

A systematic review of patient-therapist synchrony as an indicator of emotion regulation in psychotherapy: an integrated approach

Patient-therapist synchrony and emotion regulation

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ABSTRACT

Interpersonal synchrony is increasingly being studied in the context of psychotherapy. The Interpersonal Synchrony (In-Sync) model proposes that patient-therapist synchrony enhances working alliance by promoting emotion regulation (ER). While the link between synchrony and working alliance has been extensively described, its relation to ER in the clinical setting remains underexplored.

The present systematic review, therefore, aimed to address this gap by providing a qualitative synthesis of the methods employed and the results reported by studies investigating the relationship between patient-therapist synchrony and ER. A comprehensive search yielded seven studies (out of an initial 2,094), published between 2007 and 2024, encompassing 828 participants (563 patients and 265 therapists). Despite finding highly heterogeneous conceptual frameworks and methodologies employed to assess both synchrony (e.g., motion energy analysis [MEA], electrocardiogram, skin conductance) and ER (e.g., self-report questionnaires and behavioral coding systems), the studies' results revealed a predominantly positive association between synchrony and ER, with in-phase synchrony linked to improved emotional stability and positive emotional experiences. Nonetheless, two studies presented contrasting results, either suggesting a more complex dynamic of co-regulation or finding no direct relationship between nonverbal synchrony and emotional self-regulation. Additionally, a notable research gap was revealed regarding older adults, as no studies included participants over 61 years. Overall, this systematic review highlights the lack of standardized methods and conceptual ambiguity surrounding ER, ultimately limiting cross-study comparability, as well as emphasizing the multiple roles of synchrony in psychotherapy and the need for further research to establish methodological coherence and theoretical consensus in this field.

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Introduction

Interpersonal synchrony is a widespread phenomenon found in many different situations of human interaction (Ramseyer & Tschacher, 2014). It is a well-established construct studied extensively throughout the scientific literature. Nevertheless, researchers have not found an unequivocal common ground to define it. Originally, Bernieri and Rosenthal (1991) defined interactional synchrony as the smooth meshing in time of the simultaneous rhythmic activity of two interactors. More recently, Schmidt *et al.* (2012) defined interpersonal synchrony as the periodic temporal coordination between bodily movements of peo-

ple in social interactions, while according to Ramseyer and Tschacher (2014), it constitutes an objective quantification of the dynamic movement characteristics displayed by patient and therapist. Koole & Tschacher (2016) have later defined interpersonal synchronization as the automatic mirroring of behaviors or the unconscious alignment of physiology during interactions. Lastly, Yap *et al.* (2022) quantified nonverbal synchrony as the body movement coordination between patient and therapist.

Researchers have explored synchrony through both verbal and nonverbal channels of communication, such as word use, facial expressions, kinesics, proxemics, and vocal qualities (Reich *et al.*, 2014). Studies have shown that individuals naturally tend to synchronize their physiological, biological, and verbal behavioral responses, as well as their nonverbal movement behavioral responses in social interactions (Wiltshire *et al.*, 2020). This physiological co-regulation can also apply to the psychotherapeutic context, as patients and therapists do not just communicate through words, but also their bodily behavior (Koole & Tschacher, 2016). In psychotherapy, the coordination of different interpersonal modalities and behaviors has proved important for understanding the dynamics of psychotherapeutic interaction and efficacy (Wiltshire *et al.*, 2020).

By investigating interpersonal synchrony between patient and therapist during psychotherapy sessions, Ramseyer *et al.* (2011) suggested that nonverbal synchrony plays a crucial role in therapy outcomes and influences the patient's perception of the therapy process. This synchrony can manifest through the spontaneous alignment of vocal pitch, bodily movements, and even physiological processes, as Koole and Tschacher (2016) noted. Nonverbal behaviors, such as synchronized body movements and matched voice tones, are essential in establishing rapport between the client and therapist, guiding therapy in a way that is both tolerable and therapeutic toward mutual goals (Foley & Gentile, 2010; Rusu & Chiriță, 2017). In conversation, for example, the listener's body moves in synchrony with the speaker's rhythm of speech (Hove & Risen, 2009). Most studies on interpersonal synchrony have focused on observing various parameters, including body movements, brain activity, voice tone, and physiological responses, with many examining variables such as heart rate and skin conductance to better understand these interactions.

When assessing momentary physiological synchrony, it is important to consider its specific patterns (Butler & Randall, 2013) as they indicate the partners' capacity for coordinating. For this reason, Chen *et al.* (2021) proposed a framework to distinguish between dynamic shifts in dyadic synchrony, identifying moments when the biobehavioral systems of interaction are positively aligned (in-phase) and others when they are negatively aligned (anti-phase). In psychotherapy research, the synchronization of patients' and therapists' nonverbal behavior is understood as an indicator of empathy, connection, and alliance, and some evidence suggests that these relationships may be bidirectional (Asher *et al.*, 2020; Koole & Tschacher, 2016).

The study of interpersonal synchrony in psychotherapy settings is a growing field of research. It is supportive of the Interpersonal Synchrony (In-Sync) model of psychotherapy, a new integrated framework that combines insights from various literatures, including social-cognitive neuroscience, cognitive linguistics, psychophysiology, developmental science, relationship science, and emotion science (Koole & Tschacher, 2016). According to the model, synchronous (*i.e.*, shared) emotions and experiences from clients and therapists lead to a shared experience and better client's emotion-regulatory skills, while also facilitating therapeutic alliance (Bar-Kalifa *et al.*, 2023). Moreover, there is suggestive evidence that synchrony plays a role in establishing a common language and affective co-regulation between patient and therapist (Koole & Tschacher, 2016). The model also provides a framework for training psychotherapists to use feedback on movement and language synchrony to improve the therapeutic relationship (Hollandt *et al.*, 2023).

