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**Group Member Attachment Style Interacts with Actor and Partner Helping Alliance to Predict Decreasing Binge Eating Episodes**

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**Abstract**

Objective: An individual’s attachment style may impact how they interact with their therapy group. This study examined the moderating role of a group member’s attachment on the dynamic relationships between that group member’s (actor) and other group members’ (partner) therapeutic alliances and symptom outcomes. Method: This is a secondary analysis of data from a trial testing the outcome of emotionally-focused group therapy for binge-eating disorder. The sample consisted of 2,360 sessions nested within 118 group members who attended a 20-session treatment. Patients recorded binge eating episodes (BEE), their body weight and an alliance measure session-by-session. Results: Dynamic structural equation modelling showed decreases in BEE and weight over the therapy. When attachment style was not included in the model, higher-than-average partner’s alliance scores in the previous session were related to decreases in BEE in the current session. Attachment style moderated these actor and partner effects. For patients with preoccupied attachments, higher-than-average actor alliance in the previous session was related to subsequent decreases in BEE. For patients with dismissing or disorganized attachments, higher partner alliance in the previous session was related to subsequent decreases in BEE. Conclusion: Group members’ attachment characteristics can play a role in the development of alliance-outcome patterns in group therapy.

**Keywords:** group therapy, therapeutic alliance, attachment style, binge eating disorder, dynamic structural equation modeling

**Clinical or Methodological Significance of this Article:** Dynamic Structural Equation Modeling can be adopted to examine complex bidirectional associations between alliance and outcome in group therapy. Attachment style moderates the different patterns of association between alliance and outcome.

## **Group Member Attachment Style Interacts with Actor and Partner Helping Alliance to Predict Decreasing Binge Eating Episodes**

The alliance-outcome association has been extensively examined in both individual and group therapy. When examining individual treatments, a recent and comprehensive meta-analysis examining 295 studies with over 30,000 patients found a moderately sized association between alliance and outcome ( $r = .28$ ; Flückiger et al., 2018). There is also evidence that the alliance temporally precedes client improvement (Falkenström et al., 2013; Flückiger, Rubel, et al., 2020). Taken together, the evidence suggests that the alliance is an important mechanism of change in individual therapy and is likely causally related to next-session outcomes (Crits-Christoph & Connolly Gibbons, 2021). Recent studies highlighted the importance of understanding the alliance as a dyadic variable and applied the actor-partner interdependence model (APIM) to examine the impact of alliance on therapy outcome. Researchers found that both actor (e.g., patient) and partner (e.g., therapist) effects are significant predictors of within-patient change throughout individual therapy (Kivlighan et al., 2016; Zilcha-Mano et al., 2016).

The alliance-outcome association has also been examined in group therapy but understanding this association is challenging because there are multiple alliances in therapy groups (Burlingame & Strauss, 2021). For example, a group member can have a positive (or negative) alliance with the group therapist, the other members of the group, and with the group-as-a-whole (Kivlighan et al., 2017a). Two recent meta-analytic reviews of the alliance-outcome relationship showed that therapeutic alliance is a significant predictor of outcome in group psychotherapy. The first meta-analysis by Alldredge et al. (2021) indicated that the average association between member-leader alliance and treatment outcome is statistically significant

with a small effect size ( $r = .17$ ). A second meta-analysis of the alliance-outcome association in group therapy considering the structural aspects of group relationships using multilevel meta-analytic methods found a medium effect size ( $r = -.22$ ; Lo Coco et al., 2022). We build on the findings of these meta-analyses by examining the alliance-outcome association and disaggregating two types of alliance (actor and partner) with the leader in group therapy.

**Actor and partner alliances in group therapy**

Group therapists have long been aware that the leader and the members of the group influence each other in several ways (Yalom & Leszcz, 2020), and creating a positive group relationship that offers therapeutic collaboration is paramount. The active collaboration on therapy tasks and goals and the positive bond between group members and leader are specific to group therapy and clinically relevant for patient outcomes. For example, there is some evidence that both the leader and the other members of the group influence an individual group member’s experience of the group (Illing et al., 2011; Kivlighan et al., 2012). Moreover, more than half of alliance ruptures may occur between group members (Garceau et al., 2021). Thus, examining the influence of both the individual member’s alliance and the alliance of the other members of the group on patient outcomes can be worthwhile.

The APIM (Kenny et al., 2002) is a powerful conceptual and statistical model, which allows group theorists and researchers to examine the effects of a group member’s alliance (i.e., an actor effect) with the aggregate of other group members’ alliances with the leader (i.e., a partner effect). The APIM posits that an actor’s outcome is a function of both the actor’s alliance with the group therapist and their partner’s alliance with the group therapist. Kivlighan et al. (2021) reviewed studies that used the APIM to examine important group processes. However, only a few of these studies used APIM to examine the alliance-outcome relationship in group

therapy. Gullo et al. (2014) found a significant partner effect with previous session partner alliance to the group-as-a-whole predicting current session actor alliances to the group-as-a-whole. This partner effect was stronger for group members whose well-being improved. Lo Coco et al. (2012) found that group members' symptoms decreased when actors and partners agreed that their alliance to the group-as-a-whole was strong. In addition, when partner's alliance to the group-as-a-whole was stronger than the actor's alliance to the group-as-a-whole, there was greater symptom improvement. Although this research provides important information about how both actor and partner alliances in group therapy relate to member outcomes it is limited by only examining actor and partner alliances to the group-as-a-whole. In their meta-analysis, Lo Coco et al. (2022) found that the effect of the alliance to the group ( $r = -.23$ ) was significantly larger than the effect of the alliance to the leader ( $r = -.16$ ). This finding does not mean that the alliance with the leader is unimportant, as some studies found that alliance to the leader was a better predictor of outcome than the alliance to the group (e.g., Marziali et al., 1997).

Regardless, group research has not examined the effects of actor and partner alliances to the group leader on individual member outcomes. Further, it is potentially useful to understand individual patient characteristics that are important in influencing the actor or the partner alliances to the leader. This knowledge would allow group leaders to tailor interventions to patient characteristics to improve individual patient outcomes. We believe that attachment styles may be important in determining for whom the actor's or partner's alliance is most important. This might help us move toward a science of personalized relationships in group therapy. Thus, in the current study, we examine whether a group member's attachment style moderates the actor and partner alliance-outcome association.

**Attachment style moderating the effect of actor’s and partner’s alliances to the group leader**

Attachment styles develop from early experiences with caregivers (Mikulincer & Shaver, 2016). From these early experiences, children build mental models of relationships that influence how they perceive and interact with others and how they regulate and express feelings. Although the study of attachment patterns has attracted attention in psychotherapy research (Levy et al., 2019; Slade & Holmes, 2019), research findings on the association between attachment and therapeutic alliance are mixed (Mikulincer et al., 2013), partly because conceptualizations and measures of adult attachment are only partially convergent (Strauss et al., 2022). Self-report measures likely assess participants’ conscious evaluations of their attachment functioning. Because self-report measures are easier to administer, most psychotherapy studies rely on their use. However, one can argue that some attachment-related constructs like internal working models, are not consciously available and require that observers infer their characteristics. Patients’ internal working models of attachment relationships can be measured with the Adult Attachment Interview (AAI) which classifies people as secure/autonomous, dismissing, preoccupied or disorganized based on the quality, quantity, relevance, and clarity of their narratives of attachment relationships (Main & Goldwyn, 1991). In this study, we use the categories derived from pre-treatment AAI interviews to derive the attachment styles of the group members.

Adults with a secure attachment system recognize how they were affected by their early relationships. They do not ruminate about the past nor worry about the future and can be emotionally present in their current relationships (Slade & Holmes, 2019). Adults with a dismissing attachment system see the world and others as unreliable. They have an

overdeveloped sense of agency and independence and are less capable of connecting with others or attuning to their emotional experiences (Slade & Holmes, 2019). Adults with a preoccupied attachment system have an intense desire for closeness and connection but fear losing these close connections. They have ambivalent feelings towards others because they see others as important but as inconsistent and unreliable. Adults with a disorganized mental model see others as frightening and emotionally distant. The unresolved classification (disorganized) is given to individuals who demonstrate a lack of resolution concerning the loss of an attachment figure or to traumatic experiences with the attachment figure. These individuals have great difficulty regulating their emotions and have not developed adaptive strategies for dealing with relationships.

Individuals' attachment styles affect how they engage in relationships. Thus attachment styles likely color the quality of the relationship that patients develop with their therapists both in individual (Petrowski et al., 2021) and group therapy (Kivlighan et al., 2017b; Marmarosh, 2017; Talia et al., 2022). More than in individual therapy, group treatment provides a context of complex interactions between patients with different relationship experiences. Thus, research that addresses the impact of attachment style can inform group therapy practice. Several group studies show that attachment dimensions can moderate group members' responses to group processes that affect member outcomes (Tasca et al., 2021). Gallagher et al. (2014) found that pre-treatment attachment anxiety moderated the relationship between growth in group cohesion and change in binge eating, a key outcome for those with binge-eating disorder. Specifically, increasing group cohesion was associated with improved binge eating for group members with higher, but not group members with lower, attachment anxiety. Tasca et al. (2013) formed homogenous groups with individuals who had low or high levels of attachment anxiety based on

members' pre-treatment scores on a self-report measure. They found that the growth in alliance to the group was associated with improved binge eating but only for groups composed of patients with high attachment anxiety. Finally, Tasca et al. (2006) compared group cognitive-behavioral therapy or group psychodynamic-interpersonal psychotherapy for treating women with binge-eating disorder (Tasca et al., 2021). In psychodynamic-interpersonal psychotherapy groups, women with higher attachment anxiety showed more improvement in binge eating, compared to women with lower attachment anxiety. However, attachment anxiety was unrelated to improvement in the cognitive-behavioral therapy groups.

