# CLIENT-THERAPIST ALLIANCE FOR ADOLESCENTS AND YOUNG ADULTS WITH AUTISM: RELATION TO TREATMENT OUTCOMES AND CLIENT CHARACTERISTICS

by

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ABSTRACT

Adolescents and adults with autism spectrum disorder (ASD) experience difficulties with emotion regulation (ER), which has been associated with a host of co-occurring problems with mood, anxiety, and aggression. Although treatments targeting ER are available for individuals with ASD, there is a limited understanding of factors that lead to successful outcomes. The therapeutic alliance is considered important for outcomes in non-ASD samples; however, the process of alliance formation and its relation to treatment outcomes is unclear for clients with ASD. The present study aims to examine the trajectory of alliance formation across treatment, as well as examine whether alliance is related to treatment outcomes or specific within-person characteristics. Participants included adolescents and adults with ASD ($n$ = 39, mean age = 15.28 years, age range = 12 to 21 years, 79.50% male) who completed a 16-week intervention designed to treat ER difficulties. Client-therapist alliance was measured at four timepoints throughout treatment using an observational measure of alliance and parents rated their child's ER difficulties. Interrater reliability on observer-rated alliance was strong. Alliance formation significantly fluctuated throughout treatment. Overall alliance strength, as well as alliance early in treatment, predicted better treatment outcomes. Additionally, ASD symptom severity and co-occurring depression were related to alliance strength. The current study supports the importance of therapeutic alliance for clients with ASD and highlights a need for increased alliance formation during critical stages in treatment. Considerations for future research are discussed.

LIST OF ABBREVIATIONS AND SYMBOLS

| | |
|---|---|
| $\alpha$ | Cronbach's index of internal consistency |
| ABCL | Adult Behavior Checklist |
| ASD | Autism Spectrum Disorder |
| ADHD | Attention-Deficit Hyperactivity Disorder |
| ANOVA | Analysis of variance |
| $\beta$ | Beta value: standardized regression coefficient |
| *B* | Unstandardized regression coefficient |
| CBCL | Child Behavior Checklist |
| CBT | Cognitive-behavioral therapy |
| EASE | Emotional Awareness and Skills Enhancement |
| EDI | Emotion Dysregulation Inventory |
| ER | Emotion regulation |
| *F* | Fisher's *F* ratio: A ration of two variances |
| $\Delta F$ | Change in *F* value across subsequent steps of a multiple regression model |
| FSIQ-4 | Full Scale Intelligence Quotient, Four Subtest |
| *M* | Mean: the sum of a set of measurements divided by the number of measurements in the set |
| MBI | Mindfulness-based intervention |
| *n* | Number |
| *p* | Probability associated with the occurrence under the null hypothesis of a value as |

| | |
|---|---|
| | extreme as or more extreme than the observed value |
| *r* | Pearson product-moment correlation |
| $R^2$ | Coefficient of determination |
| $\Delta R^2$ | Change in $R^2$ value across subsequent steps of a multiple regression model |
| *SD* | Standard Deviation |
| *SE* | Standard Error: measure of the statistical accuracy of an estimate, equal to the standard deviation of the theoretical population distribution |
| SRS-2 | Social Responsiveness Scale, 2nd Edition |
| VTAS-R-SF | Vanderbilt Therapeutic Alliance Scale, Revised, Short Form |
| Wald | Wald Chi Square Test; logistic regression model |
| WASI-II | Wechsler Abbreviated Scales of Intelligence, Second Edition |
| $\chi^2$ | Chi squared value |
| = | Equal to |
| < | Less than |
| % | Percent |

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# INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that occurs in about 1 in 54 children (Maenner et al., 2020). It is characterized by impairments in social communication and restricted and repetitive interests (American Psychiatric Association, 2013). Although not diagnostic criteria, individuals with ASD often experience a host of co-occurring behavioral and emotional problems, such as difficulties in emotion regulation (ER; Mazefsky et al., 2014; Samson et al., 2015; Samson et al., 2012) that can lead to significant impairments in social and psychiatric functioning (Mazefsky & White, 2013).

Emotion regulation (ER) is the monitoring and modulation of one's emotions to accomplish goals (Thompson, 1994). Research has shown that individuals with ASD often experience difficulties related to ER, including reduced emotional awareness and limited ability to identify or describe emotional states (Hill et al., 2004; Rieffe et al., 2007). Individuals with ASD also use more maladaptive strategies (e.g., rumination or suppression) to regulate their emotions and fewer adaptive strategies (e.g., cognitive appraisal or acceptance) than their typically developing peers (Mazefsky et al., 2014; Patel et al., 2017; Samson et al., 2015). Impairment in ER is associated with higher rates of internalizing psychiatric disorders in both non-ASD and ASD populations (Conner et al., 2020; Mazefsky et al., 2014; McLaughlin et al., 2011; Patel et al., 2017; Pouw et al., 2013; Schafer et al., 2017). Given that many adolescents and adults with ASD experience co-occurring symptoms of internalizing disorders (e.g., anxiety and depression) at a high rate (Simonoff et al., 2008; van Steensel et al., 2011), poor ER has been

implicated as a potential pathway for internalizing disorders (Conner et al., 2020). Thus, targeting ER as a transdiagnostic factor may be ideal for intervention efforts (Weiss, 2014).

Considerable research has been conducted in the last few years to identify specific treatment approaches and protocols that are effective for treating ER impairment for individuals with ASD, although there are few studies that examine adapting treatment for adults with ASD (Conner & White, 2018; Kerns et al., 2016). Traditional cognitive-behavioral therapy (CBT) is one such method that is considered generally efficacious in treating ER in youth with ASD (Scarpa & Reyes, 2011; Thomson et al., 2015; Weiss et al., 2018). Typical CBT involves the use of exposures, cognitive strategies to address maladaptive thoughts, and parent involvement in treatment for youth. Similar to CBT, evidence suggests that mindfulness-based interventions (MBIs) could be promising for treating ER and specific co-occurring psychopathology for both non-ASD and ASD samples (Cachia et al., 2016; Conner & White, 2018; Conner et al., 2019; Gu et al., 2015; Hölzel et al., 2011; Kiep et al., 2015). MBIs incorporate mindfulness techniques to teach awareness and acceptance (Kabat-Zinn et al., 1985); rather than suppressing or actively changing negative emotional reactions, the goal of MBIs is to use mindfulness to accept that emotions are unavoidable and teach clients to notice the sensation in order to move past it (Baer & Krietemeyer, 2006). While CBT and MBI treatment approaches, as well as specific manualized treatments incorporating those approaches have shown promising results in improving ER for individuals with ASD, little research has identified the specific factors in the therapeutic process that lead to successful outcomes.

The client-therapist alliance, or the collaborative relationship between the client and therapist, is one such factor that is thought to be crucial to psychotherapy outcomes in non-ASD populations (Shirk & Karver, 2003; Shirk & Saiz, 1992). Three key elements in building the

client-therapist alliance are task characteristics (the client's willingness to talk with the therapist and participate in therapy activities), bond characteristics (the affective relationship between the client and therapist), and goal characteristics (the agreement in treatment goals; Bordin, 1979). The combination of these three elements determine the strength and quality of the client-therapist alliance (Bordin, 1979). Although these three elements are instrumental to developing strong alliance, research suggests that alliance should be analyzed as a unidimensional factor, rather than examining each component separately (Fjermestad et al., 2012).

Prior literature has examined specific client characteristics that influence the development of alliance in non-ASD clinical samples. Specifically, clients' cognitive abilities appear to influence alliance strength, with clients with higher cognitive abilities developing stronger alliances with their therapists (Kazdin & Durbin, 2012). Additionally, clients' co-occurring externalizing (e.g., aggression and oppositional behavior) and internalizing (e.g., anxiety and depression) symptoms seem to also impact their ability to form strong alliances with their therapists early in treatment, such that clients with higher co-occurring externalizing symptoms form weaker alliances with their therapists and clients with co-occurring high internalizing symptoms form stronger alliances at early stages of treatment (DiGiuseppe et al., 1996; Zorzella et al., 2015). In their study on the relationship between alliance strength and co-occurring internalizing and externalizing behaviors in traumatized youth, Zorzella and colleagues (2015) suggest that youth with co-occurring internalizing behaviors may be more willing to engage in a therapy relationship that will alleviate their internal distress, whereas youth with externalizing behaviors are more oppositional and less likely to agree on treatment goals and practices.

Developing strong client-therapist alliance is thought to be an essential factor for the success of psychotherapy (Horvath et al., 2011). Several studies have identified that strong

client-therapist alliance is predictive of better treatment outcomes for non-ASD adults in a variety of behavioral and nonbehavioral treatments, with effect sizes ranging from .22 to .29 (Flückiger et al., 2018; Flückiger et al., 2012; Martin et al., 2000; Shirk & Karver, 2011). However, alliance is considered particularly crucial for adolescents since many adolescents are brought to therapy by their parents' choosing and may not be strongly aware of their problems or motivated to receive help (Karver et al., 2005). Despite this belief, there is a lot of variance in findings on the alliance-outcome relationship for non-ASD adolescents; while some studies find medium effect sizes (.19 - .29) consistent with the alliance-outcome relationship for non-ASD adults (Karver et al., 2018; Shirk et al., 2011), others found much smaller effects ranging from .05 to .14 (Chiu et al., 2009; Liber et al., 2010; McLeod, 2011). The variability in effect sizes suggests that the importance of alliance may differ depending on the specific clinical population and treatment. In fact, research has attempted to identify moderators of this relationship to understand how and why alliance is important to treatment outcomes in non-ASD samples.

The client's presenting problem appears to be a moderator of the alliance-outcome relationship, at least for non-ASD adolescent samples (Karver et al., 2018; Shirk & Karver, 2003). Despite studies finding that externalizing problems are predictive of weaker early alliance (DiGiuseppe et al., 1996; Zorzella et al., 2015), the relationship between alliance and outcome is actually stronger for externalizing problems compared to internalizing problems (Karver et al., 2018; Shirk & Karver, 2003). This contradiction suggests that while it may be harder to establish good alliance with individuals with high externalizing problems during early stages of treatment, strong alliance seems particularly critical for good outcomes for individuals with externalizing problems. Given that individuals with ASD and ER difficulties often experience a range of internalizing and externalizing problems (e.g. depression, anxiety, or ADHD; Bauminger et al.,

2010; Simonoff et al., 2008), additional research seems warranted to understand how co-occurring internalizing and externalizing symptomology may impact alliance development in an intervention developed to improve ER rather than treating specific disorders. Despite many studies and meta-analyses examining alliance in adult non-ASD samples, none of these studies have examined presenting problem as a moderator of the alliance-outcome relationship. Thus, it is unknown whether these findings would remain using a sample of young adults.

Type of treatment, specifically CBT versus other types of treatment, has not been considered a moderator of the alliance-outcome relationship (Flückiger et al., 2012; Shirk & Karver, 2003); however, research on the client-therapist alliance in MBIs has only been examined within the last few years. Therapeutic alliance may be an important part of the therapeutic process in MBIs since the role of the therapist is to create a supportive and safe environment for clients to engage in mindfulness practices and work on awareness in the moment (Kabat-Zinn, 2011) and to model mindfulness with their clients to build participation and buy-in of the therapy (Wilson & Sandoz, 2008). Additionally, it may be hard for individuals who have difficulties with strong negative emotions to talk about or experience those emotions as the subject matter of MBIs targeting ER; thus, a strong therapeutic alliance may be important to promote client engagement with their emotions, similar to other therapeutic approaches like CBT. In comparison, it has been argued by Goldberg et al. (2013) that the therapist's role in MBIs may be less important given the introspective nature of mindfulness practice, and thus, the client-therapist alliance may not be as important or connected to treatment outcomes. These differing opinions on the importance of the therapist in the therapeutic process are also reflected in research on the alliance-outcome relationship. While some studies have found that alliance was predictive of outcomes for MBIs (Bisseling et al., 2019; Bowen & Kurz, 2014; Jazaieri et

al., 2018), others have not found this association (Goldberg et al., 2013; Snippe et al., 2015). Most of these studies were group-based interventions during which the therapist developed and engaged in multiple client-therapist alliances at once. Despite previous research suggesting an important relationship between alliance and outcomes for individual psychotherapy in other types of interventions (Shirk & Karver, 2003), there is a general lack of consensus on alliance-outcome relationship for one-on-one MBIs.