Koole and Tschacher (2016) outlined three interlinked levels of synchronous processes (Figure 1): perceptual-motor processes, which occur in any perceptual-motor system and can operate automatically (*i.e.*, movement, facial expressions, and gestures); complex cognitive processes (*i.e.*, memory and language), which are not connected with motor systems, but are also facilitated by inter-brain coupling and aim at forming long-lasting goals and intentions; lastly emotion regulation, which describes the therapeutic alliance to be grounded in the coupling of patient and therapist's brains (Goschke and Kuhl,

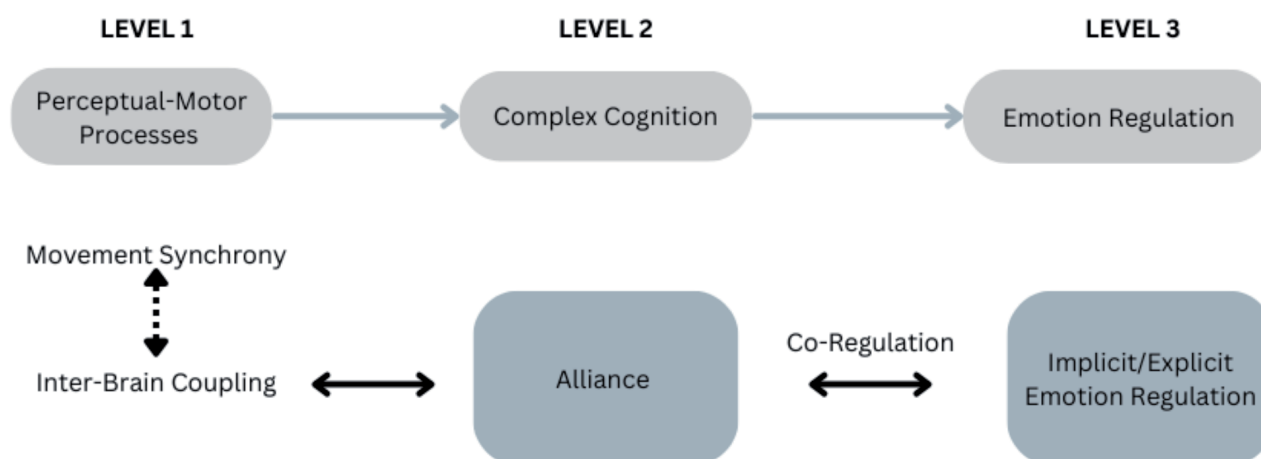


Figure 1. The In-Sync model of psychotherapy (Koole & Tschacher, 2016).

1993; Hollandt *et al.*, 2023; Tay & Qiu, 2022). Therefore, the In-Sync model implies that the therapeutic effects of the alliance are achieved by improving the patient's capacity for emotion regulation, assuming the former is intimately tied to emotional processes (Greenberg and Safran, 1989; Koole & Tschacher, 2016).

The model highlights that the alliance emerges from mutual interactions between the patient and therapist, which reciprocally influence each other (Palmieri *et al.*, 2022). This interplay can enhance patients' emotion regulation capacities over time, leading to improved therapeutic outcomes (emotional bond, shared goals, and agreement on tasks), which further reinforces the alliance, positively impacting treatment efficacy (Ardito & Rabellino, 2011; Koole & Tschacher, 2016). Emotion regulation is a crucial aspect to consider in the context of synchrony in psychotherapy, as it is fundamentally intertwined with the concept of synchrony itself.

A variety of classification systems exist for emotion regulatory processes, and the difficulty in proposing an integrative model of emotion regulation is highlighted by the controversies surrounding other dual-process conceptualizations (Gyurak *et al.*, 2011). Indeed, the terms *emotion* and *emotion regulation* remain hotly debated within psychology, as has been the question of what qualifies as an implicit *versus* an explicit mental process (Koole & Rothermund, 2011). Emotion regulation (ER) can be defined as an attempt to alter the magnitude and/or quality of emotions either prior to or following an emotional response (Gross, 2002). It is a goal-directed process functioning to influence the intensity, duration, and type of emotion experienced in ourselves or others (Gross & Thompson, 2007; McRae & Gross, 2020).

Currently, over 75% of the categories of the Diagnostic and Statistical Manual of Mental Disorders are characterized by problems with emotion regulation (American Psychiatric Association, 2013). Nevertheless, ER has been a key focus in psychology since Freud, who focused on anxiety and viewed unconscious defenses as fundamental but often maladaptive mechanisms of the psyche (Freud, 1936). In contrast to Freud's view of defenses as rudimentary and pathological, modern research on implicit ER highlights its reliance on sophisticated, automatic cognitive processes that foster resilience and psychological well-being (Koole *et al.*, 2015). As a matter of fact, one particular function of ER is the facilitation of homeostasis, which refers to returning to the resting level of arousal in an emotional system following excitation or inhibition (Soma *et al.*, 2019).

ER can be intrapersonal, occurring at the level of a single individual, or interpersonal, occurring at the level of a dyad (Gross, 2013; Jacobs & Gross, 2014). Interpersonal ER, especially in its extrinsic form, may best represent psychotherapy practice in which the therapist attempts to alter the emotional responses of patients (Palmieri *et al.*, 2022).