Taken together, these studies suggest that attachment may be an important moderator of the effects of different aspects of group treatment for binge eating. However, all these studies relied on self-reported attachment dimensions, and none disaggregated actor and partner effects of group processes. The purpose of the current research is to examine if the actor's or partner's alliance differentially relates to group treatment outcomes for patients with binge-eating disorder (BED) who have different pre-treatment attachment styles assessed with the AAI.

**Current study**

The current study is a secondary data analysis of an effectiveness trial of emotionally focused group therapy (EFGT) for binge-eating disorder (BED; Compare & Tasca, 2016). A body of research supported a model of BED that includes emotional vulnerability and a deficit of skills to modulate negative affect within a stressful interpersonal context (Lo Coco et al., 2016, Munsch et al., 2012). EFGT focuses primarily on the patient's relationship with and regulation of their own difficult emotions to help the client manage and overcome the fear associated with social situations (Greenberg, 2002). Some prior promising studies examined the reciprocal influence of alliance and outcome in group therapy for eating disorders and found that previous

change in alliance was associated with subsequent change in symptoms, but also previous change in symptoms predicted subsequent change in alliance (Tasca & Lampard, 2012). A previous investigation which used some of the current data (Tasca et al., 2016) showed that previous session alliance increase was significantly associated with lower subsequent session binge eating. However, that research did not disaggregate the actor and partner effects of the alliance nor patient characteristics that may moderate these effects. In the current study, we used dynamic structural equation modeling (DSEM: Asparouhov et al., 2018) to examine the longitudinal associations between actors' and partners' helping alliances and session-by-session changes in group member binge eating episodes (BEE) and weight. Specifically, we hypothesized that there will be reciprocal relationships between actor's and partner's alliances, and BEE and weight such that higher-than-average actor and partner alliance in the previous group session would be related to decreases in BEE and weight in the current session. This hypothesis was based on recent meta-analytic findings that showed that both alliance to leader and alliance to group members were related to treatment outcomes (Lo Coco et al., 2022). We also hypothesized that higher-than-average decreases in BEE and weight in the previous session would be related to increased actor and partner alliances in the current session. This hypothesis was based on research showing a reciprocal relationship between alliance and improvement (e.g. Flückiger et al., 2020; Tasca & Lampard, 2012).

Finally, we hypothesized that group members' attachment styles would moderate the dynamic relationships between actor and partner alliances and outcomes. Based on the attachment literature reviewed above we predicted that: (a) for group members with a preoccupied attachment, a previous stronger actor alliance would be related to decreases in BEE and weight in the current session. Adults with a preoccupied attachment style are hyper-vigilant

about their relationship with attachment figures, expecting that they will be abandoned. Their hyper-activated emotional expressions are a bid to compel the attachment figure to take care of them. Therefore, reporting a better than usual alliance with the leader in a group session would lead to reduced binge eating symptoms in the following week because a stronger alliance with the leader is a sign of less preoccupation with abandonment; (b) for group members with a dismissing attachment style, a previous stronger partner (but not actor) alliance would be related to decreases in BEE and weight in the current session. Adults with a dismissing attachment learned that displays of neediness could be overwhelming to caretakers and could cause these caretakers to withdraw. Therefore, people with a dismissing attachment style hypo-activate their emotional expression as a strategy for maintaining contact. For patients with a dismissing attachment style, a better than usual alliance with the group leader would be experienced as an interpersonal threat and lead to increased binge eating symptoms the following week. However, patients with a dismissing attachment would find an indirect alliance with the leader as less threatening. Therefore, when partners report a higher-than-average alliance with the leader in a session, actors with a dismissing attachment style would have fewer binge eating symptoms in the following week. We examined the dynamic relationships for group members with a disorganized attachment but did not make any hypotheses because these group members shared characteristics of group members with either a preoccupied or dismissing attachment styles, and it is not clear how group members will respond to actor and partner alliances.

**Method**

**Participants**

Data from 118 adult patients with obesity, meeting DSM-IV criteria for BED, were used in the study. 245 consecutive overweight participants who were referred to an outpatient public

health department were initially assessed, and 189 met the diagnostic criteria for BED. In the effectiveness trial, 63 out of 189 patients were assigned to the no-treatment condition, and so they were excluded from the current analyses. Of the 126 patients recruited for the psychological treatment condition, 8 discontinued the group therapy. The final sample of 118 patients (56 male and 62 female) reported a mean age of 50.9 years ( $SD = 4.91$ ) and a mean BMI of 33.03 ( $SD = 2.01$ ).

### Measures

*Eating Disorders Examination Interview (EDE)* (Fairburn & Cooper, 1993). The EDE was administered by clinicians who had specific training for these interviews. The EDE defines binge-eating episodes as eating a large amount of food accompanied by a subjective sense of loss of control. For this study, we looked at the assessment of binge-eating episodes in the past week before each group session. The EDE had an intraclass correlation (ICC) coefficient for objective binge-eating episodes of .87 among five raters in this study indicating good inter-rater reliability.

Weight [kg] was obtained using a medical balance beam scale before each therapy session. Both binge eating behaviors and weight change were primary outcomes in the clinical trial (Compare & Tasca, 2016).

*Helping Alliance Questionnaire-II (HAQ)* (Luborsky et al., 1996). The 19-item HAQ-II patient version was used to assess helping alliance with the therapist. Each item was rated on a 6-point Likert-type scale (1 = strongly disagree to 6 = strongly agree). The mean-item score was calculated and reported in this study. The range of Cronbach's alpha coefficient for patients' alliance ratings in this study across 20 sessions was .89 to .92. The HAQ-II forms were collected by research assistants at the end of each group session and were not seen by the therapists.

*Adult Attachment Interview (AAI)* (Main & Goldwyn, 1991): The AAI is a semi-structured interview for assessing attachment states of mind. Patients are interviewed about early childhood memories of their caregivers, separations, and losses. During the interview, adults are asked to retrieve attachment-related autobiographical memories from early childhood and to evaluate these memories from their current perspective. The AAI transcripts are rated for security of attachment and the coding is based on the thoughtfulness and the coherence with which the adult can describe and evaluate these childhood experiences (Main & Goldwyn, 1991). The coding system of the AAI leads to adult attachment classifications in four main categories. Those categorized as *Secure* tend to value attachment relationships and consider them important for their personality. Those categorized as *Preoccupied* are very much involved and preoccupied with their past attachment experiences and are therefore not able to describe them coherently. Those categorized as *Dismissing* tend to devalue the importance of attachment relationships for their own lives. They often appeal to a lack of memory of childhood experiences. Finally, adults classified as *Disorganized* have characteristic lapses in the monitoring of discourse or reasoning when discussing attachment-related loss or trauma.

**Treatment**

EFGT is a therapy aimed at helping patients change how they experience and use their emotions (Elliott & Greenberg, 2007). EFGT was adapted for BED and consists of focal treatment across three overlapping phases (Greenberg, 2002). The first phase aims to help patients to reflect on and re-evaluate emotion schemes linked with binge episodes, as well as identify patterns of interpersonal behavior linked to eating symptoms. During the second phase, patients were helped by therapists to explore primary maladaptive emotional responses. In the third phase, therapists helped patients to access subdominant adaptive emotional responses.

EFGT was administered via 20 group therapy sessions, in eight groups over a 5-month treatment period. Eight group therapists were involved in the study, and each therapist led one group. All therapists participated in 2-year (part-time) postgraduate training program with an EFGT focus and had at least 1 year of training before beginning to see clients. The therapists received 6 months of supervision to be adherent to the EFGT for BED manual (Compare & Molinari, 2012).

### **Procedure**

Diagnostic assessments of BED were completed by trained clinical psychologists through the Structured Clinical Interview for DSM-IV Axis I Disorders. Inter-rater reliability in this study was excellent ( $\kappa = 0.94$ ). Participants who met inclusion criteria provided written informed consent and were assigned to one of the study conditions (EFGT or control condition) (see Compare et al., 2016). During the 20 weeks of group therapy, participants were interviewed by trained clinical psychologists to assess BE episodes and weight change before each session.

### **Statistical Analysis**

We used the procedure described by Tasca et al. (2010) to calculate partner scores for helping alliance (HA). The actor HA was each member's HAQ rating for each group session. To calculate partner scores for each actor, we subtracted each actor's HA score from the sum of all HA scores in a group for a given session. This difference was divided by the number of group members attending that session minus 1. We completed this calculation for each group member (actor) in reference to their group for each group session. Therefore, every individual group member had an actor HA score and a unique partner (the rest of the group) HA score for each session.

Dynamic Structural Equation Modeling (DSEM, Asparouhov et al., 2018) is an innovative and comprehensive approach for analyzing intensive longitudinal data. DSEM uses time series modeling to examine lagged (e.g., session-to-session) relationships within a single case over time. DSEM combines this single-subject technique with multilevel modeling to analyze multiple cases (e.g., clients) simultaneously (Hamaker et al., 2023). DSEM can estimate lagged effects within persons and, with random components, can examine how these lagged relationships vary across persons. In addition, a structural equation modeling component allows researchers to simultaneously examine multiple predictor and criterion variables by specifying structural and measurement models (Hamaker et al., 2023).

