Title

Psychometric Evaluation of a Controlled Social Affiliation Paradigm: Findings From Anxiety, Depressive Disorder, and Healthy Samples

Journal

Behavior Therapy, 52(6)

ISSN

0005-7894

Authors

Hoffman, Samantha N

Thomas, Michael L

Pearlstein, Sarah L

et al.

Publication Date

2021-11-01

DOI

10.1016/j.beth.2021.04.003

Peer reviewed

HHS Public Access

Author manuscript

Behav Ther. Author manuscript; available in PMC 2022 November 01.

Published in final edited form as:

Behav Ther. 2021 November ; 52(6): 1464–1476. doi:10.1016/j.beth.2021.04.003.

Psychometric Evaluation of a Controlled Social Affiliation Paradigm: Findings from Anxiety, Depressive Disorder, and Healthy Samples

Samantha N. Hoffman[1], **Michael L. Thomas**[2], **Sarah L. Pearlstein**[1], **Sanskruti Kakaria**[3], **Christopher Oveis**[3], **Murray B. Stein**[3], **Charles T. Taylor**[3]

[1]San Diego State University/University of California San Diego Joint Doctoral Program in Clinical Psychology

[2]Colorado State University

[3]University of California San Diego

Abstract

Social impairments are common across many psychiatric conditions. Standardized dyadic assessments intended to elicit social affiliation between unacquainted partners are used to elucidate mechanisms that disrupt relationship formation and inform possible treatment targets; however, the psychometric properties of such paradigms remain poorly understood. This study evaluated the psychometric properties of a controlled social affiliation paradigm intended to induce connectedness between a target participant and trained confederate. Individuals with an anxiety or depressive disorder diagnosis (clinical group; $n = 132$) and those without (control group; $n = 35$) interacted face-to-face with a trained confederate; partners took turns answering a series of increasingly intimate questions about themselves. Social connectedness, affect, and affiliative behavior measures were collected during the interaction. Participant symptom and social functioning measures were collected to examine validity. The paradigm elicited escalating social connectedness throughout the task for both participants and confederates. Parallel forms (i.e., different question sets) elicited similar affiliation outcomes. Self-reported (but not behavioral) affiliation differed across some demographic variables (e.g., participant gender, Hispanic ethnicity). Within-task affiliation measures were associated with one another and with global social connectedness and social anxiety symptom measures, but not with somatic anxiety measures. Clinical participants reported lower social affiliation and positive affect reactivity and higher negative affect reactivity than healthy participants. These findings provide initial psychometric support for a standardized and controlled dyadic affiliation paradigm that could be used to reliably probe social disconnection mechanisms across psychopathology.

*Corresponding author: Charles T. Taylor, Ph.D., Department of Psychiatry, University of California, San Diego, La Jolla, CA 92037, Phone: 858.534.9446, FAX: 858.534.9450, c1taylor@health.ucsd.edu.

Conflict of Interest: Charles T. Taylor declares that in the past 3 years he has been a paid consultant for Homewood Health, and receives payment for editorial work for UpToDate. Murray B. Stein declares that in the past 3 years he has been a paid consultant for Actelion, Aptinyx, Bionomics, BioXcel, Clexio, GW Pharma, and Janssen, and receives payment for editorial work for UpToDate and the journals Biological Psychiatry and Depression and Anxiety. All other authors declare no conflict of interest.

Keywords

social affiliation; psychometrics; reliability; validity; relationship formation; behavioral; social anxiety; anxiety; depression; reciprocal self-disclosure paradigm

The capacity to develop and maintain positive interpersonal relationships is integral to overall health and well-being (Holt-Lunstad et al., 2015). Social disconnection and loneliness are common and disabling features of many psychiatric conditions that only partially respond to our best available treatments (McKnight & Kashdan, 2009). Individuals with anxiety and depression report greater loneliness and social dysfunction that can persist even after remission of affective psychopathology (Cramer et al., 2005; McKnight & Kashdan, 2009). Identifying the processes that reduce one's capacity to connect with others can inform where and how to intervene—findings that could facilitate the development of more efficacious treatments in the social domain. Advancing such knowledge begins with reliable and valid methods that model how people form social connections in their everyday lives.

All non-kin relationships begin with an initial encounter—a social affiliation opportunity between two strangers. Relationship formation occurs through social affiliation—a dynamic transactional process that unfolds between two people within contexts that encourage mutual engagement and self-disclosure—sharing one's own experiences, feelings, interests, values and opinions, and affording one's partner the opportunity to reciprocate by sharing their own experiences, feelings and so on (Aron et al., 1997; Reis & Shaver, 1988). Affiliation entails both behavioral displays (e.g., positive affect [PA] expressions and responsiveness) and subjective experiential reactions (e.g., perceived connectedness, felt PA, desire for future interaction) that arise within each individual and influence one another across the dyad (see Figure 1). Positive social cues from a given individual (e.g., smiling, initiation of self-disclosure) signal an invitation for relationship development. These cues can elicit corresponding affiliation (approach-oriented) goals (e.g., to get to know others), behaviors (e.g., reciprocal self-disclosure), and increases in positive emotions from the other party in the dyad that promote future approach motivation and behavior (i.e., a desire to seek out and engage one's partner in future social contact; Reis & Shaver, 1998). Social affiliation is thus a self-perpetuating cycle that supports opportunities for new social bonds and strengthening existing ones. *Diminished* ability to produce and/or reciprocate behavioral and experiential displays of affiliation on either side of the dyad, however, could hinder relationship formation and promote social disconnection.

Standardized dyadic laboratory assessments offer several benefits to studying the processes involved in social affiliation, including mitigation of biases in self-report of interpersonal functioning; experimental control that can limit potentially confounding variables and allow for isolation and manipulation of key processes; integration of subjective and objective measurements across multiple response channels or units of analysis (e.g., affect, behavior, physiology); and utilization of multiple sources of information (i.e., target participant, partner, observer). Key advantages of *dyadic* assessments are that they allow for structured, dynamically unfolding reciprocal interactions that involve both intra- and interpersonal

processes relevant to relationship formation. Several criteria should be met for a dyadic paradigm to sufficiently induce and enable the measurement of the processes that are central to affiliation including: (a) encouragement of mutual disclosure and engagement between unacquainted partners, (b) encouragement of progressively escalating levels of affiliation over time to model the dynamic, transactional process of affiliation, and (c) presentation of salient verbal and nonverbal displays of affiliative behavior from the target participant's partner. Measures used within affiliation paradigms should assess affiliative behavior and/or experiential reactions across both parties within the dyad given the dynamic transactional processes involved in affiliation generation.