ER and treatment research have mostly focused on intrapersonal emotion regulation strategies (Soma *et al.*, 2019), but more recently, researchers have started to describe less effortful and more automatic implicit forms of ER (Gyurak *et al.*, 2011). Indeed, ER is also divided into explicit and implicit: explicit ER can be defined as those processes that require conscious effort for initiation, demand some level of monitoring during implementation, and are associated with some level of insight and awareness (Gyurak *et al.*, 2011); on the other hand, implicit ER may be defined as any process that operates without the need for conscious supervision or explicit intentions,

and which is aimed at modifying the quality, intensity, or duration of an emotional response (Koole & Rothermund, 2011). While implicit and explicit ER differ both theoretically and empirically, they share the same fundamental goal: enabling individuals to manage their emotions in a way that is adaptable and responsive to the specific context (Aldao, 2013).

Implicit affect regulation is an essential mechanism of the therapeutic alliance and, thereby, the change process of psychotherapy (Schorre, 2001). Hayes *et al.* (2007) proposed that emotional changes in therapy disrupt typical emotional patterns, with emotions acting as a feedback loop, where one partner moderates the other's extreme emotions (Soma *et al.*, 2019). This is in service of co-creating a more regulated, coherent, modulated self-state (Dales & Jerry, 2008).

Attachment theory provides a developmental framework for understanding these processes, as early interactions with the caregivers' contingent responses shape the infant's regulatory system (Dales & Jerry, 2008). Such exchanges foster mutual synchrony – partners adapting to each other's rhythms – which supports emotional security and builds long-term self-regulatory capacities (Feldman, 2007a; 2007b). These implicit mechanisms persist across the lifespan and gain particular significance in psychotherapy, where the therapist's attuned presence provides a reparative context for expanding affect tolerance and developing mentalization, the reflective capacity to understand and consciously regulate emotions (Fonagy & Target, 1998; Schore, 2009, 2022).

Jurist's theory of Mentalized Affectivity (MA; 2005) further integrates mentalization into emotion regulation, emphasizing that effective regulation involves reflecting on the factors shaping emotions. MA identifies three interrelated stages of ER: 1) identifying emotions, including labeling and making sense of affects; 2) processing emotions by modulating their intensity or duration; and 3) expressing emotions through internal or external communication. These stages, shaped by past experiences, foster an increasing sense of emotional agency and underscore the dynamic, reflective nature of affect regulation (Greenberg *et al.*, 2017).

Emotion regulation and therapeutic outcomes can improve over time through the mutual interactions between patient and therapist, as highlighted by Koole & Tschacher (2016), implying the need to investigate the relationship between these constructs. Numerous systematic reviews have addressed the interaction between dyadic synchrony and the first two levels of the In-Sync model. Still, there is a lack of coverage in the scientific literature describing the connection between interpersonal synchrony and the third level of the model, namely, emotion regulation. To date, no prior reviews have addressed this issue in the literature; hence, this study represents the first attempt to close this gap.

The aim of this systematic review is therefore to explore the relationship between patient-therapist interpersonal synchrony and the process of emotion regulation in psychotherapy. The examination of synchrony in psychotherapy and emotion regulation is rendered complex by considerable variations in the operationalization of reference constructs and the diverse methods employed to measure related phenomena. Accordingly, this review aims to achieve three objectives: i) investigate methods for assessing patient-therapist interpersonal synchrony; ii) investigate methods for assessing emotion regulation in the psychotherapeutic context; and iii) explore findings on the relationship between interpersonal synchrony and emotion regulation in the therapeutic dyad.

Methods

The present systematic review was conducted following PRISMA norms (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) and its guidelines (Page *et al.*, 2021). It was pre-registered on PROSPERO (ID: CRD42024586495). The selection process for suitable studies was organized according to the four steps included in the PRISMA flow diagram (Figure 2) and was performed by two independent reviewers; upon disagreement regarding a study's eligibility, the reviewers discussed their views until a consensus was reached.

Firstly, potentially eligible articles were identified through the databases PubMed (<https://www.ncbi.nlm.nih.gov/>), PsycInfo (<https://www.apa.org/pubs/databases/psychinfo/>), and Web of Science (<https://www.webof-science.com/wos/woscc/basic-search>). The search was conducted on September 4, 2024, using the following search algorithm: (Synchron* OR attunement OR coordination) AND

("affective regulation" OR "emotional regulation" OR emotion* OR affect*) AND (psychotherapy). The two reviewers then excluded duplicates of studies identified across more than one database, and proceeded to screen the titles/abstracts of the remaining publications for further consideration. Finally, the eligibility of relevant articles was assessed by applying pre-defined inclusion and exclusion criteria: studies were included if they i) included a measure of patient-therapist interpersonal synchrony (*e.g.*, verbal, behavioral, physiological, neural), ii) included a measure of emotion regulation, iii) assessed the variables in the previous two criteria during one or more psychotherapy sessions, and iv) included adult participants (*i.e.*, over 18 years of age). Exclusion criteria were i) exclusive assessment of synchrony and emotion regulation in settings other than psychotherapy, ii) exclusive assessment of constructs that were not relevant, iii) patient samples comprised exclusively of children, iv) lack of any new data (*e.g.*, editorials, protocols, meta-analysis, systematic reviews), and v) non-English language publications. No restrictions were applied in terms of date of publication or the