The reporter of alliance ratings could also be particularly important methodologically, as it may influence the relationship between alliance and treatment outcomes. Shirk and Karver's (2003) meta-analysis suggests that the reporter of alliance ratings was a moderator of the alliance-outcome relationship for non-ASD adolescents, such that there was a stronger effect for therapist ratings in comparison to youth or parent ratings. In fact, the study found that there was very little variability in youth-reported ratings on alliance such that youth tended to usually report positive alliances (Shirk & Karver, 2003). There also may be secondary factors, such as the assessment procedure (e.g., rating alliance in front of the therapist), a desire to be well-liked by the therapist, or limited insight about the therapeutic process and one's own presenting problems and goals, that impact the youth's ability to rate alliance accurately (Berthoz & Hill, 2005; McLeod et al., 2016; Shirk & Karver, 2003). Moreover, it may difficult to get an unbiased, accurate measurement of alliance from anyone involved in the therapy process. For example, therapists delivering treatment in the context of a clinical trial may be more likely to rate alliance positively for better treatment outcomes. Considering the impact of potential bias in youth or therapist reports of alliance, utilizing observer ratings may be a more useful and accurate way to measure the client-therapist alliance. Although alliance is a subjective experience for the client and therapist, observational techniques for measuring alliance may be a more objective

methodological approach; moreover, studies have identified that independent observers can accurately measure the alliance construct despite not being present in the room (McLeod et al., 2017). Furthermore, the client-therapist alliance is a process that can fluctuate throughout treatment (Chu et al., 2014). Thus, observational coding systems may be able to capture these subtle changes more effectively than relying on subjective ratings by either the therapist or client, who are relying on their own individual experience of what happened during a particular session. Although a relatively new area of research, one study examining alliance in ASD found that observational coding can reliably measure alliance in ASD samples and found validity between observational measures of alliance and other treatment variables like treatment adherence and client engagement (Burnham Riosa et al., 2019). Given the potential bias of self-report measures, observational coding may be a less biased methodological approach to examining alliance in ASD.

The extant research on alliance in therapy with clients with ASD is sparse. One study identified that children with ASD ($n$ = 64; mean age = 10 years) had significantly weaker alliance with their therapists per child- and therapist-report than their typically developing peers in a mindfulness-based CBT program (Klebanoff et al., 2019), suggesting that youth with ASD may have greater difficulty with forming strong alliances with their therapists. However, alliance strength for clients with ASD does not seem to fluctuate based on type of treatment (e.g., CBT versus supportive counseling; Murphy et al., 2017) which mirrors non-ASD literature suggesting that treatment structure does not moderate alliance strength (Flückiger et al., 2018; Shirk & Karver, 2003).

There are only three studies that examine the client-therapist alliance in relation to treatment outcomes in ASD, although they primarily rely on self-report measures from

individuals involved with the therapeutic process and focus solely on children under the age of 16. Across studies, therapist-reported alliance was negatively associated with anxiety treatment outcomes, such that stronger alliance was related to decreased anxiety at posttreatment for children with ASD (Kerns et al., 2018; Klebanoff et al., 2019); child-reported or parent-reported alliance was not associated with treatment outcomes. These findings reflect Shirk and Karver's (2003) meta-analysis identifying alliance rater as a moderator of the alliance-outcome relationship and further indicates the need for studies on therapeutic alliance utilizing ratings from an independent observer to eliminate effects from a possibly biased rater.

Albaum and colleagues (2020) conducted the only study to date using an observational measure of alliance, the Therapy Process Observational Coding Scheme – Alliance Scale (McLeod & Weisz, 2005). Rather than examining alliance as a whole therapeutic process, they examined task collaboration and client-therapist bond (the task and bond facets of alliance, respectively) at early and late treatment stages in relation to ER improvement for their child clients with ASD ($n$ = 48, $M$ age = 9.60 years old). They did not find a significant relationship between either alliance variable early in treatment and ER outcomes at posttreatment, although they did find that higher task collaboration measured late in treatment was related to more improvement in ER at posttreatment (Albaum et al., 2020). Although this study provides valuable information on specific components of alliance, it may be that alliance measurement later in treatment may actually be biased by symptom improvement (Shirk & Karver, 2011). Likewise, it is suggested that alliance should be analyzed as a unidimensional construct rather than looking at specific facets of alliance individually (Fjermestad et al., 2012). This study highlights the importance of measurement at multiple points in treatment, as well as the need for further examination of the relationship between outcome and alliance as an overall construct,

rather than only analyzing specific components of alliance (i.e., task, bond, and goal). Interestingly, Albaum and colleagues (2020) also found that baseline ER was uniquely related to task collaboration, although they did not find any associations with other client characteristics (e.g., age, ASD symptom severity, cognitive ability) to task collaboration, nor did they examine the association of client characteristics to alliance as an overall construct. These results warrant further exploration of within-client characteristics for clients with ASD given the existing literature on individual factors that impact alliance formation, particularly the client's age and externalizing and internalizing symptomology.

No studies to date have analyzed the relationship between the client-therapist alliance and treatment outcome, as well as characterized formation of client-therapist alliance at multiple points throughout treatment for adolescents and young adults with ASD. Adults with ASD have largely been ignored in alliance research thus far, despite the importance of improving treatments and maximizing outcomes for this population. Given the limited research on therapeutic factors that contribute to effectiveness of MBIs for individuals with ASD and the apparent relationship between alliance and outcome in non-ASD populations (Horvath et al., 2011; Shirk & Karver, 2011), it is important to determine whether alliance also contributes to symptom improvement for clients with ASD. Despite an increasingly growing pool of clinical trials that identify promising treatment protocols for clients with ASD, very little research is aimed at understanding the underlying factors that make that treatment effective. Moreover, examining client-therapist alliance at multiple points in treatment allows for a detailed characterization of alliance formation to understand if clients with ASD are at risk of alliance rupture or plateauing at any points in treatment. Understanding the process of alliance formation and relationship to treatment outcomes could inform future treatment delivery and therapist behavior. If alliance is

found to be related to outcome, future research on how to strengthen alliance with adolescents and young adults with ASD will be warranted. Additionally, characterizing the trajectory of alliance development across treatment and other factors that impact the strength of the client-therapist alliance could also provide valuable information on how variability in these factors influence the treatment process.

The current study aims to use an observational measure of client-therapist alliance to characterize alliance at multiple points in treatment and examine its relationship to treatment outcome for adolescents and young adults with ASD. Specifically, the study aims to determine whether 1) there are significant changes in alliance strength across treatment, 2) alliance strength is predictive of ER treatment outcomes, and 3) specific within-person characteristics (e.g., age, cognitive ability, ASD severity, and co-occurring symptomology) are related to alliance strength. Since this is the first study to statistically examine the trajectory of client-therapist alliance across more than two timepoints in treatment for clients with ASD, no a priori hypotheses were made for the first research aim. It is hypothesized that strong client-therapist alliance will predict better posttreatment ER outcomes for adolescents and young adults with ASD. Furthermore, based on previous research in non-ASD samples, it is also hypothesized that older age, higher IQ, lower ASD symptom severity, and lower co-occurring symptomology (e.g., depression, anxiety, and ADHD symptoms) will be associated with stronger alliance.

# METHOD

## Participants

Participants were 39 treatment-seeking adolescents and young adults aged 12 to 21 years old (mean age = 15.28 years, 79.50% male) and their primary caregivers. All participants lived at home with the primary caregiver who referred the participant to the study and reported on the participant's ER difficulties and co-occurring symptomology. Participants were recruited as part of a previously conducted open trial (Conner et al., 2018) and ongoing larger randomized controlled trial examining the effectiveness of an intervention to improve ER skills for adolescents and young adults with ASD (Department of Defense Grant W81XWH-18-1-0284, PI: Mazefsky). Only participants receiving the experimental MBI in the open trial and randomized controlled trial were included (i.e., not those in the control condition). The randomized controlled trial is a cross-site collaboration between the University of Alabama and University of Pittsburgh Medical Center, and the previous open trial was conducted at Virginia Tech and the University of Pittsburgh Medical Center; thus, participants were recruited from all three sites. Recruitment sources include referrals from ASD clinics, flyers posted at medical offices and schools, and a registry of people who previously participated in studies with the principal investigators.

Inclusion criteria included having 1) a diagnosis of ASD, verified by the Autism Diagnostic Observation Schedule, Second Edition (Lord et al., 2012) and 2) at least average verbal intellectual ability measured by the Wechsler Abbreviated Scales of Intelligence, Second Edition (WASI-II; Wechsler, 2011). Participants were excluded from the study if they 1) had a

previous or current diagnosis of a psychotic disorder, 2) demonstrated an immediate concern of suicidality, or 3) were receiving concurrent treatment for emotional issues that was determined to be redundant with the treatment used in the original intervention study. Confirmation of this exclusion criteria was verified using a brief screening interview with the participant's caregiver prior to enrollment. See Table 1 for participants' demographic information.

**Table 1.** *Participant Demographics (n = 39)*

| | *n* (%) |
|---|---|
| Sex (male) | 31 (79.50%) |
| Race | |
| White | 31 (79.50%) |
| Black/African American | 3 (7.70%) |
| Asian | 2 (5.10%) |
| Multiple Races | 3 (7.70%) |
| Annual Household Income | |
| Less than $35,999 | 4 (10.30%) |
| $36,000 to $65,999 | 14 (35.90%) |
| $66,000 to 100,999 | 9 (23.10%) |
| More than $101,000 | 11 (28.20%) |
| Site Location | |
| University of Pittsburgh | 23 (59.00%) |
| Virginia Tech | 9 (23.10%) |
| University of Alabama | 7 (17.90%) |
| Therapist Sex (male) | 5 (12.80%) |
| Therapist Education* | |
| Pre-Masters Clinician | 2 (5.10%) |
| Masters Level Clinician | 28 (71.80%) |
| PhD Level Clinician | 9 (23.10%) |
| | *M (SD)* |
| Age (years) | 15.28 (2.16) |
| Full-scale IQ | 102.49 (17.02) |
| Pre-Tx Dysphoria T-Score | 55.19 (7.81) |
| Pre-Tx Reactivity T-Score | 51.93 (7.41) |
| Post-Tx Dysphoria T-Score | 47.54 (7.97) |
| Post-Tx Reactivity T-Score | 44.30 (7.03) |
| SRS-2 Total T-Score | 77.36 (8.71) |
| ASEBA Parent-Report | |
| Anxiety T-Scores | 68.95 (11.33) |
| Depression T-Scores | 68.58 (9.28) |
| ADHD T-Scores | 67.13 (9.12) |

*Note*. Pre-Tx is pre-treatment; Post-Tx is post-treatment; ASEBA is the Achenbach System of Empirically Based Assessment; ADHD is Attention-Deficit/Hyperactivity Disorder.
*Information on clinicians' education level was based on percentage of cases with a clinician with the specific education level, not the percentage of clinicians of that education level regardless of the number of cases they worked with.

## Treatment

The Emotional Awareness and Skills Enhancement (EASE) program (White et al., 2018) is a 16-week, individual psychotherapeutic intervention to treat ER difficulties in adolescents and adults. It follows a MBI theoretical framework that incorporates mindfulness strategies (e.g., emotional awareness and acceptance, practice of mindfulness), as well as cognitive strategies from CBT (e.g., cognitive reappraisal, distraction). The EASE program was developed as a transdiagnostic approach to improving ER in adolescents and young adults with ASD, regardless of additional psychiatric symptoms; therefore, it was designed to be effective in improving awareness and management of various manifestations of ER difficulties, such as anxiety, depression, anger, or aggression.

EASE is delivered by trained graduate students and clinical psychologists via a carefully-constructed manual. After determining clients' individual goals related to ER, the manual outlines four main components of the program that characterize different ER strategies: emotional awareness, breathing, changing how individuals relate to their thoughts, and distraction. The manual also outlines each weekly session by providing specific session objectives, mindfulness practices, and discussion topics. Each session ranges in length from 45 to 60 minutes. For complete information on the EASE program, see Conner et al. (2018).

## Measures

**Vanderbilt Therapeutic Alliance Scales Revised, Short Form (VTAS-R-SF).** The VTAS-R-SF (Shelef & Diamond, 2008) is an observational measure of client-therapist alliance.

It is comprised of five items, each rated on a 6-point Likert-type scale, that measure the presence of behaviors in psychotherapy sessions from 0 “no evidence” to 5 “extensive evidence” of the behaviors. After one item is reverse-scored, higher scores reflect stronger client-therapist alliance. The VTAS-R-SF incorporates all three components of alliance (task, bond, and goals) within the five items to characterize the affective relationship between the client and therapist and the client’s willingness to engage in the therapeutic process. See Table 2 for descriptions of the five items.

