Nonverbal Synchrony as a Marker of Alliance Ruptures

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Findings from the past 5 decades of empirical research on the working alliance suggest its importance in psychotherapy. Recent studies have sought to identify markers of the alliance, of which one of the most promising candidates is nonverbal synchrony. Delving into processes that constitute the alliance, such as alliance ruptures, may shed light on underlying mechanisms of the association between nonverbal synchrony and the therapeutic relationship. The present study examines whether nonverbal synchrony can serve as a marker of alliance ruptures. To achieve this aim, 418 sessions of 75 therapeutic dyads were coded for ruptures, using the Rupture Resolution Rating System, and for nonverbal synchrony, using motion energy analysis. A mixed-method analysis, integrating multilevel nested models with a case study analysis, was implemented. The results of the multilevel nested models suggest that nonverbal synchrony is significantly associated with confrontational ruptures, whereas withdrawal ruptures showed no such association. The findings of the case analysis suggest that moments of especially high nonverbal synchrony during a rupture are those in which the therapist made great efforts to be attentive to the patient when the patient acted in a confrontational manner. The findings of the present study demonstrate the potential of nonverbal synchrony to serve as a marker of confrontational ruptures. The findings support the social glue assumption, according to which therapists may seek higher levels of nonverbal synchrony with patients to maintain a strong alliance in the face of difficulties.

Clinical Impact Statement
Question: Can nonverbal synchrony between patients and therapists serve as a marker of alliance ruptures? ***Findings:*** Results suggest that nonverbal synchrony is significantly associated with confrontational ruptures and that therapists may seek higher levels of nonverbal synchrony with patients to maintain a strong alliance in the face of difficulties. ***Meaning:*** The study highlights the potential of nonverbal synchrony to serve as a marker of confrontational ruptures in the alliance. ***Next Steps:*** After being validated by future studies, the current findings may be implemented as an in-session live feedback system that would provide therapists and patients feedback on their nonverbal markers of alliance ruptures. This could help clinicians interpret complex processes, detect and evaluate confrontation ruptures, and address the ruptures.

Keywords: nonverbal synchrony, alliance ruptures, confrontation ruptures, process, treatment

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The working alliance, commonly defined as the emotional bond between patient and therapist and their levels of agreement on the goals and tasks of treatment (Bordin, 1979), has been the focus of much theoretical and clinical writing and of hundreds of empirical studies. Accumulating findings from the past 5 decades of empirical research on the alliance suggest that it is the most consistent predictor of treatment outcome (Horvath et al., 2011). A recent meta-analysis of 295 studies suggests that a stronger alliance is significantly associated with better treatment outcomes (Flückiger et al., 2018). The first decades of empirical research on the alliance focused

mainly on the association between the alliance, as assessed at one early session in treatment, and treatment outcome, commonly operationalized as a reduction in symptoms from pre- to posttreatment (Horvath & Symonds, 1991). These studies consistently demonstrated that a stronger alliance at that early session was associated with better treatment outcome. In recent years, several important developments have been the focus of empirical research on the alliance (Safran & Muran, 2006). These include two key developments: (a) examining the development of alliance over the course of treatment, mainly ruptures and repairs in the alliance (Safran & Muran, 2000), and (b) more recently, searching for markers of such processes.

The literature has suggested several candidates as potential markers of the alliance, including physiological synchrony (Kleinbub, 2017; Kleinbub, Talia, et al., 2020), acoustic vocal markers (Imel et al., 2014; Nof et al., 2020), linguistic markers (Goldberg et al., 2020), therapeutic presence (Geller & Porges, 2014), and biological markers (Zilcha-Mano et al., 2020). One of the promising candidates is the nonverbal synchrony between patient and therapist (Ramseyer & Tschacher, 2011). Nonverbal synchrony is defined as the movement coordination between interacting partners, irrespective of their postures or gestures (Condon & Ogston, 1966; Ramseyer & Tschacher, 2011). Many studies refer to nonverbal synchrony as an interpersonal phenomenon (Koole & Tschacher, 2016), in which individuals tend to naturally synchronize their verbal responses, their biological and physiological responses, and their nonverbal movement responses in an interaction (Arueti et al., 2013; Wiltshire et al., 2020).

Nonverbal synchrony was found to be associated with a high quality of social connections and with the process of relationship formation (Vacharkulksemsuk & Fredrickson, 2012). It was found to lead to higher levels of cooperation, affection, and rapport between interacting partners in various types of relationships: within social groups (Wiltermuth & Heath, 2009), with an experimenter (Hove & Risen, 2009), and in student–teacher dyads (Bernieri, 1988). Nonverbal synchrony was found to play an essential role in establishing prosocial behaviors, rapport, affiliation, and the development of adaptive emotion regulation (Koole & Tschacher, 2016; Wheatley et al., 2012). It has also been viewed as a marker for the establishment and maintenance of the therapeutic relationship (Hall et al., 1995; Philippot et al., 2003), and it may be regarded as a facet of so-called therapeutic presence (Geller & Porges, 2014), that is, a nonverbal aspect of being fully in contact with a patient. Despite these promising studies, inconsistencies in the findings regarding the association between nonverbal synchrony and the alliance started to accumulate. Ramseyer and Tschacher (2011) found a positive relationship between nonverbal synchrony and the patient-rated alliance. In a subsequent analysis, they found a positive relationship between nonverbal synchrony and both the patient- and therapist-rated alliance (Ramseyer & Tschacher, 2014). Similarly, Altmann et al. (2020) found nonverbal synchrony to be associated with the patient-rated alliance. However, Paulick, Deisenhofer, et al. (2018) and Ramseyer (2020a) were not able to find this association between nonverbal synchrony and the patient- and therapist-rated alliance. A deeper understanding is needed of the relation between nonverbal synchrony and the processes occurring within the therapeutic relationship.