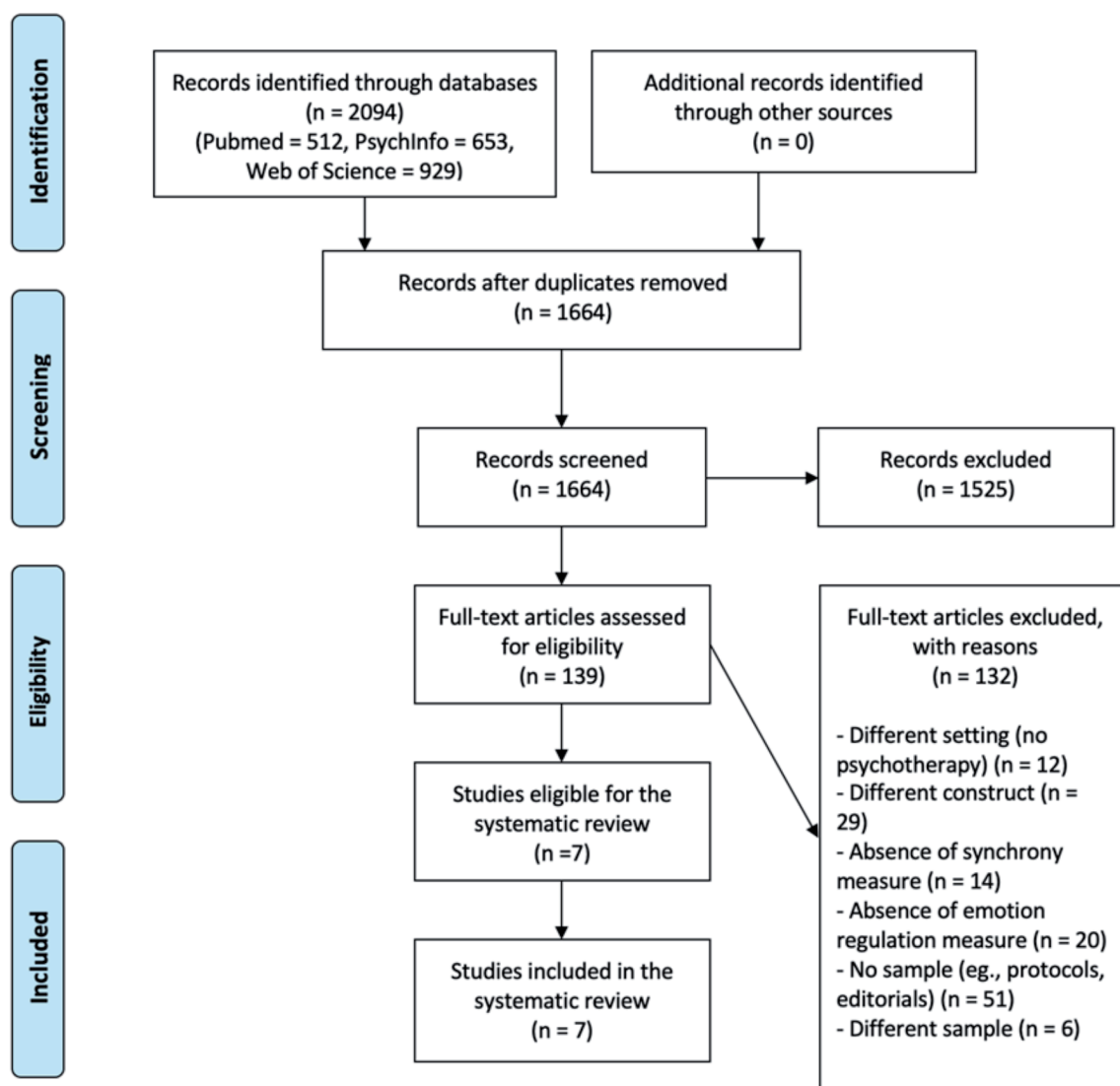


Figure 2. PRISMA Flow diagram illustrating the study selection process.

presence of peer review; thus, any grey literature identified by the database search also underwent the article selection process.

Quality assessment

The assessment of study quality was performed using the Newcastle-Ottawa Scale (Wells *et al.*, 2000), which provides a quality index ranging from 0 to 7, with higher scores indicating better study quality. Details on the applied criteria are provided in *Supplementary Table 1*.

Results

The steps involved in the article selection process are detailed in Figure 2. A total of 2,094 records were initially identified through the database search. Following duplicate removal, 1,664 articles remained, of which a further 1,525 were excluded during the screening of titles/abstracts. A full-text assessment was then conducted on the remaining 139 articles through the application of inclusion and exclusion criteria, after which a total of 7 studies were ultimately deemed eligible for inclusion; Table 1 provides an overview of the data extracted from each study, providing a synthesis of their characteristics.

In the following sections, the results of the systematic review are described in terms of i) the studies' general characteristics, ii) methods of assessing interpersonal synchrony, iii) methods of assessing emotion regulation, and iv) findings on the relationship between interpersonal synchrony and emotion regulation.

General characteristics of the included studies

Overall, the seven studies were published between 2007 and 2024, and included a total of 828 participants, of which 563 were patients and 265 were therapists. Quality indices ranged between 4 and 7; details on the scores obtained by individual studies on each criterion are provided in *Supplementary Table 2*. Participants' ages varied from 21 to 61, with no studies conducted on older individuals. It is, however, important to emphasize that two articles did not specify the participants' age (Erdös & Ramseyer, 2021; Soma *et al.*, 2019). Sample sizes ranged from 2 to 227 participants, and, when considering the patients' characteristics specifically, the majority were healthy or did not have any identified disorders; 3 studies instead included patients diagnosed with either Major Depressive Disorder or Mood/Anxiety Disorders.