**Table 2.** *VTAS-R-SF Item Description and Interrater Reliability*

| VTAS-R-SF Item Description | ICC *M* (95% CI) | Item *M* (*SD*) |
|---|---|---|
| 1. Level of Support | .970 (.939 - .985) | 2.87 (.59) |
| 2. Level of Therapeutic Participation | .887 (.773 - .944) | 2.92 (.64) |
| 3. Level of Mistrust/Defensiveness* | .855 (.708 - .928) | 4.34 (.68) |
| 4. Level of Client-Therapist Agreement on Client’s Presenting Problems | .803 (.603 - .902) | 2.40 (.61) |
| 5. Level of Client-Therapist Agreement on Session Goals and Tasks | .808 (.615 - .905) | 1.38 (.59) |

*Note*. VTAS-R-SF is the Vanderbilt Therapeutic Alliance Scale, Revised – Short Form; CI is confidence interval.
*Item 3 is reverse scored.

The VTAS-R-SF demonstrates high internal consistency ($\alpha = .90$) and predictive validity for treatment outcomes using a sample of adolescents with substance abuse problems (Shelef & Diamond, 2008). It also demonstrates good convergent validity with other observational and therapist-report measures of alliance (McLeod et al., 2017). Despite its lack of validation in an ASD sample, the VTAS-R-SF was chosen as a measure of alliance for the current study because it demonstrates good psychometrics in non-ASD adolescent and adult populations. Given that the current study was examining alliance in young adults with ASD, not just adolescents, the VTAS-R-SF was also chosen because it incorporates the goal component of alliance into the five items.

This goal component is particularly important for adults who may take a more active role in therapy. Additionally, as an observational measure of alliance, it should be free of response bias and developmental limitations that have been associated with child- and parent-report measures of alliance (Berthoz & Hill, 2005; Shirk & Karver, 2003).

In the current study, alliance was rated using videotapes of participants' EASE therapy sessions. Participants' 16 sessions were divided into four stages ranging from early to late in treatment: Time 1 (sessions 1-4), Time 2 (sessions 5-8), Time 3 (sessions 9-12), and Time 4 (sessions 13-16). These videotapes from the four stages correspond to the four components of the EASE program – awareness, breathing, changing one's relationship to their thoughts, and mindful distraction, respectively. A videotape from each of the four timepoints was randomly selected and coded for alliance, excluding the first and last sessions. Thus, each participant had four videotapes coded for alliance. Per Crits-Christoph and colleagues' (2011) recommendation to use four or more ratings of alliance for generalizability, this process was implemented to characterize alliance formation throughout the therapeutic process and reduce the number of videos that coders had to rate (four videos per participant rather than 16 videos). A total alliance score for each of the four timepoints was created by summing scores from the five VTAS-R-SF items. Additionally, a mean alliance score was created by averaging the four timepoints together to reflect overall alliance strength.

The coding team consisted of a master coder (the study's PI) and three undergraduate research assistants. Training on the VTAS-R-SF consisted of reading the coding manual, co-coding three session videotapes provided from the VTAS-R-SF team, and coding several session videotapes from the current study to establish knowledge of and comfort with items. The master coder achieved 80% overall exact agreement for the three videos provided by the VTAS-R-SF

developers (individual agreement was 60%, 100%, and 80% on the three videos, respectively). The undergraduate research assistants were trained by the master coder using a similar training process; after reading the VTAS-R-SF manual, the undergraduate coders met with the master coder to watch and co-code videotapes provided by the VTAS-R-SF team, as well as two videotapes from the current study to discuss using the measure in an ASD sample. Once the undergraduate research assistants demonstrated sufficient expertise with the EASE curriculum and the VTAS-R-SF manual, they coded "gold standard" videotapes until each of the undergraduate research assistants reached $\geq$80 percent agreement with the gold standard codes (exact agreement on 4 out of 5 items) on three consecutive videos (Cicchetti & Sparrow, 1981). The first three "gold standard" videotapes were established by the master coder and the master coder's clinical supervisor by randomly selecting and coding three EASE videotapes and discussing their scores to create consensus codes for each videotape. Four additional "gold standard" videotapes were subsequently created by the master coder, who watched and determined codes for the VTAS-R-SF items. The number of "gold standard" videotapes needed for undergraduate coders to become reliable ranged from 4 to 7.

Coders watched the sessions in their entirety, which ranged in length from 40-75 minutes. Coders made notes of relevant examples to inform their scores while watching each therapy session, and VTAS-R-SF scores were determined at the completion of each session videotape. The undergraduate research assistants collectively coded all sessions ($n$ = 156), and the master coder coded a random sample of 20 percent of sessions ($n$ = 32) to calculate reliability with the undergraduate research assistants. Coders were not blind to the session number they were coding, although precautions were taken to avoid coder bias in scores. Specifically, coders watched and reviewed tapes in random order; therefore, they did not code the same participant or

the same section of treatment twice in a row. To avoid coder drift, the coding team met bi-monthly to review any coding questions and discuss the sessions double-coded for reliability. If disagreements in ratings occurred, then the coding team discussed the reasons for disagreement and applicable item criteria from the VTAS-R-SF manual until they agreed on a consensus code.

**Emotion Dysregulation Inventory (EDI):** The EDI (Mazefsky et al., 2016; 2018) is a 30-item questionnaire used to assess ER difficulties. Parents were asked to rate the frequency and intensity of their children's emotional behaviors in the past seven days from 0 "not at all" to 4 "very severe." Examples of items included whether a child appears sad or unhappy, has explosive outbursts, seems easily triggered or upset, or cannot calm down without help from someone else. Parents completed the EDI at pretreatment (i.e., within two weeks of starting the EASE program) and posttreatment (i.e., within two weeks of ending the EASE program). The EDI provides T-scores for two measures of ER: level of dysphoria, characterized by low positive affect/motivation and a sad or nervous presentation, and level of reactivity, characterized by rapidly escalating and poorly regulated negative emotional reactions. Higher scores reflected higher severity of ER impairment (and thus, more dysregulation). Parent-reported dysphoria and reactivity T-scores at pretreatment and posttreatment were used as outcome measures for the EASE program. Parent-report was used rather than self-report given previous literature highlighting that adolescents with ASD tend to under-report their emotional and behavioral problems (Pearl et al., 2017; White et al., 2012). The EDI has shown good construct validity and sensitivity to change (Mazefsky et al., 2018).

**Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II):** The WASI-II is a measure of cognitive abilities in individuals aged 6 to 89 years. The Full-Scale Intelligence Quotient (FSIQ-4) is a composite of cognitive abilities derived from the four WASI-II subtests,

Vocabulary, Similarities, Block Design, and Matrix Reasoning. In addition to being used to determine eligibility for participants in the larger treatment study, the FSIQ-4 standard score was used as a measure of overall cognitive abilities in the current study.

**Child Behavior Checklist (CBCL) and Adult Behavior Checklist (ABCL):** The CBCL (Achenbach & Rescorla, 2001) and ABCL (Achenbach & Rescorla, 2003) are widely-used measures of emotional, behavioral, and social problems. The CBCL is completed by parents of children aged 6 to 18 years old and the ABCL is a similar form completed by parents of adult children aged 18 to 59 years old. Both measures have demonstrated good reliability and validity (Achenbach & Rescorla, 2001; 2003). T-scores from the Anxiety Problems, Depressive Problems, and ADHD Problems subscales were utilized as measures of co-occurring emotional and behavioral problems experienced by individuals with ASD to test the third hypothesis.

**Social Responsiveness Scale, Second Edition (SRS-2).** The SRS-2 (Constantino & Gruber, 2012) is a 65-item rating scale measuring ASD symptom severity. Questions on the SRS-2 tap into specific facets of social interaction, including one's social awareness, cognition, communication and motivation, as well as one's restricted and repetitive behaviors. Parents completed the SRS-2 about their children with ASD at their pretreatment assessment. The overall total T-score score was used as a measure of ASD severity to test the third hypothesis.

## Procedure

Participants completed the WASI-II and ADOS-2 at an eligibility visit prior to enrollment in the treatment study. Once enrolled, participants and their parents completed a pretreatment assessment, including the EDI, SRS-2, and CBCL or ABCL (depending on participant's age) within two weeks of the participant starting EASE. The 16-week EASE intervention was delivered by trained clinical psychology graduate students and clinical psychologists. A

participant worked with one therapist for the entirety of the intervention, and all therapists were supervised by an on-site licensed clinical psychologist. Therapists rated their weekly sessions for fidelity with the manual, and the psychologists supervising them reviewed these ratings to ensure that therapists were adhering to the treatment manual similarly across participants and sites. Parents also completed the posttreatment EDI within two weeks of finishing EASE.

# RESULTS

## Preliminary Analyses

Data were analyzed using SPSS 24 (IBM Corp, 2017). Prior to analyses, data were checked for normality, linearity, extreme outliers, sphericity, and homoscedasticity. The total alliance score at Time 3 was determined non-normal; however, given the robustness of ANOVA and regression to non-normality (Blanca Mena et al., 2017; Schmidt & Finan, 2018), the primary analyses were not changed. Missing data was minimal. All participants had four qualifying session videotapes available for the VTAS-R-SF alliance ratings and only one participant had missing posttreatment EDI scores; this one participant was included in analyses testing the first and third hypotheses and excluded in analyses testing the second hypothesis. Participants who were missing WASI-II ($n$ = 2), ASEBA ($n$ = 1), or SRS-2 data ($n$ = 1) were excluded from analysis of the third hypothesis. Prior to analyses, alliance scores were also checked to ensure that there were no significant differences in alliance strength based on the videotaped session selected, coder of the session, or any therapist characteristics (e.g., sex or education level). No statistical differences were found. See Table 1 for descriptive statistics and Table 3 for correlations between main study variables.

**Table 3.** *Bivariate Correlations Between Demographic and Main Study Variables.*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Age | - | | | | | | | | | | | | |
| 2. Gender | .11 | - | | | | | | | | | | | |
| 3. FSIQ-4 | -.05 | .28 | - | | | | | | | | | | |
| 4. Mean Alliance | .08 | .17 | .11 | | | | | | | | | | |
| 5. Time 1 Alliance | -.08 | .09 | .07 | . 72** | | | | | | | | | |
| 6. Time 2 Alliance | .16 | .01 | -.01 | .75** | .34* | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7. Time 3 Alliance | -.01 | .14 | .20 | .85* | .49* | .55** | | | | | | | |
| 8. Time 4 Alliance | .14 | .25 | .09 | .69** | .40 | .26 | .48* | | | | | | |
| 9. Post Dysphoria | -.01 | -.09 | -.17 | -.45* | -.56** | -.09 | -.55** | -.19 | | | | | |
| 10. Post Reactivity | -.16 | -.23 | -.23 | -.24 | -.39* | .01 | -.31 | -.08 | .74** | | | | |
| 11. Anxiety | -.25 | .01 | .01 | -.14 | -.15 | -.29 | -.14 | .20 | .26 | .27 | | | |
| 12. Depression | .01 | .11 | .03 | -.34* | -.30 | -.34* | -.34* | -.02 | .42* | .22 | .56** | | |
| 13. ADHD | -.01 | .03 | -.07 | -.06 | -.02 | -.21 | -.15 | .22 | .03 | .01 | .43* | .27 | |
| 14. ASD Severity | -.12 | .11 | -.21 | -.31 | -.28 | -.22 | -.35* | -.08 | .17 | .10 | .32 | .26 | .36* |

*Note*. FSIQ-4 is Full-Scale Intelligence Quotient – Four Subtest; ADHD is attention-deficit/hyperactivity disorder; ASD is autism spectrum disorder.
*$p < .05$, **$p < .001$.

We first examined interrater reliability using intraclass correlation coefficient (Shrout & Fleiss, 1979), specifically the one-way random effects model. Internal consistency of the VTAS-R-SF and EDI was calculated using Cronbach's alpha. We then conducted a series of one-way repeated-measures analysis of variances (ANOVAs) to examine statistical differences in alliance strength across the four measured timepoints of treatment (i.e., Time 1, Time 2, Time 3, and Time 4). Repeated-measures ANOVA was utilized again with individual VTAS-R-SF items measured at the four timepoints to examine statistical differences in various facets of alliance. A series of hierarchical multiple regressions were used to test the second hypothesis that stronger alliance would predict treatment outcomes. Bivariate correlations were used to test the third hypothesis that within-person characteristics would be associated with alliance strength.