Several social affiliation paradigms exist, including 'getting acquainted', single exchange ("one-shot"), and reciprocal self-disclosure tasks. In 'getting acquainted' tasks, two strangers (either two participants or a participant and trained confederate) converse over a five to 10-minute time period as they normally would during a first meeting encounter (Mellings & Alden, 2000; Taylor & Alden, 2011; Vittengl & Holt, 2000; Voncken et al., 2013). These tasks mimic first-meeting encounters; however, unstructured dialogue makes it difficult to ensure opportunities for consistent, escalating levels of self-disclosure and affiliation. In single exchange affiliation paradigms, confederates first self-disclose to a participant either in-person or via a pre-recorded video which is then followed by participant self-disclosure (Garcia et al., 2018; McCarthy et al., 2018). These tasks ensure that standardized levels of self-disclosure and affiliative behavior are displayed by one half of the dyad through the use of confederates or pre-recorded video; however, they do not allow for escalating dynamic reciprocal exchanges or perceptions of affiliation across the dyad, and the range of content discussed is often limited given the brief, single disclosure opportunity. Reciprocal self-disclosure paradigms involve two individuals who take turns responding to a series of increasingly intimate questions (Aron et al., 1997; Kashdan & Roberts, 2007). Such tasks provide an opportunity for both participants to engage in mutual and escalating levels of self-disclosure and provide the opportunity to measure induced social affiliation from each partner. Aron et al. (1997) developed the most commonly used reciprocal self-disclosure task as a standardized 'closeness-generating' paradigm. The task is administered to two unacquainted participants, often college students, who take turns responding to three sets of questions that are each 15 minutes long. Each set is intended to elicit progressively higher levels of intimacy (e.g., "What would constitute a perfect day for you?"; "Is there something that you've dreamed of doing for a long time? Why haven't you done it?"; "What is your most treasured memory?"). This task was validated as generating greater affiliation compared to a similarly structured "small-talk" task that included low-level intimacy questions (Aron et al.).

Our group (Taylor & Amir, 2012; Taylor et al., 2017) and others (Kashdan & Roberts, 2007, Study 1) adapted Aron et al.'s seminal paradigm to create a shortened, standardized and confederate-controlled version of the task. Controlling the behavior of one half of the dyad offers several benefits. We can ensure that affiliative behavior displays are made salient and, thus, create an optimal context for the generation of affiliation. Individual effects of each participant can also be better isolated given that all participants respond to a similar experimental stimulus. This is important given that, if left unconstrained, different behaviors from both sides of the dyad have the potential to unbalance the

generation of affiliation for each target individual and confound interpretation of outcomes (note, however, that there are statistical approaches that can account for such effects; e.g., Kenny et al., 2006). Controlling confederate behavior allows for the evaluation of individual differences and the effects of experimental manipulations on affiliation outcomes. Although standardized, dyadic assessments offer promise to understanding transdiagnostic mechanisms that underpin social disconnection, their psychometric properties remain poorly understood. Establishing the reliability of behavioral measures is critical to advancing our understanding of psychopathology, theory, and treatment efforts (Rodebaugh et al., 2016). It is currently unknown how successful standardized social affiliation tasks are at isolating participant effects on affiliation outcomes versus task parameters (e.g., confederate differences), or how task parameters (e.g., gender dyad match) influence outcomes. In the present study, we additionally include the use of parallel forms (i.e., different affiliation-building question sets) which are valuable in experimental, intervention, and longitudinal research designs wherein participants may be required to complete the task on multiple occasions to evaluate change in affiliation and its underlying mechanisms. The current study sought to evaluate two versions (parallel forms) of our adapted confederate-controlled dyadic social affiliation paradigm in terms of reliability and validity in healthy and clinical (individuals with an anxiety and/or depressive disorder diagnosis) participants. The following aims were addressed:

1. We examined whether the paradigm elicited increasing feelings of perceived connectedness throughout the task and whether connectedness differed by participant (e.g., gender, ethnicity) and experimental characteristics (e.g., dyad gender match). We explored parallel forms reliability between two social affiliation question sets to determine whether participants and confederates displayed and experienced comparable affiliation levels across forms. We examined changes in positive and negative affect (NA) as secondary markers of task validation.

2. We examined convergent and discriminant validity by examining social affiliation and affect measures within and outside of the paradigm. For our primary test of convergent validity (i.e., the paradigm correlates with constructs related to affiliation), we predicted (moderate) associations between measures of social affiliation (e.g., perceived connectedness, desire for future interaction) and affiliative behavior during the task, as well as with a global measure of perceived social connectedness not pertaining to the task. Because positive emotions may play an important role in perceived social connectedness (Taylor et al., 2017, 2020; Vittengl & Holt, 2000), and social anxiety is associated with diminished affiliation (Alden & Taylor, 2004), we also predicted associations between within-task affiliation measures, within-task PA, and social anxiety symptoms (inversely correlated) as secondary markers of convergent validity. To test divergent validity (i.e., the paradigm uniquely elicits affiliation and does not correlate with unrelated or less related affiliation constructs), we predicted lower magnitude (small) associations between within-task affiliation measures, duration of disclosures, and non-social trait measures of general anxiety.

3. We examined known-groups validity to determine whether the paradigm could differentiate between clinical and healthy participants. We predicted that clinical participants would experience less overall affiliation and display blunted PA reactivity and heightened NA reactivity throughout the paradigm compared to control participants. It is possible that clinical and control participants begin with comparable affiliation levels after first meeting their conversation partner, but clinical participants show a lesser degree of change in affiliation as the conversation progressed (group by time interaction), reflecting a reduced capacity to experience escalating connectedness in a context designed to elicit it. Alternatively, clinical participants may experience less affiliation at the outset of the task compared to control participants but may experience similar increases in affiliation over time (main effect of group). To our knowledge, this question has not been addressed by prior paradigms that primarily assess affiliation responses globally at the end of the conversation.

Methods

Participants

The sample comprised 167 participants between 18 and 55 years of age who were recruited through clinical referrals and from the general community via posted announcements and online settings (e.g., ResearchMatch.org). Participants in the current sample were drawn from three individual studies that selected for individuals seeking treatment for anxiety or depression, and a comparison group of healthy (non-anxious/non-depressed) controls. See Supplemental Materials for inclusion criteria details. Exclusion criteria across all three studies included (a) active suicidal ideation with intent or plan, (b) moderate to severe alcohol or marijuana use disorder within the past year, (c) all other mild substance use disorders within the past year, (d) bipolar I disorder, (e) psychotic disorders, (f) moderate to severe traumatic brain injury with evidence of neurological deficits or neurological disorders, (g) severe or unstable medical conditions that might leave the individual negatively affected by participation in the study, (h) inability to speak or understand English, (i) concurrent psychotherapy (unless 12-week stability criteria had been met for non-empirically supported therapies only), (j) concurrent psychotropic medication (e.g., selective serotonin reuptake inhibitors, benzodiazepines), and (k) characteristics that would make it unsafe to complete a magnetic resonance imaging (MRI) scan (e.g., metal devices in body). In the present sample, 56.1% of participants met for a primary clinical diagnosis of social anxiety disorder, 34.1% met for major depressive disorder, 6.8% met for generalized anxiety disorder, and 3.0% met for another diagnosis. Full demographics characteristics and diagnoses by group are presented in Table 1.