Initially, DSEM was used to examine data from experience sampling or daily diaries. More recently, it was used to model session-to-session synchrony in clients' and therapists' alliance ratings (Lin et al., 2024), as well as the co-development of clients' and therapists' perceptions of the alliance (Escudero et al., 2022). As far as we can tell, this is the first application of DSEM with group therapy data. Specifically, we used DSEM to see if actors' and partners' HAs in a session predicted actors' binge eating episodes and weight the following week and if binge eating episodes and weight in a week predicted actors' HA in the following session. In addition, we examined if group members' attachment style moderated these session-to-session relationships. The session-to-session aspect of the DSEM analysis is important because it can establish which variable temporally precedes another variable, and temporally precedence can suggest possible causal relations among the variables.

As noted above, we are interested in how variables in one session/week (e.g., HA) are associated with variables in the next session/week. Because we collected HA, binge eating and weight data across 20 sessions, there are likely trends in the data. A trend is a change in the mean

of a variable over time, for example, HAs often increase over group sessions. Detrending involves removing a trend, like a linear increase, from a time series. It is important to detrend variables that are increasing or decreasing over sessions to see sub-trends. Sub-trends are fluctuations in session-to-session data and are the focus of the DSEM analysis. Increasing or decreasing trends can be detrended by regressing the variable (e.g., HA) on session number. Therefore, we detrended our data by regressing the actor and partner HA, BEE, and weight on session number. In addition, Savord et al. (2023) contended that modelling the variance in actor and partner data as random effects allows for uncertainty to be better quantified. Therefore, we included random intercepts to model variability in the detrended data.

We had repeated observations of the HA for actors and partners for up to 20 sessions, therefore the data structure had within-group member and between-group member variance. DSEM (Asparouhov et al., 2018) combines aspects of time-series analysis, Multilevel Modeling, and Structural Equation Modeling to analyze the data (Schultzberg & Muthén, 2018). We followed the procedure described by Savord et al. (2023) for implementing the APIM in DSEM. Supplementary Figure 1 shows a path diagram of the moderated model we examined. Falkenström et al. (2020) showed that including therapist effects either did not affect or increase the bias of within-client effects. For this reason, we did not model therapists in our analysis.

A Markov Chain Monte Carlo approach, which is an iterative Bayesian estimation, was used to estimate the model. Bayesian estimation requires starting information, called priors, to conduct the estimation procedure. Priors are starting values that predict the strength of each relationship in the model. Picking priors is like specifying an effect size for the relationship among variables in a power analysis. If there is a robust literature in an area of research, the findings (e.g., associations found) from previous studies determine start values for the analysis.

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If incorrect priors are specified in the DSEM analysis, these priors will bias the model. There is not a robust literature for determining priors for the variables in our study. In other words, we do not have empirical evidence about the week-to-week relationship between HA and weight or binge eating episodes. When researchers do not have good empirical evidence to specify priors it is recommended that weakly informative priors be used. Weakly informative are start values that will not bias the analysis in any direction. Therefore, all parameters in the DSEM analysis were modeled with these weakly informative standard priors.

We used two Markov chains, each with 50,000 iterations, with the first 40,000 iterations discarded as burn-in (i.e., these were iterations before convergence). Burn-in involves running the iterative analysis 50,000 times but not using this initial analysis in determining the final model. As noted above, incorrect priors can bias the results. Burn-in is used to allow the model to reach an equilibrium distribution. That means that there are no further changes in the distribution of values. The analysis “forgets” about the initial priors, and parameter estimates are based on the sample data. Once an equilibrium distribution is reached the model parameters can be accurately estimated.

We assessed convergence with the Gelman-Rubin Rhat statistic (Gelman & Rubin, 1992). The Rhat statistic is used to determine if the model has converged and reached a proper solution. Specifically, the Rhat statistic compares the estimated between-level and within-level variances for each parameter in the model. Large differences between the within- and between-variances indicate failure to converge. At convergence, the scale reduction statistic was 1.05, which was below the recommended upper limit of 1.20. The value of 1.05 means that the within- and between-variances were approximately equal. Parameter estimates were means for the iterations after burn-in. We assessed the significance of these parameters by examining the 95%

credible intervals (CI), with statistical significance indicated when the CI did not contain zero. According to Hespanhol et al. (2019), credible intervals are similar to confidence intervals, but these intervals are estimated and interpreted differently. The confidence interval means that we are 95% certain that that true estimate would lie within the interval. The credibility interval means that “there is a 95% probability that the true estimate would lie within the interval” (Hespanhol et al., 2019, p. 290).

To test the significance of our directional hypotheses we examined the 1-tail p-values. For any other tests, we examined the credibility intervals (C.I.). If the C.I. did not include zero, the relationship was statistically significant. According to Orth et al. (2022), conventional effect size guidelines are not appropriate when examining cross-lagged effects because cross-lagged effects: (a) are estimated based on prospective relations over time, NOT concurrent relations, (b) have restricted range because autoregressive and between-person effects are included in the model. Orth et al.’s (2022) guidelines for cross-lagged effects suggest that: .03 indicates a small effect, .07 indicates a medium effect, and .12 indicates a large effect.

## Results

Across all group members ( $N = 118$ ) and sessions ( $N = 2,360$ ), the average actor and partner HA, BEE and weight were 3.57 ( $SD = 0.92$ ), 3.57 ( $SD = 0.64$ ), 10.26 ( $SD = 5.20$ ) and 93.08 ( $SD = 7.07$ ), respectively. Skew ranged from -0.31 for partner HA to 1.11 for weight, and kurtosis ranged from -1.11 for BEE to 1.15 for weight. Based on their pre-treatment adult attachment interviews, 73 (61.9%) clients were classified as preoccupied, 20 (16.9%) as dismissing and 25 (21.2%) as disorganized.

### Dynamic relationships between actor’s and partner’s HA, BEE and weight

The standardized results of the DSEM analysis, without attachment style as a moderator, are presented in Supplementary Table 1. In this analysis, autocorrelations and cross-correlations are assessed by regressing a current variable onto a set of lagged variables. DSEM uses latent variable centering to create lagged (Time 1) actor HA (aHA lag1), partner HA (pHA lag1), BEE (BEE lag1) and weight (Wt lag1). Then, current session variables were regressed on aHA lag1, aHA lag1, BEE lag1 and Wt lag1.

As seen in Supplementary Table 1, all the auto correlations were significant. That is, (a) previous actor HA was significantly related to current actor HA,  $\beta = 0.07$ , posterior  $SD = 0.01$ ,  $p < 0.001$ , 95% CI [0.060, 0.118], (b) previous partner HA was significantly related to current partner HA,  $\beta = 0.09$ , posterior  $SD = 0.01$ ,  $p < 0.001$ , 95% CI [0.116, 0.285], (c) previous BEE was significantly related to current BEE,  $\beta = 0.90$ , posterior  $SD = 0.00$ ,  $p < 0.001$ , 95% CI [0.890, 0.907], and (d) previous weight was significantly related to current weight,  $\beta = 0.93$ , posterior  $SD = 0.01$ ,  $p < 0.001$ , 95% CI [0.922, 0.940]. The autocorrelations for BEE and weight were larger than the autocorrelations for actor and partner HA. This suggests that there was a relatively large amount of stability in BEE and weight from week to week but a relatively small amount of stability in actor and partner HAs from session to session. The four linear trends were also significant. That is, (a) actor HA was significantly related to session number,  $\beta = 0.07$ , posterior  $SD = 0.03$ ,  $p = 0.012$ , 95% CI [0.011, 0.134], (b) partner HA was significantly related to session number,  $\beta = -0.18$ , posterior  $SD = 0.01$ ,  $p < 0.001$ , 95% CI [-0.213, -0.146], (c) BEE was significantly related to session number,  $\beta = -0.09$ , posterior  $SD = 0.01$ ,  $p < 0.001$ , 95% CI [-0.097, -0.077], and (d) weight was significantly related to session number,  $\beta = -0.07$ , posterior  $SD = 0.00$ ,  $p < 0.001$ , 95% CI [-0.079, -0.063]. These significant trends show that BEE and weight decreased across the treatment session.

Contrary to our hypothesis, previous session actor's HA was not related to current week BEE or weight. However, partner's HA was related to current week BEE,  $\beta = -0.01$ , Posterior  $SD = 0.00$ ,  $p = 0.020$ , 95% CI [-0.017, -0.001]. For cross-lagged effects, the effect of BEE regressed on partner HA was a very small effect. Partner HA was not related to current week weight.

Previous week BEE was significantly related to current session actor's HA,  $\beta = 0.13$ , posterior  $SD = 0.04$ ,  $p = 0.001$ , 95% CI [0.062, 0.203], and previous week weight was significantly related to current session actor's HA,  $\beta = 0.07$ , posterior  $SD = 0.04$ ,  $p = 0.024$ , 95% CI [0.01, 0.137]. These significant effects were in the opposite direction than hypothesized. When binge eating or weight in the previous week was greater than usual, the actor's alliance in the current session was stronger than usual. Using Orth et al.'s (2022) benchmark values, the effect of partner HA regressed on BEE was large and the effect of HA regressed on weight was a medium.