**Reliability**

Approximately 20% ($n$ = 32) of the total number of videotaped sessions coded by the undergraduate coders were randomly selected by the master coder to calculate interrater reliability. Interrater reliability was considered "excellent" (Cicchetti & Sparrow, 1981) for the items (intraclass correlation coefficients ranged .81 - .97; see Table 2). Overall internal consistency of the VTAS-R-SF was also good ($\alpha$ = .85). It was noted that correlations between item 5 (i.e., agreement between therapist and client on agenda) and other items were consistently

weaker than correlations between the other 4 items (see Table 4). Given that EASE is a manualized treatment with outlined treatment objectives and tasks that therapists must complete for each session, the amount that the client can contribute to creating an in-session agenda is limited. Thus, item 5, which measures how much the client independently brings up ideas for the agenda, does not seem to fit conceptually within the framework of this manualized treatment. Given the low intercorrelations with other items and limited ability to conceptually measure this aspect of alliance within the constraints of EASE, item 5 was removed from the alliance variables for the main analyses. Removal of item 5 increased the overall internal consistency of the measure ($\alpha$ = .87). See the Appendix for the results of main analyses if item 5 was retained.

Internal consistency of the EDI was also examined in this sample using T-scores from the two subscales, dysphoria and reactivity. Internal consistency was good both at pretreatment ($\alpha$ = .81) and posttreatment ($\alpha$ = .85).

**Table 4.** *VTAS-R-SF Inter-Correlations and Scale Internal Consistency if Item was Deleted*

| VTAS-R-SF Items | 1 | 2 | 3 | 4 | Total α if item deleted |
|---|---|---|---|---|---|
| Item 1 | – | | | | .80 |
| Item 2 | .82** | – | | | .78 |
| Item 3 | .42* | .55** | – | | .85 |
| Item 4 | .74** | .79** | .52* | – | .78 |
| Item 5 | .39* | .32 | .29 | .50* | .87 |

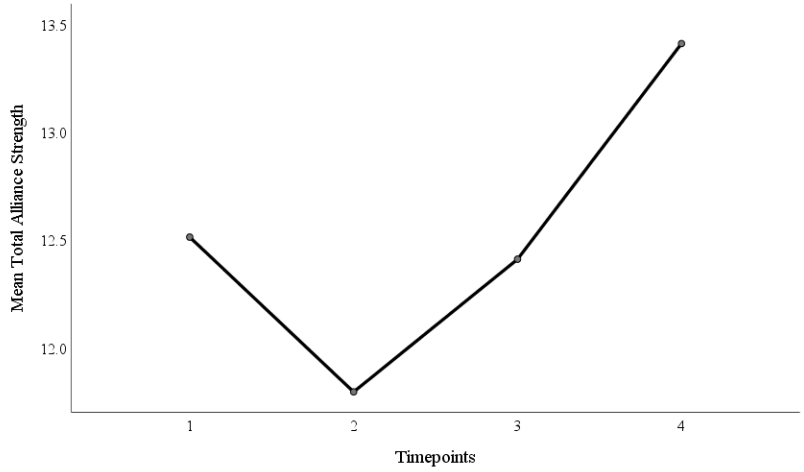
*Note*. VTAS-R-SF is the Vanderbilt Therapeutic Alliance Scale, Revised – Short Form.
*$p$ < .05, **$p$ < .001

**Aim 1. Trajectory of alliance development across treatment**

A one-way repeated-measures ANOVA showed that there was a significant change in alliance across the four measured timepoints in treatment, $F(3, 114) = 3.05$, $p = .031$. Pairwise comparisons showed that alliance strength at Time 2 ($M$ = 11.80, $SE$ = .53) was significantly lower than alliance strength at Time 4 ($M$ = 13.31, $SE$ = .44). Additionally, the change in alliance

strength at Time 3 (*M* = 12.41, *SE* = .47) and Time 4 was approaching significance. There were no significant differences between Time 1 (*M* = 12.49, *SE* = .41) with any of the timepoints or between Time 2 and Time 3. See Figure 1 for the trajectory of alliance strength across treatment.

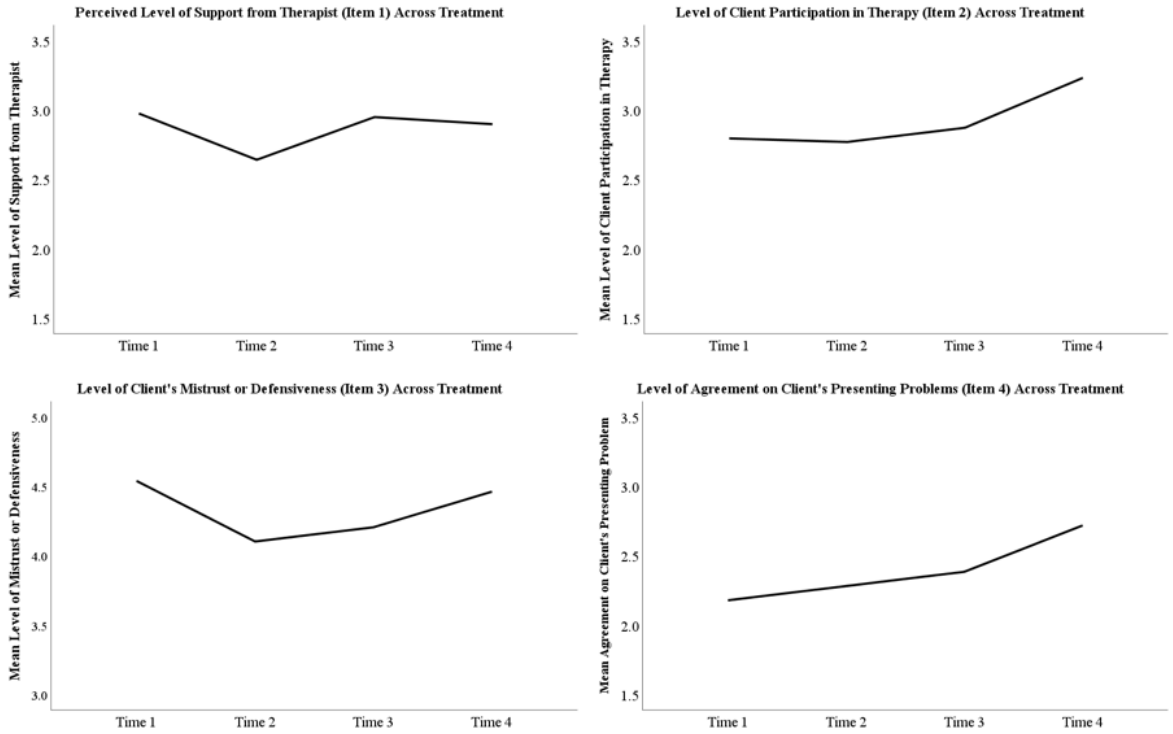
**Figure 1.** *Total Alliance Strength Across Treatment*




A series of one-way repeated-measures ANOVAs were also conducted to examine the trajectory of individual VTAS-R-SF items throughout treatment (see Figure 2). There was not a significant difference in the perceived amount of support the client felt from the therapist (item 1) across the four timepoints, $F(3, 114) = 2.14$, $p = .099$. However, there was a significant difference in the client's level of participation in therapy tasks (item 2) across the four timepoints, $F(3, 114) = 3.40$, $p = .020$. Pairwise comparisons showed that clients' participation level at Time 1 (*M* = 2.80, *SE* =.13), Time 2 (*M* = 2.77, *SE* = .14), and Time 3 (*M* = 2.87, *SE* = .15) were all significantly lower than their participation level at Time 4 (*M* = 3.23, *SE* = .15). There were no significant differences between Time 1, Time 2, and Time 3 on level of participation. For the ANOVA on clients' level of mistrust/defensiveness (item 3; reverse-coded to match the other items), Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, $\chi^2(5) = 14.40$, $p = .013$. Therefore, a Greenhouse-Geisser correction

was used. There was not a significant effect of the client's level of mistrust/defensiveness across treatment, $F(2.41, 91.53) = 2.29$, $p = .096$. There was a significant difference in the amount of agreement between therapist and client on the client's presenting problems (item 4) across treatment, $F(3, 114) = 4.08$, $p = .009$. Follow-up pairwise comparisons showed that level of client-therapist agreement at Time 1 ($M = 2.18$, $SE = .14$), Time 2 ($M = 2.28$, $SE = .16$), and Time 3 ($M = 2.39$, $SE = .14$) were all significantly lower than level of agreement at Time 4 ($M = 2.72$, $SE = .14$). There were no significant differences between Time 1, Time 2, and Time 3.

**Figure 2.** *VTAS-R-SF Item Level Change Across Treatment*



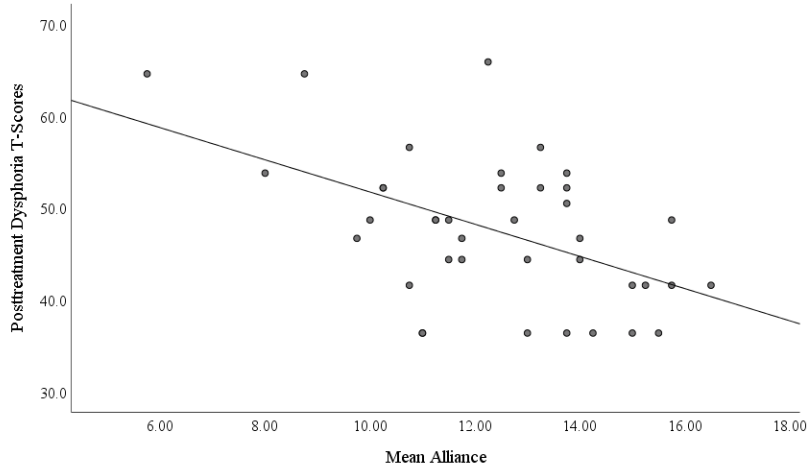

## Aim 2. Association between Alliance Strength and Treatment Outcome

A series of hierarchical multiple regressions were utilized to test the hypothesis that stronger alliance would predict better ER treatment outcomes. The first two regression models focused on whether clients' mean alliance, averaged across all four timepoints, predicted posttreatment EDI outcomes (one model for dysphoria and one model for reactivity as a

treatment outcome). The second two regression models (one for dysphoria and one for reactivity as a treatment outcome) parsed apart the mean alliance score into alliance at different timepoints to understand whether alliance is particularly important for improving outcomes at specific points in treatment.

In the first regression model, posttreatment EDI dysphoria T-scores were entered as the dependent variable and pretreatment EDI dysphoria T-scores were entered as a predictor in step 1. Mean alliance was entered in step 2, resulting in a significant increase in $R^2$, $\Delta F(1, 35) = 5.44$, $p = .026$, $\Delta R^2 = .11$. The overall model accounted for 33% of the variance, $F(2, 37) = 8.27$, $p = .001$, $R^2 = .32$. After controlling for baseline dysphoria ($\beta = .39$, $p = .010$), stronger mean alliance ($\beta = -.33$, $p = .026$) predicted decreased posttreatment dysphoria (see Figure 3).

**Figure 3.** *Association Between Mean Alliance and Posttreatment Dysphoria*




In the second regression model, posttreatment EDI reactivity T-scores were entered as the dependent variable and pretreatment EDI reactivity T-scores were entered as a predictor in step 1. Clients' mean alliance was entered as a predictor in step 2, which did not result in a significant increase in $R^2$, $\Delta F(1, 35) = 2.81$, $p = .103$, $\Delta R^2 = .05$. The overall model remained significant, $F(2, 37) = 9.90$, $p < .001$, $R^2 = .36$. After controlling for pretreatment reactivity ($\beta = .55$, $p <$

.001), mean alliance strength ($\beta$ = -.23, $p$ = .103) was not a unique predictor of posttreatment reactivity. See Table 5 for full information on models 1 and 2.