Despite all seven studies having included some form of psychotherapy, no two studies used the same one. The interventions included coaching therapy (Erdös & Ramseyer, 2021); manualized short-term Supportive-Expressive Therapy adapted for depression (Goren *et al.*, 2025); Supportive-Expressive psychodynamic psychotherapy tailored to depression (Bar-Kalifa *et al.*, 2023); Cognitive-Behavioral Therapy; imagery-based techniques (Prinz *et al.*, 2021); brief substance use-focused sessions (Soma *et al.*, 2019); couple therapy (Kykyri *et al.*, 2024); and standard psychodynamic psychotherapy (Marci *et al.*, 2007). The number of therapists per study ranged from 2 to 108 therapists, while the treatment frequency ranged from 1 to 16 sessions, with one study failing to specify the frequency of the sessions (Kykyri *et al.*, 2024).

Treatment duration varied from 13 months to two years (Bar-Kalifa *et al.*, 2023; Erdös & Ramseyer, 2021; Marci *et al.*,

2007); one study conducted a single therapy session (Kykyri *et al.*, 2024), one study reported that each research had a different duration (Soma *et al.*, 2019), and two studies failed to specify the treatment duration (Goren *et al.*, 2025; Prinz *et al.*, 2021).

While potentially relevant variables such as gender dyads or therapist experience were neither examined nor analyzed in the included studies, some studies did consider specific variables to assess their potential moderating effects on the relationship between synchrony and emotion regulation. Although three studies accounted for patients' diagnostic status (Bar-Kalifa *et al.*, 2023; Goren *et al.*, 2025; Marci *et al.*, 2007), none examined its potential role as a moderator in the association between physiological synchrony and ER, a question that warrants future investigation. Regarding therapeutic process variables, Kykyri *et al.* (2024) emphasized the facilitating role of conversational structure and content in the relationship between physiological synchrony and ER. Conversely, other findings suggest more complex dynamics: Prinz *et al.* (2021) reported that therapist-led synchrony was associated with heightened anxiety and depression, while Soma *et al.* (2019) demonstrated that therapeutic interventions may increase patients' arousal, thereby moderating the physiological synchrony-ER relationship.

Methods for assessing interpersonal synchrony

Different methods were used to assess synchrony in the selected articles. Erdös & Ramseyer (2021) calculated an index of synchrony through video recordings of the dyad interaction, expressed as the coordination of movements between a coach and a client, through motion energy analysis (MEA; Ramseyer and Tschacher, 2011; Ramseyer, 2020). The studies conducted by (Goren *et al.*, 2025) and Bar-Kalifa *et al.* (2023) used an electrocardiogram evaluation to obtain a synchrony measure. In particular, they both calculated respiratory sinus arrhythmia (RSA) signals to determine the degree of coordination between patients and therapists. RSA reflects the extent to which successive heartbeats vary within the breathing frequency band (Berntson *et al.*, 1997). To determine patient-therapist synchrony, Soma *et al.* (2019) used the vocal fundamental frequency, a validated and minimally invasive measure of vocally encoded emotional arousal (Juslin & Scherer, 2005).

Three out of all the selected articles used a measure of skin conductance (SC; Kykyri *et al.*, 2024; Marci *et al.*, 2007; Prinz *et al.*, 2021). Marci *et al.* (2007) used simultaneous measures of SC during a live therapy session; Prinz *et al.* (2021) monitored the simultaneous electrodermal activity (EDA) of the dyad; Kykyri *et al.* (2024) evaluated synchrony through both movement and physiological synchrony measures with MEA and EDA measures, respectively.

Methods for assessing emotion regulation

The seven studies all differ in the methods they used to calculate emotion regulation. Indeed, a comprehensive range of techniques has been used to measure emotion regulation in modern literature; nevertheless, all of the studies presented a specific measure to evaluate the emotional state of the patients. Erdös & Ramseyer (2021) used the 20-item positive and negative affect scale (PANAS; Watson *et al.*, 1988) to assess the presence of positive and negative emotions. Bar-Kalifa *et al.* (2023) assessed emotional states based on the Classification of Affective-Meaning States (CAMS) (Pascual-Leone & Greenberg, 2005), a system using verbal and nonverbal cues to identify and categorize

Table 1. An overview of the studies' characteristics.

Study	Sample size	Mean age (SD) or age range	Quality Index (0 - 7)	Patient population	Number of therapists	Type of intervention	Treatment frequency	Treatment duration	Synchrony measure	Emotion regulation measure	Experimental control
Erdős & Ramseyer, 2021	184 coach-client pairs	n.s.	6	Healthy	99	Coaching	1-10 sessions	13 months	MEA	PANAS	Pre-post; intervention type (coaching)
Goren <i>et al.</i> , 2025	52 clients	21-61	6	MDD	13	Manualized short-term SE therapy for treating depression	16 sessions	n.s.	ECG (RSA)	APIM	Pre-post; intervention type (short-term SE psychotherapy)
Bar-Kalifa <i>et al.</i> , 2023	28 clients	21-60 (10.30)	5	MDD	9	SE psychodynamic therapy for treating depression	16 sessions	23 months	ECG (RSA)	CAMS	Post; intervention type (SE dynamic psychotherapy)
Prinz <i>et al.</i> , 2021	50 clients	25.3 (6.17)	7	Healthy	22	CBT; imagery based techniques	6 sessions	n.s.	EDA	POMS	Pre-post; intervention type (CBT)
Soma <i>et al.</i> , 2019	227 clients	n.s.	6	n.s.	108	Brief substance used focused sessions	1 observation-a-dyad	Varying	Vocal fundamental frequency (f0)	APIM (CLO)	Post; intervention type (MI psychotherapy)
Kykyni <i>et al.</i> , 2024	2 clients	40	5	n.s.	2	Couple therapy	n.s.	Single session	MEA, EDA	Observations and transcripts	Pre-post; intervention type (Couple therapy)
Marci <i>et al.</i> , 2007	20 clients	36.3 years; 21-55 (SD 8.6)	4	Mood/anxiety disorders	12	Dynamic psychotherapy	1 session	21 months	SC	BICS	Pre-post; intervention type (psychodynamic psychotherapy)

