Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Dancing in synchrony with a new acquaintance increases romantic interest

Kira von Kleist
University of California San Diego
Piotr Winkielman
University of California San Diego
Karen Dobkins
kdobkins@ucsd.edu

University of California San Diego

Article

Keywords:

Posted Date: November 9th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11355089/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Dancing in synchrony with a new acquaintance increases romantic interest

Kira von Kleist[1*], Piotr Winkielman[1] and Karen Dobkins[1*]

[1*]Department of Psychology, University of California San Diego, La Jolla, CA, USA.

*Corresponding author(s). E-mail(s): kvonklei@ucsd.edu;
kdobkins@ucsd.edu;
Contributing authors: piotr@ucsd.edu;

Abstract

Previous research shows that moving in synchrony with others fosters social connection. In this study, we tested whether dancing, and particularly dancing in synchrony (vs. asynchronously) with a new acquaintance, increases romantic interest. Female participants were paired with a male partner (a confederate from the lab) and randomly assigned to one of three conditions: dancing the same moves in synchrony, dancing different moves asynchronously or sitting together without dancing (no-dance). Among 245 participants, those who danced synchronously with the confederate showed the greatest increase in romantic interest, when compared with the asynchronous and the no-dance condition. Furthermore, asynchronous dancing also increased romantic interest more than not dancing. Exploratory analyses showed that the effect of synchronous (vs. asynchronous) dancing on romantic interest was mediated by a change in positive affect. These findings suggest that dancing in synchrony with a new acquaintance may promote romantic interest.

Keywords: Synchrony, Dance, Partner Dance, Romantic Attraction, Social Bonding, Positive Affect, Stranger

1 Introduction

Around the world, people commonly engage in dance in social contexts, often moving rhythmically together in groups or dyads. As proposed by Dunbar [1], humans

may rely on music and dance to foster affiliation across larger social groups. Specifically, the repetitiveness of the music allows for predictability, which further facilitates coordination and synchronization in movements among two or more individuals [2]. Dunbar [1] further discussed sexual selection as an additional explanation for the evolution of dancing. This is supported by the evidence of synchronous courtship dances in other species. For example, synchronous movements during pair formation have been observed in the western grebe [3], as well as in the fiddler crab [4]. In humans, partner dancing has been suggested as a way to allow individuals to evaluate a partner's romantic potential, through their ability to coordinate [5]. Unlike group dancing, where individuals primarily synchronize to a beat in the music, partner dancing demands an additional layer of synchronization with a partner's movements. This type of synchrony may be especially important in dyads as the coordination of movements between partners may generate a sense of moving as one.

More broadly, research outside the domain of dance has identified interpersonal synchrony as a particularly powerful mechanism through which coordinated activity promotes social connection. Across a range of studies, interpersonal synchrony has been shown to increase connection relative to control conditions across a variety of outcome measures, including liking, closeness, and cooperation [6]. These effects have been demonstrated using a wide range of simple behaviors, including rocking in chairs [7], walking in step [8], and finger tapping [9].

Consistent with findings from the broader synchrony literature, studies of dance have similarly linked synchronous movement to increased social connection. For example, in one study, Tarr et al. [10] showed that participants dancing synchronously in groups in a silent-disco scenario felt more socially bonded to their group members compared to participants who performed different dance moves than their group members. In another study, Reddish et al. [11] had participants dance in groups of four to a metronome beat. Participants who danced to the same beat reported feeling more connected compared to participants who danced to a different beat. Interestingly, in this study, the authors also assigned participants to a condition in which they were instructed to actively coordinate together to achieve synchrony. This "shared intentionality" condition reported the highest levels of social bonding among group members. Importantly, however, most dance-based synchrony research has focused on groups rather than dyads, leaving it an open question whether interpersonal synchrony within partner dance increases social connection, and in particular, romantic interest.

At the same time, the broader synchrony literature has faced growing methodological scrutiny. Rennung and Göritz's [6] meta-analysis found that synchronous movement increased self-reported prosociality and prosocial behavior; however, the effects on self-reported prosociality became weaker and the effects on prosocial behavior became substantially non-significant when analyses were limited to studies employing experimenter blinding procedures. Notably, relatively few studies in the meta-analysis explicitly reported that experimenters were blind to participants' condition assignments, raising concerns that subtle experimenter behavior may have influenced participants' responses. Building on these concerns, Atwood et al. [12] noted that many synchrony studies rely on procedures in which experimenters are aware of the study hypotheses and condition assignments. Furthermore, Schachner and Garvin

failed to replicate previously reported synchrony effects on cooperation, conformity, and trust when experimenters were blinded to condition (as reported in Atwood et al. [12]). Atwood et al. [12] further argue that synchrony effects may partially reflect participant expectancy effects, whereby participants' belief that synchrony should increase social bonding shapes how they respond. This expectancy concern may also apply to Reddish et al. [11], where participants in the "shared intentionality condition" who were asked to work together to achieve synchrony reported the highest feelings of social bonding. Together, these findings suggest that although synchrony is often associated with increased social connection, the robustness and underlying mechanisms of these effects remain an active area of investigation.