**Table 5.** *Regression Analyses Examining Mean Alliance Strength and Treatment Outcomes.*

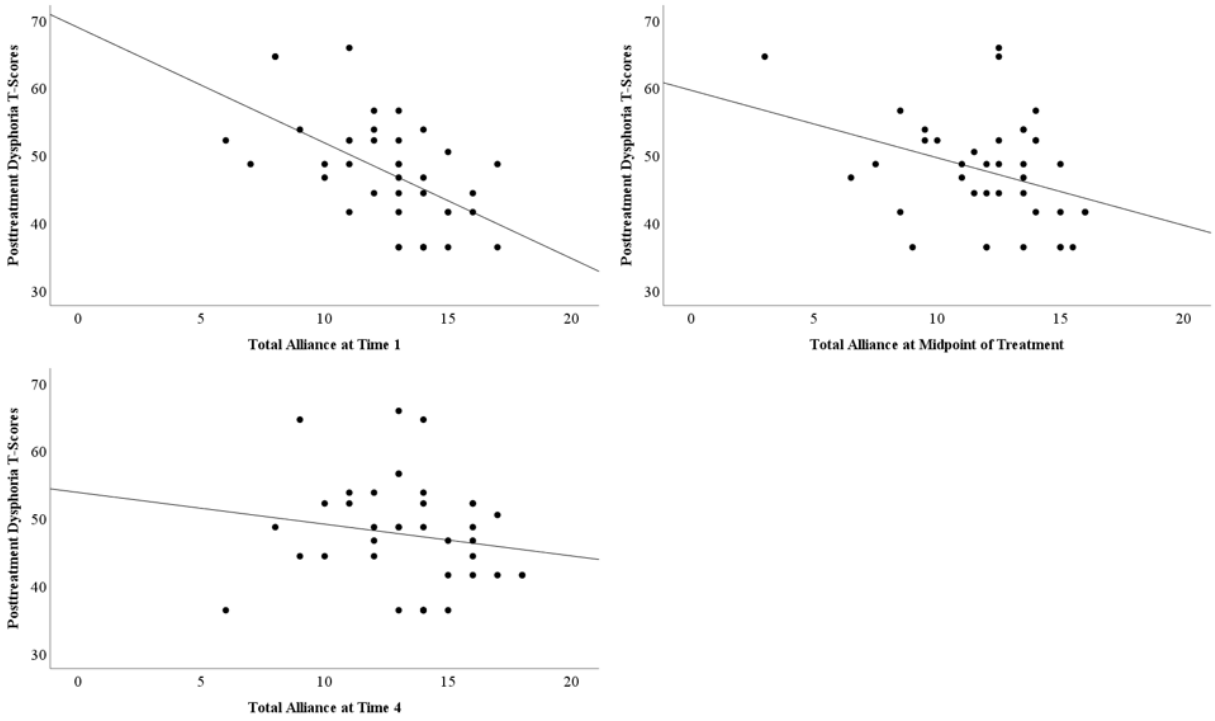
| | Step 1 | | | | Step 2 | | | |
|---|---|---|---|---|---|---|---|---|
| | *b* | *SE* | *β* | *t* | *b* | *SE* | *β* | *t* |
| DV: Post Dysphoria | $R^2$ = .22 | | | | $R^2$ = .32, $\Delta R^2$ = .11 | | | |
| Pre Dysphoria | .47 | .15 | .46 | 3.14 | .40 | .14 | .39 | 2.73* |
| Alliance | - | - | - | - | -1.20 | .52 | -.33 | -2.33* |
| DV: Post Reactivity | $R^2$ = .31 | | | | $R^2$ = .36, $\Delta R^2$ = .05 | | | |
| Pre Reactivity | .54 | .13 | .56 | 4.02** | .53 | .13 | .55 | 4.08** |
| Alliance | - | - | - | - | -.74 | .44 | -.23 | -1.68 |

*Note.* *$p$ < .05, **$p$ < .001.

The third regression model aimed to determine whether specific timepoints in treatment (i.e., alliance at Time 1, Time 2, Time 3, and Time 4) predicted posttreatment dysphoria scores. Initial correlations between the four alliance scores (i.e., alliance at Time 1, Time 2, Time 3, and Time 4) showed that alliance at Time 3 was highly correlated with all other timepoints (see Table 2 for correlations matrix). Although collinearity statistics for Time 3 were in the normal range in the original model (tolerance = .51, variable inflation factor = 1.95), collinearity between Time 3 and the other variables seemed evident based on the correlations matrix. To avoid collinearity, alliance strength at Time 2 and Time 3 were averaged together to create a new variable representing alliance strength during the middle of treatment. Alliance strength at Time 1 and Time 4 were retained as measures of alliance strength early and late in treatment. Pretreatment EDI dysphoria T-scores were entered in step 1, and alliance scores at early (Time 1), middle (average of Time 2 and Time 3 scores), and late (Time 4) points in treatment were entered in step 2. This resulted in a significant increase in $R^2$, $\Delta F(3, 33) = 3.56$, $p$ = .025, $\Delta R^2$ = .19. The full model accounted for 41% of the variance, $F(4, 37) = 5.67$, $p$ = .001, $R^2$ = .41. After controlling for pretreatment dysphoria ($\beta$ = .33, $p$ = .024), total alliance strength at Time 1 ($\beta$ = -.43, $p$ =

.012) uniquely predicted posttreatment dysphoria; specifically, stronger alliance at Time 1 was associated with less dysphoria at posttreatment. Alliance strength averaged across Time 2 and Time 3 ($\beta$ = -.11, $p$ = .486) and Time 4 ($\beta$ = .08, $p$ = .591) were not significant unique predictors of posttreatment dysphoria. See Figure 4 for an illustration of individual predictors.

**Figure 4.** *Association Between Alliance Across Treatment and Posttreatment Dysphoria*




For the fourth regression model, posttreatment EDI reactivity T-scores were entered as the dependent variable and pretreatment EDI reactivity T-scores were entered in step 1. Similar to the model predicting dysphoria outcomes, alliance at Time 1 and Time 4, as well as the new variable measuring alliance strength in the middle of treatment (i.e., alliance at Time 2 and Time 3 averaged) were entered as individual predictors in step 2, which did not result in a significant increase in $R^2$, $\Delta F(3, 33) = 1.67$, $p$ = .193, $\Delta R^2$ = .09. The full model remained significant, $F(4, 33) = 5.52$, $p$ = .002, $R^2$ = .40, although there were no other significant predictors of

posttreatment reactivity after controlling for pretreatment reactivity ($\beta$ = .52, $p$ = .001). See Table 6 for full information on models 3 and 4.

**Table 6.** *Regression Analyses Examining Alliance Across Treatment and Treatment Outcomes.*

| | Step 1 | | | | Step 2 | | | |
|---|---|---|---|---|---|---|---|---|
| | *b* | *SE* | *β* | *t* | *b* | *SE* | *β* | *t* |
| DV: Post Dysphoria | $R^2$ = .22 | | | | $R^2$ = .41, $\Delta R^2$ = .19 | | | |
| Pre Dysphoria | .47 | .15 | .46 | 3.14* | .33 | .14 | .33 | 2.36* |
| Time 1 Alliance | - | - | - | - | -1.30 | .49 | -.43 | -2.66* |
| Midpoint Alliance | - | - | - | - | -.31 | .44 | -.11 | -.71 |
| Time 4 Alliance | - | - | - | - | .24 | .43 | .08 | .54 |
| DV: Post Reactivity | $R^2$ = .31 | | | | $R^2$ = .40, $\Delta R^2$ = .09 | | | |
| Pre Reactivity | .54 | .13 | .56 | 4.02** | .50 | .14 | .52 | 3.66* |
| Time 1Alliance | - | - | - | - | -.79 | .44 | -.29 | -1.79 |
| Midpoint Alliance | - | - | - | - | .03 | .40 | .01 | .06 |
| Time 4 Alliance | - | - | - | - | -.12 | .41 | -.05 | -.29 |

*Note*. *$p$ < .05, **$p$ < .001.

**Aim 3. Within-person variables associated with alliance strength**

Bivariate correlations were run to test the third hypothesis that certain within-person variables would be associated with alliance strength. Specifically, the client's age, IQ, ASD severity, and parent-reported co-occurring anxiety, depression, and ADHD symptoms at pretreatment were examined. There was a moderate negative correlation between mean alliance strength and parent-reported co-occurring depression symptoms, $r$(38) = -.34, $p$ = .039. Clients with more co-occurring depression symptoms were more likely to have weaker overall mean alliance with their therapists. There was also a moderate negative correlation between mean alliance strength and parent-reported ASD symptoms that was approaching statistical significance, $r$(39) = -.31, $p$ = .055. Clients with higher ASD severity had weaker overall mean alliance with their therapists. There was not a statistically significant relationship between alliance strength and age, IQ, or co-occurring anxiety and ADHD symptoms (see Table 2).

Exploratory analyses were conducted to see if any of these within-person variables were associated with alliance strength formed early in treatment (Time 1) given that early alliance is associated with positive ER treatment outcomes. Alliance at Time 1 was not significantly related to any within-person characteristics, although there was a moderate negative relationship between alliance at Time 1 and parent-reported depression symptoms, $r(38) = -.30$, $p = .064$.

# DISCUSSION

This study is the first to analyze the role of client-therapist alliance formation in therapeutic treatments for adolescents and young adults with ASD using an unbiased, observational measure of alliance. Previous research has largely relied on the therapist or client providing subjective ratings of their experiences, sometimes retrospectively (Kerns et al., 2018; Klebanoff et al., 2019). This is a reasonable approach, given that quality of the therapeutic relationship is undoubtedly a subjective experience. However, subjective ratings by provider or client are likely biased by a variety of factors (e.g., transference and countertransference, situational stressors, context of the alliance assessment, or pressure to rate alliance positively for research trial outcomes or interpersonal reasons; Fenton et al., 2001). Observational coding offers a less biased approach to measuring alliance, and it permits quantification of alliance strength at multiple points during treatment. The current study demonstrates that the alliance construct can be reliably measured, via observational coding, in ASD samples.

Furthermore, internal consistency of the VTAS-R-SF in the current study was high, suggesting that it can be reliably coded by trained raters. However, the 5-item measure poses a poignant question about the applicability of the VTAS-R-SF for studies utilizing manualized treatments. Specifically, the theoretical basis of item 5 (i.e., client and therapist's agreement on the session tasks) did not seem to fit with EASE as a manualized treatment given that session tasks are outlined at the outset of treatment. However, the findings suggest that the measure is psychometrically strong without item 5, and the results were similar in main analyses with item 5 excluded and supplemental analyses (see Appendix) with item 5 included. The number of

manualized treatments for treating co-occurring problems in ASD is growing (Kerns et al., 2016; Storch et al., 2015; White et al., 2013); thus, the reliability of the VTAS-R-SF and its ability to characterize alliance in an ASD sample and using a manualized treatment seems promising for therapy process research in ASD.

The findings also suggest that alliance for clients with ASD is a working relationship that can fluctuate throughout treatment. There was a significant decrease in alliance at Time 2, which then increased nearly back to baseline level by Time 3 and increased by Time 4. It may be that elements specific to the EASE program and the sessions involved in Time 2 (sessions 5-8) led to the decrease in alliance strength. This portion of the EASE program is largely spent either completing several different mindfulness exercises back-to-back to build mindfulness abilities or engaging in emotionally arousing situations to practice skills; therefore, it could be argued that clients may have felt less support from their therapists given that their therapists are the ones encouraging them to engage in potentially distressing situations. The findings on trajectories of specific VTAS-R-SF items seem to support this idea, as the perceived level of support felt by the client (item 1) and the client's level of trust and lack of defensiveness (item 3) experienced a similar dip at Time 2. In fact, research suggests that alliance does fluctuate throughout treatment (Chu, Skriner, & Zandberg, 2014). However, previous literature examining alliance during exposure tasks, which are similar to the practices conducted in the EASE program in that clients engage in situations that are emotionally arousing, suggest that alliance is not ruptured during these tasks (Chu, Skriner, & Zandberg, 2014; Kendall et al., 2009). The decrease in alliance strength at Time 2 could also reflect a natural adjustment to therapy that is not attributable to the EASE program; it may be that when clients with ASD enter treatment, they are generally very compliant towards their therapist in this new and vulnerable situation, and as they get more

accustomed to their therapist, clients are less willing to follow along with their therapist's expectations. Importantly, many of these clients were brought to therapy by their parents, rather than seeking help themselves, which may also lead them to being less willing to be compliant once they have attended several therapy sessions. Regardless, there is a need for additional research measuring the trajectory of alliance formation in different treatments for ASD to better understand whether these results reflect something specific to the EASE program or the therapeutic process generally.

The specific trajectories for the level of the client's participation in therapy tasks (item 2) and level of the client-therapist agreement on the client's presenting problem (item 4) present a promising picture. From the beginning to end of treatment, there is a general upwards increase in both of these facets of alliance, and by the end of treatment, the level of each facet is significantly higher than all other timepoints. This suggests that therapists are able to establish a good working relationship with their clients with ASD in which the client feels buy-in to what s/he is working on in therapy and has built awareness of her/his underlying difficulties with ER, which are vital to make improvements on their presenting problems.

