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**EMPIRICAL PAPER**

# Patient alliance with the program predicts treatment outcomes whereas alliance with the therapist predicts adherence in internet-based therapy for panic disorder

DINA ZALAZNIK[1], ASHER Y. STRAUSS[1], ASALA HALAJ[1], SNIR BARZILAY[1], ISAAC FRADKIN[1], BENJAMIN A. KATZ[1], TAL GANOR[1], DAVID DANIEL EBERT [2], GERHARD ANDERSSON[3,4], & JONATHAN D. HUPPERT [1]

[1]Department of Psychology, The Hebrew University of Jerusalem, Jerusalem, Israel; [2]Faculty of Behavioural and Movement Sciences, Clinical, Neuro- & Developmental Psychology, Vrije Universiteit, Amsterdam, Netherlands; [3]Department of Behavioural Sciences and Learning, Linköping University, Linköping, Sweden & [4]Department of Clinical Neuroscience, Karolinska Institutet, Stockholm, Sweden

**Abstract**
*Objective* This study examines relationships among different aspects of therapeutic alliance with treatment outcome, adherence and attrition in internet delivered cognitive behavioral therapy (ICBT) for panic disorder. **Methods:** We examined alliance-outcome relationships in ICBT ($N = 74$) using a newly developed self-report alliance measure that disentangles alliance with program content (Internet Patient's Experience of Attunement and Responsiveness with the program; I-PEARp) and with the therapist (I-PEARt). We compared ICBT outcomes of patient rated and therapist-rated alliance with conventional alliance scales (WAI-6 and WAI-T). **Results:** Consistent with our hypothesis, I-PEARp and I-PEARt distinguished between different aspects of the alliance and predicted outcomes better than standard alliance scales. Furthermore, higher ratings of I-PEARp were associated with subsequent lower symptoms and lower symptoms were associated with higher subsequent alliance. In contrast, I-PEARt predicted adherence, but not symptoms. Although therapists' ratings of alliance (thI-PEAR) improved significantly during treatment, they did not predict subsequent symptoms, adherence, or dropout. **Conclusion:** Results indicate that the patient experience of the alliance in ICBT includes two aspects, each of which uniquely contributes to outcomes; patient connection to the program is related to symptom outcomes whereas the dyadic relationship with the therapist serves as the glue to allow the treatment to hold.

**Keywords:** ICBT; symptom reduction; adherence; dropout; internet alliance; internet intervention; I-PEAR

**Clinical or methodological significance of this article**: The experience of the relationship in CBT guided self-help treatments is different than in CBT face-to-face treatments. This study suggests a novel concept: that patients have a relationship with the treatment program (content) that is distinct from their relationship with their therapist. Patient's relationship with the program was uniquely associated with subsequent symptom reduction, whereas the patient's relationship with the therapist was associated with completion of modules. However, therapist-rated alliance was associated with neither symptom reduction nor with patient adherence or dropout. Therefore, it is important that therapists in ICBT guided self-help treatments such as ICBT do not rely on their impressions, but rather inquire explicitly regarding the patient's experience of the relationship, both with the program as well as with the therapist.

The therapeutic alliance, one of the most widely researched concepts in psychotherapy, has been consistently linked to positive outcomes across most therapies, including cognitive–behavioral

Correspondence concerning this article should be addressed to Dina Zalaznik. Email: dina.zalaznik@mail.huji.ac.il

therapy (CBT), and various disorders, including panic disorder (PD; Flückiger et al., 2018). Recent meta-analytic research including internet-based interventions with guided therapist support suggests that alliance is related to treatment outcomes, similar to face-to-face (FTF) psychotherapy (Flückiger et al., 2018; Probst et al., 2019). Although these meta-analyses did not include studies that separately examined the alliance in ICBT for PD, a few studies have examined the alliance in ICBT for various anxiety disorders, including PD (e.g., Berger et al., 2014).

Many of existing studies have used more traditional measures of alliance, which tend to have ceiling effects, and do not differentiate between alliance with the therapist and alliance with the treatment program (cf. Berger, 2017). Berger and colleagues (2014) conducted one of the first studies that modified an existing alliance measure to internet intervention. They used the items of Working Alliance Inventory and changed the items of the goal and task subscales into alliance with the program rather than alliance with the therapist. Later, Probst and colleagues (2019) conducted a meta-analysis and found an effect similar to FTF. Their analyses of the subscales indicated that the task component was slightly more predictive of outcomes than the bond component. These findings suggested that whereas the alliance in internet intervention is a robust predictor, the components of the alliance might be somewhat different than in FTF. Clearly, more research is required to understand these components. Other studies modified existing measures of alliance to examine the aspect of the alliance with program (e.g., Herrero et al., 2020; Meyer et al., 2015). Overall, the level of program helpfulness/ alliance was related to the level of symptoms. More recently, Heim and colleagues (2018) examined the aspect of alliance to avatars in the program, and found that users established a working alliance with the avatars.

However, to date, these studies have primarily examined single or averaged measures of alliance in single or pre–post treatment designs as opposed to longitudinal, time-lagged, within treatment associations (cf. Flückiger et al., 2020). Moreover, only a few studies fully differentiated the aspect of alliance with therapist and with treatment and referred to the two aspects. As described below, such a distinction may be particularly important in internet-based interventions.