1.1 The present study

To address these limitations, the current study examined the effects of synchrony within the context of partner dancing in dyads, and romantic interest. In addition, the study incorporated several methodological features designed to reduce potential expectancy and experimenter effects. First, experimenters were kept blind to the study hypotheses and condition assignments in order to minimize experimenter bias. Second, synchrony was embedded within the broader context of partner dancing, and an active control condition was included, which was recommended by Atwood et al. [12] to reduce the likelihood that participants would infer synchrony to be the primary mechanism under investigation. Third, rather than explicitly instructing participants to synchronize, synchrony was manipulated indirectly by teaching participants the same dance routine while the confederate either performed matching or non-matching movements, allowing synchrony to emerge more naturally during the interaction. All participants danced to the same music without the use of headphones, reducing potential confounds associated with shared auditory experiences. Fourth, we avoided manipulating temporal mismatch alone (e.g., partners moving to different beats or hearing offset music) and instead focused on movement mismatch, as a partner perceived to be off beat may be judged as less skilled or competent, thereby introducing an unintended confound. Fifth, the use of a confederate, together with video recordings, allowed for greater control over the actual level of synchrony achieved during the interaction. Finally, we examined potential mediating variables to shed further light on the mechanisms linking synchrony to romantic interest. In particular, one possible candidate is positive affect, which has been linked to synchrony [13].

Together, previous literature suggests that although synchrony is often associated with social bonding, the robustness of these findings remains uncertain, due to experimenter bias and participant expectancy. In addition to addressing the methodological limitations, we extend the literature by examining whether partner dance promotes social connection and romantic interest in dyads.

2 Methods

The study design, hypotheses, and analyses were preregistered on the Open Science Framework (OSF; https://osf.io/38k9v)

2.1 Participants

Participants were undergraduate students at our university who received academic credit in exchange for their participation. Eligibility criteria included participants who self-identified as female, heterosexual and single, and who were over 18 years old. Before starting the study, all participants read and signed an informed consent form and a video consent form and agreed to participate. The study was approved by the IRB at the University of California, San Diego (IRB approval: 807172). All methods were carried out in accordance with relevant guidelines and regulations.

2.2 Sample Size

A meta-analysis by Mogan and colleagues [13] revealed a wide diversity of effect sizes in this literature – ranging from .16 to .48, depending on the DV (behavior, affect, perception, cognition) and the specific comparison (synchrony, coordination, no action). Assuming an effect in the lower range, we conducted an a priori power analysis using G*Power (version 3.1.9.7) [14, 15] based on a meta-analytic effect of synchronous vs. asynchronous movements (mean effect size $r = 0.17$ [13]). This analysis indicated a required sample size of 325 participants to obtain a statistical power of 0.80.

2.3 Exclusion Criteria

We tested 376 participants in our study. After the initial data collection, we found that one confederate did not perform the dance as instructed during a fidelity check. Therefore, we excluded the participants who were tested by this confederate and recruited another 51 participants to make up for the loss of participants. The following exclusion criteria were implemented in the order presented below. The first exclusion was based on an "attention check": at two randomly placed points in the survey, participants were instructed to select a specific option (e.g., "please select number 5 to show that you are paying attention"). If they failed any of these, they were excluded ($n = 26$). The second exclusion criterion was participants' self-reported levels of attention and compliance, assessed at the very end of the study. Participants were excluded if they did not select the highest of four levels of attention/compliance: "I read all instructions and questions carefully and answered honestly to the best of my ability" ($n = 12$). The following three exclusion criteria were implemented for participants who changed their responses regarding eligibility criteria for our study from the time of recruitment to the time of the actual study ($n = 34$). This included people who at the time of the study reported: (1) being a gender other than "woman" (n=2), (2) being "Gay or Lesbian" (n=5) or (3) being in a relationship and answering "yes" to an exit question that read: "If you indicated that you are currently in a relationship, do you believe being in a relationship affected the way you answered questions about your study partner?" (n=27). The final sample of participants included for analysis was 245.

2.4 Study Conditions

Participants were randomly assigned to one of three conditions. In all three, the participant was trained on simple dance moves by a research assistant before meeting their partner, who was one of five confederates in the study. The three conditions were: 1) Synchronous, in which the participant danced with a partner (a confederate pretending to be another participant) who was making the same movements as the participant, 2) Asynchronous, in which the participant danced with a confederate who was not always making the same movements as the participant, or 3) No-Dance Condition, in which the participant sat near the confederate while they both reflected on the dance routine they had just learned. In all three conditions, the participant and the confederate were placed two feet apart, facing each other, and both were instructed not to talk.

2.5 Study Design

Before beginning the study, all confederates were taught three simple dance moves in two different sequences (routine "A" vs. "B") by a dance instructor. As described further below, "routine A" was designed such that the confederate's sequence/movements would always match with that of the participant's (Synchrony condition), while "routine B" was designed such that the sequence/movements would not match roughly 2/3 of the time (Asynchrony condition). To reduce variability, the dance instructors paid close attention to ensure that the different confederates made the same steps, arm, hand, and head movements during the dance. In addition, confederates were instructed to wear the same clothes (white T-shirt and jeans) and remove all jewelry and accessories during the study. Importantly, confederates were kept blind to the hypotheses and measures of the current study, and although they could clearly notice the difference in the degree of synchrony between the two conditions when dancing with participants they had no reason to believe that one condition would result in greater romantic interest (the dependent measure) than the other.

2.6 In-Lab Procedure

Introductions and Pre-Intervention Surveys.