Furthermore, the strength of overall alliance appears important to treatment outcomes for individuals with ASD. This finding is similar to research on the relationship between client-therapist alliance and treatment outcomes for non-ASD samples (Flückiger et al., 2018; McLeod & Weisz, 2005; Shirk & Karver, 2003). Specifically, strong alliance is associated with improvement in dysphoria. It may be that solid relationship building in therapy leads to improvement in one's dissatisfaction or distress about life. An instrumental part of therapy is developing a warm and trusting bond with one's therapist and, if done successfully, it likely that this client-therapist relationship could be a source of comfort and support for clients.

Furthermore, individuals with ASD characteristically struggle with developing and maintaining interpersonal relationships and many experience increased loneliness and depressive symptoms because of this difficulty (Cooper, Smith, & Russell, 2017; Hedley, Uljarevic, Wilmot, Richdale, & Dissanayake, 2018). The client-therapist relationship could both serve as a source of support and as a model for social relationships outside of therapy for clients who have limited social support and limited knowledge of how to create social support; thus, having a good bond with one's therapist may be a unique benefit for adolescents and adults with ASD that subsequently decreases dysphoria.

Alliance at Time 1 was a unique predictor of dysphoria, such that strong alliance in early treatment was associated with decreased dysphoria at posttreatment. Alliance strength at Time 1 has value both scientifically and therapeutically for treatment development. The findings suggest that alliance can be developed quickly and have an important impact on outcomes for individuals with ASD. Thus, spending additional time to build strong alliance in the initial sessions of therapy could be beneficial to maximizing treatment outcomes for clients with ASD, particularly for those who are slow to warm up to the therapist or who seem less responsive to psychotherapy. Activities that may be beneficial to strengthening alliance in those initial treatment sessions could focus on the therapist and client getting to know each other better, building trust and warmth, and identifying how therapy can be enjoyable or helpful for the client's personal goals, particularly for those who did not choose or want to attend therapy. Additional research is needed to understand what activities are more effective in building strong alliance early in treatment to further improve treatment development for clients with ASD.

In contrast, alliance strength, both overall and at separate timepoints, was not associated with improvement in clients' levels of reactivity at posttreatment. Whereas alliance and overall

relationship building with one's therapist appears important for clients' symptoms of dysphoria, this aspect of therapy seems less critical for clients' symptoms of reactivity in the present study. This finding is interesting as it contrasts with previous, non-ASD literature suggesting that strong alliance is particularly critical for good outcomes for clients with externalizing presenting problems (i.e., conduct disorder, ADHD, etc.; Karver et al., 2018; Shirk & Karver, 2003). This contrasting finding may reflect the difference between the alliance-outcome relationship using an outcome measure of reactivity, an often externalized, component of ER that may serve as a possible underlying mechanism of psychiatric disorders, versus the actual externalizing psychiatric disorders themselves, which may have multiple underlying mechanisms (including reactivity). This is particularly important when considering that individuals with ASD often have several comorbid psychiatric disorders (e.g., co-occurring ADHD, mood, or conduct disorders) that could confound the alliance-outcome relationship. It may also be that there is less of a relationship between alliance and reactivity outcomes because other treatment factors are more effective in decreasing one's reactivity level. For example, therapeutic tasks focused on building a client's awareness of how s/he responds to an emotionally arousing situation or learning cognitive strategies to challenge the client to pause before reacting on a negative or upsetting thought may be more directly related to reducing reactivity and more easily used in settings in which the high reactivity is occurring than the alliance the client has developed while in her/his weekly therapy session.

Given the relationship between alliance strength and improvement in treatment outcomes, this study began to identify specific within-person variables that are associated with a client's ability to form strong alliance. Clients' parent-reported ASD symptom severity and co-occurring depression symptoms were the only two variables that were associated with alliance formation,

both overall alliance and alliance early in treatment (for depression symptoms, only). A core symptom of ASD is difficulty in developing relationships, so it may be that clients who are more severely affected lack the motivation or skill to appropriately and effectively develop a strong alliance throughout therapy. Additionally, increased parent-reported co-occurring depression symptoms were related to decreased alliance strength. This finding likely reflects how certain depressive symptoms (e.g., social withdrawal, hopelessness, lethargy) can prevent clients from forming strong relationships in therapy, as it does for individuals outside of therapy.

The lack of association between age and alliance strength, particularly at Time 1, is surprising since younger clients are often brought to therapy by their parents, rather than choosing to pursue therapy themselves. Although there were fewer young adult clients than adolescent clients, this finding may be a promising sign that therapists are able to establish alliance with their clients with ASD regardless of age. Furthermore, alliance strength was not associated with parent-reported co-occurring anxiety or ADHD symptoms. This finding did not mirror research in non-ASD samples (DiGiuseppe et al., 1996; Zorzella et al., 2015), which have identified that externalizing and internalizing symptoms impact the strength of alliance. It may be that other primary problems experienced by clients with ASD, like the severity of their ASD symptoms, impacts their alliance formation more than these co-occurring problems. Additional research on these co-occurring problems, as well as other within-person variables, is necessary to identify which clients with ASD may be at risk of forming weaker alliances.

**Limitations**

The limitations of the current study are important to note. Although the VTAS-R-SF has been used in a variety of clinical populations (e.g., individuals involved in substance abuse treatment, family therapy, or anxiety treatment; Feder & Diamond, 2016; McLeod et al., 2017;

Shelef & Diamond, 2008), it has not been validated using an ASD sample. The VTAS-R-SF may not be the most useful way to capture the range of distinct behavioral and emotional symptoms associated with ASD that could influence the typical presentation of alliance in this population. However, no observational tools exist yet that have been modified to measure alliance for individuals with ASD and a primary aim of the study was to begin to characterize alliance formation for this population; thus, the findings may help to create tools designed for this population. Coders were not completely blind to the session number they were coding, although precautions were taken to limit the possibility of coder bias. Additionally, the lack of a non-ASD control group or another treatment type are limitations of the study, because the importance of alliance formation, as well as distinctive qualities of alliance throughout treatment for individuals with ASD in comparison to other clinical samples cannot be assessed. However, this is the first study to initially characterize alliance in a MBI with adolescents and adults with ASD, and future studies could build on these findings to determine if they differ from non-ASD samples or in other types of treatments. Although the study utilizes multi-method data (e.g., observational data and parent-report forms), the lack of self-report measures is a limitation and could provide unique information about how alliance is related to clients' own perceptions of their ER difficulties. Likewise, the small sample size is a limitation of the study, although the sample size is similar to other studies analyzing alliance in ASD (Kerns et al., 2018; Klebanoff, 2019; Murphy et al., 2017). Future directions should include increasing sample size to improve power for more complex analyses such as examining moderators of the alliance-outcome relationship.

**Implications and Future Directions**

Although there is a proliferation of interventions targeting specific co-occurring problems like ER impairment in individuals with ASD, there is little research on the therapeutic

mechanisms linked to positive change in treatment for these individuals. The current study begins to answer an aspect of the essential question of intervention research – what works, for whom, and under what conditions? We have surmised that alliance, an integral facet of the therapy process, does indeed predict treatment outcomes for adolescents and adults with ASD. The current study also utilizes methodology that is novel for ASD research on alliance, specifically the unbiased, observational measure of alliance and capacity to characterize alliance formation at multiple points in treatment. Alliance is considered important to treatment outcomes for clients without ASD and the current study supports its importance for clients with ASD. The findings also demonstrate that aspects of alliance fluctuate during crucial times in treatment, highlighting a need for increased alliance formation during these stages. Furthermore, specific within-person variables such as ASD symptom severity and co-occurring depressive symptoms impact alliance formation for clients with ASD.

Research on alliance for clients with ASD is vital to continue building our understanding of alliance as a potentially effective therapeutic process characteristic for clients with ASD. Future directions should include comparing alliance formation for clients with ASD to clients with other clinical diagnoses, as well as to clients with ASD receiving other therapy treatments to understand whether the trajectory of alliance formation captured in the present study is unique to clients with ASD or unique to specific interventions that clients receive. Further exploration of additional client characteristics that may be related to development of strong alliance, such as specific co-occurring anxiety disorders (rather than co-occurring anxiety broadly), personality traits, and social competence, is warranted to identify clients that may be slow to warm or at risk of developing poor alliances. The promise of the VTAS-R-SF as a reliable measure of alliance for clients with ASD is encouraging; however, future directions should include using the VTAS-

R-SF in other ASD samples to replicate the current study, as well as in comparison to other observational measures to identify the best tool to reliably measure alliance in ASD. Using the longer version of the VTAS-Revised may also provide a more comprehensive analysis of specific components of alliance for clients with ASD. Overall, given emerging evidence that alliance can change and is associated with treatment outcomes for clients with ASD, purposefully targeting alliance formation early in treatment, particularly for clients who struggle to form strong alliance, may enhance treatment development in ASD research and maximize successful treatment outcomes for clients with ASD.

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# APPENDIX

## Supplemental Analysis 1. Did removal of item 5 from alliance variables affect the results?

### Trajectory of alliance development over treatment.

A one-way repeated-measures ANOVA was conducted to compare the effect of total alliance strength (including Item 5) on four timepoints in treatment (i.e., the first, second, third, and fourth quarters). There was a marginally significant difference in total alliance strength across treatment, $F(3, 114) = 2.35$, $p = .076$. A one-way repeated-measures ANOVA was also conducted to compare the level of client-therapist agreement on session tasks (Item 5) at four timepoints in treatment. There was not a significant difference in the level of agreement on session tasks across timepoints, $F(3, 114) = .19$, $p = .904$. See Figures S1 and S2 for change in total alliance strength and level of agreement on session tasks (Item 5) across treatment, respectively.

### Association between alliance strength and treatment outcome.

Similar to the main analyses for hypothesis 2, a series of hierarchical multiple regression analyses were conducted to examine whether alliance strength (measured using VTAS-R-SF item 5) was associated with ER treatment outcomes. The first two models focused on whether total alliance strength averaged across all four timepoints predicted change in dysphoria and reactivity T-scores, respectively. As such, pretreatment EDI dysphoria or reactivity T-scores were entered as a predictor in step 1 of their respective models and clients' mean alliance scores were entered as a predictor in step 2. For the model predicting posttreatment dysphoria levels, there was a significant increase in $R^2$ after adding mean alliance in step 2, $\Delta F(1, 35) = 5.57$, $p =$

.024, $\Delta R^2$ = .11. The overall model remained significant and accounted for 33% of the variance, $F(2, 35) = 8.36$, $p$ = .001, $R^2$ = .32. After controlling for pretreatment dysphoria ($\beta$ = .38, $p$ = .011), average total alliance strength was a unique predictor of posttreatment dysphoria ($\beta$ = -.34, $p$ = .024) such that stronger average alliance strength was associated with decreased dysphoria at posttreatment. In contrast, there was not a significant increase in $R^2$ after entering mean alliance in step 2 of the model predicting posttreatment reactivity, $\Delta F(1, 35) = 2.18$, $p$ = .149, $\Delta R^2$ = .04. Although the overall model remained significant, $F(2, 37) = 9.45$, $p$ = .001, $R^2$ = .35, mean alliance ($\beta$ = -.20, $p$ = .149) was not a significant predictor of posttreatment reactivity. See Table A1 for information on both models.

The second two regression models examined whether alliance strength (including item 5) at specific timepoints in treatment uniquely predicted change in dysphoria and reactivity T-scores, respectively. Similar to the main analyses without item 5, collinearity between Time 3 and other timepoints was determined present given the high correlations between Time 3 and the other variables. Thus, Time 2 and Time 3 were averaged together to create a new variable reflecting alliance in the middle of treatment. Again, pretreatment EDI dysphoria or reactivity T-scores were entered as a predictor in step 1 of their respective models and total alliance scores measured at early (Time 1), middle (new averaged Time 2 and Time 3 variable), and late (Time 4) points in treatment were entered as unique predictors at step 2. For the model predicting posttreatment dysphoria levels, there was a significant increase in $R^2$ after entering the three mean alliance scores in step 2, $\Delta F(3, 33) = 3.77$, $p$ = .020, $\Delta R^2$ = .20. The overall model accounted for 42% of the variance, $F(4, 37) = 5.87$, $p$ = .001, $R^2$ = .42. After controlling for pretreatment dysphoria ($\beta$ = .30, $p$ = .039), total alliance strength at Time 1 ($\beta$ = -.46, $p$ = .009) uniquely predicted posttreatment dysphoria such that stronger alliance at Time 1 was associated

with decreased dysphoria at posttreatment. Total alliance at the midpoint of treatment ($\beta$ = -.06, $p$ = .696) and Time 4 ($\beta$ = .05, $p$ = .784) did not predict posttreatment dysphoria. In contrast, there was not a significant increase in $R^2$ after entering the three total alliance scores in step 2 of the model predicting posttreatment reactivity, $\Delta F(3, 33) = 1.78$, $p$ = .171, $\Delta R^2$ = .10. The overall model remained significant, $F(4, 37) = 5.64$, $p$ = .001, $R^2$ = .41. After controlling for pretreatment reactivity ($\beta$ = .51, $p$ = .001), no alliance scores at any of the timepoints were unique predictors of posttreatment reactivity, although alliance at Time 1 was approaching significance ($\beta$ = -.32, $p$ = .060). See Table A2 for information on both models.