Social Affiliation Paradigm

The current study utilized a modified version of the task developed by Aron et al. (1997).[1] Participants and trained confederates alternated responses to a series of six questions with each question gradually increasing in intimacy level. Before the social affiliation paradigm,

[1]The social affiliation paradigm materials are available upon request.

participants were randomly assigned to one of two different affiliation-building question sets, namely Form A (n = 84) or Form B (n = 83; see Supplemental Materials). An experimenter informed the participant they would be getting to know an assistant who worked in the lab (i.e., the confederate) before the start of the task.[2] With the confederate present, the experimenter stated that the purpose of the task was to get to know one another by answering a series of questions about themselves. The experimenter then started a video recording of the dyad and exited the room. The conversation began with an open-ended question (i.e., "Tell your partner a bit about yourself") followed by progressively personal questions (i.e., "If you were going to become a close friend with your partner, please share what would be important for him or her to know"). Each interaction started with the confederate reading aloud and answering the first question, followed by the participant's response to the same question. The participant responded first to the next question, followed by the confederate response (and so on). Participants and confederates completed ratings following each question (described below) on a separate form and out of their partner's sight. The interaction lasted approximately 25 minutes or until all questions were answered by both the confederate and participant.

Personnel—Confederates were trained bachelor-level research staff (21 women and 3 men) who remained blind to clinical diagnosis and experimental conditions. As part of their training to serve in the confederate role, each confederate drafted written answers to the affiliation-building questions based on their personal experiences, referring to a previously-created "gold-standard" set of responses as a template. A senior research coordinator reviewed all written answers to ensure consistent levels of intimacy and length compared against the gold-standard template. Confederates were encouraged to display warm and friendly nonverbal behaviors (e.g., appropriate eye contact, leaning forward) and were trained on how to deliver standardized responses and how to respond to challenging situations (e.g., excessive follow-up questions). All confederates watched a gold-standard confederate training video and demonstrated competency via a mock video with another research assistant within the lab. All mock videos were reviewed, and confederates were provided with feedback to modify answers or behavior if necessary. Participants and confederate dyads were not explicitly matched on demographic characteristics. The majority of participants (85.6%) interacted with a female confederate, which did not differ between the clinical (84.1%) and control group (91.4%), χ^2 (1, N = 167) = 1.2, p = .271. Experimenters consisted of undergraduate, post-baccalaureate, or graduate students who were trained to deliver scripted instructions to participants.

Confederate Consistency Check—Observers rated confederate performance while viewing video recordings of the social interaction to evaluate the consistency and fidelity of confederate behavior. Raters used a five-item scale assessing warm and affiliative behavior displays (friendly, talkative, disinterested, distant, self-disclosive). Items were rated from 1 (*not at all*) to 7 (*very much*) and summed to create a total score (total score range = 5 to 35).

[2]Deception was not used to conceal the confederate's role within the lab because clinical participants were seeking treatment within our research clinic and we did not want to impair trust or rapport. Participants were debriefed at the end of the study that confederate disclosures were structured to adhere to a set amount of time; however, the content of disclosures was personalized to each individual confederate.

Interrater reliability was assessed using the intraclass correlation coefficient (ICC; two-way mixed model). The average measure ICC was .624 with a 95% confidence interval ranging from .388 to .769, suggesting moderate reliability.

Measures

A full description of measures and review of psychometric properties is presented in the Supplemental Materials.

Within-Task Measures

Social Affiliation.: Three measures collected within the paradigm were intended to measure different facets of affiliation.

Perceived Connectedness.: Following each affiliation-building question, participants and confederates rated "how connected to your partner do you feel right now?" ranging from 0 (*not at all*) to 100 (*extremely*) to evaluate changes in connectedness throughout the task.

Desire for Future Interaction.: The Desire for Future Interaction Scale (DFI; Coyne, 1976) assesses the extent to which the rater (participant or confederate) would be willing to engage in a variety of social activities with their interaction partner in the future (Sample items: "Would you like to spend more time with a person like this in the future?"; "Would you like to have a person like this as a friend?"). Eight items are rated from 1 (*not at all*) and 7 (*very much*). Cronbach's $\alpha = .95$.

Self-Other Overlap.: The Inclusion of Other in the Self (IOS; Aron et al., 1992) measures how close or interconnected the respondent feels with another person. Participants chose from among seven pairs of circles (Venn-like diagrams) ranging from barely touching to almost completely overlapping to describe their relationship with their conversation partner following the task. One circle in each pair is labeled "Self" and the second circle is labeled "Other". The degree of overlap between the circles indicates how interconnected the respondent feels towards the other person and is rated from 1 (*no overlap*) to 7 (*most overlap*).

Affiliative Behavior.: Observers and confederates rated participant affiliative behavior using a five-item scale (Taylor & Alden, 2011; Taylor & Amir, 2012) that reflects the types of behaviors shown to be important in facilitating friendship development during first-meeting encounters (i.e., talk openly about yourself, convey interest in your partner, appear actively engaged in the conversation, appear friendly, talkative). Each item is rated from 1 (*not at all*) and 7 (*very much*). The average measure ICC for observer and confederate ratings of participant's affiliative behavior was .777, suggesting good inter-rater agreement.

Duration of disclosures.: Observers independently rated the total time spent talking per question for both participants and confederates. Observer ratings for each of the six questions were averaged and summed to determine the total time spent talking.

State Affect.: Changes in affect were evaluated with the 20-item Positive and Negative Affect Schedule (PANAS; Watson et al., 1988). State PA and NA were assessed by asking participants to rate how they feel "right now (that is, at the present moment)" before learning about the conversation task (baseline), after being informed about the task (anticipation), and immediately after completing the paradigm. Cronbach's $\alpha = .93$ and $\alpha = .90$ for PA and NA, respectively. The Spielberger State-Trait Anxiety Inventory (STAI-S; Spielberger et al., 1983) measured participant's self-reported state anxiety reactivity at baseline, anticipation, and post-conversation. Participants also rated how pleasant and anxious they felt following each affiliation-building question from 0 (*not at all*) to 100 (*extremely*). STAI-S, pleasantness, and anxiousness ratings are presented in the Supplemental Materials. Cronbach's $\alpha = .95$.

External Measures

Convergent Validity.: The Social Connectedness Scale-Revised (SCS-R; Lee et al., 2001) measures perceptions of interpersonal closeness with one's social world. Cronbach's $\alpha = .96$. The Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987) assesses social anxiety severity. Study 1 participants completed the clinician-administered LSAS whereas Study 2 and Study 3 participants completed the self-reported version of the LSAS (LSAS-SR; Fresco et al., 2001). Cronbach's $\alpha = .95$. The Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) measures anxiety when interacting with different kinds of companions. Cronbach's $\alpha = .96$.

Discriminant Validity.: The Anxious Arousal subscale (AA) of the Mood and Anxiety Symptom Questionnaire - Short Form (MASQ; Watson & Clark, 1991) measures somatic tension and hyperarousal. Cronbach's $\alpha = .87$. The STAI-Trait (STAI-T; Spielberger et al., 1983) asks about general feelings of trait anxiety. Cronbach's $\alpha = .95$.