SD, standard deviation; n.s., not specified; MEA, motion energy analysis; PANAS, Positive and Negative Affect Scale; MDD, major depressive disorder; SE, supportive expressive; ECG, electrocardiography; RSA, respiratory sinus arrhythmia; APIM, Actor-Partner Interdependence Model; CAMS, Classification of Affective Meaning States; CBT, cognitive behavioral therapy; EDA, electrodermal activity; POMS, Profile of Mood States; CLO, coupled linear oscillator; MI, motivational interviewing; SC, skin conductance; BICS, bales interaction coding systems.

the expression of emotions in speech. Two articles (Goren *et al.*, 2025; Soma *et al.*, 2019) employed a longitudinal Actor-Partner Interdependence Model (APIM; Cook & Kenny, 2005) to examine how interpersonal and intrapersonal regulation were associated with the client's changes in pre-post session functioning. In particular, Soma *et al.* (2019) used a coupled linear oscillator (CLO) dynamic systems model, a specific form of the APIM. CLO is useful in characterizing mutual influence in dyadic contexts. In CLO models, patterns of emotion regulation are operationalized as the degree to which a therapist or client returns to their emotional set point (Soma *et al.*, 2019). Prinz *et al.* (2021) used a shortened version of the Profile of Mood States (POMS) questionnaire to assess the clients' and therapists' in-session emotions. Marci *et al.* (2007) used the Bales Interaction Coding System (BICS), developed for the analysis of face-to-face social interaction (Bales, 1951). Kykryi *et al.* (2024) evaluated nonverbal and verbal emotionality as well as nonverbal regulation by encoding specific emotional indicators that occurred in a couple therapy session.

Findings on the relationship between interpersonal synchrony and emotion regulation

Regarding the outcomes of the analyzed studies, we specifically selected articles that explored the relationship between a measure of synchrony and one of emotion regulation.

Five out of seven studies detected a positive relationship between synchrony and emotion regulation. In particular, Bar-Kalifa *et al.* (2023), using Greenberg *et al.* (2007) definition, categorized emotional states in psychotherapy into maladaptive unproductive emotions (*e.g.*, global distress); adaptive productive emotions (*e.g.*, grief, hurt), which, when avoided, hinder personal growth; and positive emotions (*e.g.*, joy, calmness), which enhance emotion regulation and are integral to effective psychotherapy. The researchers observed greater anti-phase synchrony during moments of productive emotional experiences compared to moments of unproductive emotional experience, and also greater in-phase and antiphase synchrony were observed during moments of positive emotional experiences. Goren *et al.*, 2025 found similar outcomes, highlighting in their study how sessions with in-phase and anti-phase synchrony were associated respectively with better and worse therapeutic outcomes, suggesting that achieving in-phase synchrony may represent a therapeutic turning point. Furthermore, synchrony was found to vary based on emotional valence: greater synchrony occurred during moments of productive emotional experiences, which correlated with better session evaluations. Similarly, the study conducted by Kykryi *et al.* (2024) analyzed a single couple therapy session, finding physiological synchrony to be associated with the emotional aspects of the session and to episodes in which the spouses' relationship was addressed, while movement synchrony was only related to emotional valence.

Similarly, Marci *et al.* (2007) suggested that during moments of high *versus* low SC concordance, there were significantly greater positive social-emotional interactions for both patients and therapists. On the same note, results found by Soma *et al.* (2019) showed that when clients became more emotionally labile over the course of the session, therapists became less so, and when changes in therapist arousal increased, the client's tendency to become more aroused during the session slowed and *vice versa*. Prinz *et al.* (2021) emphasized the difference between client or therapist-led synchrony in relation to emotion regulation, reporting in their results how certain client (but not

therapist) in-session emotions were tied to therapist-led (but not client-led) physiological synchrony. This suggests that therapist-led synchrony is tied to more positive and less negative emotional experiences for clients. A notable exception is the study conducted by Erdős & Ramseyer (2021), which presents results that challenge the prevailing interpretation, finding no evidence for the hypothesized positive relationship between nonverbal synchrony and emotional self-regulation.

The analyzed studies predominantly highlight a positive relationship between synchrony and emotion regulation, with greater synchrony during productive or positive emotions correlating with better therapeutic outcomes. Nuances included therapist-led synchrony, fostering positive experiences and varied impacts on emotional lability. Overall, only one study challenged this trend, finding no direct relationship between nonverbal synchrony and emotional self-regulation, warranting further research.

Discussion

This review aimed to fill the gap in the research field of interpersonal synchrony and the third level of the In-Sync model, namely, emotion regulation. Since no prior systematic review had previously addressed this, the relationship between patient-therapist interpersonal synchrony and the process of emotion regulation was explored in the context of psychotherapy, identifying a total of seven studies which ultimately revealed both supportive and nuanced findings.