When the female participant entered the lab, the male confederate (pretending to be another participant) and the female research assistant (RA) were already waiting. At that point, the RA welcomed both, saying: "Welcome to the study. Now that everyone is here, we can get started. The two of you will be partnered up today." The RA then instructed the participant and confederate (whom we hitherto refer to as the "dyad") to look at one another, and then proceeded to act distracted (trying to find the consent form) to allow the dyad a little extra time to get familiar with one another. The RA then led the confederate to a separate room, to give the impression (to the participant) that the confederate was undergoing his own consent by a different RA. Once alone with the participant, the research assistant opened a survey on the lab computer and instructed the female participant to complete the consent form and some survey questions. The survey questions included rating the confederate on several scales (based on first impressions), including our Baseline Romantic Interest Scores

(which we later used as a covariate in our models). After completing the survey, the RA taught the participant a simple dance routine, as described below.

Participant Dance Training.

All participants were trained in the same three simple dance moves, in the same sequence, with the same music, for an entire routine lasting approximately 3:30 min, comparable to a duration used in previous synchrony studies [16, 17]. (For a full description of dance moves and training, please refer to the Supplementary Materials.) The dance was designed to be as easy as possible while still providing variability for the different synchrony conditions. All participants went through eight rounds of training, during which the RA first explained each step individually and practiced it afterward with the participant. The RA semi-faced the participant when demonstrating the dance moves and then turned their back to the participant to practice the moves together. After training the individual moves, the RA practiced the complete three-step sequence with the participant and then the RA observed the participant dancing on their own for two additional rounds. Participants were allowed up to two additional practice rounds if they had difficulty completing the routine. Although the moves were simple, this long training session was necessary to ensure that all participants were equally comfortable with the dance.

2.7 Intervention

After the dance training, the RA walked over to the door to the hallway, opened the door slightly, and pretended to ask another RA, named Jill, if the "other participant was ready", at which point the confederate rejoined the RA and participant in the original room. Next, one of the three conditions followed.

Synchrony Condition.

The RA instructed the dyad to face one another and dance the routine they had just separately learned. The RA started the dance music, gave them a "4, 3, 2, 1" signal, left the room, and then the dyad began to dance together for 3:30 min. Here, the confederate knew to dance "routine A", which resulted in the dyad moving in synchrony (noting that because they faced one another, synchrony was achieved by the confederate moving to his left while the participant moved to her right, and vice versa).

Asynchrony Condition.

As above, the RA instructed the dyad to face one another and dance the routine they had just learned separately. Here, however, the confederate knew to dance "routine B", which resulted in the dyad moving asynchronously for most of the sequence (see Supplementary Materials for details).

No-Dance Condition.

The RA instructed the dyad to sit across from one another (as they had been when first getting acquainted at the beginning of the study) and simply reflect, while the

music played, on the dance routines they had just learned. They were allowed to take notes about their memories if they wanted.

The confederates were counterbalanced in all conditions. In other words, each confederate rotated through all three conditions, ensuring that conditions were evenly distributed among them. This approach helps balance any potential confederate-specific effects. In all cases, the interactions between the participant and the confederate were videotaped to assess procedural fidelity (see Results).

2.8 Post-Intervention Surveys

When the intervention was completed (after 3:30 min), the RA returned to the room and then guided the confederate to the separate room where they were pretending to finish up the study with "the other RA, Jill". Once alone with the participant, the RA opened a survey on the lab computer and instructed the female participant to complete the survey questions again. This survey included questions about their affective state and asked them to rate their partner again on the same scales as before. At the end of the study, participants were thanked and handed a debrief form.

2.9 Addressing Biases in Synchrony Research

As noted in the Introduction, concerns have been raised about the internal validity of synchrony research. To minimize these concerns we implemented the following features in our study design. In order to address experimenter bias, research assistants were largely trained separately from confederates and both teams were blind to our hypotheses. Furthermore, the research assistants were kept blind to the difference between the synchrony and the asynchrony condition (since the instructions in the beginning of these two conditions were the same). While confederates were aware that the study involved dancing in synchrony vs. asynchrony, they were not aware of any of the other procedures in the lab (subsequent tests or questionnaires). Confederates and research assistants could not correctly identify the purpose of the study, when asked after the study was conducted.

2.10 Measures

The following measures were collected in all three conditions. All measures were adapted to a 7-point Likert response format to maintain consistency in resolution across items and to simplify the survey experience for participants (noting that this adaptation should have negligible effects on psychometric properties [18]).

Dependent Variables.

Four items were used as the dependent measure, with the pre-registered decision to use their average if they were highly correlated (see Results). For this reason, we collectively refer to the four as "Romantic Interest", which were collected both pre-intervention (which we refer to as "baseline") and post-intervention. They consisted of:

Attractiveness.

"How attractive would you rate your partner?" (1=not at all, 7=very much). Note that this item was embedded with a list of seven other attributes about the partner (e.g., Openness to new experiences, Intelligence) to conceal the primary focus on attractiveness and reduce participant bias.

Connection.

"How connected do you feel to your partner?" (1=not at all, 7=very much).

Desire to Spend Time with the Partner.

"To what extent would you want to spend time with your partner?" (1=not at all, 7=very much).

Self-Other Merging.

Here, we used the Inclusion of Other in the Self (IOS) Scale [19].

2.11 Covariates

In addition to the dependent variables, we measured several covariates to investigate potential mechanisms underlying the relationship between synchronous vs. asynchronous dancing and Romantic Interest.

Positive and Negative Affect.