Procedure

All study procedures were approved by the University of California San Diego Human Research Protections Program and in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki). All participants provided informed written consent before participating in the study. After completing the eligibility assessment, participants completed self-report measures and the social affiliation paradigm on a separate visit. Trained observers, who were blind to participant diagnostic status and to study hypotheses, independently watched video recordings of the interactions and rated affiliative behavior for participants and confederates.

Results

Confederate Consistency

Analyses were conducted using IBM SPSS Statistics (Version 26). Independent samples *t*-tests revealed that confederate behavior did not significantly differ across parallel forms, $t(154) = 0.64$, $p = .525$, $d = 0.10$, 95% confidence interval (CI) [−0.43, 0.85], but did significantly differ depending on whether confederates interacted with clinical participants or control participants, $t(76.51) = 2.25$, $p = .028$, $d = 0.38$, [0.08, 1.30]. Group differences

were nominally small [mean item score for affiliative behavior (possible range = 0–7): control (M = 6.01, SD = 0.33); clinical (M = 5.93, SD = 0.41)], and confederates overall adhered to expected levels of warmth and openness.[4]

Social Affiliation

A repeated measures analysis of variance (ANOVA) revealed a significant main effect of time on participant perceived connectedness, $F(2.84, 470.54) = 91.70$, $p < .001$, $\eta_p^2 = .36$. Bonferroni post hoc tests indicated that participants rated significantly greater feelings of connectedness as questions proceeded (all ps < .05). There was a significant main effect of time on confederate ratings of connectedness, $F(3.71, 616.47) = 96.97$, $p < .001$, $\eta_p^2 = .37$. Bonferroni post hoc tests indicated that confederates rated greater feelings of connectedness following each preceding question (ps < .05), excluding the time between question 3 and 4 of the paradigm ($p = .638$).[3]

Parallel Forms—A Form by Time repeated measures ANOVA determined that participant within-task perceived connectedness did not significantly differ between forms, $F(1, 165) = 0.76$, $p = .384$, $\eta_p^2 = .005$ (see Figure 2a). The interaction effect was not significant, $F(2.83, 466.60) = .462$, $p = .698$, $\eta_p^2 = .003$. Confederate perceived connectedness did not differ by form (ps > .05; see Supplemental Materials). A one-way multivariate analysis of variance (MANOVA) revealed that participant social affiliation outcome measures (i.e., post-task connectedness, DFI, and IOS) and affiliative behavior did not significantly differ between forms, $F(4, 159) = 0.52$, $p = .721$; Wilk's $\Lambda = .987$, $\eta_p^2 = .013$. Similar results were observed for confederate affiliation outcomes (ps > .05; see Supplemental Materials).

Participant and Dyad Characteristics—Associations between participant and dyad characteristics and perceived connectedness are presented in the Supplemental Materials. To summarize, participants who identified as women (vs. men; $F(1, 164) = 6.39$, $p = .012$, $\eta_p^2 = .038$), Hispanic (vs. non-Hispanic; $F(1, 165) = 4.70$, $p = .032$, $\eta_p^2 = .02$), and gender matched dyads (vs. unmatched; $F(1, 164) = 7.16$, $p = .008$, $\eta_p^2 = .042$) reported higher overall connectedness throughout and at the end of the task (main effects) but did not differ in affiliation behavior nor in the slope (increase) of connectedness from beginning to end (all ps > .05). Within-task social affiliation measures were not related to age (all ps > .05; see Supplemental Materials).

Known-Groups Validity for Affiliation—A one-way MANOVA revealed that participants in the control group reported significantly higher scores on all within-task social affiliation measures compared to those in the clinical group, $F(3, 163) = 9.51$, $p < .001$; Wilk's $\Lambda = .851$, $\eta_p^2 = .149$ (see Table 2). A Group by Time repeated measures ANOVA indicated that participants in the clinical group perceived significantly less connectedness during the task compared to those in the control group, $F(1, 165) = 23.04$, $p < .001$, $\eta_p^2 = .12$. The interaction effect was not significant, $F(2.83, 467.07) = .237$, $p = .860$, $\eta_p^2 =$

[4]Given the statistically significant difference in confederate behavior when interacting with participants in the clinical or control group, analyses for known-groups validity were run adjusting for confederate behavior. All results remained consistent.

[3]Greenhouse-Geisser corrections were used in cases in which sphericity was violated for repeated measures analysis of variance tests.

.001, suggesting group differences in connectedness were consistent throughout the task (see Figure 2b).[4]

Affect

Separate repeated measures ANOVAs were conducted in the full sample to examine participant affect processes throughout the paradigm as a secondary marker of task validation. PA scores did not significantly differ between time points, $F(1.65, 272.19) = 2.12$, $p = .132$, $\eta_p^2 = .013$. NA scores significantly differed between timepoints, $F(1.90, 313.45) = 26.81$, $p < .001$, $\eta_p^2 = .140$. Bonferroni post hoc tests indicated that the paradigm elicited greater NA in anticipation of the task ($M = 16.13$, $SE = 0.47$) compared to baseline ($M = 14.25$, $SE = 0.40$, $p < .001$, 95% CI [1.21, 2.54]) and post-task ($M = 14.12$, $SE = 0.39$, $p < .001$, [1.26, 2.75]). There were no significant differences in NA between baseline and post-task ($p > .999$, [−0.68, 0.94]). STAI-S scores produced similar results (see Supplemental Materials).

Given that the clinical group was expected to show diminished PA compared to the control group, we conducted an analysis to examine whether there was significant change in PA throughout the paradigm in the control group alone. PA scores significantly differed between timepoints, $F(2, 68) = 5.55$, $p = .006$, $\eta_p^2 = .140$. Bonferroni post hoc tests indicated the paradigm elicited significantly greater PA in anticipation of the task ($M = 35.63$, $SE = 1.69$, $p = .006$, 95% CI [0.52, 3.71]) and at post-task ($M = 35.63$, $SE = 1.71$, $p = .041$, [0.07, 4.16]) compared to baseline ($M = 33.51$, $SE = 1.54$). PA scores did not significantly differ between anticipation of the task and post-task ($p > .999$).

Parallel Forms and Participant and Dyad Characteristics for Affect—Repeated measures ANOVAs indicated that PA, $F(1, 64) = 0.50$, $p = .479$, $\eta_p^2 = .003$, and NA, $F(1, 164) = 3.84$, $p = .052$, $\eta_p^2 = .023$, did not significantly differ between parallel forms, respectively. Interaction effects for PA, $F(1.65, 271.11) = 1.08$, $p = .331$, $\eta_p^2 = .007$, and NA, $F(1.90, 311.56) = 1.63$, $p = .200$, $\eta_p^2 = .010$, were not significant, respectively (see Supplemental Figure 10 and Supplemental Figure 11). STAI-S scores produced similar results (ps >.05; see Supplemental Materials). No participant or dyad characteristics examined were related to affective reactivity throughout the task (all ps > .05; see Supplemental Materials).