Therapist-supported internet-based CBT (ICBT) has been found to effectively treat a range of disorders, with similar outcomes to FTF CBT (see Carlbring et al., 2018; Stech et al., 2020). Evidence indicates that therapist-supported ICBT appears to be more effective than unguided self-help versions of ICBT, both in terms of retention and outcomes (e.g., Baumeister et al., 2014). However, a recent meta-analysis by Stech et al. (2020) examined 27 studies for PD (with or without agoraphobia). All but two were with different levels of therapist support and found that there was no impact of degree of clinician support in the ICBT on the results. It should be noted that earlier research tended to compare ICBT with no support to ICBT with a substantial amount of clinician support, whereas they compared those who received less than 1 hour, 1–2 hours or more than 2 hours of support. These results suggest the need to better understand the role of the therapist in therapist-supported ICBT.

The relationship between the therapist and patient during ICBT typically develops via written correspondence. Therapists provide feedback on patients' worksheets and on patients' general progress via the treatment platform. In addition, patients can write to their therapist throughout the treatment and usually receive an answer within 24–48 hours, which they can review repeatedly. Additionally, in some ICBT programs, there is an option for chat or a brief phone call with patients when needed. Thus, internet interventions have modified and limited the role of the therapist in treatment, primarily so as to allow for greater scaling (Andersson et al., 2019). However, this raises a major question: How does the modification of the therapist role affect the therapeutic alliance in internet interventions? In addition, does the modified, limited (or condensed) information that the therapists receive from their patients influence their ability to accurately assess the patient's alliance?

Further examination of commonly used scales for the therapeutic alliance (see Flückiger et al., 2018) raises questions regarding the compatibility of most existing scales to describe the experience of alliance in ICBT. First, as noted above, the therapist in ICBT is limited to written exchanges and/or brief phone calls with the patient. Indeed, some studies reported that participants in ICBT had difficulties responding to the WAI, especially at the beginning of the intervention (e.g., Jasper et al., 2014). Second, the dominant component of ICBT is the treatment program itself as opposed to the therapist. Therefore, the patient might develop a "therapeutic alliance" with the program itself, which includes informational text, worksheets and weekly graphs that provide feedback regarding patient progress. That being the case, most current measures of alliance fail to capture this specific experience of alliance in internet-based interventions. There is a need to disentangle the patient's alliance with the therapist from the patient's alliance with the program in

order to test their relative contributions to treatment outcomes. Furthermore, given the distinct nature of the interactions in internet-based interventions from FTF psychotherapy, it is also important to differentiate the patient's view of the alliance from the therapist's estimation of the patient's view of the alliance and the therapist's own view of the alliance when measuring these constructs to predict processes and outcomes.

Additionally, even with therapist support, the dropout rates in internet-based treatments may be higher than FTF treatments (van Ballegooijen et al., 2014). FTF treatment studies suggest that poorer alliance plays a role in attrition from therapy (cf. Flückiger et al., 2018; Sharf et al., 2010; for meta-analyses of dropout and therapeutic alliance). Therefore, an alliance scale that is based on the patients experience and tailored to internet interventions and disentangles the alliance with the therapist and the alliance with the program might also help to better understand adherence and attrition and predict it more effectively.

Thus, the current study aims to fill this gap by examining the different aspects of the alliance with treatment outcomes and adherence and attrition using a newly developed self-report measure that was based on patients' experience with ICBT. The Internet Patient Experiences and Attunement Responsiveness (I-PEAR), is based on selected modified items from the Patient Experiences and Attunement Responsiveness scale (PEAR; Snyder & Silberschatz, 2017). The I-PEAR was developed from the outset to accommodate the alliance experience in internet interventions (see supplementary materials). We propose that the I-PEAR and its subscales (patient perspective: I-PEAR with program, I-PEARp; I-PEAR with therapist, I-PEARt; and therapist perspective: therapist I-PEAR, thI-PEAR) will predict treatment outcomes and attrition and adherence better than traditional alliance scales. In order to examine these hypotheses, we analyze the relationships among alliance measures and treatment outcomes, adherence, and attrition. Given the importance of temporality (see Flückiger et al., 2020; Zilcha-Mano, 2017), we examined whether alliance predicted symptom reduction in the next week, or vice versa.

We hypothesized that all aspects of therapeutic alliance measured with the different scales of the I-PEAR (i.e., I-PEARp, I-PEARt, thI-PEAR) will increase over time during ICBT treatment. Next, the main a priori hypothesis was that alliance with the program (I-PEARp) as well as the alliance with the therapist (I-PEARt) would predict symptom reduction. Moreover, we proposed that each subscale of the I-PEAR (i.e., program and therapist) will explain distinct portions of the variance in outcomes, but that the association between alliance with program (I-PEARp) and treatment outcome (i.e., symptoms reduction) will be greater than the association between alliance with therapist (I-PEARt) and treatment outcome. Finally, as adherence and attrition can be issues in ICBT, we hypothesized that early alliance, both with the therapist (I-PEARt) and with the program (I-PEARp), will predict dropout and adherence (the latter measured by the number of modules that the patient completed) with the possibility that alliance with the therapist will be a stronger predictor, given that unguided treatments tend to have greater attrition than guided self-help, though those who complete the program may have similar outcomes to guided treatments (e.g., Baumeister et al., 2014). We did not have strong hypotheses regarding the therapist perspective of the alliance (thI-PEAR). However, given that the therapist has much less information to use to infer the alliance and that data suggests that the patient perspective in CBT for panic disorder is a better predictor of outcomes than the therapist perspective (Huppert et al., 2014), we expected weaker relationships than with the patient perspective. Overall, although we examine these questions in a sample of patients with panic disorder, the hypotheses were proposed for ICBT in general and not specific to the disorder.