Here, we used the Positive and Negative Affect Schedule (PANAS) [20]. The inclusion of the PANAS was motivated by previous, albeit mixed, literature regarding the potential role of affect. In their meta-analysis, Mogan et al. [13] list positive affect as one potential mechanism for the interpersonal benefits of synchrony. In line with this notion, Tschacher et al. [21] reported that prior synchrony could predict later positive affect, although others have failed to support this claim [8, 10].

Eye Contact.

At the end of the study, confederates were instructed to report the degree of eye contact they had with the participant (1= not at all, 7 = very much). This was motivated by a previous finding by Tunçgenç and Cohen [22] showing that eye contact is significantly greater in children playing synchronously (vs. asynchronously), although eye contact was not found to mediate the effect of synchrony on the dependent variable, i.e., prosocial behavior.

Perceived Task Performance.

"When performing the task across from your partner, how well do you think you performed the task?"

Effort.

"When performing the task across from your partner, how effortful was the task?"

Randomization check.

To ensure that the randomization of participants across the three conditions did not result in trait-level differences that might bias results, we added two extra questions. (1): Enjoy Dance. "How much do you enjoy dancing?" (1= not at all, 7 = very much), and (2) Prior Dance Experience. "How much dance experience do you have?" (1= not at all, 7 = very much). Simple ANOVAs revealed that there were no differences across the three groups for these two items (both F values < 0.85, both p values $> .433$).

2.12 Data Analysis

All statistical analyses were computed using R (version 4.6.1) [23]. Between-group differences in "Romantic Interest" were analyzed using multilevel models. Romantic Interest following the intervention (i.e., post-intervention) was modeled as the dependent variable, with baseline scores (pre-intervention) and condition (Synchrony, Asynchrony vs. No-Dance) as independent variables, and confederate as a random effect. Interaction terms were dropped from the model if they were not statistically significant. Because the baseline level of the Romantic Interest was entered as a covariate to account for individual differences at baseline, a one-unit increase in the dependent variable can be interpreted as a one-unit change in scores following the intervention, accounting for baseline scores. To examine changes in our dependent variable (Romantic Interest) as a result of intervention, we computed difference scores (post-intervention minus pre-intervention), and analyzed them with paired-sample t-tests. All tests were two-tailed with $\alpha = .05$. As a final step, we focused on the comparison between the Synchronous and Asynchronous conditions to isolate the effects of synchrony per se and to shed light on potential mechanisms. To identify candidate variables that might account for this difference, we first tested which covariates significantly differed between these two conditions. Only those variables were carried forward into exploratory mediation analyses, which used percentile bootstrapping to estimate the proportion (and significance) of the effect of synchrony on Romantic Interest that could be explained by these covariates.

3 Results

3.1 Descriptive Statistics

For the 245 participants retained for analysis, the mean age was 20.25 years (SD = 2.47). Participants self-identified as Asian (40.4%), followed by Hispanic/Latino (31.4%), White (13.1%), Mixed (8.6%), Middle Eastern/North African (4.5%), and Black/African American (1.6%). One participant preferred not to indicate their ethnoracial status. The majority of participants were single (78%) at the time of the study, and this percentage did not differ significantly across the three Conditions ($\chi^2(2, N = 245) = 1.71$, $p = .43$).

3.2 Interrater Coding of Synchrony

To ensure procedural fidelity, two independent coders watched the dance videos from the Synchrony condition ($n = 82$ sessions) and Asynchrony condition ($n = 63$ sessions)

and rated the degree to which the confederate/participant dyad was dancing synchronously. (Note that we lost video data from 21 participants, 13%, due to technical failure). To this end, each dance session was divided into 20 eight-count segments and coders were instructed to rate each segment on a scale of 0 (completely asynchronous) to 1 (completely synchronous), with the prediction that the average of these segments should be close to 1 in the Synchronous condition and 0.33 in the Asynchronous condition (since this latter condition was designed to produce synchrony one-third of the time, see protocols, above). The results showed excellent interrater reliability (Cohen's kappa = .951) and significantly higher synchrony in the Synchronous condition (M = 0.92) than in the Asynchrony condition (M = 0.28) ($t(123.2) = 24.90$, $p < .001$).

3.3 Dependent Variable: Romantic Interest

As a first step, we examined whether our four measures of Romantic Interest (Attractiveness Rating, Connection, Self-Other Merging, and Desire to Spend time with the other person) could be combined into a single composite score. Given acceptable internal consistency (Cronbach's alpha = .67), we averaged the four items into a single "Romantic Interest" score. Baseline Romantic Interest scores (i.e., pre-intervention) did not differ significantly across the three conditions ($F(2, 242) = 0.40$, $p = .668$). On average, the mean score across the three conditions was 2.49 (SD = 0.76) on a scale of 1–7.

3.3.1 Does Synchronous Dancing Enhance Romantic Interest?

The main goal of the present study was to determine whether dyads who dance in synchrony (i.e., perform the same movements at the same time) show higher Romantic Interest when compared to 1) dyads who dance asynchronously, and 2) dyads in the No-Dance condition. To test this, we conducted a linear mixed model (Type II), in which Romantic Interest scores following the intervention were modeled as a function of baseline Romantic Interest scores (i.e., pre-intervention) and Condition (with the Synchrony Condition as the Reference Group), with Confederate included as a random effect. As shown in Table 1, Romantic Interest was significantly lower in the Asynchronous (β ($s.e.$) = -0.25 (0.10), $p = .016$, CI = (-0.46, -0.05)) and the No-Dance condition (β ($s.e.$) = -0.68 (0.10), $p < .001$, CI = (-0.88,-0.47)), when compared to the Synchrony Condition.