Safran and Muran (2000) suggested that a critical stage in explaining the processes of alliance development over the course of treatment is decomposing the alliance into its underlying processes. The authors conceptualized the alliance as affecting treatment outcome through processes of rupture and repair. The ruptures are commonly conceptualized as deterioration or tension in the components of the alliance (Safran et al., 2011), specifically, disagreements between patient and therapist on the goals of treatment, inability to work collaboratively on the tasks of treatment, and a strain in the emotional bond (Eubanks et al., 2018). Ruptures can manifest as a break in therapy or as a minor tension between patient and therapist (Safran & Muran, 2006; Safran et al., 2011).

Ruptures are commonly classified into two main types: confrontation and withdrawal (Eubanks et al., 2015; Safran & Muran, 2000). In confrontation ruptures, patients move against the therapist or the work of therapy and express anger or dissatisfaction (Safran & Muran, 2000; Safran et al., 2011). For example, the patient may complain about the therapist or the tasks of treatment. In withdrawal ruptures, patients either move away from the therapist or the treatment or move toward the therapist in a way that denies an aspect of the patient's experience (Safran & Muran, 2000; Safran et al., 2011). For example, the patient may provide minimal response to a question asked by the therapist. Accumulating empirical research in the last 2 decades suggests that rupture and repair processes are an integral part of treatment and have the potential to either undermine the treatment or enhance it. Findings suggest that unnoticed and unresolved ruptures are associated with deterioration of the alliance and dropout (Eubanks et al., 2018). Findings suggest further that, when identified and resolved, ruptures are significantly associated with better treatment outcomes (Eubanks et al., 2018). These findings highlight the importance of focusing on ruptures when seeking to understand the processes of alliance development.

Although profound research has been conducted on alliance ruptures, little is known about the underlying processes of how alliance ruptures occur. Given the previous research on the association between nonverbal synchrony and the therapeutic relationship, it is possible that changes in nonverbal synchrony are involved in the processes of alliance ruptures. A recent study found that a rise in oxytocin during the session may serve as a marker of confrontational ruptures (Zilcha-Mano, Porat, et al., 2018), suggesting that nonverbal measures may be helpful in detecting ruptures in the alliance. Indeed, it has been argued that nonverbal synchrony may be a promising marker of the processes of rupture and repair (Friedman, 2020). Several studies have found that higher levels of nonverbal synchrony were indicative of deterioration and unfavorable processes in psychotherapy, such as dropout, lower progress, and higher symptoms (Paulick, Deisenhofer, et al., 2018; Ramseyer, 2020a). Similarly, a number of studies on couples have found that higher levels of physiological and biological synchrony were associated with conflict, spousal strain, and disagreement (Coutinho et al., 2019; Levenson & Gottman, 1983; Liu et al., 2013). To the best of our knowledge, no study to date has empirically examined the association between nonverbal synchrony and alliance ruptures. This association may take three forms: (a) nonverbal synchrony may signal a general tension or deterioration in the alliance, in which case, both confrontational and withdrawal ruptures are associated with nonverbal synchrony; (b) nonverbal synchrony may serve as a marker of the alliance but may not be sensitive to changes in alliance, such as ruptures, during the sessions, in which case, neither confrontational nor withdrawal

ruptures are associated with nonverbal synchrony; and (c) similarly to the findings concerning the rise in oxytocin as a marker of confrontation ruptures (Zilcha-Mano, Porat, et al., 2018), only these ruptures are associated with nonverbal synchrony, perhaps signaling an increase in arousal during a confrontation rupture.

The present study examines systematically the association between alliance ruptures and nonverbal synchrony in psychotherapy for major depressive disorder (MDD). We focused on MDD because of findings suggesting that the role of nonverbal synchrony may be particularly pronounced in this population (Paulick, Rubel, et al., 2018). Using the current data set, we have recently demonstrated a bidirectional positive association between nonverbal synchrony and the patient- and therapist-reported alliance (Cohen et al., 2021). The present study aims to examine how processes occurring within the therapeutic relationship are related to the nonverbal synchrony between patient and therapist. Our findings have the potential to better explain the mechanisms that may underlie the association between nonverbal synchrony and the therapeutic relationship. We focused on the state-like effects to see how changes in alliance ruptures are associated with changes in nonverbal synchrony. Given the pioneering nature of this study, the analyses were exploratory. To achieve this aim, we used a mixed-method analysis, examining the association between nonverbal synchrony and alliance ruptures in the full sample and exploring the nuances of this association in a case study.