## Method

### Participants

The sample reported here included 74 out of the 79 total patients diagnosed with primary panic disorder (PD) who received ICBT and were administered the I-PEAR. Data were collected as part of an open trial examining uptake and adherence to ICBT for PD. Five patients (all of whom dropped out of treatment) never completed the I-PEAR and therefore were not included in the current study. Inclusion criteria were: a primary DSM-5 diagnosis of current PD, at least 18 years old, not in concurrent weekly therapy, no history of a full course of CBT for PD, and a score of 10 or above on the Panic Disorder Severity Scale – Independent Evaluator Version (PDSS-IE; Shear et al., 1997). Patients who were on a stable dose of medication for two months could participate in the study provided that they did not increase their medication during the study. Exclusion criteria included a history of psychosis or mania, recent history of substance abuse or dependence, or current suicidal ideation or a history of suicide attempts. The sample included 70% females ($n = 54$) and 30% ($n = 20$)

males, aged 21–68 years ($M = 38.3$, $SD = 10.8$). Participants had completed an average of 14.56 ($SD = 2.4$) years of education, and 64.5% were employed full-time. Of the 74 participants, 41% were single, 50% were married, 8% were divorced and 1% were widowed. At baseline, 38% of participants reported current use of medications. In terms of language, 89% of participants were native Hebrew speakers, 5% were native Russian speakers, 4% were native English speakers, and 1% were native Romanian speakers. All participants were fluent and literate in Hebrew. Inclusion and exclusion criteria and demographics were similar to FTF studies for PD (cf. Aaronson et al., 2008; Wieder et al., 2020; Zalaznik et al., 2019) as well as other ICBT for PD studies (cf. Stech et al., 2020). Regarding attrition, 60% ($n = 44$) of participants completed at least five of six modules of treatment (Module 6 was a summary and relapse prevention), and 40% ($n = 31$) completed less than five modules and were defined as dropouts. The average number of weeks in treatment was 16.5 ($SD = 8.5$). The study was approved by The Hebrew University's Ethics board and all participants signed informed consent prior to participation in the study; treatment was offered for free.

**Therapists.** Therapists consisted of eight doctoral level students who were trained and received supervision from a clinical psychologist with extensive experience in the treatment of PDA (JDH). Similar to other studies on FTF CBT for PD, as well as ICBT for PD, in the current ICBT study therapists were already trained and experienced with at least one patient using FTF CBT for PD. Therapists received group supervision once a week for an hour; supervision typically covered six to ten patients within the hour (more patients per hour as the study progressed). This is significantly less supervision than typically provided in FTF studies. During supervision patients' symptom monitoring, worksheets and correspondences with the therapist were discussed. The issue of therapist fidelity in ICBT is less complex than in FTF treatment, as all written exchanges with the patient are recorded in the system and the main content of the treatment is administered via the system and not the therapist. Therapists were encouraged to be supportive, to help motivate the patient to engage in the modules, and to help provide a clearer conceptualization of their panic when needed. Therapists were generally discouraged from engaging in parallel treatment via correspondence, instead encouraging patients to do the therapeutic work via the worksheets and modules. Flexibility was allowed in rare cases of true crises such as miscarriage, divorce, etc. Age of

therapists ranged between 29 and 42 years; four were female.

## Treatment

ICBT for panic is designed for patients to follow a written treatment program along with videos and exercises available on the internet in conjunction with receiving therapist support, via text exchanges and, if necessary, by telephone. The intervention involves content that parallels that of FTF CBT for panic (Barlow & Craske, 2007), therapist-patient contact (albeit through non-traditional means), and the patient homework exercises. The current ICBT for panic program included six modules (recommended times for each noted in parentheses): Module 1 included an introduction to the program and initial psychoeducation (up to 1 week), Modules 2 and 3 included further psychoeducation and cognitive work (1–2 weeks), Module 4 focused on exposure to feared physical sensations (i.e., interoceptive exposures; 2–3 weeks), Module 5 included in vivo and combined in vivo and interoceptive exposures (2–4 weeks), and Module 6 included a summary of the treatment program and work on relapse prevention material (1 week).

## Measures

All measures were translated to Hebrew and back-translated into English by the laboratory for previous FTF treatment studies (e.g., Zalaznik et al., 2019) or for the current study.

*Panic Disorder Severity Scale* (PDSS; Houck et al., 2002; Shear et al., 1997). Both the independent evaluator (PDSS-IE) and the self-report (PDSS-SR) versions were administered: the PDSS-IE only at pre- and post-treatment, and the PDSS-SR weekly throughout treatment. Both measures have been shown to have good psychometrics and sensitivity to change (Houck et al., 2002; Shear et al., 1997). Cronbach's $\alpha$'s in the present study showed very good internal consistency for each assessment point ($\alpha$'s $\geq$ .87, 95% CI [.85; .89]).