### Dynamic relationships moderated by attachment style

The standardized results of the DSEM analysis with group member attachment style as a between-person moderator are presented in Supplementary Table 2. We highlight the instances where attachment style was a significant moderator of the dynamic relationships examined in our previous analysis. As seen in Supplementary Table 2, group member's attachment style moderated the relationship between current session BEE regressed on previous session actor HA,  $\beta = -0.82$ , posterior  $SD = 0.17$ ,  $p = 0.001$ , 95% CI [-0.992, -0.342], with a large effect. Figure 1 (panel A) displays a plot of this interaction for group members whose pretreatment attachment classification was preoccupied, dismissing, or disorganized. Previous session actor HA was person-centered to represent within-client changes in previous session actor's HA. The simple slope for preoccupied group members was significant and negative,  $b = -0.06$ , posterior  $SD =$

0.03,  $p = 0.014$ , 95% CI [-0.124, -0.007]. The simple slope for group members with a dismissing attachment style was not significant,  $b = 0.02$ , posterior  $SD = 0.03$ ,  $p = 0.223$ , 95% CI [-0.031, 0.077]. The simple slope for group members with a disorganized attachment style was positive and significant,  $b = 0.11$ , posterior  $SD = 0.05$ ,  $p = 0.014$ , 95% CI [0.011, 0.208]. As seen in the figure, for group members with a preoccupied attachment style, when previous actor HA was higher than average, there was a greater decrease of BEEs. Also as seen in the figure, for group members with a disorganized attachment, when previous actor HA was stronger than usual, there was a greater increase of BEEs.

As seen in Supplementary Table 2, group member attachment style also moderated the relationship between current week BEE regressed on previous session partner's HA,  $\beta = 0.76$ , posterior  $SD = 0.22$ ,  $p = 0.008$ , 95% CI [0.169, 0.985], with a large effect. Figure 1 (Panel B) displays a plot of this interaction for group members whose pretreatment attachment classification was preoccupied, dismissive or disorganized. Previous session partner HA was person-centered to represent within-client changes in previous session partner's HA. The simple slope for group members with a preoccupied attachment was not significant,  $b = 0.02$ , posterior  $SD = 0.04$ ,  $p = 0.352$ , 95% CI [-0.071, 0.096]. The simple slope for group members with a dismissing attachment was negative and significant,  $b = -0.07$ , posterior  $SD = 0.04$ ,  $p = 0.016$ , 95% CI [-0.143, -0.005], and simple slope for group members with a disorganized attachment was negative and significant,  $b = -0.16$ , posterior  $SD = 0.06$ ,  $p = 0.002$ , 95% CI [-0.283, -0.042]. As seen in the figure, for group members with a dismissing or disorganized attachment style, when previous partner HA was stronger than usual, there was a greater decrease of BEEs.

As seen in Supplementary Table 2, group member attachment style moderated the relationship between current session actor's HA regressed on previous week BEE,  $\beta = 0.92$ ,

posterior  $SD = 0.22$ ,  $p = 0.006$ , 95% CI [0.199, 0.997], with a large effect. Figure 1 (Panel C) displays a plot of this interaction for group members whose pretreatment attachment classification was preoccupied, dismissive or disoriented/disorganized. Previous week BEE was person-centered to represent within-client changes in previous week BEE. The simple slope for group members with a preoccupied attachment style was positive and significant,  $b = 0.06$ , Posterior  $SD = 0.01$ ,  $p < 0.001$ , 95% CI [0.035, 0.081]. The simple slopes for group members with a dismissing attachment style,  $b = 0.02$ , posterior  $SD = 0.01$ ,  $p = 0.059$ , 95% CI [-0.004, 0.040] and for group members with a disorganized attachment style,  $b = -0.03$ , posterior  $SD = 0.02$ ,  $p = 0.124$ , 95% CI [-0.059, 0.025] were not significant. As seen in the figure, for preoccupied group members, when previous BEE was greater than usual, there was a greater increase in actors' HA.

Finally, as seen in Supplementary Table 2, the regression of within-person actor's HA variance on group member attachment was significant,  $\beta = 0.61$ , posterior  $SD = 0.19$ ,  $p = 0.001$ , 95% CI [0.232, 0.926], with a large effect. The within-person variance was significant for group members classified as preoccupied,  $b = -0.17$ , posterior  $SD = 0.04$ ,  $p < 0.001$ , 95% CI [-0.247, -0.102], for group members classified as dismissing,  $b = -0.31$ , posterior  $SD = 0.03$ ,  $p < 0.001$ , 95% CI [-0.380, -0.243], and for group members classified as disorganized,  $b = -0.45$ , posterior  $SD = 0.06$ ,  $p < 0.001$ , 95% CI [-0.573, -0.324]. The exponentiated variances for preoccupied, dismissing, and disorganized attachment styles were .84, .73 and .64, respectively. Stevens et al. (2007) showed that greater alliance variability was associated with more rupture and repair episodes, therefore preoccupied group members had more rupture and repair episodes than dismissing group members who had more rupture and repair episodes than disoriented/disorganized group members.

**Discussion**

In the current study, we used DSEM to examine the temporal dynamic relationships between actors’ and partners’ alliance to the leader and outcome in group therapy for BED, as well as the moderating role of members’ attachment style. In our base model, partners’ but not actors’ HA to the leader predicted reduced binge eating, whereas neither partner nor actor HA predicted weight change. In our moderator analyses, pre-treatment attachment style moderated both the actor and the partner HA effects.

**Auto correlations and linear trends**

In the base model, both the actor and partner HAs from the previous to the current session were significantly associated. Thus, stronger, or weaker than usual actor (or partner) HA in the previous session was related to increased actor’s (or partner’s) HA in the current session. This significant autocorrelation may illustrate the adaptive spiral and vicious cycle that Yalom and Lezscz (2020) described. For example, strengthening HAs from session to session will, across the life of the group, lead to a linear increase a group member’s (actor’s) HA as seen in the trend analysis. Given the overall significant positive linear trend for actors’ HA, our findings suggest that more group members experienced an adaptive spiral rather than a vicious cycle for actors’ HA. This finding is similar to research showing that group engagement and group cohesion increase over time (Arnold et al., 2022; Chapman & Kivlighan, 2019).

Despite significant autocorrelations across sessions, both binge eating episodes and weight showed a significant linear decrease over time as previously reported by Compare & Tasca (2016). These represent a medium effect suggesting that the decreases were clinically meaningful. These findings suggest that EFGT was effective in helping group members decrease their binge eating and decrease their weight.

As noted above, actors' helping alliance increase over time is congruent with previous findings about group engagement and group cohesion (Arnold et al., 2022; Chapman & Kivlighan, 2019). We were surprised that partner helping alliance showed a significant decrease over time. In examining the actor and partner trends, it appears that individual members experienced a stronger alliance with the leader over time but the group-as-a-whole experienced a weaker alliance with the leader over time. These results may indicate that members are making an upward comparison, believing that they have a stronger relationship with the leader compared to the other group members. As far as we can tell, this is the first study to examine how partner relationship ratings change over time. Previous studies examining the temporal relationship of actor and partner scores have only examined session-to-session changes in aggregated alliances or relationships (e.g., Lo Coco, Gullo et al., 2019). Therefore, it will be important for future research to replicate our findings and further examine how partner alliance scores change over time.

### Cross correlations

Contrary to our hypothesis, actor HA did not predict a subsequent reduction of actor binge eating episodes or weight. Our finding is discrepant from previous meta-analyses (Alldredge et al., 2021; Lo Coco et al., 2022), which found a small correlation between alliance and outcome when group members rated their alliance with the group leader. Our study examined the temporal ordering of the alliance-outcome association, which is a major difference from the studies included in the Lo Coco et al. meta-analysis. As far as we can discern, ours is the first study to examine this temporal relationship while also modeling autocorrelation and examining bidirectional causality. Falkenström et al. (2022) showed that multi-level models, like the one used in the studies included in Lo Coco et al.'s (2022) meta-analysis can result in

severely biased estimates of cross-lagged effects when autoregression and bidirectionality are present in the data. The DSEM used in the current study addresses the issues identified by Falkenström et al. (2022) and may help to provide a more accurate reflection of how actors' HA is related to outcomes in group therapy.

On the other hand, the disaggregating of partner from actor effects allowed us a more nuanced assessment of the association between HA and symptom outcomes in group therapy. As hypothesized, a stronger previous partner HA predicted subsequent decrease of binge eating episodes. This partner effect was small, but 3 times larger than the actor effect. This is in line with the research summarized by Kivlighan & Narvaez (2021) showing that partner effects are better predictors of actor outcomes than actor effects. These results suggest that in the group context, the HA functions in a more complex manner. That is, unlike the individual therapy dyad that only depends on an actor's alliance with the therapist, therapy groups are composed of multiple HAs captured by both the actor and partner effects that we modelled.

Our HA results did not provide support for the concept of an adaptive spiral or vicious cycle between previous session symptom improvement and subsequent session positive alliance. When group members had more binge eating episodes and gained weight in the previous session, they reported a stronger, not weaker, actor HA in the next session. By contrast, in individual treatments, there appears to be a reciprocal relationship between symptom outcomes and subsequent alliance such that worsening symptoms in a previous session are associated with poorer alliance in a subsequent session (Flückiger et al., 2020). One could argue that experiencing more binge eating episodes and gaining weight while in group treatment may indicate that a group member needs help dealing with their eating disorder symptoms, which may motivate them to invest more in the interpersonal context of the group. The bidirectional

associations between therapy outcome and alliance were mostly examined in individual treatments (Flückiger et al., 2020), and the reciprocal alliance–outcome relationship may operate differently in groups.