Method

Participants

In all, 75 patients with MDD were recruited through advertisements offering free treatment for depression. This study is part of a larger ongoing randomized controlled trial (RCT), training and active phase, comparing supportive and supportive-expressive therapy for MDD (Zilcha-Mano, Dolev, et al., 2018). All patients signed informed consent forms, confirming their understanding that all treatment sessions were to be videotaped and that they had the right to withdraw from the research at any time. The procedures were approved by the internal review board of the institution. Inclusion criteria were as follows: (a) meeting MDD diagnostic criteria based on structured clinical interviews for *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition,* with scores above 14 on the 17-item Hamilton Rating Scale for Depression (HRSD) at two evaluations, 1 week apart (Hamilton, 1967), and current MDD based on the Mini-International Neuropsychiatric Interview (Sheehan et al., 1998); (b) if the patients were on medication, their dosage had to be stable for at least 3 months before entering the study, and they had to be willing to maintain stable dosage for the duration of the treatment; (c) age between 18 and 60 years; (d) fluency in Hebrew; and (e) provision of written informed consent. Exclusion criteria were as follows: (a) current risk of suicide or self-harm (HRSD suicide item score > 2); (b) current substance abuse disorder; (c) current or past schizophrenia or psychosis, bipolar disorder, or severe eating disorder requiring medical monitoring; (d) history of organic mental disease; or (e) currently in psychotherapy.

The mean age of the participants was 31.88 years ($SD = 9.02$), and 61.3% were female; mean level of education was 14.82 years

($SD = 2.91$); 49.3% reported that their monthly family income was below the average monthly income per family (about \$4,212), 28.0% reported it was average, 20.0% reported it was above average, and 2.7% did not report income; 45.3% were employed, 41.3% were students, 9.3% were unemployed, 2.7% were homemakers, and 1.3% indicated "other." Of the participants, 72.0% were single, 17.3% married, 2.7% lived in a relationship, 5.3% were divorced or separated, 1.3% were widowed, and 1.3% were "other." In all, 74.7% were Jewish, 9.3% were Christian, 5.3% were Muslim, 2.7% were atheist, 2.7% were "other," and 5.3% did not report their religion. In addition to MDD, 70.7% of the patients were diagnosed with one or more personality disorders: the most frequent personality disorders were obsessive–compulsive (46.7%), avoidant (29.3%), dependent (17.3%), borderline (17.3%), narcissistic (13.3%), and histrionic (5.3%).

Therapists and Treatment

A total of eight therapists, with at least 5 years of expertise in psychodynamic treatment, participated in the study. All had formal training and experience in psychodynamic treatment. The therapists attended a 20-hr training workshop in supportive and expressive techniques before seeing patients. All therapists completed treatment of two pilot patients, one of each treatment type, and had to demonstrate sufficient adherence before moving to the trial phase. Throughout the study, the therapists received weekly personal and group supervision provided by two experienced licensed clinical psychologists, who received supervision on supervision from an international expert in supportive-expressive therapy (SET). Therapists provided treatment in both conditions to act as their own controls and avoid nesting of therapists within treatment conditions, which may result in unwanted confounding. The mean clinical experience of the therapists was 11.87 years ($SD = 6.12$), mean age was 39.87 years ($SD = 6.57$), and 62.5% were women. The mean number of patients treated by each therapist in the current study was 8.87 ($SD = 6.85$; range: 1–18). In all, six of the therapists were Jewish, one was Christian, and one was atheist.

Patients received 16 weekly 50-min sessions of SET, a time-limited psychodynamic therapy adapted for depression, either in an expressive-focused condition or in a supportive-focused one. Assignment to treatment condition was conducted by an outside institution not involved in the study. Following the general requirement in psychotherapy research to not break the blindness to conditions before the end of the RCT, in this study, similarly to other studies in the literature, the two conditions were analyzed together. We used comprehensive treatment protocols for SET: the Luborsky manualized treatment (Luborsky, 1984; Luborsky et al., 1995). The supportive condition included all supportive techniques detailed in the manual, but forbid the use of any expressive techniques (as detailed in Leibovich et al., 2018).

Measures

Alliance Ruptures

Ruptures were assessed using the Rupture Resolution Rating System (3RS; Eubanks et al., 2019), an observational system for coding ruptures and resolutions. While watching recorded sessions, divided into 5-min segments, coders noted events attesting

to lack of collaboration or tension between patient and therapist. When a rupture was identified, it was coded as confrontation or withdrawal. Clarity of the rupture was rated as a check minus (a weak or somewhat unclear example of the marker), a check (a solid example of the marker), or a check plus (a very clear, "text-book" example of the marker). The frequency of each type of rupture was summed up across all the 5-min segments of the session. The present study included coding of ruptures for 75 patients in six sessions over the course of treatment (Sessions 2, 4, 6, 8, 10, and 12).

All coders received 6 months of training (approximately 100 hr) from an experienced coder. The coders first learned the theoretical background, then practiced coding of therapy sessions until they achieved adequate reliability. During the training and coding phase, all coders received weekly supervision to maintain reliability. Each session was coded by a pair of coders drawn from a pool of eight undergraduate students in psychology, blind to the study hypothesis. Interrater reliability for confrontation ruptures in the current study was intraclass correlation (ICC) (1,2) = .94, and for withdrawal ruptures was ICC (1,2) = .95.

