teaching moments. They can also promote the incorporation of quantitative measures of therapy outcomes, including harms, similar to the HSCED case study evidence gathering designs.

Organisations can also support the integration of bioethics in qualification standards and continuing education requirements. Specific to psychotherapies integrating neuroscience knowledge, ethical training that includes a framework for practitioners to reflectively assess their own knowledge, competence, heuristic approaches and biases (such as neurocentrism) is especially valuable to promote active recovery and collaborative approaches in trauma-focused psychotherapy.

Conclusion

There are several contemporary therapies for trauma in practice in Australia deriving from research and theory in the fields of neuroscience and related sciences. This paper has examined a contemporary psychodynamic approach, a brain training biofeedback approach, and a somatic/interoceptive approach, which incorporate knowledge from affective, developmental and socio-neurobiological research and theory. In the traditional evidence hierarchy RCTs are usually considered the gold standard for determining treatment efficacy, with meta-analytic reviews of RCTs the 'apex' of the hierarchy of evidence pyramid. However, these modalities currently cannot claim that level of evidence, and yet are in clinical practice in a number of services such as the WPP, STARTTS and private practice. However, there are arguments supporting both the need for and acceptance of other types of evidence. Firstly, with psychotherapy, research designs face difficulties: capturing the complex inter-relationships between therapist, client and contextual factors; operationalising and distinguishing between complex interventions. Established therapies are not applicable to all individuals. Too often research design relies on an assumption that psychotherapy clients are given treatment by a therapist, rather than operating in a collaborative and reciprocally attuned therapeutic relationship. Using different evidence-gathering designs including single patient and case studies and qualitative investigation allows for practitioner-based research to become part of the evidence base and supports the development of nuanced, individual therapies or combinations of therapies from current research and knowledge. Secondly, evidence needs to be weighed alongside theory and relevant ethical principles appropriate for the therapeutic framework. This often derives from experience and training-based knowledge. There is rarely effectiveness evidence on everything that could be known when working with an individual client, and some effective actions might not be ethical in that individual therapeutic context. It can be a better choice to consider evidence-informed action [30]. The importance of monitoring for and openly addressing any potential harms in therapy is also essential. In considering future practice and research these ethical considerations require further attention.

Author Contributions All authors have agreed on the final version and made substantial contributions to the conception, drafting and revision of the document.

Compliance with Ethical Standards

Conflict of Interest Associate Professor Loyola McLean is the holder of a Northern Sydney Local Health District/Ramsay Teaching and Research Grant: *The implementation and evaluation of a trauma specific short-term Conversational Model Intervention for clients of the Northern Sydney Sexual Assault Service: team skill-building, culture change and fostering recovery.*

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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