We also asked whether Romantic Interest was lower in the Asynchronous vs. the No-Dance Condition, by including just those two conditions in a separate model, while also controlling for prior Romantic Interest and including Confederate as a random effect. Compared to the Asynchrony Condition, Romantic Interest was significantly lower in the No-Dance Condition (β ($s.e.$) = -0.42 (0.10), $p < .001$, CI = (-0.61, -0.22)), when controlling for prior Romantic Interest.

3.4 Change in Romantic Interest

Although the regression model in Table 1 shows that participants in the Synchrony condition had higher post-intervention Romantic Interest scores than the other conditions (when controlling for baseline), it does not address whether Romantic Interest

Table 1 Linear mixed model predicting post-intervention Romantic Interest ($N = 245$)

Predictor	β (se)	95% CI	p
Baseline Romantic Interest	0.70 (0.04)	[0.62, 0.79]	<.001
Synchrony vs. No-Dance	−0.68 (0.10)	[−0.88, −0.47]	<.001
Synchrony vs. Asynchrony	−0.25 (0.10)	[−0.46, −0.05]	.016
Marginal $R^2 = .55$, 95% CI [.48, .63]			

Note: Confederate was included as a random effect. The Synchrony Condition is the reference group. β = standardized regression coefficient (all continuous variables were z-scored; condition comparisons are semi-standardized); se = standard error; CI = confidence interval of β.

changed from pre- to post-intervention. To test this, we created a difference score (post minus pre) for each participant, with values greater than zero indicating an increase in Romantic Interest following the intervention. Means and standard errors for each of the three conditions are presented in Figure 1. Paired-sample t-tests, comparing Romantic Interest before and after the intervention, showed a significant increase in Romantic Interest for the Synchrony group ($t(88) = 10.94$, $p < .001$), with a large effect size (Cohen's $d = 0.84$). In contrast, the Asynchrony group showed a medium increase in Romantic Interest ($t(76) = 6.82$, $p < .001$, Cohen's $d = 0.63$). And, the No-Dance Condition showed a small increase in Romantic Interest after the intervention ($t(78) = 2.61$, $p = .011$; Cohen's $d = 0.17$). The small increase in Romantic Interest in the No-Dance condition might best be explained by an increase in familiarity with the partner [24].

3.5 Potential Covariates

Having found a significant effect of synchronous dancing on Romantic Interest, our next analyses turned to investigating potential mechanisms that might account for the observed differences between the Synchrony and Asynchrony conditions. To this end, any of the measured covariates (see Methods) found to differ between those two conditions are potential candidates. Table 2 shows the means and standard deviations of these covariates for the Synchrony ($n = 89$) and Asynchrony ($n = 77$) conditions, and the p-value (based on a t-test) and Cohen's d associated with differences between the two.

Following our preregistration, only covariates that differed significantly between the two conditions (Synchronous and Asynchronous) were tested as a potential mechanism to account for differences in Romantic Interest between the two conditions. The only covariates that met this criterion were Change in Positive Affect and Perceived Task Performance. As a first step, we re-ran the model in Table 1, but simply removed data from the No-Dance Condition, with the results presented in Table 3 (left panel). As above, we ran a linear mixed model (Type II), in which post-intervention Romantic Interest was modeled as a function of Condition (Synchrony vs. Asynchrony), baseline

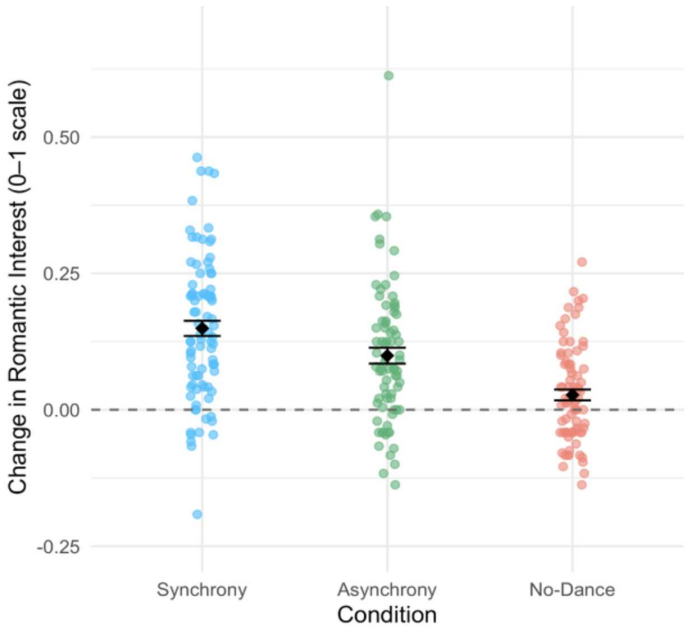


Fig. 1 Romantic Interest difference scores by condition. Difference scores (post-intervention − pre-intervention) for the Synchrony Condition ($n = 89$), Asynchrony Condition ($n = 77$) and No-Dance Condition ($n = 79$). Scores were rescaled to 0–1 (original scale from 1–7). The dashed line marks no change.