Nonverbal Synchrony

Nonverbal synchrony was measured using motion energy analysis (MEA; Ramseyer, 2020b). A total of $N = 418$ videotaped therapy sessions, each lasting 50 mins, were analyzed, of 75 patients in six sessions over the course of treatment (Sessions 2, 4, 6, 8, 10, and 12). A total of 32 sessions were not available for analysis because of a lack of rupture coding, technical reasons, or premature termination. Motion energy was defined as the difference in pixel values between consecutive video frames. The detection of frame-by-frame changes enables the quantification of changes in predefined regions of interest. The regions of interest of the head and body regions were summed up into one region per partner. Calculations of nonverbal synchrony were conducted using the rMEA R-package (Kleinbub & Ramseyer, 2020).

The quantification of nonverbal synchrony was based on a time-lagged cross-correlation algorithm, which calculates the association of the two partners' time series in a range of ±5 s. The mean of all absolute correlation values was considered to be the quantity of coordinated movements between the two partners; that is, a single-value representative of the global nonverbal synchrony between patient and therapist (Ramseyer, 2020b; Ramseyer & Tschacher, 2011). We examined nonverbal synchrony as described earlier in contrast to pseudosynchrony, that is, nonverbal synchrony caused by random coincidence, to obtain an estimate of the strength of the phenomenon of nonverbal synchrony (Ramseyer, 2020b; Ramseyer & Tschacher, 2010). Nonverbal synchrony was adjusted by assessing a z transformed variable by providing an effect-size estimate of nonverbal synchrony compared with pseudosynchrony (Ramseyer & Tschacher, 2011) and was used in all subsequent analyses (see the online supplemental materials for more details).

Data Analysis

To measure the amount of variance in nonverbal synchrony due to the random effects of the therapist and patient, we used ICCs with the SAS PROC MIXED output. Therapist's random effects were calculated as follows:

$ICC = \sigma^2_{\text{therapist}}/(\sigma^2_{\text{therapist}} + \sigma^2_{\text{dyad}} + \sigma^2_{\text{error}})$. Random variance components for therapist and dyad (referring to dyad and patient) were estimated based on a model with the only random intercept of the therapist and dyad, with no other covariates.

To examine the development of nonverbal synchrony over time, we evaluated the following trend models: linear, linear in log of time, and stability over time, either as fixed or random effects. We started with a model with only a fixed intercept and no random effects and added a sequentially fixed effect of week and a random effect of week in therapy. Next, we examined the models with fixed and random linear effects of log of week. We used the likelihood ratio test and the Bayesian information criterion to determine whether the inclusion of each term improved the model fit.

Disentangling the Trait-Like and State-Like Effects of Confrontation and Withdrawal Alliance Ruptures on Nonverbal Synchrony

The data were hierarchically nested on three levels: assessments nested within patients nested within therapists. A total of 418 observations were available out of 450. To account for the resulting nonindependence of assessments, and to prevent inflation of the effects, we added the patient and therapist as random effects, using the SAS PROC MIXED procedure for multilevel modeling (Littell et al., 2006).

To examine the ability of trait-like, between-dyads variance, and state-like, within-dyad variance components of confrontation ruptures to predict nonverbal synchrony in the same session, we followed the recommendations of Raudenbush and Bryk (2002), Bolger and Laurenceau (2013), and Wang and Maxwell (2015). For the trait-like component, we used the mean value of the confrontation ruptures, and for the state-like component, we centered confrontation ruptures around their mean. We conducted a multilevel model with the mean and centered values as predictors of nonverbal synchrony, controlling for time. Because we were interested in predicting the development of nonverbal synchrony over time, we used the interaction of the mean value with time, that is the ability of the trait-like component to predict the individual-specific slope of nonverbal synchrony, and the centered value as it develops over time without interaction with time, that is the ability of the state-like component to predict individual-specific slope of nonverbal synchrony. We carried out the same procedure with the withdrawal ruptures. The full multilevel model equation appears in the online supplemental material.

Results

For nonverbal synchrony, the estimated variance of the therapist's random effect was marginally significant ($\sigma^2 = .59$, $p = .06$, ICC = .26), and the dyad's random effect was significant ($\sigma^2 = .91$, $p < .0001$; ICC = .408). These findings indicate that the therapist's random effect contributed marginally significantly to the variance in outcome and that the dyad's random effect contributed significantly to the variance in outcome. A model of fixed effect of log of time showed the best model fit in predicting nonverbal synchrony, based on the log-likelihood test and the Bayesian information criterion. Detailed information appears in the online supplemental material about descriptive information (Table S1 in

the online supplemental materials); correlations among the variables at the patient and session level (Tables S2 and S3 in the online supplemental materials); changes in nonverbal synchrony over time (Figure S1 in the online supplemental materials); changes in nonverbal synchrony and confrontation ruptures overtime at the group level (Figure S2 in the online supplemental materials); and the distributions of the key variables (Figures S3, S4, and S5 in the online supplemental materials).

Disentangling the Trait-Like and State-Like Effects of Confrontation and Withdrawal Alliance Ruptures on Nonverbal Synchrony

The state-like effect of confrontation ruptures, calculated as their centered value, was significantly associated with nonverbal synchrony over the course of treatment ($B = .19$, $SE = .09$, $p = .03$). Higher levels of state-like confrontation ruptures were found to predict higher levels of nonverbal synchrony. The trait-like effect of confrontation ruptures, calculated as their mean value, was not significant (Table 1). The state-like effect of withdrawal ruptures, calculated as their centered value, and the trait-like effect of withdrawal ruptures, calculated as their mean value, were not significantly associated with nonverbal synchrony over the course of treatment (Table 1). Standardized coefficients of all the effects appear in the online supplemental materials.