### **Moderation by attachment style**

Our results are in line with the literature showing that attachment style is linked to both alliance and therapy outcomes (Slade & Holmes, 2019). Our findings suggest that for individuals with a preoccupied attachment, actor HA in the previous session was associated with better subsequent session binge eating. Group members with a preoccupied attachment are hypervigilant about the loss of relationships and hyperactivate their attachment system as a strategy for maintaining contact. When group members with a preoccupied attachment report a higher-than-average HA after a session they may be exhibiting signs of earned security, or the capacity to engage in relationships characterized by greater attachment security. In this case, it is possible that the experience of collaborative group relationships resulted in the group member with a preoccupied attachment becoming less concerned about losing relationships and less likely to hyperactivate their attachment system. Such a process might explain why the individual with a preoccupied attachment had fewer binge eating episodes in the subsequent session. These findings are like those reported by Gallagher et al. (2014), who showed that increasing cohesion was related to better outcomes for group members who were higher versus lower in attachment anxiety (a proxy for preoccupied attachment).

For group members with a disorganized attachment, previous actor HA was associated with high binge eating symptoms in the subsequent session. Group members with a disorganized attachment feel they don't deserve love or closeness in a relationship, and their states of mind can be incoherent when recalling traumatic experiences (Talia et al., 2022). Sometimes their

attachment systems may be hyperactivated and other times they may be hypo-activated. Having a higher-than-average HA in a previous session may create an approach-avoidance dilemma for group members with a disorganized attachment. Their attachment systems may alter between hyper- and hypo-activation, which could account for the increased binge eating episodes in the subsequent session. On the other hand, patients with a disorganized attachment showed a decrease in binge eating when previous partner HA was higher than usual. The experience of an increasing HA in the group may play an important role in providing a secure context for patients with a disorganized attachment. Such a context may function as a corrective experience that led to lower binge eating in a subsequent session.

Similarly, those with a dismissing attachment style, showed a decrease in binge eating when previous session partner HA was higher-than-average. Group members with a dismissing attachment style believe that signaling their attachment needs can overwhelm caregivers or result in unresponsive caregiving, and so those with a dismissing attachment will hypo-activate their attachment system as a strategy for maintaining contact. The partner alliance may serve as a model for group members with a dismissing attachment style showing them that seeking connection does not lead to caregiver withdrawal or abandonment. This modeling of a healthy connection in the group context can account for the reduction in binge eating episodes in the current week.

Only for preoccupied group members did higher than average binge eating episodes in the previous week lead to stronger HA in the current session. Preoccupied patients may be more reluctant to express negative feelings toward the therapist or interpersonal distrust, even when experiencing higher symptoms in the previous week. As previously mentioned, experiencing

higher-than-average binge eating symptoms could motivate these individuals to invest more in the therapeutic relationship and seek more proximity with the therapist in the following session.

Moreover, we found that the within-person HA variance was higher for group members classified as preoccupied. Consistent with Stevens et al. (2007) who showed that greater alliance variability was associated with more rupture and repair episodes, one could speculate that group members with a preoccupied attachment had more rupture and repair episodes than those with dismissing or disorganized attachment styles. Patients with a preoccupied attachment tend to assume that the therapist will not pay attention consistently to them (Talia et al., 2022). Their fear of abandonment could trigger rupture episodes, whereas their intense desire for closeness and connection could lead to repair processes. However, these findings need to be replicated especially regarding their association with therapy outcomes, given that the literature on rupture and repair processes in group therapy is still in its infancy (Lo Coco et al., 2019; Marmarosh et al., 2021).

Almost all of the empirical literature examining attachment as a moderator in group therapy focused on treatments for eating disorders. This suggests that attachment insecurity and its failure to develop trusting relationships with others may characterize individuals with unhealthy eating behaviors (Faber et al., 2018). If this is correct, then our results may not generalize to other health/mental health conditions. On the other hand, the transdiagnostic model of attachment and psychopathology (Ein-Dor & Doron, 2015) contends that attachment dispositions are risk factors for multiple psychopathological disorders. This view suggests that our findings would apply to other health/mental health conditions. For example, recent meta-analytic evidence showed that higher levels of attachment anxiety and avoidance were associated with negative affect (e.g., depression, anxiety, loneliness) (Zhang et al., 2022). The current

findings could stimulate further attachment research when examining the relationship between alliance and outcome in group therapy for depression, for example (Crowe & Grenyer, 2008). Future research could replicate the current findings in other mental health conditions to gain a comprehensive view of the complex relationships between alliance and outcome in groups.

**Strengths and limitations**

The session-by-session assessment of both alliance and outcome strengthened the findings of this study by allowing for reliable estimates of the dynamic association of these variables across therapy sessions. We also disaggregated actor and partner effects which allowed use to appropriately model the complex relationships that evolve in a group context between members and therapists, and members and the group as a whole. In addition, we adopted the gold standard measurement for patient attachment style that does not only rely on self-reporting of consciously available elements of attachment functioning (Strauss et al., 2022). Furthermore, although there is some evidence of the effectiveness of group psychotherapy for eating disorders (Grenon et al., 2017), much less is known about its mechanisms of change. The current study may fill this gap by providing a better understanding of the impact of the individual and group context on eating disorder symptom improvement. Despite these merits, some limitations must be considered. First, we did not have data on therapist attachment. Previous research showed that therapist insecure attachment may negatively affect the therapeutic alliance in more symptomatic clients (Bucci et al., 2016). Future group research should consider the interaction between patient and therapist attachment and how these interactions influence the alliance in group therapy. Moreover, session-by-session therapist ratings of the alliance are lacking in this study. Although we did take into account the alliance from multiple perspectives in the group, we were unable to examine whether both patient and therapist ratings of alliance explained unique variance in

patient improvement. Third, only binge symptoms and weight were measured as outcomes, and the link between alliance and other psychological outcomes for BED remains unclear. Finally, the current study examined a specific type of group therapy (EFGT) and a complex clinical population (adult obese individuals with BED). Further research is necessary to examine how our results may generalize to young adults with BED, to other types of patient problems and to other types of group treatments.

## Conclusion

The current study shed some light on the complex bidirectional associations between alliance and outcome in group therapy by adopting a DSEM analysis. The results suggest that stronger than usual partner (but not actor) helping alliance in the previous session may predict subsequent decreases in binge symptoms in the current week. However, the findings did not support the hypothesized association between a higher-than-average improvement in symptoms with higher alliance in the subsequent session. Overall, these findings provide support for a core assumption of group therapy, that a group member's outcomes are meaningfully affected by the other group members (Yalom & Leszcz, 2020). This suggests that group therapists should foster a therapeutic alliance in the group as a whole to optimize patient outcomes (Lo Coco et al., 2022; Tasca & Lampard, 2012). This may include emphasizing a collective agreement on the goals of the group and on how the group works (i.e., tasks of the group). Therapists could accomplish this through careful pre-group preparation and returning to the collective goals and tasks during group sessions. A therapeutic alliance also includes developing a relational bond between members and the therapist (Kivlighan et al., 2017a). This may involve therapists focusing some attention on here-and-now interactions in the group to shore up the sense of safety and group cohesion (Yalom & Leszcz, 2020). Our findings on the moderating role of pre-treatment

attachment style may also indicate for whom actor or partner alliance is the most important. For patients with a preoccupied attachment, higher-than-average actor alliance in their previous session predicted reduced binge eating in the subsequent session, suggesting that therapists pay particular attention to these individuals' needs to feel secure within their relationship with the therapist. However, for individuals with dismissing or disorganized attachments higher-than-average partner alliance in their previous session was associated with decreased binge eating in the current session. For these individuals, group therapists may want to emphasize the safety and collaborative nature of the group to provide a context in which these patients may feel secure enough to engage in new adaptive behaviors. In conclusion, the assessment of group members' attachment characteristics can help leaders understand how patients develop specific alliance-outcome patterns in group therapy and compose balanced treatment groups to effectively foster therapeutic alliance as a vehicle of change.