**Conclusion:** Overall, these analyses generally mirror the main analyses that did not include item 5. Consequently, these analyses suggest that removal of item 5 from the VTAS-R-SF measure did not greatly impact or change findings for research aim 2. All other supplemental analyses in this appendix (except for question #3 analyzing all 5 items as individual predictors) do not include Item 5 in alliance variables.

**Figure A1.** *Total Alliance Strength (including Item 5) Across Treatment*

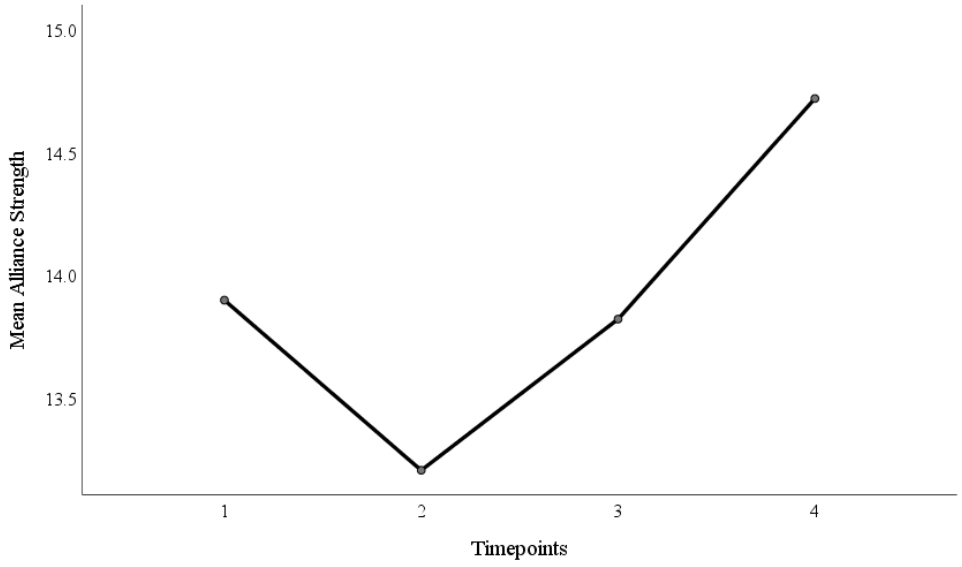

**Figure A2**. *Level of Client-Therapist Agreement in Session Tasks Across Treatment*

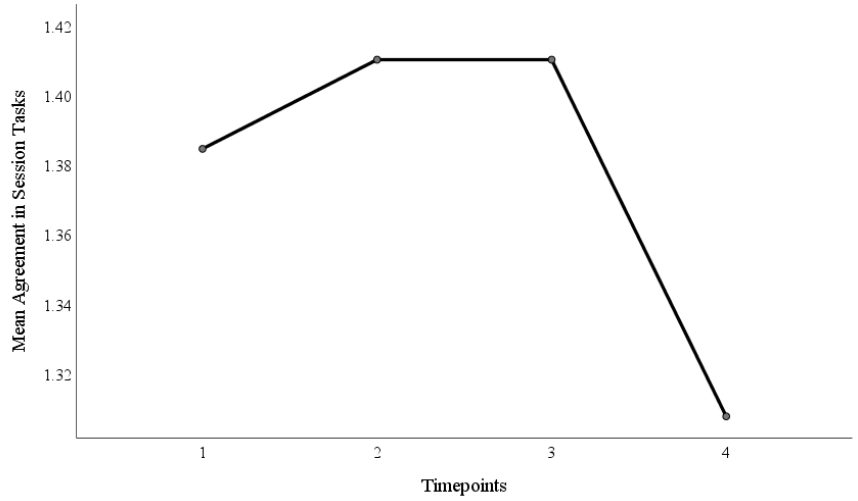


**Table A1.** *Regressions Examining Mean Alliance (with Item 5) and Treatment Outcomes*

| | Step 1 | | | | Step 2 | | | |
|---|---|---|---|---|---|---|---|---|
| | *b* | *SE* | *β* | *t* | *b* | *SE* | *β* | *t* |
| DV: Post Dysphoria | $R^2$ = .22 | | | | $R^2$ = .32, $\Delta R^2$ = .11 | | | |
| Pre Dysphoria | .47 | .15 | .46 | 3.14* | .39 | .14 | .38 | 2.68* |
| Mean Alliance | - | - | - | - | -1.06 | .45 | -.34 | -2.36* |
| DV: Post Reactivity | $R^2$ = .31 | | | | $R^2$ = .35, $\Delta R^2$ = .04 | | | |
| Pre Reactivity | .54 | .13 | .56 | 4.02** | .53 | .13 | .55 | 4.03** |
| Mean Alliance | - | - | - | - | -.57 | .39 | -.20 | -1.48 |

*Note.* $^{*}p < .05$, $^{**}p < .001$

**Table A2**. *Regressions Examining Alliance at Four Timepoints and Treatment Outcomes*

| | Step 1 | | | | Step 2 | | | |
|---|---|---|---|---|---|---|---|---|
| | *b* | *SE* | *β* | *t* | *b* | *SE* | *β* | *t* |
| DV: Post Dysphoria | $R^2$ = .22 | | | | $R^2$ = .42, $\Delta R^2$ = .20 | | | |
| Pre Dysphoria | .47 | .15 | .46 | 3.14* | .31 | .14 | .30 | 2.15* |
| T1 Alliance | - | - | - | - | -1.31 | .47 | -.46 | -2.79* |
| Midpoint Alliance | - | - | - | - | -.16 | .40 | -.06 | -.39 |
| T4 Alliance | - | - | - | - | .12 | .42 | .05 | .28 |
| DV: Post Reactivity | $R^2$ = .31 | | | | $R^2$ = .43, $\Delta R^2$ = .12 | | | |
| Pre Reactivity | .54 | .13 | .56 | 4.02** | .49 | .14 | .51 | 3.58* |
| Time 1 Alliance | - | - | - | - | -.83 | .42 | -.32 | -1.95 |
| Midpoint Alliance | - | - | - | - | .12 | .37 | .05 | .33 |
| Time 4 Alliance | - | - | - | - | -.06 | .39 | -.03 | -.16 |

*Note.* $^{*}p < .05$, $^{**}p < .001$

**Supplemental Analysis 2. Do the results change if using self-reported data?**

**Association Between Alliance Strength and Treatment Outcomes**

Regression analyses were re-run using available self-report data on EDI pretreatment and posttreatment T-scores for a subset of participants ($n$ = 14). These analyses examined whether alliance was predictive of self-reported ER outcomes. For the first model, self-reported dysphoria at posttreatment was entered as the dependent variable and self-reported dysphoria at pretreatment was entered as a predictor in step 1. Mean alliance across treatment was entered as the predictor in step 2, which did not result in a significant increase in $R^2$, $\Delta F(1, 11) = 1.69$, $p$ = .220, $\Delta R^2$ = .03. The overall model remained significant, $F(2, 13) = 21.95$, $p < .001$, $R^2$ = .76. After controlling for self-reported dysphoria at pretreatment ($\beta$ = .87, $p < .000$), mean alliance was not a unique predictor of dysphoria outcomes ($\beta$ = -.18, $p$ = .220). In the model predicting self-reported reactivity at posttreatment, entering mean alliance across treatment as a predictor in step 2 also did not result in an increase in $R^2$, $\Delta F(1, 11) = .03$, $p$ = .871, $\Delta R^2 < .01$. The overall model was not significant, $F(2, 13) = .07$, $p$ = .930, $R^2$ = .01. After controlling for pretreatment reactivity ($\beta$ = -.10, $p$ = .742), mean alliance strength ($\beta$ = .05, $p$ = .871) did not predict self-reported reactivity at posttreatment. See Table A3 for information on both models.

Two additional models were run to analyze whether alliance at specific timepoints in treatment predicted self-reported dysphoria and reactivity at posttreatment. For the model predicting self-reported dysphoria at posttreatment, total alliance scores at the three timepoints (Time 1, the new middle timepoint variable, and Time 4) were entered as individual predictors in step 2, which did not result in a significant increase in $R^2$, $\Delta F(3, 9) = 2.31$, $p$ = .145, $\Delta R^2$ = .10. The overall model was not significant, $F(4, 13) = 14.97$, $p$ = .001, $R^2$ = .87. After controlling for

pretreatment dysphoria ($\beta$ = .91, $p$ < .000), only alliance strength at Time 4 was a unique predictor of dysphoria outcomes ($\beta$ = -.33, $p$ = .034).

For the second model, self-reported reactivity at posttreatment was entered as the dependent variable and self-reported reactivity at pretreatment was entered as a predictor in step 1. Total alliance scores at the three timepoints were entered as individual predictors in step 2. Similar to the first model, entering the total alliance scores in step 2 did not result in a significant increase in $R^2$, $\Delta F(3, 9) = 1.72$, $p$ = .233, $\Delta R^2$ = .36. The overall model was not significant, $F(4, 13) = 1.33$, $p$ = .332, $R^2$ = .37. After controlling for pretreatment reactivity ($\beta$ = -.19, $p$ = .512), no alliance scores at any of the timepoints were unique predictors of self-reported reactivity at posttreatment although alliance at Time 4 ($\beta$ = -.62, $p$ = .064) was approaching significance as a predictor. See Table A4 for full information on both models.

**Within-person variables associated with alliance strength**

Bivariate correlations were re-run using available self-report data on co-occurring symptomology (i.e., co-occurring depression, anxiety, and ADHD symptoms) for a subset of participants ($n$ = 23). None of the variables were significantly associated with clients' mean alliance scores. Similarly, none of the variables were significantly associated with clients' alliance scores at Time 1, although the relationship between mean alliance scores and self-reported co-occurring anxiety symptoms was approaching significance, $r(23) = .38$, $p$ = .072.

**Conclusion:** Alliance strength generally did not predict self-reported dysphoria or reactivity outcomes, which was dissimilar from main analyses finding that alliance strength did predict parent-reported dysphoria, but not reactivity outcomes. Only alliance at Time 4 was predictive of self-reported posttreatment dysphoria, which may be impacted by clients' symptom

improvements late in treatment influencing their alliance scores. Additionally, self-reported co-occurring symptomology was not related to alliance strength.

**Table A3**. *Regression Analyses for Mean Alliance and Self-Reported Treatment Outcomes*

| | Step 1 | | | | Step 2 | | | |
|---|---|---|---|---|---|---|---|---|
| | *b* | *SE* | *β* | *t* | *b* | *SE* | *β* | *t* |
| DV: Post Self-Dysphoria | $R^2$ = .77 | | | | $R^2$ = .80, $\Delta R^2$ = .03 | | | |
| Pre Self-Dysphoria | .51 | .08 | .88 | 6.32** | .51 | .08 | .87 | 6.45** |
| Mean Alliance | - | - | - | - | -.42 | .32 | -.18 | -1.30 |
| DV: Post Self-Reactivity | $R^2$ = .01 | | | | $R^2$ = .01, $\Delta R^2$ < .01 | | | |
| Pre Self-Reactivity | -.11 | .31 | -.10 | -.36 | -.11 | .32 | -.10 | -.34 |
| Mean Alliance | - | - | - | - | .16 | .99 | .05 | .17 |

*Note.* *$p$ < .05, **$p$ < .001.