Post Hoc Analyses

We conducted analyses examining the association between nonverbal synchrony and the repair of ruptures and the extent to which ruptures were resolved (these appear in the online supplemental materials). Findings show that the repair (Table S4 in the online supplemental materials) and the extent to which ruptures were resolved (Table S5 in the online supplemental materials) were not significantly associated with nonverbal synchrony. In addition, we conducted analyses examining the association between nonverbal synchrony and the therapist-reported ruptures (appear in the online supplemental materials). Findings show that the therapist-reported

ruptures were not significantly associated with nonverbal synchrony (Table S6 in the online supplemental materials).

Descriptive Analysis: Case Study

To illustrate the findings of the data analysis and to explore the co-occurrence of confrontation ruptures and nonverbal synchrony, we conducted descriptive analyses (Castonguay et al., 1996) of one case from the ongoing RCT. We chose the first session of treatment and the six sessions included in the multilevel models (Sessions 2, 4, 6, 8, 10, and 12). Initially, the descriptive analyses consisted of reviewing the videotaped therapy sessions, exploring the interpersonal processes occurring throughout treatment, and identifying (a) the ruptures occurring between the patient and therapist during the session and (b) their movements and nonverbal synchrony accompanying these ruptures. Three researchers performed the same analysis independently, after which they reached an agreement about the case formulation and the course of treatment. Finally, we integrated the measures of confrontation ruptures, using the 3RS (Eubanks et al., 2015), and the nonverbal synchrony, using the MEA (Ramseyer, 2020b), of the sessions with the descriptive analyses. To protect the confidentiality of the patient and therapist, their names and details were disguised. Both signed informed consent forms agreeing to the publication of their information.

Background

Mark is a married man in his late 40s who works in the field of engineering. He has three children in their early 20s who live at a distance and do not visit often. Mark married at a very young age, and his wife was his first romantic partner. He reports that the decision to marry was made under pressure from his parents, and it was not his genuine desire. On one hand, he describes growing up in an open and warm household, but on the other, he felt as if his interpersonal needs were at times a burden on his mother, who suffered from depression. He has been suffering from recurrent depressive episodes since late adolescence and has tried various

Table 1

Trait-Like and State-Like Confrontation and Withdrawal Alliance Ruptures as Predictors of Nonverbal Synchrony

Effects	Estimate	SE	df	T value	z value	p value
			Fixed effects			
Intercept	0.0009	0.55	7	0.00		.99
Time	0.25	0.20	402	1.25		.21
CFm × Time (TL)	−0.18	0.19	402	−0.97		.33
CFc (SL)	0.19	0.09	402	2.10		.03
WDm × Time (TL)	0.005	0.15	402	0.03		.97
WDc (SL)	−0.05	0.05	402	−1.07		.28
			Random effects			
Therapist	0.702	0.49			1.42	.07
Dyad	0.83	0.16			4.93	<.0001
Random	0.7	0.05			13.09	<.0001

Note. CF = confrontation ruptures; WD = withdrawal ruptures; c = centered value; TL = trait-like; SL = state-like. Because we were interested in predicting the development of nonverbal synchrony, and of confrontation and withdrawal ruptures in the alliance over time, we used the interaction of the mean predictor value (CFm; WDm) with time and the centered predictor value (CFc; WDc), as it develops over time (without interaction with time).

treatments, including psychotherapy and medication, which have helped only temporarily.

At intake, the patient had a score of 19 on the HRSD-17, from a potential range of 14 to 52 (Hamilton, 1967), which indicates a severe level of depressive symptoms (National Collaborating Centre for Mental Health, 2010). He also showed high levels of distress in interpersonal relationships, scoring 75 on the short version of the Inventory of Interpersonal Problems, from a potential range of 0 to 128 (IIP-32; Barkham et al., 1996), and high levels of attachment anxiety and attachment avoidance, with scores of 6.44 and 3.56 on the Anxiety and Avoidance scales, respectively, of the Experiences in Close Relationships scale, from a potential range of 1 to 7 (Brennan et al., 1998). At the beginning of the therapy sessions, Mark expressed the difficulties in his interpersonal relationships: "Some of the people around me just ignore my needs and wishes, this can really hurt me . . . I might keep silent about my feelings and try to avoid meeting these people as much as possible . . . I might also get very angry and upset until I blow up." The therapist, Emily, is an experienced female clinical psychologist in her 30s who received comprehensive training in SET (Luborsky, 1984; Luborsky et al., 1995), as part of the RCT.

Case Formulation

Based on the first sessions with the patient, Emily formulated Mark's core conflictual relationship theme (CCRT; Book, 1998; Luborsky, 1984). His interpersonal wish is that others accept him for who he is, including his flaws, and appreciate him for his strengths. Yet, he often feels that others respond to him in a critical and judgmental way. As a result, he feels hurt and insulted, which leads him to withdraw from expressing his feelings; he becomes angry and furious, and is liable to have outbursts at others, for which, immediately afterward, he feels shame and self-criticism.