Literature found synchrony to be associated with positive therapeutic outcomes and, importantly, with improved emotion regulation. Specifically, in-phase synchrony is tied to better outcomes and appears to act as a therapeutic turning point (Bar-Kalifa *et al.*, 2023; Goren *et al.*, 2025). Similarly, physiological synchrony has been linked to emotional session dynamics (Kykryi *et al.*, 2024), while Marci *et al.* (2007) found that high SC concordance significantly correlated with more positive social-emotional interactions for both patients and therapists. Therapist-led synchrony further enhances client experiences by increasing positive and reducing negative emotions (Prinz *et al.*, 2021).

Despite the positive association between interpersonal synchrony and ER highlighted in previous studies, two articles identified in the present systematic review reported outcomes that fail to align with earlier results. Specifically, results from Soma *et al.* (2019) lead to a much more complex interaction, highlighting an inverse dynamic where client emotional lability was balanced by therapist stability, suggesting a co-regulation process rather than simple alignment. On a contrasting note, Erdős and Ramseyer (2021) found no direct effect of nonverbal synchrony on emotional self-regulation, highlighting the need for further exploration of contextual and methodological factors.

Another critical consideration is the integration of rupture-and-repair processes of therapeutic alliance (Safran & Muran, 2003) in the In-Sync framework to examine the discrepancies of the results of this review: a micro-processual perspective may offer a more dynamic and detailed insight into underlying processes, potentially highlighting a further link between the constructs of ER and therapeutic alliance. In this framework, a rupture manifests as a deterioration in the emotional alignment between patient and therapist. The collaborative interactions that follow such ruptures represent crucial moments of repair, often resulting in a renewed and enhanced attunement. Adopting this

paradigm may thus offer an innovative interpretative framework for understanding the complex relationship between interpersonal synchrony and emotion regulation within the therapeutic dyad (Colli & Lingardi, 2009; Eubanks & Muran, 2010; Safran & Muran, 2003).

Studies that have not identified a linear relationship between interpersonal synchrony and emotional regulation could be interpreted in light of repetitive and dysfunctional affective-relational dynamics. Instead of a dyad's lack of alignment, the issue may concern an alignment on dysfunctional aspects, often linked to maladaptive interactions between negative transference and countertransference, which therapists fail to manage consciously.

These findings highlight both the potential and the complexities of synchrony in therapy, while stressing the idea of a multifaceted role of synchrony in psychotherapy and its reciprocal influence on emotion regulation.

This nonlinear relationship could also be understood through the lens of therapist responsiveness and countertransference dynamics (Fiorentino *et al.*, 2024), as negative reactions from the therapist or misattunement can hinder profound elaboration of therapeutic content.

These mixed findings prompt a deeper theoretical consideration: under what circumstances might synchrony itself be colusive? Literature highlights how processes of rupture and repair of alliance are of high relevance for a good therapeutic outcome (Safran *et al.*, 2011). Therefore, the absence of these necessary disruptions, manifested as overly stable patterns, may indicate that important therapeutic work is not occurring. Rather than reflecting optimal attunement, persistent synchrony without rupture-repair cycles might suggest that the dyad is not engaging with the challenging material necessary for therapeutic progress. This perspective is supported by research showing that interpersonal coordination dynamics are implicated in rupture and repair episodes, affecting not only emotional regulation but also empathy and trust (Høgenhaug *et al.*, 2024).

However, the detection of rupture-repair processes may require different methodological approaches than those used to assess moment-to-moment physiological synchrony. While physiological measures capture second-by-second coordination, rupture-repair dynamics may unfold across different temporal scales and require assessment methods that can detect these therapeutic process shifts. Thus, if the lack of synchrony found in some studies was actually reflecting these underlying dynamics, the temporal resolution of current physiological assessments may be insufficient to detect these processes. This suggests that integrating different theoretical models, such as those focusing on rupture-repair cycles alongside physiological synchrony measures, could provide a more comprehensive framework capable of explaining the discontinuities found in this systematic review.

Nyman-Salonen *et al.* (2022) highlighted how embodied aspects of psychotherapy are complex constructs to be studied, accounting for it with an interesting three-fold reason: the lack of standardized methodologies, the absence of a unifying theoretical framework, and the context-dependent, idiosyncratic nature of embodied variables. This aligns with our observations in the fields of synchrony and emotion regulation, where there are still debates on appropriate methods and relevant features to study in clinical contexts. There is a lack of a common methodology for studying the construct of ER, and a consensus on a unified theoretical model for synchrony has not been reached. One reason for this is that the concept of ER appears to be an umbrella

term, often intertwining with similar constructs, making it difficult to compare studies. This conceptual ambiguity makes establishing standardized definitions and measurement tools challenging, leading to significant methodological variability across studies. In fact, each study employed a different method to investigate this construct, ranging from questionnaires, *e.g.*, PANAS (Erdös & Ramseyer, 2021) and POMS (Prinz *et al.*, 2021) scales, to the use of coding systems, *e.g.*, CAMS (Bar-Kalifa *et al.*, 2023) and BICS (Marci *et al.*, 2007), but also more neuroscientific approaches, *e.g.*, APIM (Goren *et al.*, 2025; Soma *et al.*, 2019).