*Anxiety Sensitivity Index-3* (ASI; Taylor et al., 2007). The ASI is an 18-item self-report scale used to evaluate concerns related to panic-related bodily sensations. It has strong psychometrics (Taylor et al., 2007) and is associated with various indices of PD (Rodriguez, Bruce, Pagano, Spencer, & Keller, 2004). Cronbach's $\alpha$'s in the present study showed excellent internal consistency ($\alpha$'s $\geq$ .94, 95% CI [.93; .95]).

*Working Alliance Index-6 items* (WAI-6; Falkenström et al., 2015) The WAI-6 is a six-item

measure of working alliance. The WAI-6 asks for the patient's experience of the alliance in the most recent session, in order to allow repeated administrations during therapy. In the current study, we replaced the word "session" with "module" to adapt it to use with ICBT. For the current study, alliance showed excellent internal consistency ($\alpha$'s $\geq$ .92, 95% CI [.94; .96]).

*Working Alliance Index—Therapist Short Form* (WAI-T, therapist perspective; Tracey & Kokotovic, 1989). The WAI-T is a 12-item version of the WAI. The WAI-T total score was used here, averaging all 12 items. Internal consistency in the current study was excellent ($\alpha \geq$ .94, 95% CI [.93; .94]).

*Internet Patient's Experience of Attunement and Responsiveness Scale (I-PEAR)* To examine the nature of the alliance in ICBT, we conducted qualitative interviews with participants (see supplementary materials for information regarding item development and selection). Following this, we developed an internet-based measure of alliance that is based on the PEAR (Snyder & Silberschatz, 2017). The PEAR was selected due to it having content that allowed for clear, specific differentiation of the relationship with therapist and program, and its ease of use. The patient version of the PEAR has three factors: acceptance, empathy, and accomplishment (Snyder & Silberschatz, 2017). We adapted the three subscales for the I-PEARt and two subscales for the I-PEARp. The I-PEARt measures the alliance experience of the patient with the therapist which is based on the therapist's written feedback between patient and therapist. The I-PEARp measures the patient's experience of the alliance with the program itself including the text, worksheets, and graphs. Whereas the program content could be seen as being attuned (i.e., acceptance) and helpful (e.g., accomplishment) to the patient, the items related to empathy were deemed as requiring responsiveness that does not typically exist in ICBT (i.e., the material does not provide empathic responses). Parallel to the PEAR, the thI-PEAR assesses the therapist's view that the patient feels safe and accepted by the therapist and how much the therapist views her/his own helpfulness with the patient. For all I-PEAR scales, each item is rated on a Likert scale from 1 (= very little) to 5 (= very much).

Given that this is a newly adapted scale, we examined the factor structure using confirmatory factor analysis (CFA) and assumed a similar three-factor structure for the I-PEARt as the original PEAR (perceived helpfulness, felt empathy and sensed accomplishment). For the I-PEARp, we adapted the two relevant factors: perceived helpfulness and sensed accomplishment. Finally, we assumed a two-factor model for the thI-PEAR, which is parallel to the PEAR (therapists' ratings of their helpfulness and their patients' sense of feeling safe and accepted). Results suggested good fit for all three scales, superior to a one-factor model (see supplementary material).

We examined the reliability, convergent, and divergent validity of the I-PEAR. MacDonald's omega was high for all the I-PEAR subscales and subscales (MacDonald's $\omega$ > .93 for all scales; for subscales see supplementary material Table 3), indicating strong internal consistency (see Table I). Convergent and divergent validity of all 3 I-PEAR scales were examined by comparing the correlations of average early scores (post modules 1 and 2; hereafter early alliance) with each other and with the WAI scales. Specifically, we predicted that early alliance of I-PEARt and I-PEARp would be positively correlated with the WAI-6, but that this correlation would be higher between the I-PEARt and WAI-6. Similarly, the thI-PEAR was predicted to be positively correlated with the WAI-T. Table I presents the correlations among the measures of alliance used in the current study. Whereas the early alliance with the therapist (I-PEARt) and WAI-6 were moderately correlated ($r$ = .57, $p$ < .0001), the early alliance scores between alliance with program (I-PEARp) and WAI-6 scores were only modestly correlated ($r$ = .30, $p$ = .03). Similarly, the thI-PEAR scores were highly correlated with WAI-T ($r$ = .76, $p$ < .0001). Thus, good convergent and discriminant validity of the I-PEAR scales is evident, supporting initial construct validity of the measure.

*Attrition.* We defined attrition as the failure to complete the first five of the six treatment modules. The definition was based on the idea that the last module was regarding relapse prevention, and the main active components of the treatment were completed by the fifth module (cognitive work, interoceptive exposure, in vivo exposure).

*Adherence.* Adherence was defined as typically done in the ICBT literature, which is the number of modules completed. For the current trial, individuals were not permitted to continue to the next module without completing the previous module, which means that adherence here means completion of material within a module. Given that the next module was not made available to the patient until completion of the prior one, this is also a proxy for retention (parallel to the number of sessions attended in FTF treatment).