Course of Treatment

As illustrated in Figure 1, Sessions 1 to 4 of therapy included a small number of confrontation ruptures and showed lower levels of nonverbal synchrony. Descriptive analysis suggests that the patient and therapist initially worked together in a good and agreeable way to get to know one another, and the therapist started to suggest interpretations aimed at

Figure 1

Confrontation Ruptures and Nonverbal Synchrony Over the Course of Treatment of Mark and Emily
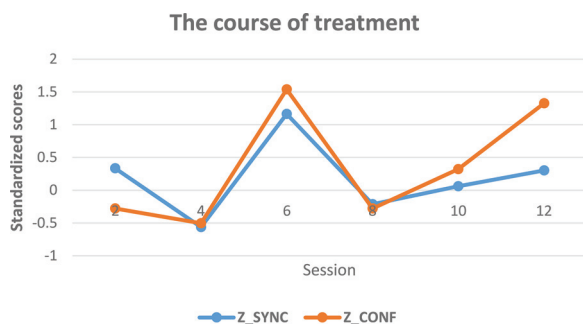
Note. The scores of confrontational ruptures and nonverbal synchrony have been standardized. See the online article for the color version of this figure.

exploring, together with the patient, his core conflictual relationship theme. During Sessions 5 to 7, however, Mark felt that the therapy was not helping him and blamed Emily in a noncollaborative manner, which manifested as confrontation ruptures (see the example of a vignette in the following text from one of these sessions). They discussed the ruptures, and Emily made great efforts to stay on the same page with Mark, making efforts to help him to express his concerns authentically by listening to him carefully and asking him about his feelings during those particular moments. She also tried her best to maintain an empathetic, validating, and accepting position by making an effort to understand his point of view at these moments. Emily was extremely cautious, walking on eggshells around Mark while trying to address the issues he had brought up and to attend to the ruptures between them. She made multiple efforts to do so but had to struggle to reach Mark.

Analyses of the Ruptures in Session 6

We now zoom in to Session 6, which included a substantial number of ruptures (Figure 2). This session came after several sessions in which Mark shared meaningful experiences, to be observed together, by him and the therapist, and to generate insights based on them. Later in the sessions, he seemed to show considerable anxiety and was overwhelmed by the contents coming to the surface in therapy. At Session 6, from the first moments, Mark expresses his dissatisfaction, coded in the 3RS with a score of 3 for confrontation ruptures and a score of 1 for withdrawal ruptures, as can be seen in the following short vignette:

Minute 1: Beginning of a Confrontation Rupture. Minute 1 of Session 6. The beginning of a confrontation rupture between Mark and Emily.

> Mark (opens the meeting with this): *I've been very irritated lately, more than I've ever been. I don't really understand what we are doing in the sessions, and they are very overwhelming and hard for me. I feel that following the sessions it's difficult for me to function in my day-to-day life, and I don't see the point of what we are doing. I feel as if it makes my depression worse and doesn't help me.* [Mark uses hand gestures that express helplessness while he talks. As she listens, Emily consistently nods her head. This was coded as complaints/concerns about the activities in therapy in the 3RS.]
>
> Emily: *I appreciate your sharing these feelings with me. It's important that you feel that you can express your feelings in the relationship between us, and share what feels right for you, and what doesn't.* [As she begins to respond, she changes her posture to one that is identical to Mark's. She significantly leans forward toward him and talks with considerable hand gestures.]

Minute 2: A Withdrawal Rupture. Minute 2 of Session 6. A withdrawal rupture occurs between Mark and Emily as Mark withdraws from the conversation.

> Mark: *I don't know what feels right to me and what doesn't. I have no idea.* [Mark seems to withdraw backward, without much movement, and finds it difficult to speak.]
>
> Emily: *It seems that you're attentive to your feelings.* [Emily nods and uses smaller hand gestures.]

Minute 3: Continuation of the Confrontation Rupture. Minute 3 of Session 6. The confrontation rupture between Mark and Emily continues.

Figure 2

Zoom-in Analysis of Session 6: Minute-By-Minute Fluctuations in the Nonverbal Synchrony Between Mark and Emily and the Co-Occurring Confrontation Ruptures
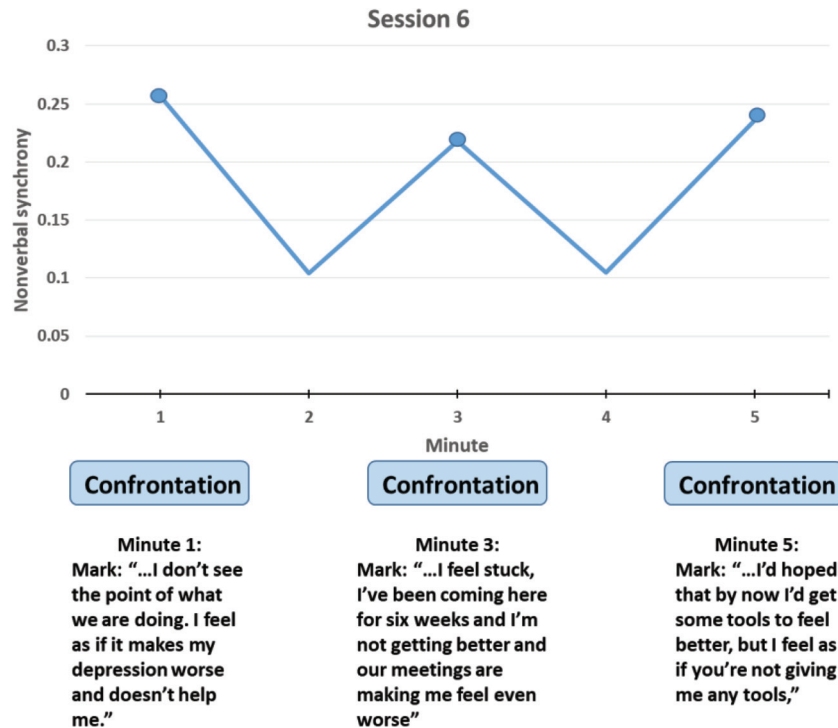
Note. The line is the nonverbal synchrony of the dyad during 5 min of therapy Session 6. The confrontation ruptures appear in the section below the *x* axis according to the time of their occurrence, along with the corresponding transcripts. See the online article for the color version of this figure.