Table 2 Covariates by condition

Covariate	Synchrony ($n = 89$)	Asynchrony ($n = 77$)	p	Cohen's d
Change in Positive Affect	−0.21 (0.77)	−0.49 (0.76)	.018	0.37
Perceived Task Performance	5.00 (1.53)	4.42 (1.79)	.029	0.35
Change in Negative Affect	−0.29 (0.79)	−0.09 (0.72)	.094	−0.26
Eye Contact	4.02 (1.81)	3.66 (1.92)	.218	0.19
Effort	4.63 (1.60)	4.61 (1.50)	.938	0.01

Note: Values are means with standard deviations in parentheses. p-values are from two-tailed Welch's t-tests; Cohen's d is based on the pooled standard deviation.

Romantic Interest scores, with Confederate included as a random effect. As expected, the results showing differences between the Synchrony and Asynchrony condition were unchanged from the model that included the No-Dance Condition. We then re-ran this model with the inclusion of two covariates: Change in Positive Affect and Perceived Task Performance. We first ensured that there were no interactions between Condition and either covariate, and because there were none (all ps $> .34$), they were removed from the model for parsimony. The results showed that only Change in Positive Affect was a significant predictor of Romantic Interest (β $(s.e.) = 0.30$ (0.05),$p < .001$, CI $=$ $(0.20, 0.41)$), whereas Perceived Task Performance was not (β $(s.e.) = 0.07$ (0.05), $p =$

.177, CI = (−0.03, 0.18)). For this reason, only Change in Positive Affect was included as a covariate in the final model, with results shown in Table 3 (right panel). As expected, Change in Positive Affect remained a robust predictor of Romantic Interest (β (*s.e.*) = 0.31 (0.05), $p < .001$, CI = (0.20, 0.41)), and its inclusion significantly improved the model fit ($\chi^2(1) = 31.10$, $p < .001$; BIC without Change in Positive Affect = 397.04, BIC with Change in Positive Affect = 371.05). Additionally, the effect of condition was attenuated with the inclusion of this covariate (β (*s.e.*) = −0.13 (0.11), $p = .211$, CI = (−0.34, 0.08)). Positive Affect decreased from pre- to post-intervention in both the Synchrony and the Asynchrony Condition, but significantly less after synchronous dancing (see Table 2). For simplicity, we refer to this relative difference as synchrony improving change in positive affect compared to asynchronous dancing.

3.6 Mediation Analysis

This finding suggests that Change in Positive Affect accounts for the effect of synchronous (vs. asynchronous) dancing on Romantic Interest. To demonstrate this indirect effect more rigorously, we used the PROCESS macro for R Version 5.0 [25], including Baseline Romantic Interest as a Covariate. A 95% confidence interval for the indirect effect was computed with 5,000 percentile bootstrap samples. All continuous variables were z-scored prior to the mediation analysis, so coefficients are standardized. The results show that Synchronous (vs. Asynchronous) dancing significantly increased Romantic Interest (i.e., the "total effect", $c = 0.25$, $t = 2.16$, $p = .032$), Synchronous (vs. Asynchronous) dancing increased Change in Positive Affect ($a = 0.37$, $t = 2.42$, $p = .017$), and Change in Positive Affect was associated with Romantic Interest (after controlling for dance condition, $b = 0.30$, $t = 5.73$, $p < .001$). This means that the indirect effect of Change in Positive Affect was 0.11 (0.37×0.30) with a 95% confidence interval of 0.02 to 0.22. After accounting for this covariate, synchronous dancing still increased Romantic Interest, but this effect was smaller and not significant (the "direct effect", $c' = 0.13$, $t = 1.26$, $p = .211$). Put another way, the proportion of the effect of Synchrony on Romantic Interest that was mediated by Positive Affect was 46%.

3.7 Covariates that Predict Romantic Interest

Lastly, we were interested in exploring other variables that might enhance Romantic Interest in two people dancing together, regardless of the degree of synchrony. To this end, we used data solely from the Synchrony condition and looked at which of our covariates were most strongly associated with Romantic Interest, when controlling for baseline Romantic Interest. To test this, we conducted a linear mixed model (Type II) analysis, in which Romantic Interest scores following the intervention were modeled as a function of baseline Romantic Interest scores (i.e., pre-intervention), as well as the covariates shown in Table 2. Including all covariates in the same model allowed us to look at the unique effect of each when controlling for all others.

The results reveal two significant covariates. The first was Change in Positive Affect (β (*s.e.*) = 0.27 (0.07), $p < .001$), which mirrors the results observed when

Table 3 Models with and without Change in Positive Affect ($N = 166$)

	Parsimonious Model			Model with Covariate		
Predictor	β (se)	95% CI	p	β (se)	95% CI	p
Baseline Romantic Interest	0.68 (0.06)	[0.57, 0.80]	<.001	0.66 (0.05)	[0.55, 0.77]	<.001
Synchrony vs. Asynchrony	−0.25 (0.11)	[−0.47, −0.02]	.032	−0.13 (0.11)	[−0.34, 0.08]	.211
Change in Positive Affect				0.31 (0.05)	[0.20, 0.41]	<.001
Random effects						
σ^2	0.55			0.46		
τ_{00}	0.01			0.02		
Marginal / Conditional R^2	.467 / .475			.554 / .568		

Note: Linear mixed models with Confederate as a random effect. Condition is dummy coded with the Synchrony Condition as the reference level. Change in Positive Affect = post-intervention minus pre-intervention. β = standardized regression coefficient; se = standard error; CI = confidence interval of β