## Procedure

Participants were primarily recruited via ads on social media (additional recruitment came from word-of-mouth and professional referrals). After completing

Table I. Descriptive statistics of I-PEAR and WAI scales.

| | Mean (SD) | I-PEARp | I-PEARt | WAI-6 | thI-PEAR | WAI-T |
|---|---|---|---|---|---|---|
| I-PEARp | 3.1 (0.8) | .93 | | | | |
| I-PEARt | 3.4 (0.9) | .67*** | .96 | | | |
| WAI-6 | 3.9 (1.3) | .30* | .57*** | .95 | | |
| thI-PEAR | 3.4 (0.6) | .07 | .15 | .25 | .93 | |
| WAI-T | 4.6 (1.1) | .02 | .09 | .11 | .78*** | .94 |

Note. I-PEARt = Internet Patient's Experience of Attunement with the therapist, I-PEARp = Internet Patient's Experience of Attunement with the program, thI-PEAR = therapist-rated Internet Patients Experience of Attunement, WAI-6 = Working Alliance Inventory: 6 items, WAI–T = Working Alliance Inventory Therapist rated. Mean and SD are for average early alliance (average of the first two post modules). Scoring of I-PEAR scales range between 1-5, Scoring of WAI scales range between 1 and 7. $n = 74$.
*/*** significantly different from zero at the $p < .05/.0001$ level.
Numbers on the diagonal are the scale reliability (MacDonald's omega for I-PEAR, Chronbach's alpha for WAI). Numbers below the diagonal are Pearson correlations.

online questionnaires, participants first completed a phone screen and then were invited to a FTF interview with an independent evaluator if they were found eligible. The independent evaluators were 4 MA level psychologists. Participants were diagnosed using the Mini International Neuropsychiatric Interview 7.0.0 (MINI-7.0.0; Sheehan, 2014), a structured interview of DSM-5, and the PDSS-IE (Shear et al., 2001). A random selection of 20 of the recorded interviews was examined to determine interrater reliability. Both the PDSS-IE ($ICC_1$: .98, CI [.95; .99]) and panic disorder diagnosis (100% agreement) were found to have excellent reliability (Koo & Li, 2016). After the intake, participants accepted to the ICBT program received guidance on the platform and completed the pretreatment online questionnaires. They then received a short, introductory phone call (3–7 min) from their therapist and began the ICBT program. After each module, patients and therapists completed a battery of questionnaires including the alliance measures (for patients, WAI-6, I-PEARp, and I-PEARt were interspersed with other measures in order to prevent response biases; for therapists: WAI-T, thI-PEAR). In addition, patients answered weekly online questionnaires about their symptoms (PDSS and ASI) so that their progress could be tracked throughout treatment. This is the first published analysis of these 74 cases.

### Data Analytic Plan for Predicting Outcomes, Adherence and Dropout

The main purpose of this study was to examine how within-patient variability in internet alliance with the program (I-PEARp), with the therapist (I-PEARt) and therapist-rated alliance (thI-PEAR) were related to within-patient variability in panic symptoms in a time-lagged (1 week) fashion during

treatment. To accommodate the interdependence of the repeated observations within individuals and the multiple levels of data (i.e., time within patients), we analyzed the data using a multilevel modeling approach that adjusted for the hierarchy of clustering with nested random effects (MLM; Bryk & Raudenbush, 1992). This dependency is accounted for by introducing individual-specific random effects and by modeling the covariance structure of the residuals. Models were adjusted for repeated measures with maximum likelihood estimation (ML; Shin et al., 2017), a first-order autoregressive covariance structure (AR1) at the time level and random intercepts and slopes at the patient level. Linear, curvilinear and log-linear curves were estimated and compared in terms of model fit. To account for possible therapist effects in the data, we fitted models with therapists as fixed effects (due to the small number of therapists in the study; McNeish & Stapleton, 2016). Because the effect was non-significant for all study variables ($p = .06$–.99), we removed this effect from all subsequent analyses. Analyses were conducted using the R Version 3.6.1 package "nlme" version 3.1 (Pinheiro et al., 2016).

MLM analyses were implemented in two steps. First, we ran a simple model, to examine the effects of time on all three scales of the internet alliance (I-PEARp, I-PEARt, thI-PEAR; Hypothesis 1). All variables were expected to change over time, where the slopes represent average improvement in relationship per module during therapy. In addition, we ran an identical model to examine the effect of time on the working alliance scales (WAI-6 or WAI-T). Next, to determine temporal precedence with symptoms (Hypothesis 2), we conducted a lagged model in which patient panic symptom scores (PDSS-SR or ASI) completed approximately one week (average 7 days; range 5–12 days) after the assessment of the I-PEAR were predicted separately by each of the alliance scales. We conducted a

similar model in which I-PEARp, I-PEARt, and WAI-6 were all included in the same model predicting panic symptoms a week later. Finally, to determine whether the results were unidirectional, the opposite direction was tested as well, such that each of the alliance scales (i.e., I-PEAR, WAI) were predicted by symptoms (i.e., PDSS, ASI) measured on average one week before. Person-mean centering of the time varying predictors was used, following Wang and Maxwell (2015). Also in accordance with Wang and Maxwell (2015), the factor of time in the model was not controlled for because time is an integral part of the therapy process; therefore, detrending (controlling for the effect of time) could overcorrect the within-person association and mask the effects of interest, particularly in a time-lagged model. Finally, we did not control for the lagged dependent variable in our analyses due to the problem of endogeneity described by Falkenström and colleagues (2017). Analyses were conducted separately for patient-rated and therapist-rated measures. Effect sizes of MLM were calculated as semi-partial $r$ ($r_s$; Jaeger et al., 2016; Nakagawa et al., 2013) using package "r2glmm" version 0.1.2 in R (Jaeger, 2016). These effect sizes represent the unique contribution of the predictor variables above and beyond the contribution of all other effects (fixed, intercept and random slopes) in the model. Significance level was set at $\alpha = .01$ for all analyses.