Emily*: Can you tell me more about these feelings of irritation and nervousness you are experiencing?* [Emily nods curiously.]

Mark*: Every little thing annoys me; it's starting to come out toward my family and friends out of my control. I act impulsively and say offensive things I immediately regret. I feel stuck. I've been coming here for 6 weeks, and I'm not getting better, and our meetings are making me feel even worse.* [Mark uses big hand gestures that express frustration and despair. Emily nods, listening attentively. This was coded as complaints/concerns about the progress in therapy in the 3RS.]

Emily: *I can understand you; this sounds really difficult to feel and go through.* [Emily leans forward and nods with great hand gestures to convey a sense of understanding.]

Minute 4: Working Through the Confrontation Rupture. Minute 4 of Session 6. Mark and Emily begin working through the confrontation rupture.

Emily*: We'll talk more about what you've said, but I'd like to focus for a minute on how important it is that you've said something about the way you feel. For you, I think this is a positive thing. Usually when something bothers you . . .* [Emily uses small hand gestures.]

Mark*: Yes, I usually don't say anything at all . . .* [Nods slightly in agreement.]

Minute 5: Continuation of the Confrontation Rupture and Working Through It. Minute 5 of Session 6. The continuation of the confrontation rupture and working through it.

Mark*: I feel that talking in therapy about the things that are bothering me overwhelms me and that it's very hard and painful for me after our meetings. I'd hoped that by now I'd get some tools to feel better, but I feel as if you're not giving me any tools.* [Mark moves uncomfortably in his chair and uses big hand gestures. Emily nods considerably as she listens. This was coded as complaints/concerns about the activities in therapy in the 3RS.]

Emily*: It's very important that now you've said something about these feelings. We'll try to think together about what can help you cope with this. I want to encourage you to keep expressing and sharing your feelings with me and also in other relationships you have. It can be very helpful.* [Emily again changes her posture to match Mark's, leans toward him, and uses hand gestures to try and convey a sense of understanding and acceptance. Mark seems to be more engaged with the therapist as he nods in agreement and slightly smiles.]

The findings demonstrate how confrontation ruptures between patients and therapists are accompanied by higher levels of nonverbal synchrony, as the therapists make great efforts to be attentive to patients and in agreement with them.

Discussion

The present study sought to examine the association between alliance ruptures and nonverbal synchrony to better understand the relation between processes occurring within the therapeutic relationship and the nonverbal synchrony between patient and therapist. Our findings suggest that in psychotherapy for MDD, nonverbal synchrony has the potential to serve as a marker of confrontation ruptures in the alliance. Integration of the findings from the data analysis of the full sample and from the descriptive analyses of the case study shows that, when there are many confrontational ruptures, there is an increase in the level of the nonverbal synchrony between the patient and therapist.

The results of the data analysis may shed light on previous inconsistent results in the literature regarding the association between nonverbal synchrony and the alliance, where some found a positive correlation (Altmann et al., 2020; Cohen et al., 2021; Ramseyer & Tschacher, 2011, 2014) and others did not find such an effect (Paulick, Deisenhofer, et al., 2018; Ramseyer, 2020a). Our findings show that, when there are many confrontational ruptures in the alliance between patients and therapists, there are higher levels of nonverbal synchrony between them. Our findings have the potential to explain the mechanisms that may underlie the association between nonverbal synchrony and the therapeutic relationship, by highlighting the importance of focusing on the confrontation and withdrawal ruptures occurring within the alliance, and on their different associations with the nonverbal synchrony of the dyad.

The finding that confrontation ruptures between patients and therapists are accompanied by higher levels of nonverbal synchrony is intriguing. There are several potential post hoc explanations for this finding. First, several studies show an increase in synchrony during times of conflicts. Studies on conflict in couples report increased physiological synchrony during conflict (Coutinho et al., 2019; Levenson & Gottman, 1983) and higher levels of biological synchrony were associated with spousal strain and disagreement (Liu et al., 2013). Another study, using the same methodology for nonverbal synchrony in body movement, reported high levels of synchrony in both pleasant interactions and in competitive discussions (Tschacher et al., 2014). Second, the increase in synchrony could also be interpreted from an interpersonal perspective (Horowitz et al., 2006), which would predict that, during ruptures, the dimension of agency would be high in both patient and therapist—a combination of low complementarity but high behavioral coinfluence. On a behavioral level assessed in a collaborative problem-solving task, positive correlations between affiliative behaviors and negative correlations between dominant behaviors were reported (Sadler et al., 2009). A potential translation to the data in our study, high synchrony in ruptures, quantified by absolute cross-correlations based on movement-behavior, could thus be comparable to the high negative correlations found in dominant behaviors.