Although all the methods employed investigated ER, they all focused on different characteristics, which resulted in difficulty comparing both conceptually and methodologically. For instance, Erdös & Ramseyer (2021) used a 20-item PANAS to assess the distribution of affective emotions, while Goren *et al.*, 2025 focused on investigating intrapersonal regulation by evaluating the extent to which the client's respiratory sinus arrhythmia varies in time. Nonetheless, the two main areas of ER that were more frequently analyzed were positive and negative affective states (Bar-Kalifa *et al.*, 2023; Erdös & Ramseyer, 2021; Kykri *et al.*, 2024; Marci *et al.*, 2007; Prinz *et al.*, 2021) and intra-personal regulation (Goren *et al.*, 2025; Soma *et al.*, 2019).

Due to the lack of consensus in defining and operationalizing ER, it is important to remain cautious when attempting to generalize any observed results; what is considered ER in one study may vary in another. The absence of a shared framework means that studies may capture different aspects of this phenomenon, potentially leading to inconsistent findings. This lack of methodological coherence underscores the importance of developing more precise definitions and standardized tools to ensure the comparability and reliability of future research in this field.

Finally, it is important to highlight that, despite not having set any exclusion criteria regarding an upper age limit, no studies have yet addressed the relationship between patient-therapist synchrony and emotion regulation in psychotherapy sessions involving older individuals (*i.e.*, over the age of 60), emphasizing the necessity for psychotherapy research to target an increasingly pertinent and growing portion of the population.

These discrepancies highlight the need for future research to systematically report clinically relevant sample variables, including diagnostic status, therapist experience, and gender composition of dyads, and to explore their potential moderating role in the relationship between synchrony and emotion regulation.

In addition, it is worth noting that two of the seven included studies did not report the participants' age. This represents a significant methodological limitation. Age is a fundamental demographic variable in research on synchrony and emotion regulation, as both processes exhibit significant developmental variability. The lack of this information constrains the interpretability of findings, limits comparability across studies, and hinders assessments of generalizability to specific age groups. Future research should implement systematic reporting of demographic characteristics, particularly age, to allow for meaningful comparisons and to better understand developmental influences on synchrony and emotion regulation.

Limitations

The present systematic review has several limitations. Firstly, in order to address a specific gap regarding the relationship between interpersonal synchrony and ER, stringent inclusion and exclusion criteria were used, leading to a reduced

sample of studies, which, however, also highlights the need for further investigation of this topic. The small number of available studies measuring ER in relation to synchrony was in part due to the majority of studies focusing on broader and clearer constructs in the literature, such as *empathy* or *therapeutic alliance*, which were excluded as they do not directly address ER. Additionally, studies in the literature addressing concepts like *emotional attunement* or *empathic attunement* were deemed unsuitable for this research, as these confound the two variables of interest (emotion regulation and synchrony) by measuring synchrony as a proxy for emotion regulation, thus failing to isolate it accurately. Finally, despite allowing for non-peer-reviewed work to undergo the article selection process, no grey literature record was identified that satisfied all of the inclusion and exclusion criteria.

Conclusions

This systematic review aims to investigate methods of assessment of emotion regulation and interpersonal synchrony, and to examine the relationship between the two variables in the therapeutic context, using the In-Sync model as a reference framework.

The obtained results indicated a moderate range of methodologies used to measure interpersonal synchrony. More specifically, results included in this review were obtained by measuring phase synchrony (Bar-Kalifa *et al.*, 2023; Goren *et al.*, 2025), physiological synchrony (Kykyri *et al.*, 2024; Marci *et al.*, 2007), and therapist-led synchrony (Prinz *et al.*, 2021).

The same argument holds significantly more for emotion regulation, where the methodology variety employed to evaluate the construct ranged from self-report measures (PANAS, POMS) to behavioural coding systems (CAMS, BICS) and neuroscientific approaches (APIM), highlighting the need for standardized definitions and measurement.

While the studies included in this review generally found a positive association between enhanced emotion regulation and synchrony, findings by Soma *et al.* (2019), which reported an inverse dynamic, and by Erdös and Ramseyer (2021), which found no direct effect of nonverbal synchrony on emotional self-regulation, suggest that contextual and methodological factors may influence these relationships. This highlights the need for further research to refine measurement approaches, control for potential contextual biases, and work toward establishing a unified theoretical framework.

Future research should adopt an integrated perspective on emotion regulation, encompassing both implicit nonverbal mechanisms, such as co-regulation and interpersonal synchrony rooted in early attachment dynamics, and explicit reflective processes, including mentalized affectivity.

Although the field of synchrony and emotion regulation in psychotherapy is still in its early stages, with ongoing debates about the appropriate methods and relevant features to study in clinical contexts, recent innovations have enabled rigorous research in this domain (Koole & Tschacher, 2016). Nevertheless, the results obtained thus far have been partially inconsistent and only based on a small number of studies. As a consequence, the current state of research suggests focusing on a disorder-specific sample to exclude heterogeneity, as this could foster our understanding of synchrony-outcome associations on a more detailed level. ER and synchrony are constructs that still need to be defined in a coherent way throughout the literature, as researchers

have yet to reach a consensus on the specific methodologies to adopt when studying their relationship in psychotherapy. Furthermore, while having been proven to be a cunning way to understand the role of synchrony in psychotherapy, the In-Sync model still needs more research to fully assess its validity.

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Online supplementary material:

Supplementary Table 1. The Newcastle-Ottawa Scale used in the present study for quality assessment (maximum 7 stars).

Supplementary Table 2. Details on the quality assessment of each included study for each criterion of the Newcastle-Ottawa Scale.