Known-Groups Validity for Affect—Separate Group by Time repeated measures ANOVAs revealed that participants in the clinical group experienced significantly less PA compared to those in the control group, $F(1, 164) = 118.12$, $p < .001$, $\eta_p^2 = .419$. The interaction effect was not significant $F(1.64, 269.26) = 2.50$, $p = .094$, $\eta_p^2 = .015$. Participants in the clinical group experienced significantly more NA than those in the control group, $F(1, 164) = 41.67$ $p < .001$, $\eta_p^2 = .203$. The interaction effect was significant, $F(1.86, 304.16) = 7.91$, $p = .001$, $\eta_p^2 = .046$. Simple effects Bonferroni post hoc analyses in the clinical group alone indicated significant differences in NA at baseline ($M = 15.24$, $SE = 0.47$) and anticipation of the task ($M = 17.63$, $SE = 0.52$, $p < .001$, 95% CI [−3.19, −1.56]), and at anticipation and post-task ($M = 15.08$, $SE = 0.46$, $p < .001$, [1.65, 3.47]). There was no significant difference in NA at baseline and post-task ($p > .999$, [−0.86, 1.20]). There

were no significant differences in NA over the task (all *p*s > .05; see Figure 3) in the control group alone. STAI-S scores produced similar results (see Supplemental Materials).[4]

Convergent Validity

Pearson correlations between within-task measures (i.e., social affiliation, affiliative behavior, and PA) and external social connectedness (SCS-R) and social anxiety symptom measures (LSAS and SIAS) were used to assess convergent validity. Supporting convergent validity, within-task social affiliation measures positively correlated with external social connectedness and negatively correlated with anxiety symptom measures (see Table 3).

Discriminant Validity

Pearson correlations between within-task social affiliation measures (i.e., perceived connectedness, DFI, IOS), general trait anxiety measures (STAI-T, MASQ-AA), and the duration of disclosures were used to assess discriminant validity. The associations were small in magnitude and non-significant (all *p*s > .05; see Table 4).

Reliability Analysis

We used generalizability (G) theory to further investigate sources of variance in participant within-task connectedness, pleasantness, anxiousness/anxiety, PA, and NA. A linear mixed-effects model with random intercepts for participant, confederate, items, and rater was fitted to the data using the lme4 package (Bates et al., 2015) and variance components were estimated using the gtheory package (Moore, 2016) in R (R Core Team, 2020). Participants (i.e., individual differences) accounted for the majority of variance across within-task connectedness (77%) and affective outcomes (65.3% to 87.0%). G theory models are presented in the Supplemental Materials.[5]

Discussion

This study examined the psychometric properties of a controlled dyadic paradigm intended to induce social affiliation in a sample of clinical and healthy participants. The paradigm successfully elicited perceived connectedness between unacquainted partners. Support for parallel forms reliability across participant and confederate affiliation outcomes suggests that the task could be administered repeatedly (pending future evidence of test-retest reliability) and may therefore be useful in experimental manipulation, intervention, and/or longitudinal research. Evidence supporting convergent, discriminant, and known-groups validity suggests that social affiliation can be modeled in a dyadic context under controlled experimental conditions. Participants accounted for the majority of the variance across connectedness and affective outcomes, suggesting the paradigm to be a reliable measure of individual differences in social affiliation. This paradigm could offer a standardized approach to probe mechanisms hypothesized to impair social affiliation in psychiatric disorders and identify treatment targets for reducing social disconnection and loneliness.

[5]G theory models were first run including a Form variable (A vs. B). All models, except for the negative affect model, produced a singular fit with minimal variance explained (~0.0%). An analysis, removing the Form variable from the models, revealed similar results. Therefore, the Form variable was removed from the models.

Affiliation outcomes differed according to several participant and dyad characteristics. Participants who identified as women (vs. men), Hispanic (vs. non-Hispanic), and those from dyads matched on gender (vs. not matched) *experienced* significantly greater social affiliation (i.e., connectedness, desire for future interaction) but did not differ on affiliative behavior. Although there were main effect differences for these characteristics on subjective affiliation, the paradigm induced connectedness at a similar rate within each group of the factors. These findings are consistent with research indicating women are more likely to describe themselves as more socially connected compared to men (Lang-Takac & Osterweil, 1992), as well as with literature suggesting Hispanic/Latino culture is described as having high collectivism and social empathy values, which may more strongly relate to social connectedness, compared to other ethnic groups or individualistic cultures (Segal et al., 2011). Researchers should additionally consider dyad gender match differences when designing future studies. It would be informative to directly test whether the type of dyad gender match between confederate and participant (e.g., male-male, male-female, female-female, female-male) significantly differs in eliciting social affiliation given that our sample was not large enough to permit this analysis. Participant age, by contrast, did not relate to within-task social affiliation measures, which is notable given that confederates were primarily undergraduate students in their early twenties. Future research should ensure participants are stratified on demographic characteristics such as gender, ethnicity, and dyad match in between-group cross-sectional and experimental designs.

When examining known-groups validity, the amount of social connectedness experienced throughout the paradigm significantly differed between the clinical and control group. This is consistent with literature showing that individuals with anxiety and/or depression experience less social connectedness relative to their non-clinical counterparts (McKnight & Kashdan, 2009), and provides support for the paradigm in its ability to distinguish individuals characterized by greater social disconnection. Given that *change* in affiliation did not differ by participant group, future research may benefit from examining to what extent, if any, the social affiliation paradigm could be further shortened in order to capture these between-group differences. The paradigm provided further evidence of validity by capturing blunted affiliation, reduced PA, and heightened anticipatory NA in the clinical group compared to the control group, underscoring the social affiliation impairments and related affective processes typically experienced by individuals with anxiety and depressive disorders (Taylor et al., 2020). The paradigm may be considered a valid tool to study the processes to better understand *why* some individuals have a reduced capacity to connect with others. Research using this paradigm with other clinical populations with difficulties forming social relationships is needed to identify unique and shared (transdiagnostic) social (dis)affiliation processes.

In addition to inducing social affiliation, the paradigm provided evidence of convergent and discriminant validity. Supporting convergent validity, within-task measures of social affiliation, affiliative behavior, and PA were positively associated with external measures of social connectedness and negatively associated with social anxiety symptoms. External trait measures of somatic tension and hyperarousal symptoms and total time spent talking were unrelated to affiliation experienced during the paradigm, providing evidence of discriminant validity. This data supports that the paradigm is sensitive in measuring social affiliation

processes rather than general anxious arousal symptoms and/or reactivity. Future research could also examine how other interpersonal processes, such as those related to agency/dominance (e.g., confidence, self-assurance, control), are engaged by the affiliation task.