Third, a further potential post hoc explanation of this finding is that the nonverbal synchrony between the patient and therapist can function as a social glue (Lakin et al., 2003). It has been shown that movement coordination of interacting partners reflects not only the level of affiliation and rapport between them but can also be a means of achieving affiliation when the quality of their relationship is weak (Lakin et al., 2003). Thus, therapists may seek higher levels of nonverbal synchrony with patients when the level of the alliance between them is poor and there are many ruptures. Higher levels of synchrony may also be conceptualized as moments where the therapist's attention was more strongly focused on microprocesses occurring at the interpersonal level, signaling that they were fully present with the patient (Geller & Porges, 2014). This post hoc explanation is supported by the findings of the present case study, showing that the therapist may have struggled to increase the level of nonverbal synchrony with the patient to improve and maintain a strong alliance and a strong interpersonal presence, especially at times of confrontation ruptures that included conflict and distress, as evident in the session with the most profound confrontation rupture (Session 6). These findings are intriguing because, on one hand, higher levels of nonverbal synchrony have been shown to be associated with beneficial effects for the alliance and better outcome of treatment (Altmann et al., 2020; Cohen et al., 2021; Ramseyer & Tschacher, 2011, 2014), and on the other hand, signatures of synchrony have been also reported in phases of conflict and disagreement (Coutinho et al., 2019; Paulick, Deisenhofer, et al., 2018; Ramseyer, 2020a). Our findings show that higher levels of nonverbal synchrony are associated with confrontation ruptures. One way of reconciling these findings is to regard ruptures in the alliance as opportunities for significant therapeutic work in psychotherapy, which may have positive consequences in the longer term.

If replicated in future studies, the present findings may suggest the promising potential of nonverbal synchrony to serve as a marker of the ruptures occurring within the alliance between patients and therapists, which would present nonverbal synchrony as a potential indicator of significant events (both with positive as well as negative valence) in psychotherapy. Our findings show how important it is for therapists to be attentive to the nonverbal processes occurring during the sessions, in addition to the explicit words that are being said by patients. Ruptures that are not addressed and do not undergo a process of repair and resolution might have negative effects on therapy, such as deterioration and premature dropout (Eubanks et al., 2018; Gülüm et al., 2018). In addition to the content of the session, nonverbal synchrony may serve as an additional layer helping identify and assess confrontation ruptures using an automatic approach that does not require the investment of high cost, time, or effort. If additional future studies show that nonverbal synchrony can serve as a marker of the ruptures occurring within the alliance, it will be possible to develop an in-session automatic live feedback system that would provide feedback to therapists and patients on their nonverbal markers of ruptures in the alliance (Imel et al., 2017; Kleinbub, Mannarini, et al., 2020). This will provide information on the state-like development of ruptures throughout the session, when the rupture is increasing or decreasing, such that therapists can receive feedback on whether the techniques they use are effective in decreasing the intensity of the rupture. A feedback system could benefit the process of therapist training, both ongoing clinical practice and new therapist training, to help them identify confrontation ruptures and address them in the therapy session.

The present study had several limitations. Although the sample is moderate in size, it is still not large enough, and we may have missed small effects. Given the pioneering nature of our exploratory analyses, the findings should be interpreted carefully. The current study could not establish temporal precedence between

patient and therapist regarding the leading of the nonverbal synchrony. Future studies should examine whether other methods of quantifying nonverbal synchrony could explain what happens to nonverbal synchrony when there is a withdrawal rupture and the relationship with the repair process of ruptures. Future research should examine the extent to which nonverbal synchrony is giving therapists new information on ruptures. In addition, a causal examination of the association between nonverbal synchrony and alliance ruptures should be the focus of future studies. Because patients worked with only one therapist, we were not able to disentangle the dyad from the patient and dyad effect and due to the size of the therapists' sample, we could not accurately estimate the therapist effect. It will be important for future studies to systematically examine the extent of variance explained by therapists in nonverbal synchrony. Furthermore, the association between nonverbal synchrony and alliance ruptures may vary between different subpopulations of patients. Future studies should use a larger sample size to systematically examine moderators of attachment anxiety and avoidance of the patient and therapist to further characterize how alliance ruptures may manifest differently in individuals with distinct attachment orientations. Because this is an ongoing trial, we were not able to use treatment condition and outcome as variables. Future studies should examine to what extent the results of the current study can be generalized to other types of psychotherapy. Lastly, the findings of the present study are specific to patients with MDD, and additional studies should examine populations of patients with other diagnoses.

The present study may explain the mechanisms that underlie the association between nonverbal synchrony and the therapeutic relationship. The findings suggest that focusing on the ruptures occurring within the alliance can provide an in-depth study of how processes occurring within the therapeutic relationship are related to nonverbal synchrony. The confrontation ruptures occurring within the alliance between patients and therapists were found to be positively associated with higher levels of nonverbal synchrony, whereas the withdrawal ruptures showed no such association. The findings of the present study show that nonverbal synchrony can be a promising marker of alliance ruptures. Additional studies are needed to better understand the association between nonverbal synchrony and the processes of rupture and repair.

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