Additionally, to predict independent evaluator rated outcomes (PDSS-IE) that were only collected pre and post treatment, we conducted multiple regression analyses predicting posttreatment PDSS-IE by pretreatment PDSS-IE and each of the three patient early (i.e., Modules 1 and 2) alliance measures (I-PEARp, I-PEARt, and WAI-6) in separate models. Furthermore, we examined whether alliance predicted dropout from therapy via logistic regressions using early alliance measures (average of Modules 1 and 2) and dropout (Hypothesis 3). Finally, we also examined the relationship with adherence by conducting separate linear regression models predicting the number of modules completed from the average level of early alliance (average of Module 1 and 2).

## Results

### Treatment Outcome

The PDSS-SR was used as an indicator of PD severity (Houck et al., 2002) and the ASI as a proxy for panic cognitions (Taylor et al., 2007). See Table II for all analyses of covariation over time. The average decrease on the PDSS-SR in each module across participants was 0.97 points ($t(146) = -4.14$, $p < .0001$, $r_s = .25$ [.12, .37]) The ASI had an average decrease of 2.49 points in each module ($t(146) = -2.38$, $p < .0001$, $r_s = .22$ [.10, .34]).

### Patient-Rated Alliance Change Over Time

Consistent with our hypothesis, there were statistically significant improvements in rated scores of the patients' alliance with the program (I-PEARp) and for the patients' alliance with the therapist (I-PEARt) ($t(158) = 5.50$, $p < .0001$, $r_s = .30$ [.18, .41]; $t(164) = 5.47$, $p < .0001$, $r_s = .30$ [.18, .41]; respectively). In contrast, the improvement in WAI rated scores over time was not statistically significant ($t(171) = 0.82$, $p = .41$, $r_s = .02$ [.00, .15])

### Therapist Improvement in Alliance

Analyses revealed statistically significant improvements in therapist-rated scores of alliance (thI-PEAR; $p < .0001$, $r_s = .41$[.30, .52]). Similarly, the improvement in WAI-T was statistically significant ($p < .0001$, $r_s = .40$ [.28, .50]).

### Association of Patient Alliance and Outcome

Our goal with these analyses was to examine whether the patient-rated internet alliance (I-PEARp, I-PEARt) predict lagged-covariation of symptoms during treatment. Table III provides the results of the multilevel lagged-covariation analyses relating the patient-rated alliance with the program and with the therapist to outcome in the following week. The I-PEARp significantly predicted the PDSS-SR a week later ($t(127) = -3.69$, $p < .0001$, $r_s = .18$ [.05,

Table II. Analyses of changes in alliance scales over time during treatment.

| Analysis | Changes in alliance over time | | | | |
| --- | --- | --- | --- | --- | --- |
| | b | SE | F | df | $p$ |
| PDSS | −0.97 | 0.24 | −4.14 | 146 | <.0001 |
| ASI | −2.49 | 0.50 | −2.38 | 146 | <.0001 |
| I-PEARp | 0.10 | 0.02 | 5.50 | 158 | <.0001 |
| I-PEARt | 0.12 | 0.02 | 5.47 | 164 | <.0001 |
| WAI-6 | 0.02 | 0.03 | 0.82 | 171 | .41 |
| thI-PEAR | 0.11 | 0.02 | 6.41 | 122 | <.0001 |
| WAI-T | 0.16 | 0.02 | 6.60 | 129 | <.0001 |

*Note.* b = unstandardized coefficient; SE = standard error. I-PEARt = Internet Patients Experience of Attunement related to Therapist, I-PEARp = Internet Patients Experience of Attunement related to Program, thI-PEAR = therapist-rated Internet Patients Experience of Attunement, WAI- 6 = Working Alliance Inventory 6 items, WAI –T = Working Alliance Inventory Therapist rated. $n = 74$.

.31]; see Figure 1). However, the lagged analyses for the I-PEARt was only marginally significant ($t(127) = -2.45$, $p = .013$, $r_s = .13$ [.01, .26]). The WAI-6 did not predict subsequent symptoms ($t(127) = -0.85$, $p = .40$, $r_s = .05$ [.00, .18]), supporting our hypothesis that the I-PEAR would be a better predictor of outcomes than would that WAI-6.

In addition, when examining the I-PEARp, I-PEARt and WAI-6 in the same model, only the I-PEARp predicted symptoms one week later (I-PEARp: $b = -1.94$, $SE = 0.72$, $t(125) = -2.70$, $p < 0.01$, $r_s = .13$ [.01, .27]; I-PEARt: $b = -0.33$, $SE = 0.61$, $t(125) = -0.55$, $p = .58$, $r_s = .03$ [.00, .17]; WAI-6: $b = 0.17$, $SE = 0.48$, $t(125) = 0.35$, $p = .72$, $r_s = .02$ [.00, .16]). This result is consistent with our hypothesis that internet alliance with the program explains unique variance related to outcome.