Limitations must be considered. Although the sample comprised participants from diverse backgrounds, not all racial groups were well-represented relative to participants who identified as Asian or White. In addition, the control group sample size was considerably smaller than the clinical participant group sample size, limiting our ability to detect more subtle group differences or interaction effects (e.g., differential PA reactivity to the task across groups). Future research is warranted to extend investigations of the controlled social affiliation paradigm to a larger sample. With regard to the clinical group, and notwithstanding the fact that low affiliation is typically observed within individuals with anxiety and/or depression, there is evidence to suggest that *high* affiliation levels may be a predominant challenge for some, particularly for those with generalized anxiety disorder (Shin & Newman, 2019). Given that our sample predominantly met for SAD and major depressive disorder diagnoses, research that further examines interpersonal heterogeneity in anxiety and depression and other psychiatric conditions is needed to better understand affiliation trans-diagnostically. Test-retest reliability and sensitivity to change should be examined to determine the potential clinical utility of this paradigm in experimental manipulation and intervention studies. Although confederates offer standardization and experimental control, they are not entirely naturalistic interaction partners and real interactions may nonetheless influence interpersonal behavior. Evaluating the paradigm using non-confederate unacquainted partners as well as established relationship partners (e.g., friends) is needed to understand whether and how affiliation processes differ across different conversation partners and initial relationship development vs. maintenance contexts. The current study involved mostly female confederates, and future research would benefit from examining a more equal balance of female and male confederates. Lastly, although the current study utilized self-report assessments and behavioral responses, the paradigm allows for measurement across other units of analysis (e.g., physiology) that could be considered in future research.

Notwithstanding these limitations, the current findings provide preliminary support for the use of this standardized, confederate-controlled dyadic paradigm to better understand transdiagnostic social affiliation processes in the context of initial relationship formation. From a clinical perspective, our results highlight the importance of considering how such processes, particularly those that differed by participant group (i.e., blunted perceived affiliation/connectedness and affiliation behavior and heightened NA in the clinical group), may be improved to explicitly facilitate greater social connection and subjective well-being in individuals with and without psychopathology. Our social lives primarily involve reciprocal interactions, and the mechanisms that support interactive social encounters differ from those involving social observation only (Schilbach, 2016). The current paradigm offers a systematic way to study dyadic affiliation processes to advance understanding and ultimately amelioration of social impairments across psychopathology.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments:

We thank Elizabeth Page-Gould for providing us with affiliation-building question sets and ratings from her prior work that informed the questions selected for use in developing our paradigm. We thank David Sheehan for giving us permission to use a preliminary version of the MINI for DSM-5 in this study.

Funding:

This research was supported by grants awarded to Charles T. Taylor from the National Institute of Mental Health (R00MH090243, R61MH113769), Brain and Behavior Foundation (21695), and the University of California, San Diego, National Institute of Health Clinical and Translational Science Awards Program Grant UL1TR001442.

References

Alden LE, & Taylor CT (2004). Interpersonal processes in social phobia. Clinical Psychology Review, 24(7), 857–882. 10.1016/j.cpr.2004.07.006 [PubMed: 15501559]

Aron A, Aron EN, & Smollan D (1992). Inclusion of other in the self scale and the structure of interpersonal closeness. Journal of Personality and Social Psychology, 63(4), 596–612. 10.1037/0022-3514.63.4.596

Aron A, Melinat E, Aron EN, Vallone RD, & Bator RJ (1997). The experimental generation of interpersonal closeness: A procedure and some preliminary findings. Personality and Social Psychology Bulletin, 23(4), 363–377. 10.1177/0146167297234003

Bates D, Mächler M, Bolker B, & Walker S (2015). Fitting Linear Mixed-Effects Models Using lme4. Journal of Statistical Software, 67(1), 1–48. 10.18637/jss.v067.i01.

Cramer V, Torgersen S, & Kringlen E (2005). Quality of life and anxiety disorders: A population study. The Journal of Nervous and Mental Disease, 193(3), 196–202. 10.1097/01.nmd.0000154836.22687.13 [PubMed: 15729110]

Coyne JC (1976). Depression and the response of others. Journal of Abnormal Psychology, 85(2), 186–193. 10.1037/0021-843X.85.2.186 [PubMed: 1254779]

Fresco DM, Coles ME, Heimberg RG, Liebowitz MR, Hami S, Stein MB, & Goetz D (2001). The Liebowitz Social Anxiety Scale: a comparison of the psychometric properties of self-report and clinician-administered formats. Psychological Medicine, 31(6), 1025–1035. 10.1017/s0033291701004056 [PubMed: 11513370]

Garcia CP, Catalano LT, Dwyer KR, McCarthy JM, Bennett ME, & Blanchard JJ (2018). Assessing social affiliative behavior: A comparison of in vivo and video tasks. Behavior Therapy, 49(6), 1039–1047. 10.1016/j.beth.2018.03.006 [PubMed: 30316483]

Holt-Lunstad J, Smith TB, Baker M, Harris T, & Stephenson D (2015). Loneliness and social isolation as risk factors for mortality: a meta-analytic review. Perspectives on Psychological Science, 10(2), 227–237. 10.1177/1745691614568352 [PubMed: 25910392]

Kashdan TB, Roberts JE (2007). Social anxiety, depressive symptoms, and post-event rumination: affective consequences and social contextual influences. Journal of Anxiety Disorders, 21(3), 284–301. https://doi.org/10.1016.j.janxdis.2006.05.009 [PubMed: 16859889]

Kenny DA, Kashy DA, & Cook W (2006). Dyadic data analysis. Guilford Press.

Lang-Takac E, & Osterweil Z (1992). Separateness and connectedness: Differences between the genders. Sex Roles, 27(5–6), 277–289. 10.1007/BF00289929

Lee RM, Draper M, & Lee S (2001). Social connectedness, dysfunctional interpersonal behaviors, and psychological distress: Testing a mediator model. Journal of Counseling Psychology, 48(3), 310–318. 10.1037//0022-0167.48.3.310

Liebowitz MR (1987). Social phobia. Modern Problems of Pharmacopsychiatry, 22, 141–173. [PubMed: 2885745]

Mattick RP, & Clarke JC (1998). Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. Behaviour Research and Therapy, 36(4), 455–470. 10.1016/s0005-7967(97)10031-6 [PubMed: 9670605]

McCarthy JM, Bradshaw KR, Catalano LT, Garcia CP, Malik A, Bennett ME, & Blanchard JJ (2018). Negative symptoms and the formation of social affiliative bonds in schizophrenia. Schizophrenia Research, 193, 225–231. 10.1016/j.schres.2017.07.034 [PubMed: 28779852]

McKnight PE, & Kashdan TB (2009). The importance of functional impairment to mental health outcomes: A case for reassessing our goals in depression treatment research. Clinical Psychology Review, 29(3), 243–259. 10.1016/j.cpr.2009.01.005 [PubMed: 19269076]

Mellings TMB, & Alden LE (2000). Cognitive processes in social anxiety: the effects of self-focus, rumination and anticipatory processing. Behaviour Research and Therapy, 38(3), 243–257. 10.1016/S0005-7967(99)00040-6 [PubMed: 10665158]

Moore CT (2016). gtheory: Apply Generalizability Theory with R. R package version 0.1.2.

Reis HT, & Shaver P (1988). Intimacy as an Interpersonal Process. In: Duck SW, ed. Handbook of Personal Relationships: John Wiley & Sons Ltd; 367–389.