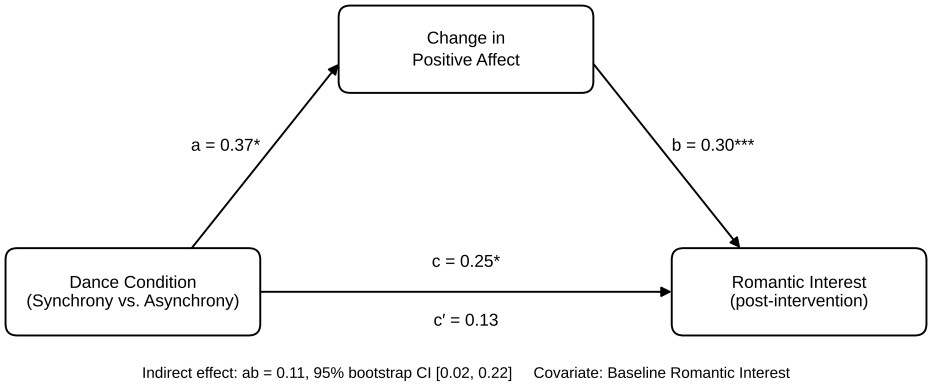


Fig. 2 Mediation of the effect of synchrony on Romantic Interest by Change in Positive Affect. Standardized coefficients from PROCESS Model 4 [25] ($n = 166$; Synchrony vs. Asynchrony Condition), controlling for baseline Romantic Interest. Condition was coded 0 = Asynchrony, 1 = Synchrony. a = effect of condition on Change in Positive Affect; b = effect of Change in Positive Affect on Romantic Interest; c = total effect; c' = direct effect. The indirect effect ($ab = 0.11$, 95% CI [0.02, 0.22]) was tested with 5,000 percentile bootstrap samples. $^{*}p < .05$, $^{***}p < .001$.

not controlling for all other covariates (i.e., the "b" pathway in Figure 2). The other covariate that was significantly associated with Romantic Interest was Effort (β ($s.e.$) = 0.23 (0.07), $p < .001$). That is, participants who reported that the task was more effortful showed greater increases in Romantic Interest.

4 Discussion

The findings of this double-blinded experiment indicate that a brief partner dance exercise can increase romantic interest in a new acquaintance, relative to a no-dance condition and that this effect was stronger when movements were synchronous (vs. asynchronous). Furthermore, this effect was mediated by change in positive affect, such that synchronous dancing improved change of positive affect relative to asynchronous dancing, which in turn predicted greater romantic interest.

These findings are consistent with the synchrony literature showing that synchronous movements can lead to more connection [6] and synchronous dancing in groups can lead to more social bonding between the group members [10, 11]. The present study extends this work in two important ways. First, it moves beyond group level designs to examine synchrony within a dyad, a context that received relatively little attention despite its relevance to relationship formation. Second, by addressing potential limitations from previous studies, such as potential experimenter and participant expectancy effects, the study adds to the existing debate whether the effects reported in the synchrony literature are real, by incorporating several methodological safeguards, such as blinding experimenters and incorporating both an active and a passive control condition.

The mediation findings further contribute to an ongoing debate about the mechanisms underlying synchrony effects. Prior evidence regarding positive affect had been

mixed. For example, Mogan et al. [13] found a small but significant effect of synchrony on positive affect across studies. On the other hand, studies such as Wiltermuth and Heath [8] found no difference in positive affect between synchronized and nonsynchronized walkers, and although Tarr et al. [10] observed increases in positive affect following group dancing, these increases did not differ across synchrony conditions. It might be that positive affect plays a particularly strong role in dancing and that prior studies were underpowered to detect this effect. Mogan et al. [13] also note that even small effects of positive affect in the synchrony literature might be enhanced in more naturalistic settings, because laboratory studies naturally limit how much positive affect participants are experiencing.

We also found that effort significantly predicted romantic interest in the synchrony condition, such that participants who reported greater effort during the task showed higher levels of Romantic Interest in the dance partner. Although exploratory, there are at least two interpretations of this association between Effort and Romantic Interest. First, Romantic Interest may emerge dynamically during the interaction, such that participants who begin to feel more socially connected become more motivated and thus report exerting greater effort. Second, this effect may reflect a form of effort justification, with participants assigning higher value to effortful outcomes [26, 27].

5 Limitations

Although the present study addresses several methodological critiques of prior studies, some limitations remain. While confederates were not informed of the study's hypotheses, they were aware of the differences in conditions. Several steps were taken to minimize experimenter bias, for example by keeping confederates blind to the actual hypotheses about the study, instructing confederates to maintain consistent facial expressions and not letting confederates and participants speak to each other throughout the experiment. Nevertheless, confederates might have still had hypotheses about the difference in conditions and subtle unintended differences in behaviors could remain.

The sample was also restricted to heterosexual female and single participants, which limits the generalizability of the findings. The effects of synchrony on romantic interest may differ for male participants, those with diverse sexual orientations or individuals from different cultural backgrounds. Additionally, variables such as the physical attractiveness of the partner or the participant's current relationship status may moderate the relationship between synchrony and romantic interest.

Furthermore, while laboratory settings allow for tight control of confounding variables, they are limited in ecological validity. Partner dancing in real-world contexts tends to occur in less artificial settings and over longer periods of time. That synchrony effects were detectable within such a brief and controlled interaction setting suggests that the magnitude in naturalistic settings might be considerably larger.

Finally, there are other factors that might be associated with partner dancing besides synchrony that could affect romantic interest, such as touch, vulnerability and creativity. The current study did not explore these factors, and future research

should examine additional factors alongside synchrony to develop a more complete understanding of how partner dancing affects romantic interest.