**Table A4.** *Regression Analyses for Alliance at Specific Timepoints and Self-Reported Treatment Outcomes*

| | Step 1 | | | | Step 2 | | | |
|---|---|---|---|---|---|---|---|---|
| | *b* | *SE* | *β* | *t* | *b* | *SE* | *β* | *t* |
| DV: Post Self-Dysphoria | $R^2$ = .77 | | | | $R^2$ = .87, $\Delta R^2$ = .10 | | | |
| Pre Self-Dysphoria | .51 | .08 | .88 | 6.32** | .53 | .08 | .87 | 6.11** |
| Time 1 Alliance | - | - | - | - | .09 | .26 | .05 | .35 |
| Midpoint Alliance | - | - | - | - | .02 | .24 | .01 | .08 |
| Time 4 Alliance | - | - | - | - | -.66 | .27 | -.33 | -2.50* |
| DV: Post Self-Reactivity | $R^2$ = .01 | | | | $R^2$ = .37, $\Delta R^2$ = .36 | | | |
| Pre Self-Reactivity | -.11 | .31 | -.10 | -.36 | -.20 | .30 | -.19 | -.68 |
| Time 1 Alliance | - | - | - | - | .78 | .84 | .29 | .94 |
| Midpoint Alliance | - | - | - | - | .69 | .74 | .29 | .94 |
| Time 4 Alliance | - | - | - | - | -1.69 | .80 | -.62 | -2.11 |

*Note.* *$p$ < .05, **$p$ < .001.

**Supplemental Analysis 3. Do any of the five VTAS-R-SF items serve as individual predictors of treatment outcomes?**

Two hierarchical multiple regression analyses were conducted to determine whether any of the five VTAS-R-SF items serve as unique predictors of posttreatment EDI outcomes. For the first model, posttreatment dysphoria scores were entered as the dependent variable and pretreatment dysphoria scores were entered as a predictor in step 1. The five VTAS-R-SF items

were entered as predictors in step 2, which did not result in a significant increase in $R^2$, $\Delta F(5, 31) = 1.78$, $p = .147$, $\Delta R^2 = .18$. The overall model remained significant, $F(6, 37) = 3.30$, $p = .012$, $R^2 = .39$. After controlling for pretreatment dysphoria ($\beta = .36$, $p = .021$), none of the items were significant predictors of posttreatment dysphoria scores. For the second model, posttreatment reactivity scores were entered as the dependent variable and pretreatment reactivity scores were entered as a predictor in step 1. The five VTAS-R-SF items were entered as predictors in step 2, which similarly did not result in a significant increase in $R^2$, $\Delta F(5, 31) = .86$, $p = .520$, $\Delta R^2 = .08$. The overall model remained significant, $F(6, 37) = 3.36$, $p = .011$, $R^2 = .39$. After controlling for pretreatment reactivity ($\beta = .53$, $p = .002$), none of the items were significant predictors of posttreatment reactivity scores. See Table A5 for full information on both models.

**Conclusion**: No individual VTAS-R-SF items were significant predictors of treatment outcome.

**Table A5**. *Regression Analyses Examining Mean VTAS-R-SF Items and Treatment Outcomes.*

| | Step 1 | | | | Step 2 | | | |
|---|---|---|---|---|---|---|---|---|
| | *b* | *SE* | *β* | *t* | *b* | *SE* | *β* | *t* |
| DV: Post Dysphoria | $R^2 = .22$ | | | | $R^2 = .39$, $\Delta R^2 = .18$ | | | |
| Pre Dysphoria | .47 | .15 | .46 | 3.14* | .36 | .15 | .36 | 2.43* |
| Item 1 | - | - | - | - | 3.78 | 3.56 | .29 | 1.06 |
| Item 2 | - | - | - | - | -5.89 | 3.80 | -.48 | -1.55 |
| Item 3 | - | - | - | - | -2.34 | 1.92 | -.21 | -1.22 |
| Item 4 | - | - | - | - | 1.13 | 3.23 | .09 | .35 |
| Item 5 | | | | | -2.00 | 2.24 | -.15 | -.89 |
| DV: Post Reactivity | $R^2 = .31$ | | | | $R^2 = .39$, $\Delta R^2 = .08$ | | | |
| Pre Reactivity | .54 | .13 | .56 | 4.02** | .50 | .15 | .53 | 3.35* |
| Item 1 | - | - | - | - | .43 | 3.53 | .04 | .12 |
| Item 2 | - | - | - | - | -4.36 | 3.58 | -.39 | -1.22 |
| Item 3 | - | - | - | - | -.63 | 1.74 | -.06 | -.36 |
| Item 4 | - | - | - | - | 1.69 | 2.90 | .15 | .58 |
| Item 5 | | | | | .44 | 2.04 | .04 | .21 |

*Note.* *$p < .05$, **$p < .001$.

**Supplemental Analysis 4. Does therapeutic alliance mediate the relationship between specific within-client characteristics and treatment outcomes?**

Simple mediation was performed using PROCESS to investigate whether alliance mediates the relationship between within-client characteristics and ER treatment outcomes. Initial correlations demonstrated that only parent-reported pretreatment depression was significantly associated with posttreatment dysphoria ($r$ = .42, $p$ = .008), and no within-client characteristics were significantly associated with posttreatment reactivity. Thus, the relationship between parent-reported depression at pretreatment and parent-reported dysphoria at posttreatment was the only relationship examined for potential mediation.

For the mediation model, parent-reported posttreatment dysphoria was entered as the outcome and parent-reported pretreatment dysphoria was entered as the covariate. Parent-reported pretreatment depression was entered as the predictor variable and mean alliance across treatment was entered as the mediator variable. The overall total effect between pretreatment depression and posttreatment dysphoria was not significant ($\beta$ = .22, $SE$ = .15, $p$ = .146), and the direct effect (when accounting for pretreatment dysphoria) was also not significant ($\beta$ = .14, $SE$ = .14, $p$ = .351). Depression scores did not significantly predict mean alliance ($\beta$ = -.07, $SE$ = .05, $p$ = .120) after accounting for pretreatment dysphoria ($\beta$ = -.01, $SE$ = .06, $p$ = .873). However, mean alliance predicted posttreatment dysphoria ($\beta$ = -1.07, $SE$ = .51, $p$ = .047) when accounting for pretreatment depression and dysphoria scores. Based on bootstrapping with 5,000 samples with replacement, the indirect effect of pretreatment depression on posttreatment dysphoria through mean alliance was not significant ($\beta$ = .08, $SE$ = .08, 95% CI [-.01, .28]).

**Conclusion**: Mediation was not supported. Mean alliance was not a mediator of the relationship between parent-reported pretreatment depression and parent-reported posttreatment dysphoria.

**Supplemental Analysis 5. What do Aim 3 results look like utilizing HLM analysis?**

Given the data's nested nature (i.e., repeated measures within participants over time), a two-level hierarchical linear model (HLM) was conducted to test whether within-client characteristics predicted initial alliance strength or the slope of change in alliance strength across treatment. HLM8 Software was used for analyses (Raudenbush, Bryk, Cheong, Congdon Jr., & du Toit, 2019). The outcome variable was total alliance strength. Level 1 units were the four timepoints at which alliance was measured and the Level 2 units were participants. Specific within-client characteristics were used as Level 2 predictors to examine their association with initial alliance strength and the slope of alliance strength across treatment. Level 2 predictors of interest included the client's gender, IQ, and age, as well as parent-reported autism severity, depression symptoms, anxiety symptoms, and ADHD symptoms at pretreatment.

The Time variable was coded 0, 1, 2, 3 with each unit representing the specific timepoint that alliance was measured (i.e., Time 1, Time 2, Time 3, and Time 4 in main analyses). Similar to main analyses, significance level was set at $\alpha = .05$ with two-tailed test, although results at the $\alpha = .10$ level will also be mentioned given the small sample size.

Results indicated that no independent variables of interest significantly predicted initial alliance strength (i.e., the intercept). Both parent-reported depression scores ($\beta = -.09$, $p = .077$) and parent-reported ASD severity ($\beta = -.08$, $p = .070$) approached significance, suggesting that decreased symptoms of depression and ASD severity was associated with stronger alliance at the beginning of treatment. Likewise, there were no significant predictors of change in alliance strength across treatment (i.e., Time x Alliance slope), although parent-reported anxiety symptoms ($\beta = .03$, $p = .068$) approached significance. This finding suggests that more anxiety symptoms was associated with an increase in alliance strength over time. The Wald test

examining the trajectory of alliance scores across treatment indicated that clients experienced a significantly stronger alliance with their therapists from Time 1 to Time 4, $\chi^2(27) = 95.45$, $p <$ .001 (two-tailed). See Table A6 for results on the full HLM model.

**Conclusion**: Parent-reported depression and ASD symptom severity seem related to initial alliance strength at Time 1, although statistical power was limited given the number of predictors in the model. Interestingly, parent-reported anxiety appears related to the slope of alliance change.

**Table A6.** *HLM Results for Supplemental Analysis*

| Fixed Effects | | |
|---|---|---|
| Initial Alliance Strength | Intercept | 5.15*** |
| | Gender | 1.01 |
| | FSIQ | -.25 |
| | Age | -.77 |
| | ASD Severity | -1.89* |
| | Depression | -1.84* |
| | Anxiety | -.59 |
| | ADHD | .09 |
| Slope of Change in Alliance | Intercept | -1.18 |
| | Gender | .62 |
| | FSIQ | .44 |
| | Age | 1.40 |
| | ASD Severity | .60 |
| | Depression | -.10 |
| | Anxiety | 1.85* |
| | ADHD | -.16 |

*Note*. The *p* values are based on t test for fixed effects parameters; FSIQ = Full-Scale IQ; ASD = Autism Spectrum Disorder; ADHD = Attention Deficit/Hyperactivity Disorder.
***$p < .001$, **$p < .05$, *$p < .10$

APPENDIX 2

**University of Pittsburgh Documentation of IRB Approval for the Overall Treatment Study**

**and Site Agreement to Cede UA's IRB to University of Pittsburgh for the Study**


# University of Pittsburgh
***Institutional Review Board***

3500 Fifth Avenue
Pittsburgh, PA 15213
(412) 383-1480
(412) 383-1508 (fax)
http://www.irb.pitt.edu/


## Memorandum

To: Carla Mazefsky

From: IRB Office

Date: 12/13/2019

IRB#: REN19110072 / PRO17070496

Subject: EASE (Emotional Awareness and Skills Enhancement) Program: A Clinical Trial

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Your renewal for the above referenced research study has received expedited review and approval from the Institutional Review Board under:

45 CFR 46.110.(6)
45 CFR 46.110.(7)

Please note the following information:

Approval Date: 12/13/2019
Expiration Date: 12/12/2020

Please note that it is the investigator's responsibility to report to the IRB any unanticipated problems involving risks to subjects or others [see 45 CFR 46.103(b)(5) and 21 CFR 56.108(b)]. Refer to the IRB Policy and Procedure Manual regarding the reporting requirements for unanticipated problems which include, but are not limited to, adverse events. If you have any questions about this process, please contact the Adverse Events Coordinator at 412-383-1480.

The protocol and consent forms, along with a brief progress report must be resubmitted at least **one month** prior to the renewal date noted above as required by FWA00006790 (University of Pittsburgh), FWA00006735 (University of Pittsburgh Medical Center), FWA00000600 (Children's Hospital of Pittsburgh), FWA00003567 (Magee-Womens Health Corporation), FWA00003338 (University of Pittsburgh Medical Center Cancer Institute).

ACKNOWLEDGEMENT OF SITE AGREEMENT TO CEDE IRB REVIEW AND REVIEWING IRB TO PROVIDE OVERSIGHT

This form documents that:

1) **University of Pittsburgh - Of the Commonwealth System of Higher Education** will serve as the Reviewing IRB for **University of Alabama** for the study noted below;

and

2) **University of Alabama** has agreed to cede IRB review to **University of Pittsburgh - Of the Commonwealth System of Higher Education** for the study noted below.

| | |
|---|---|
| Study Title: | The Emotion Awareness and Skills Enhancement (EASE) Program: A Randomized Controlled Trial |
| Overall Pl: | Carla A. Mazefsky, PhD |
| Relying Site Investigator: | Susan W. White, PhD |

IRB review will be ceded under the SMART !RB Master Common Reciprocal Institutional Review Board Authorization Agreement.

Questions about the IRB review process or study status should be directed to **Michelle LeMenager** irb.reliance@pitt.edu, **412-383-1781.**

**IRB of Record Point of Contact Signature**

_____ Date: _____

Name: REDACTED
Title: Reliance Specialist

**Relying Institution Point of Contact Signature**

_____ Date: _____

Name: REDACTED
Office for Research Compliance
The University of Alabama

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