Rodebaugh TL, Scullin RB, Langer JK, Dixon DJ, Huppert JD, Bernstein A, Zvielli A, & Lenze EJ (2016). Unreliability as a threat to understanding psychopathology: The cautionary tale of attentional bias. Journal of Abnormal Psychology, 125(6), 840–851. 10.1037/abn0000184 [PubMed: 27322741]

Schilbach L (2016). Towards a second-person neuropsychiatry. Philosophical Transactions of the Royal Society B: Biological Sciences, 371(1686), 20150081. 10.1098/rstb.2015.0081

Segal EA, Gerdesm KE, Mullins J, Wagaman MA, & Androff D (2011). Social Empathy Attitudes: Do Latino Students Have More?. Journal of Human Behavior in the Social Environment, 21(4), 438–454. 10.1080/10911359.2011.566445

Shin KE, & Newman MG (2019). Self- and other-perceptions of interpersonal problems: Effects of generalized anxiety, social anxiety, and depression. Journal of Anxiety Disorders, 65, 1–10. 10.1016/j.janxdis.2019.04.005 [PubMed: 31054457]

Spielberger CD, Gorsuch RL, Lushene R, Vagg PR, & Jacobs GA (1983). Manual for the State-Trait Anxiety Inventory. Consulting Psychologists Press.

Taylor CT, & Alden LE (2011). To see ourselves as others see us: an experimental integration of the intra and interpersonal consequences of self-protection in social anxiety disorder. Journal of Abnormal Psychology, 120(1), 129–141. 10.1037/a0022127 [PubMed: 21319927]

Taylor CT, & Amir N (2012). Modifying automatic approach action tendencies in individuals with elevated social anxiety symptoms. Behaviour Research and Therapy, 50(9), 529 536. 10.1016/j.brat.2012.05.004 [PubMed: 22728645]

Taylor CT, Pearlstein SL, & Stein MB (2017). The affective tie that binds: Examining the contribution of positive emotions and anxiety to relationship formation in social anxiety disorder. Journal of Anxiety Disorders, 49, 21–30. 10.1016/j.janxdis.2017.03.007 [PubMed: 28384621]

Taylor CT, Pearlstein SL, & Stein MB (2020). A tale of two systems: Testing a positive and negative valence systems framework to understand social disconnection across anxiety and depressive disorders. Journal of Affective Disorders, 266, 207–214. 10.1016/j.jad.2020.01.041 [PubMed: 32056878]

Vittengl JR, & Holt CS (2000). Getting acquainted: The relationship of self-disclosure and social attraction to positive affect. Journal of Social and Personal Relationships, 17(1), 53–66. 10.1177/0265407500171003

Voncken MJ, & Dijk KFL (2013). Socially anxious individuals get a second chance after being disliked at first sight: The role of self-disclosure in the development of likeability in sequential social contact. Cognitive Therapy and Research, 37(1), 7–17. 10.1007/s10608-012-9449-4 [PubMed: 23355754]

Watson D, & Clark LA (1991). The mood and anxiety symptom questionnaire (MASQ). Unpublished manuscript, University of Iowa, Iowa City.

Watson D, Clark LA, & Tellegen A (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. Journal of Personality and Social Psychology, 54(6), 1063–1070. 10.1037//0022-3514.54.6.1063 [PubMed: 3397865]

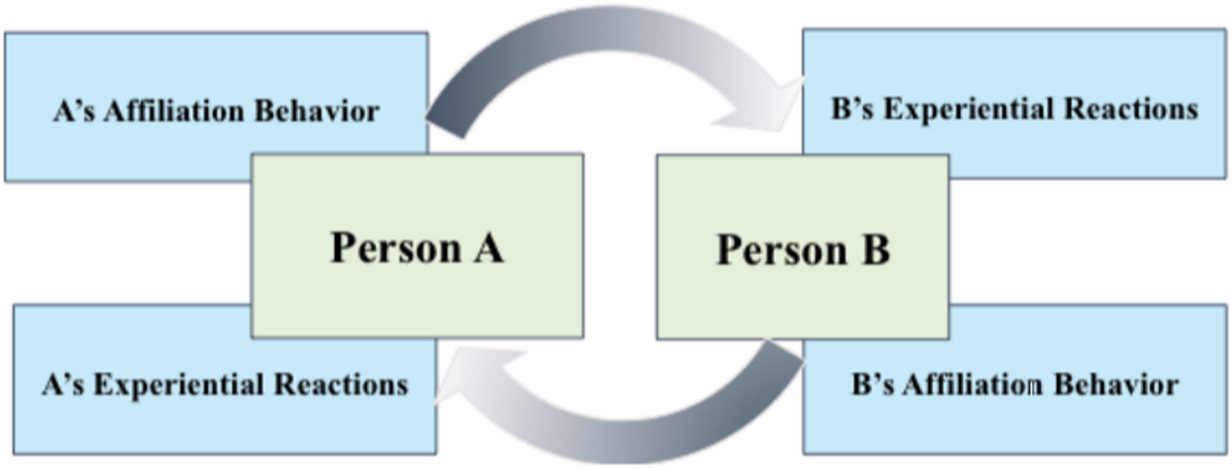

Figure 1.
Dynamic and Transactional Affiliation Processes Across the Dyad

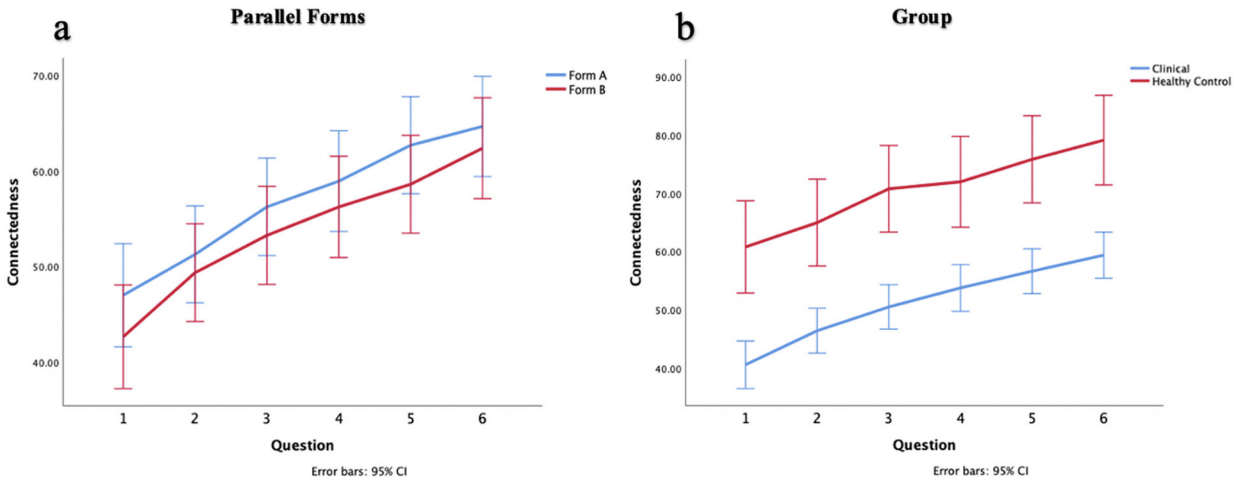

Figure 2.
Participant Within-Task Connectedness by Parallel Forms (a) and Group (b)