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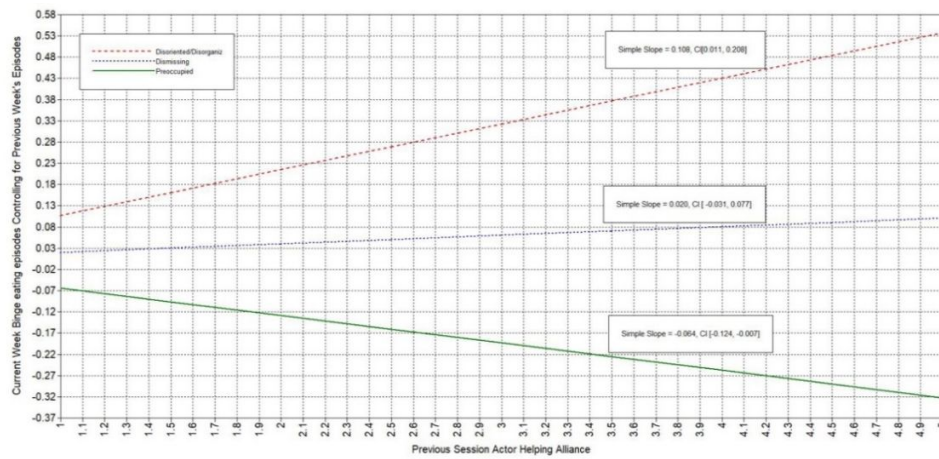
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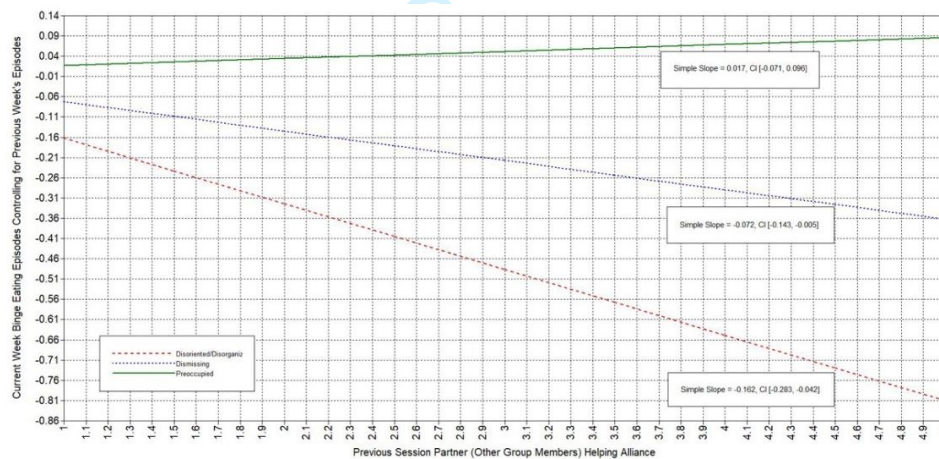
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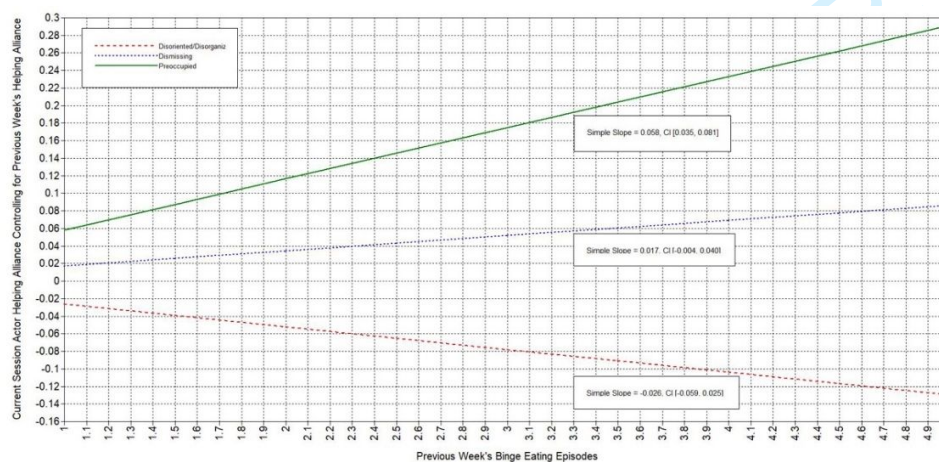
Figure 1. Panel A



Panel B



Panel C



Note. Model is derived from 2,360 counseling sessions nested within 118 group members.

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**Panel A.** Previous sessions’ actor’s helping alliance predicting current week binge eating episodes for preoccupied, dismissing and disorganized group members.

**Panel B.** Previous session’s partners’ helping alliance predicting current week binge eating episodes for preoccupied, dismissing and disorganized group members.

**Panel C.** Previous week’s week binge eating episodes predicting current session actor helping alliance for preoccupied, dismissing and disorganized group members.

For Peer Review Only

Professor Julian Rubel  
Psychotherapy Research  
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Dear Prof. Julian Rubel,

We are excited that you indicated that our manuscript entitled "Group Member Attachment Style Interacts with Actor and Partner Helping Alliance to Predict Decreasing Binge Eating Episodes", is in very good shape and only needs some minor revisions. The reviewer's comments were insightful and in responding to them we believe that we have strengthened our manuscript.

Below we describe how we have addressed each of the issues raised by the reviewer.

**The introduction provides an excellent orientation to the APIM and attachment style presentations in the clinical setting. An extended discussion of future research based on these findings would be appreciated; in my view, it is critical to determine how the findings might generalize to group treatments for other mental health conditions.**

We have added the following to our discussion.

“Almost all of the empirical literature examining attachment as a moderator in group therapy focused on treatments for eating disorders. This suggests that attachment insecurity and its failure to develop trusting relationships with others may characterize individuals with unhealthy eating behaviors (Faber et al., 2018). If this is correct, then our results may not generalize to other health/mental health conditions. On the other hand, the transdiagnostic model of attachment and psychopathology (Ein-Dor & Doron, 2015) contends that attachment dispositions are risk factors for multiple psychopathological disorders. This view suggests that our findings would apply to other health/mental health conditions. For example, recent meta-analytic evidence showed that higher levels of attachment anxiety and avoidance were associated with negative affect (e.g., depression, anxiety, loneliness) (Zhang et al., 2022). The current findings could stimulate further attachment research when examining the relationship between alliance and outcome in group therapy for depression, for example (Crowe & Grenyer, 2008). Future research could replicate the current findings in other mental health conditions to gain a comprehensive view of the complex relationships between alliance and outcome in groups”.

**I consider myself no slouch when it comes to statistical analysis but the DSEM approach employed in the study was an unfamiliar technique and could use more explication in the manuscript. If the insertion of additional explanatory description in the text would prove unwieldy, the authors might consider an appendix that offers a primer on the statistical approach.**

**In particular, a number of terms and steps in the analysis require further clarification. The detrending of the distributions for the helping alliance, binge eating episode, and weight variables needs further explication, i.e., why this was critical to the analysis and how it was implemented. What are “weakly informative standard priors” (p. 13, line 33)? What does “burn in” refer to in the bootstrapping function? More detail would be appreciated**

regarding the  $r$ -hat statistic (p. 13, line 42), the scale reduction statistic, credible intervals (p. 13, line 49), and “posterior sd” (p. 15, line5). (the credible interval clearly resembles a confidence interval but the terminology suggests the term encompasses additional inferential considerations.)

We really appreciate the reviewer’s detailed description of the issues that need to be addressed in our description of the DSEM analysis. We have taken all of these suggestions and expanded and refined our description of the DSEM analysis as follows:

“Dynamic Structural Equation Modeling (DSEM, Asparouhov et al., 2018) is an innovative and comprehensive approach for analyzing intensive longitudinal data. DSEM uses time series modeling to examine lagged (e.g., session-to-session) relationships within a single case over time. DSEM combines this single-subject technique with multilevel modeling to analyze multiple cases (e.g., clients) simultaneously (Hamaker et al., 2023). DSEM can estimate lagged effects within persons and, with random components, can examine how these lagged relationships vary across persons. In addition, a structural equation modeling component allows researchers to simultaneously examine multiple predictor and criterion variables by specifying structural and measurement models (Hamaker et al., 2023).

Initially, DSEM was used to examine data from experience sampling or daily diaries. More recently, it was used to model session-to-session synchrony in clients’ and therapists’ alliance ratings (Lin et al., 2024), as well as the co-development of clients’ and therapists’ perceptions of the alliance (Escudero et al., 2022). As far as we can tell, this is the first application of DSEM with group therapy data. Specifically, we used DSEM to see if actors’ and partners’ HAs in a session predicted actors’ binge eating episodes and weight the following week and if binge eating episodes and weight in a week predicted actors’ HA in the following session. In addition, we examined if group members’ attachment style moderated these session-to-session relationships. The session-to-session aspect of the DSEM analysis is important because it can establish which variable temporally precedes another variable, and temporally precedence can suggest possible causal relations among the variables.

As noted above, we are interested in how variables in one session/week (e.g., HA) are associated with variables in the next session/week. Because we collected HA, binge eating and weight data across 20 sessions, there are likely trends in the data. A trend is a change in the mean of a variable over time, for example, HAs often increase over group sessions. Detrending involves removing a trend, like a linear increase, from a time series. It is important to detrend variables that are increasing or decreasing over sessions to see sub-trends. Sub-trends are fluctuations in session-to-session data and are the focus of the DSEM analysis. Increasing or decreasing trends can be detrended by regressing the variable (e.g., HA) on session number. Therefore, we detrended our data by regressing the actor and partner HA, BEE, and weight on session number. In addition, Savord et al. (2023) contended that modelling the variance in actor and partner data as random effects allows for uncertainty to be better quantified. Therefore, we included random intercepts to model variability in the detrended data.

We had repeated observations of the HA for actors and partners for up to 20 sessions, therefore the data structure had within-group member and between-group member variance. DSEM (Asparouhov et al., 2018) combines aspects of time-series analysis, Multilevel Modeling, and Structural Equation Modeling to analyze the data (Schultzberg & Muthén, 2018). We followed the procedure described by Savord et al. (2023) for implementing the APIM in DSEM.