Similarly, we examined whether alliance predicted anxiety sensitivity (measured by the ASI) lagged at 1-week. Consistent with the results for PDSS-SR, the I-PEARp significantly predicted ASI scores ($t(127) = -2.58$, $p = .010$, $r_s = .08$ [.002, .22]), whereas neither the I-PEARt nor the WAI-6 predicted ASI scores ($t(127) = -1.18$, $p = .24$, $r_s = .05$ [.002, .17]; $t(127) = 1.20$, $p = .23$, $r_s = .04$ [.00, .17]); respectively. When examining alliance to the therapist and alliance to the program in the same model for the ASI, only I-PEARp significantly predicted ASI scores a week later (I-PEARp: $b = -3.14$, $SE = 1.29$, $t(125) = -2.43$, $p = .01$, $r_s = .07$ [.00, .21]; I-PEARt: $b = -0.53$, $SE = 1.09$, $t(125) = -0.49$, $p = .63$, $r_s = .01$ [.00, .16]; WAI-6: $b = 1.93$, $SE = 0.90$, $t(125) = 2.16$, $p = .03$, $r_s = .07$ [.00, .20]). This further supports our hypothesis.

We also examined the possibility of reverse temporality. Panic symptoms (i.e., PDSS) preceding I-PEARp by one week yielded a significant result for predicting the I-PEARp ($t(149) = -2.53$, $p = .01$, $r_s = .17$ [.01, .24]), but not for the I-PEARt ($t(155) = -1.50$, $p = .14$, $r_s = .07$ [.004, .20]) nor for the WAI-6 ($t(162) = 0.54$, $p = 0.59$). In addition, results of the ASI preceding I-PEARp, I-PEARt or WAI-6 failed to reach significance ($t(149) = -2.43$, $p = .016$, $r_s = .12$ [.01, .25]); ($t(155) = -2.20$, $p = .03$, $r_s = .11$ [.01, .23]); ($t(162) = -1.07$, $p = .28$, $r_s = .05$ [.00, .18]), respectively.

In addition, given the inability to conduct time-lagged analyses with the independent evaluator measure (PDSS-IE) because it was only collected pre- and post-treatment, we examined the role of early alliance as a predictor of treatment outcome between individuals. Thus, we examined the association between the mean patient-rated early alliance (first two modules) and PDSS-IE via linear regression by examining I-PEARp, I-PEARt, and

WAI-6 as predictors in separate models of PDSS-IE posttreatment when including PDSS-IE pretreatment as an additional predictor of each model. Results were significant for the I-PEARp ($b = -2.83$, $SE = 0.97$, $t(47) = -2.93$, $p < 0.01$, $r = -.41$) but not for I-PEARt ($b = -1.41$, $SE = 0.91$, $t(53) = -1.55$, $p = .12$, $r = -.28$) or WAI-6 ($b = -0.59$, $SE = 0.60$, $t(51) = -0.97$, $p = .33$, $r = -.20$). Results indicate that the change in symptoms is related to average level of alliance with the program but not to the alliance with the therapist.

## Associations Between Therapist Perceived Alliance and Outcome

The therapist-rated alliance (thI-PEAR) was not significantly related to PDSS-SR measured 1-week later ($t(91) = -1.31$, $p = .19$, $r_s = .07$ [.00, .23]), nor was the WAI-T ($t(97) = -1.42$, $p = .16$, $r_s = .09$ [.01, .24]; see Table II). Similarly, neither the thI-PEAR nor WAI-T predicted subsequent ASI scores ($t(91) = -0.16$, $p = .87$, $r_s = .01$ [.00, .18]; $t(97) = -0.57$, $p = .57$, $r_s = .02$ [.00, .18]; respectively).

We also examined the possibility of reverse temporality. The variability of patient's symptoms (PDSS) preceding therapist-rated alliance (thI-PEAR, WAI-T) yielded significant results for both thI-PEAR and WAI-T ($t(114) = -2.58$, $p = .01$, $r_s = .13$ [.01, .27]; $t(121) = -3.75$, $p < .0001$, $r_s = .16$ [.03, .30]). In addition, the results with ASI preceding therapist–rated alliance was not significant for the thI-PEAR ($t(114) = -1.26$, $p = .21$, $r_s = .07$ [.00, .21]), but was significant for the WAI-T ($t(121) = -2.66$, $p = .009$, $r_s = .12$ [.01, .26]).

In addition, we examined the role of average early alliance of the therapist-rated alliance as a predictor of independent evaluator treatment outcome (PDSS-IE). Results were not significant for the thI-PEAR ($b = -0.30$, $SE = 1.36$, $t(41) = -0.22$, $p = .82$, $r = -.09$) or for the WAI-T ($b = -1.02$, $SE = 0.66$, $t(45) = -1.53$, $p = .13$, $r = -.23$). Results suggest that therapist perspective is not predictive of change in symptoms, but reduction in symptoms is a somewhat consistent predictor of therapists' perspective of the alliance.

## Adherence and Attrition in Relation to Alliance

The goal with these analyses was to examine whether early alliance with the program and early alliance with the therapist predicts adherence and dropout. Thus, we conducted separate linear regression models predicting the number of modules from the average level of early alliance. Results were significant only

Table III. One-week lagged-covariation analyses between alliance scales and outcomes.