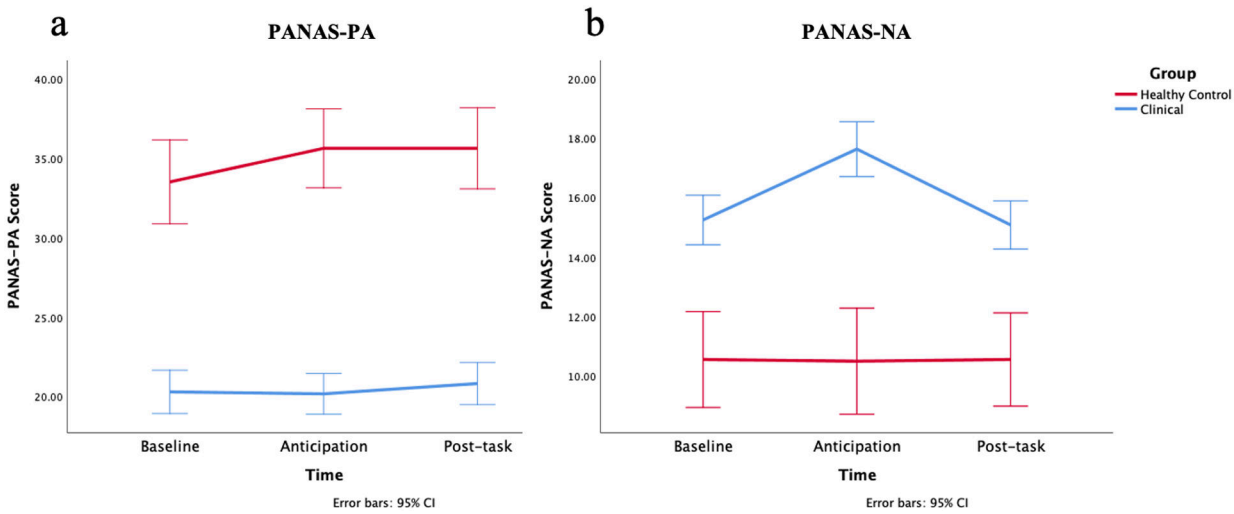

Figure 3. Participant Within-Task PANAS-PA and PANAS-NA by Group

Note. PANAS-PA = Positive and Negative Affect Schedule – Positive Affect; PANAS-NA = Positive and Negative Affect Schedule

Table 1

Participant Demographics by Group

	Clinical (n = 132)	Control (n = 35)	t or χ^2	p
	M (SD) or %	M (SD) or %		
Current Clinical Diagnosis[a]				
Alcohol Use Disorder	5.6	—	—	—
Agoraphobia	7.9	—	—	—
Bipolar Disorder II	2.2	—	—	—
Bulimia Nervosa	2.2	—	—	—
Generalized Anxiety Disorder	28.1	—	—	—
Major Depressive Disorder (current)	56.2	—	—	—
Major Depressive Disorder (recurrent)	39.3	—	—	—
Obsessive-Compulsive Disorder	3.4	—	—	—
Panic Disorder	4.5	—	—	—
Posttraumatic Stress Disorder	7.9	—	—	—
Social Anxiety Disorder	64.0	—	—	—
Substance Use Disorder	1.1	—	—	—
Age	25.54 (7.97)	26.86 (7.40)	0.88	.379
Gender[a]			0.38	.826
Female	62.1	65.7	—	—
Male	37.1	34.3	—	—
Years of Education	15.56 (2.06)	16.74 (2.54)	2.87	.005
Hispanic	24.2	20.0	0.28	.598
Race			5.43	.607
Asian	28.0	31.4	—	—
Black	4.5	2.9	—	—
Native American or Alaskan Native	1.5	0.0	—	—
Native Hawaiian or Pacific Islander	2.3	0.0	—	—
White	46.2	51.4	—	—
More than one race	9.1	14.3	—	—
Other	4.5	0.0	—	—
Unknown or Decline to respond	3.8	0.0	—	—

Note.

[a]Because participants could meet criteria for more than one diagnosis, the percentages for current clinical diagnoses exceed 100%. The percentages of primary clinical diagnoses are presented in the main text.

[b]One participant in the clinical group did not identify as a man or woman.

Table 2

Participant Mean, Standard Deviations, Range, and MANOVA Statistics for Affiliation Outcome Measures

	Clinical (n = 132)			Control (n = 35)			MANOVA		
Measure	***M***	***SD***	**Range**	***M***	***SD***	**Range**	***F*(1, 165)**	***p***	η_p^2
Post-task Connectedness	59.38	24.44	0–100	79.11	16.42	40–100	20.32	< .001*	.110
DFI	37.42	10.73	8–56	46.74	7.39	30–56	23.43	<. 001*	.124
IOS	2.80	1.21	1–7	3.51	1.42	1–7	9.06	.003*	.052

Note. MANOVA = multivariate analysis of variance; DFI = Desire for Future Interaction Scale; IOS = Inclusion of Other in the Self.

* $p < .05$.

Table 3

Correlations for Convergent Validity Measures

Measure	1	2	3	4	5	6	7	8	9
1. Post-task Connectedness	—								
2. Participant DFI	.58***	—							
3. Confederate DFI	.29***	.22**	—						
4. IOS	.58***	.52***	.25***	—					
5. Affiliative behavior	.32***	.30***	.56***	.28***	—				
6. PANAS-PA	.50***	.51**	.32***	.36***	.45***	—			
7. SCS-R	.40***	.39***	.33***	.30***	.35***	.60***	—		
8. LSAS	−.24**	−.21**	−.30***	−.19*	−.35***	−.54***	−.78***	—	
9. SIAS	−.30***	−.26**	−.36***	−.21**	−.37***	−.57***	−.82***	.90***	—

Note. DFI = Desire for Future Interaction Scale; IOS = Inclusion of Other in the Self; PANAS-PA = Positive and Negative Affect Schedule – Positive Affect; SCS-R = Social Connectedness Scale – Revised; LSAS = Liebowitz Social Anxiety Scale; SIAS = Social Interaction Anxiety Scale.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 4

Correlations for Discriminant Validity Measures

Measure	1	2	3	4	5	6	7
1. Post-task Connectedness	—						
2. DFI	.58***	—					
3. IOS	.58***	.52***	—				
4. STAI-T	.04	.12	−.01	—			
5. MASQ-AA	.02	−.04	−.07	.20**	—		
6. Participant total time speaking	.07	.06	.06	−.10	−.01	—	
7. Confederate total time speaking	−.02	−.05	−.01	−.07	.05	.31***	—

Note. DFI = Desire for Future Interaction Scale; IOS. = Inclusion of Other in the Self; STAI = Spielberger State-Trait Anxiety Inventory-Trait subscale; MASQ-AA = Mood and Anxiety Symptom Questionnaire – Anxious Arousal subscale.

* $p < .05$.

** $p < .01$.

*** $p < .001$.