Supplementary Figure 1 shows a path diagram of the moderated model we examined. Falkenström et al. (2020) showed that including therapist effects either did not affect or increase the bias of within-client effects. For this reason, we did not model therapists in our analysis. A Markov Chain Monte Carlo approach, which is an iterative Bayesian estimation, was used to estimate the model. Bayesian estimation requires starting information, called priors, to conduct the estimation procedure. Priors are starting values that predict the strength of each relationship in the model. Picking priors is like specifying an effect size for the relationship among variables in a power analysis. If there is a robust literature in an area of research, the findings (e.g., associations found) from previous studies determine start values for the analysis. If incorrect priors are specified in the DSEM analysis, these priors will bias the model. There is not a robust literature for determining priors for the variables in our study. In other words, we do not have empirical evidence about the week-to-week relationship between HA and weight or binge eating episodes. When researchers do not have good empirical evidence to specify priors it is recommended that weakly informative priors be used. Weakly informative are start values that will not bias the analysis in any direction. Therefore, all parameters in the DSEM analysis were modeled with these weakly informative standard priors. We used two Markov chains, each with 50,000 iterations, with the first 40,000 iterations discarded as burn-in (i.e., these were iterations before convergence). Burn-in involves running the iterative analysis 50,000 times but not using this initial analysis in determining the final model. As noted above, incorrect priors can bias the results. Burn-in is used to allow the model to reach an equilibrium distribution. That means that there are no further changes in the distribution of values. The analysis “forgets” about the initial priors, and parameter estimates are based on the sample data. Once an equilibrium distribution is reached the model parameters can be accurately estimated. We assessed convergence with the Gelman-Rubin Rhat statistic (Gelman & Rubin, 1992). The Rhat statistic is used to determine if the model has converged and reached a proper solution. Specifically, the Rhat statistic compares the estimated between-level and within-level variances for each parameter in the model. Large differences between the within- and between- variances indicate failure to converge. At convergence, the scale reduction statistic was 1.05, which was below the recommended upper limit of 1.20. The value of 1.05 means that the within- and between-variances were approximately equal. Parameter estimates were means for the iterations after burn-in. We assessed the significance of these parameters by examining the 95% credible intervals (CI), with statistical significance indicated when the CI did not contain zero. According to Hespanhol et al. (2019), credible intervals are similar to confidence intervals, but these intervals are estimated and interpreted differently. The confidence interval means that we are 95% certain that that true estimate would lie within the interval. The credibility interval means that “there is a 95% probability that the true estimate would lie within the interval” (Hespanhol et al., 2019, p. 290”).

**There were a few statements that raised questions of meaning. On p. 4, line 8, the summary of lo coco et al. Seems counterintuitive, as it suggests that symptoms were greater when the alliance (actor and partner) was stronger.**

Thank you for catching this mistake. As you suspected we did report the result incorrectly. The sentence now reads: “Lo Coco et al. (2012) found that group members’ symptoms decreased when actors and partners agreed that their alliance to the group-as-a-whole was strong.

**On p. 10, line 10, in the presentation of the sample, I noted a higher than expected average age of the group members; is this atypical for group treatment of bed?**

Patients with obesity and BED may enter psychotherapy within a multimodal treatment at an older age than usual, as they usually report a chronic condition. For example, the study by Gallagher et al (2014) included patients with a mean age of 44 years in Canada. In the current study participants were between 35 and 60 years old. However, we now added to the limitations that our findings should be replicated with a sample comprising young adults with BED.

**On p. 15, line 28, the suggestion is that the partner alliance scores demonstrated a decline across sessions; if this inference is correct, the authors might comment on this trend.**

It is correct that the partners' alliance decreased across treatment. We now comment on this finding as follows:

“As noted above, actors' helping alliance increase over time is congruent with previous findings about group engagement and group cohesion (Arnold et al., 2022; Chapman & Kivlighan, 2019). We were surprised that partner helping alliance showed a significant decrease over time. In examining the actor and partner trends, it appears that individual members experienced a stronger alliance with the leader over time but the group-as-a-whole experienced a weaker alliance with the leader over time. These results may indicate that members are making an upward comparison, believing that they have a stronger relationship with the leader compared to the other group members. As far as we can tell, this is the first study to examine how partner relationship ratings change over time. Previous studies examining the temporal relationship of actor and partner scores have only examined session-to-session changes in aggregated alliances or relationships (e.g., Lo Coco, Gullo et al., 2019). Therefore, it will be important for future research to replicate our findings and further examine how partner alliance scores change over time”.

**On p. 18, in the last paragraph of the Results section, the authors could clarify why they considered the variance of the HA variables over time as a function of group member attachment designation, setting up the subsequent discussion of what this sub-analysis revealed.**

We added the following to this paragraph:

“Stevens et al. (2007) showed that greater alliance variability was associated with more rupture and repair episodes, therefore preoccupied group members had more rupture and repair episodes than dismissing group members who had more rupture and repair episodes than disoriented/disorganized group members”.

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6 **Lastly, there were a number of grammatical and word choice issues in the text. On p. 1,**  
7 **line 35 (in the Abstract), the word “to” is missing. On p. 3, line 42, should “with” be**  
8 **replaced with “and”?** On p. 9, line 49, insert a comma after “BED.” In the Methods section  
9 **where the various instruments are described, I’d suggest using some font change to**  
10 **introduce each individual measure (e.g., italicize the instrument name at the start of each**  
11 **sub-section). On p. 13, line 8, remove the comma after the cited year (2023). On p. 14, line**  
12 **52, one of the terms (aHAlag1) should be changed to pHAlag1. On p. 23, line 6, the phrase**  
13 **should be “and seek more proximity.” On p. 25, line 20, the sentence needs rewording:**  
14 **“This may involve therapists focusing some attention . . .”**  
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17 We carefully revised the manuscript in order to improve its language clarity.  
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20 IN THE NOTE FOR FIGURE 1, PANEL C, “OR” SHOULD BE “FOR.” IN  
21 SUPPLEMENTARY FIGURE 1, THE FORMATTING FOR THE TERMS WITHIN EACH  
22 BUBBLE SHOULD BE IMPROVED. SIMILARLY, THE FORMATTING FOR THE  
23 BANNER IN SUPPLEMENTARY TABLES 1 AND 2 SHOULD BE CORRECTED.  
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25 “For” has been corrected.  
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27 Supplemental Figure 1 has been redrawn.  
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30 The formatting for the banner in Supplementary Tables 1 and 2 has been corrected.  
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**Supplementary Table 1.** Standardized Dynamic Structural Equation Results from the Longitudinal Actor-Partner Analysis of actor and partner helping alliances, and group member binge eating episodes and weight.

|                                             | Coefficient | Posterior S.D. | <i>p</i> | 95% CI     |            |
|---------------------------------------------|-------------|----------------|----------|------------|------------|
|                                             |             |                |          | Lower 2.5% | Upper 2.5% |
| Within-Person Auto Correlations             |             |                |          |            |            |
| Current Actor HAQ on Previous Actor HAQ     | 0.07        | 0.01           | <0.001   | 0.044      | 0.097      |
| Current Partner HAQ on Previous Partner HAQ | 0.09        | 0.01           | <0.001   | 0.060      | 0.118      |
| Current BEE on Previous BEE                 | 0.90        | 0.00           | <0.001   | 0.890      | 0.907      |
| Current Weight on Previous Weight           | 0.93        | 0.01           | <0.001   | 0.922      | 0.940      |
| Within-Person Cross Correlations            |             |                |          |            |            |
| Current BEE on Previous Actor HAQ           | -0.00       | 0.01           | 0.177    | -0.014     | 0.006      |
| Current BEE on Previous Partner HAQ         | -0.01       | 0.00           | 0.020    | -0.017     | 0.001      |
| Current Weight on Previous Actor HAQ        | 0.00        | 0.00           | 0.075    | -0.001     | 0.009      |
| Current Weight on Previous Partner HAQ      | 0.00        | 0.00           | 0.324    | -0.003     | 0.006      |
| Current Actor HAQ on Previous BEE           | 0.13        | 0.04           | 0.001    | 0.062      | 0.203      |
| Current Actor HAQ on Previous Weight        | 0.07        | 0.04           | 0.024    | 0.001      | 0.137      |
| Linear Trends                               |             |                |          |            |            |
| Actor HAQ on Session Number                 | 0.07        | 0.03           | 0.012    | 0.011      | 0.134      |

Actor and Partner Alliance 2

|                               |       |      |       |        |        |
|-------------------------------|-------|------|-------|--------|--------|
| Partner HAQ on Session Number | -0.18 | 0.01 | <.001 | -0.213 | -0.146 |
| BEE on Session Number         | -0.09 | 0.01 | <.001 | -0.097 | -0.077 |
| Weight on Session Number      | -0.07 | 0.00 | <.001 | -0.079 | -0.063 |
| Within-Person Variance        |       |      |       |        |        |
| Actor HAQ Variance            | 0.89  | 0.03 | <.001 | 0.85   | 0.919  |
| Partner HAQ Variance          | 0.92  | 0.01 | <.001 | 0.893  | 0.945  |
| BEE Variance                  | 0.05  | 0.01 | <.001 | 0.04   | 0.056  |
| Weight Variance               | 0.03  | 0.01 | <.001 | 0.027  | 0.04   |

*Note.* 2360 sessions nested within 118 group members. HAQ = Helping Alliance Questionnaire.

Actor = the focal group member. Partner = the aggregated perceptions of the other group members, excluding the focal group member. BE binge eating episodes evaluated by EDE criterion.