Declarations

Funding. This research received no specific funding.

Competing interests. The authors declare no competing interests.

Consent for publication. Not applicable.

Data and code availability. The de-identified data and the R code in this article are openly available on the Open Science Framework at https://osf.io/bve8t/. The PROCESS macro for R (v5.0) used for the mediation analysis can be downloaded from https://www.afhayes.com/download.html.

Author contributions. All authors contributed to the concept and design of the study. K.v.K. supervised data collection, analyzed results, and wrote the first draft. All authors contributed to the final version of the manuscript.

References

[1] Dunbar, R. I. M. On the evolutionary function of song and dance. in *Music, Language, and Human Evolution* (ed. Bannan, N.) 201–214, Oxford University Press (2012).

[2] Savage, P. E. *et al.* Music as a coevolved system for social bonding. *Behav. Brain Sci.* **44**, e59 (2021).

[3] Nuechterlein, G. L. & Storer, R. W. The pair-formation displays of the Western Grebe. *Condor* **84**, 351–369 (1982).

[4] Backwell, P., Jennions, M., Passmore, N. & Christy, J. Synchronized courtship in fiddler crabs. *Nature* **391**, 31–32 (1998).

[5] Lucchi Basili, L. & Sacco, P. L. Dance and the embodied social cognition of mating: Carlos Saura's Tango in the perspective of the tie-up theory. *Integr. Psychol. Behav. Sci.* **59**, 31 (2025).

[6] Rennung, M. & Göritz, A. S. Prosocial consequences of interpersonal synchrony: a meta-analysis. *Z. Psychol.* **224**, 168–189 (2016).

[7] Demos, A. P., Chaffin, R., Begosh, K. T., Daniels, J. R. & Marsh, K. L. Rocking to the beat: effects of music and partner's movements on spontaneous interpersonal coordination. *J. Exp. Psychol. Gen.* **141**, 49–53 (2012).

[8] Wiltermuth, S. S. & Heath, C. Synchrony and cooperation. *Psychol. Sci.* **20**, 1–5 (2009).

[9] Launay, J., Dean, R. T. & Bailes, F. Synchronization can influence trust following virtual interaction. *Exp. Psychol.* **60**, 53–63 (2013).

[10] Tarr, B., Launay, J. & Dunbar, R. I. M. Silent disco: dancing in synchrony leads to elevated pain thresholds and social closeness. *Evol. Hum. Behav.* **37**, 343–349 (2016).

[11] Reddish, P., Fischer, R. & Bulbulia, J. Let's dance together: synchrony, shared intentionality and cooperation. *PLoS ONE* **8**, e71182 (2013).

[12] Atwood, S., Schachner, A. & Mehr, S. A. Expectancy effects threaten the inferential validity of synchrony-prosociality research. *Open Mind* **6**, 280–290 (2022).

[13] Mogan, R., Fischer, R. & Bulbulia, J. A. To be in synchrony or not? A meta-analysis of synchrony's effects on behavior, perception, cognition and affect. *J. Exp. Soc. Psychol.* **72**, 13–20 (2017).

[14] Faul, F., Erdfelder, E., Lang, A.-G. & Buchner, A. G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav. Res. Methods* **39**, 175–191 (2007).

[15] Faul, F., Erdfelder, E., Buchner, A. & Lang, A.-G. Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. *Behav. Res. Methods* **41**, 1149–1160 (2009).

[16] Hove, M. J. & Risen, J. L. It's all in the timing: interpersonal synchrony increases affiliation. *Soc. Cogn.* **27**, 949–960 (2009).

[17] Tarr, B., Slater, M. & Cohen, E. Synchrony and social connection in immersive virtual reality. *Sci. Rep.* **8**, 3693 (2018).

[18] Preston, C. C. & Colman, A. M. Optimal number of response categories in rating scales: reliability, validity, discriminating power, and respondent preferences. *Acta Psychol.* **104**, 1–15 (2000).

[19] Aron, A., Aron, E. N. & Smollan, D. Inclusion of Other in the Self Scale and the structure of interpersonal closeness. *J. Pers. Soc. Psychol.* **63**, 596–612 (1992).

[20] Watson, D., Clark, L. A. & Tellegen, A. Development and validation of brief measures of positive and negative affect: the PANAS scales. *J. Pers. Soc. Psychol.* **54**, 1063–1070 (1988).

[21] Tschacher, W., Rees, G. M. & Ramseyer, F. Nonverbal synchrony and affect in dyadic interactions. *Front. Psychol.* **5**, 1323 (2014).

[22] Tunçgenç, B. & Cohen, E. Interpersonal movement synchrony facilitates pro-social behavior in children's peer-play. *Dev. Sci.* **21**, e12505 (2018).

[23] R Core Team. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/ (2026).

[24] Zajonc, R. B. Attitudinal effects of mere exposure. *J. Pers. Soc. Psychol.* **9**, 1–27 (1968).

[25] Hayes, A. F. *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach* 3rd edn (Guilford Press, New York, 2022).

[26] Aronson, E. & Mills, J. The effect of severity of initiation on liking for a group. *J. Abnorm. Soc. Psychol.* **59**, 177–181 (1959).

[27] Inzlicht, M., Shenhav, A. & Olivola, C. Y. The effort paradox: effort is both costly and valued. *Trends Cogn. Sci.* **22**, 337–349 (2018).