**Supplementary Table 2.** Dynamic Structural Equation Results for Actor and Partner Helping Alliance, Binge Eating and Weight as moderated by Attachment Style

|                                                        | Coefficient | Posterior<br>S.D. | <i>p</i> | 95% CI        |               |
|--------------------------------------------------------|-------------|-------------------|----------|---------------|---------------|
|                                                        |             |                   |          | Lower<br>2.5% | Upper<br>2.5% |
| Within-Person Auto Correlations with Attachment Style  |             |                   |          |               |               |
| Current Actor HAQ on Previous Actor HAQ                | 0.07        | 0.02              | <.001    | 0.031         | 0.109         |
| Moderated by Attachment Style                          | 0.54        | 0.28              | 0.045    | -0.096        | 0.961         |
| Current Partner HAQ on Previous Partner HAQ            | 0.09        | 0.01              | <.001    | 0.072         | 0.123         |
| Moderated by Attachment Style                          | -0.19       | 0.43              | 0.329    | -0.964        | 0.647         |
| Current BEE on Previous BEE                            | 0.90        | 0.01              | <.001    | 0.892         | 0.911         |
| Moderated by Attachment Style                          | 0.07        | 0.32              | 0.389    | -0.414        | 0.922         |
| Current Weight on Previous Weight                      | 0.93        | 0.00              | <.001    | 0.925         | 0.939         |
| Moderated by Attachment Style                          | 0.02        | 0.13              | 0.428    | -0.220        | 0.284         |
| Within-Person Cross Correlations with Attachment Style |             |                   |          |               |               |
| Current BEE on Previous Actor HAQ                      | -0.00       | 0.00              | 0.177    | -0.012        | 0.00          |
| Moderated by Attachment Style                          | -0.82       | 0.17              | 0.001    | -0.992        | -0.342        |
| Current BEE on Previous Partner HAQ                    | -0.01       | 0.00              | 0.042    | -0.013        | 0.001         |
| Moderated by Attachment Style                          | 0.76        | 0.22              | 0.008    | 0.169         | 0.985         |
| Current Weight on Previous Actor HAQ                   | 0.00        | 0.00              | 0.103    | -0.002        | -0.010        |

## Actor and Partner Alliance 4

|                                        |       |      |       |        |        |
|----------------------------------------|-------|------|-------|--------|--------|
| Moderated by Attachment Style          | -0.12 | 0.41 | 0.382 | -0.867 | 0.723  |
| Current Weight on Previous Partner HAQ | 0.0   | 0.00 | 0.194 | -0.003 | -0.007 |
| Moderated by Attachment Style          | -0.02 | 0.46 | 0.481 | -0.874 | 0.828  |
| Current Actor HAQ on Previous BEE      | 0.16  | 0.04 | <.001 | 0.083  | 0.240  |
| Moderated by Attachment Style          | 0.92  | 0.22 | 0.006 | 0.199  | 0.997  |
| Current Actor HAQ on Previous Weight   | 0.04  | 0.04 | .135  | -0.031 | 0.108  |
| Moderated by Attachment Style          | -0.00 | 0.16 | 0.493 | -0.332 | 0.313  |

## Linear Trends with Attachment Style

|                               |       |      |       |        |        |
|-------------------------------|-------|------|-------|--------|--------|
| Actor HAQ on Session Number   | 0.09  | 0.04 | .019  | 0.006  | 0.165  |
| Moderated by Attachment Style | 0.79  | 0.32 | 0.039 | -0.074 | 0.999  |
| Partner HAQ on Session Number | -0.18 | 0.02 | <.001 | -0.212 | -0.144 |
| Moderated by Attachment Style | 0.01  | 0.14 | 0.462 | -0.258 | 0.275  |
| BEE on Session Number         | 0.08  | 0.01 | <.001 | -0.095 | -0.074 |
| Moderated by Attachment Style | 0.17  | 0.36 | 0.320 | -0.440 | 0.996  |
| Weight on Session Number      | 0.07  | 0.00 | <.001 | -0.077 | -0.063 |
| Moderated by Attachment Style | -0.17 | 0.13 | 0.102 | -0.396 | 0.100  |

## Within-Person Variance with Attachment Style

|                    |      |      |       |       |       |
|--------------------|------|------|-------|-------|-------|
| Actor HAQ Variance | 0.90 | 0.04 | <.001 | 0.859 | 0.923 |
|--------------------|------|------|-------|-------|-------|

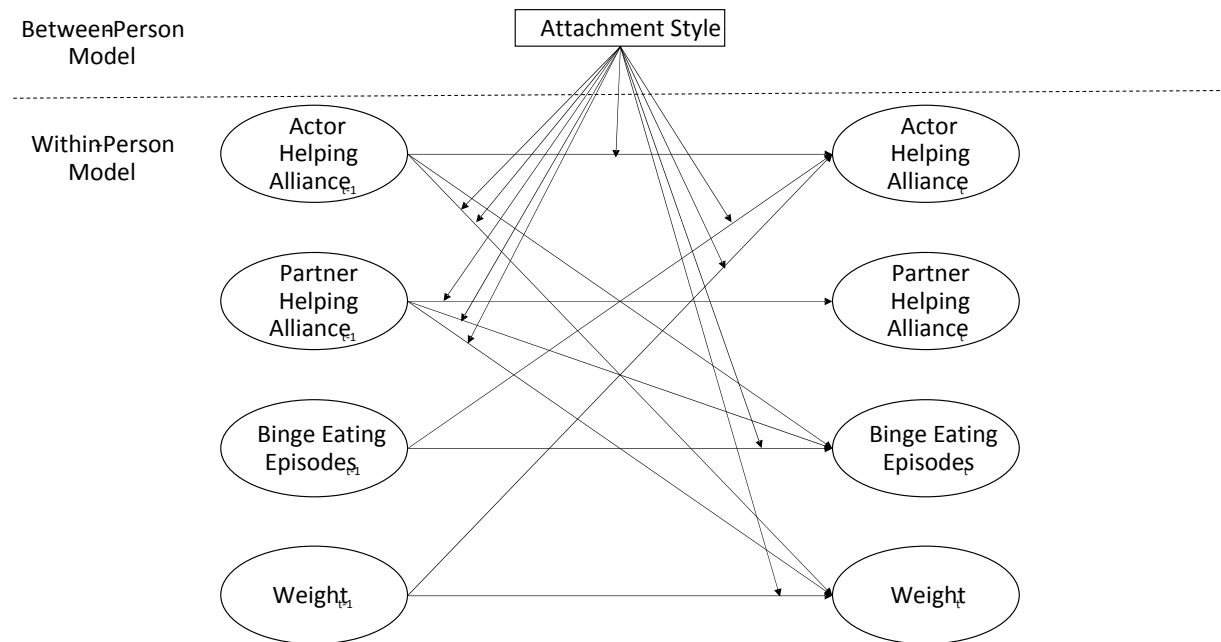
Actor and Partner Alliance 5

|    |                                 |       |       |       |        |       |
|----|---------------------------------|-------|-------|-------|--------|-------|
| 1  |                                 |       |       |       |        |       |
| 2  |                                 |       |       |       |        |       |
| 3  | Moderated by Attachment Style   | 0.61  | 0.19  | 0.001 | 0.232  | 0.926 |
| 4  |                                 |       |       |       |        |       |
| 5  |                                 |       |       |       |        |       |
| 6  | Partner HAQ Variance            | 0.92  | 0.013 | <.001 | 0.892  | 0.942 |
| 7  |                                 |       |       |       |        |       |
| 8  |                                 |       |       |       |        |       |
| 9  | Moderated by Attachment Style   | 0.07  | 0.505 | 0.451 | -0.912 | 0.898 |
| 10 |                                 |       |       |       |        |       |
| 11 |                                 |       |       |       |        |       |
| 12 | BEE Variance                    | 0.05  | 0.025 | <.001 | 0.041  | 0.056 |
| 13 |                                 |       |       |       |        |       |
| 14 |                                 |       |       |       |        |       |
| 15 | Moderated by Attachment Style   | -0.01 | 0.081 | 0.434 | -0.173 | 0.146 |
| 16 |                                 |       |       |       |        |       |
| 17 |                                 |       |       |       |        |       |
| 18 | Weight Variance                 | 0.03  | 0.06  | <.001 | 0.027  | 0.041 |
| 19 |                                 |       |       |       |        |       |
| 20 |                                 |       |       |       |        |       |
| 21 | Moderated by Attachment Style   | 0.048 | 0.073 | 0.26  | -0.096 | 0.186 |
| 22 |                                 |       |       |       |        |       |
| 23 |                                 |       |       |       |        |       |
| 24 | Between-Person Regressions      |       |       |       |        |       |
| 25 |                                 |       |       |       |        |       |
| 26 |                                 |       |       |       |        |       |
| 27 | HAQ on Attachment Style         | -0.55 | 0.52  | 0.248 | -0.925 | 0.822 |
| 28 |                                 |       |       |       |        |       |
| 29 |                                 |       |       |       |        |       |
| 30 | Partner HAQ on Attachment Style | -0.21 | 0.29  | 0.241 | -0.736 | 0.415 |
| 31 |                                 |       |       |       |        |       |
| 32 |                                 |       |       |       |        |       |
| 33 | BEE on Attachment Style         | -0.21 | 0.44  | 0.344 | -0.947 | 0.676 |
| 34 |                                 |       |       |       |        |       |
| 35 |                                 |       |       |       |        |       |
| 36 | Weight on Attachment Style      | 0.21  | 0.26  | 0.225 | -0.316 | 0.702 |
| 37 |                                 |       |       |       |        |       |

*Note.* 2360 sessions nested within 118 group members. HAQ = Helping Alliance Questionnaire.

Actor = the focal group member. Partner = the aggregated perceptions of the other group members, excluding the focal group member. BE binge eating episodes evaluated by EDE criterion.

**Supplementary Figure 1.** Within-member model for the relationships among actor and partner helping alliances, and binge eating episodes and weight.



*Note.* T-1 = previous session/week. T = current session/week. Actor Helping Alliance is a group member's own alliance with the group therapist. Partner Helping Alliance is the average alliance with the group therapist for the other members of the group, excluding the actor. Within-Person variables are created by latent mean centering. Between-person variables (averaged over the 20 sessions for Actor and Partner Helping Alliances, Binge Eating Episodes, and Weight) are created and used in the analysis but are not displayed in the figure.