| Analysis | Alliance predicting changes in symptoms | | | | | Symptoms predicting changes in alliance | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | b | SE | F | df | p | b | SE | F | df | p |
| I-PEARp PDSS | −2.10 | 0.57 | −3.69 | 127 | < .0001 | −0.03 | 0.01 | −2.53 | 149 | .010 |
| I-PEARt - PDSS | −1.15 | 0.46 | −2.45 | 127 | .013 | −0.02 | 0.01 | −1.50 | 155 | .14 |
| WAI - PDSS | −0.37 | 0.44 | −0.85 | 127 | .40 | 0.01 | 0.02 | 0.54 | 162 | .59 |
| I-PEARp - ASI | −2.75 | 1.06 | −2.58 | 127 | .010 | −0.01 | 0.00 | −2.43 | 149 | .016 |
| I-PEARt – ASI | −0.99 | 0.84 | −1.18 | 127 | .24 | −0.01 | 0.01 | −2.20 | 155 | .029 |
| WAI – ASI | 0.95 | 0.80 | 1.20 | 127 | .23 | −0.01 | 0.01 | −1.07 | 162 | .28 |
| thI-PEAR - PDSS | −1.00 | 0.77 | −1.31 | 97 | .19 | −0.03 | 0.01 | −2.58 | 114 | .01 |
| WAI-T –PDSS | −0.84 | 0.59 | −1.42 | 97 | .16 | −0.05 | 0.01 | −3.57 | 121 | < .0001 |
| thI-PEAR - ASI | −0.25 | 1.47 | −0.16 | 91 | .87 | −0.01 | 0.00 | −1.26 | 114 | .21 |
| WAI-T - ASI | −0.56 | 0.98 | −0.57 | 97 | .57 | −0.02 | 0.01 | −2.66 | 121 | .009 |

Note. $b$ = unstandardized coefficient; SE = standard error; The within-person dependent variables were lagged to establish a timeline of lag +1 correlation. Thus, the lagged-variables are in time+1 week, and the changes in independent variable in module 1 (i.e., the alliance scales) predicted changes in symptoms in the following week during therapy. I-PEARt = Internet Patients Experience of Attunement related to therapist, I-PEARp = Internet Patients Experience of Attunement related to program, thI-PEAR = therapist-rated Internet Patients Experience of Attunement, WAI- 6 = Working Alliance Inventory 6 items, WAI–T = Working Alliance Inventory Therapist rated. $n$ = 74

for the I-PEARt ($b = 0.55$, $SE = 0.19$, $t(63) = 2.84$, $p < 0.01$, $r = .34$); they were not significant for the I-PEARp ($b = 0.49$, $SE = 0.23$, $t(62) = 2.13$, $p = 0.04$, $r = .26$) or the WAI-6 ($b = 0.20$, $SE = 0.14$, $t(65) = 1.41$, $p = 0.162$, $r = .17$). Overall, the I-PEARt was the only predictor of treatment adherence. We also conducted logistic regression analysis to predict dropout. Results indicated that there was no relationship between any scale and dropout, though effects were somewhat stronger for I-PEAR-t (I-PEARt: $b = −0.57$, $SE = 0.31$, $z = −1.81$, $p = .07$; I-PEARp: $b = −0.43$, $SE = 0.37$, $z = −1.17$, $p = .24$; WAI-6: $b = −0.15$, $SE = 0.21$, $z = −0.73$, $p = .46$).

In addition, we examined whether the therapist perspective of early alliance was related adherence and to dropout. Results of linear regression models between the average level of therapist-rated early alliance and patients' adherence were not significant for both the thI-PEAR and the WAI-T ($b = −0.32$, $SE = 0.28$, $t(58) = −1.11$, $p = .27$, $r = -.14$; $b = 0.21$, $SE = 0.15$, $t(60) = 1.42$, $p = .16$, $r = 0.18$; respectively). Additionally, results of logistic regression were insignificant for both the thI-PEAR and the WAI-T ($b = 0.14$, $SE = 0.45$, $z = 0.30$, $p = .76$; $b = −0.16$, $SE = 0.25$, $z = −0.64$, $p = .52$; respectively). Overall, results indicate that therapist-rated alliance was not related to adherence or dropout in ICBT.

## Discussion

The purpose of this study was to examine the relationship between different aspects of alliance with treatment outcomes in ICBT. Patients and their outcomes were similar to previous studies of CBT for PD, both FTF (e.g., Aaronson et al.,

2008) and ICBT (cf. Stech et al., 2020). The results were generally consistent with our hypotheses. Analysis revealed that all I-PEAR scales improved during treatment, but the WAI-6 showed no improvement. Moreover, consistent with our primary hypothesis, the I-PEAR predicted outcomes better than the WAI-6. Furthermore, I-PEARp predicted subsequent symptoms (measured both by self-report and an independent evaluator), whereas I-PEARt early in treatment was a unique predictor of adherence. A bidirectional, time-lagged relationship between I-PEARp and symptoms was revealed (cf. Flückiger et al., 2020 for similar findings in FTF therapy). Although therapist-rated alliance improved significantly during treatment, these ratings did not predict subsequent levels of symptoms, attrition or adherence; however, level of panic symptoms did predict subsequent therapist-rated alliance. Together, the results of this study provide increased evidence for two distinct aspects of patient alliance in ICBT and their relations to outcomes and adherence. Figure 2 characterizes the relationship between alliance and outcomes found in this study.

The alliance with the program appears to be associated with treatment outcome, but not with adherence or dropout. The patients' alliance with the program might be an indicator that a patient finds the content of the treatment relevant (i.e., agreement with goals and tasks). The increased ratings of alliance with the program over time might also serve as a proxy for the internalization of the principles and rationale of the treatment. Furthermore, similar to findings in FTF treatment (Flückiger et al., 2020), we found that the relationship between alliance with the program and
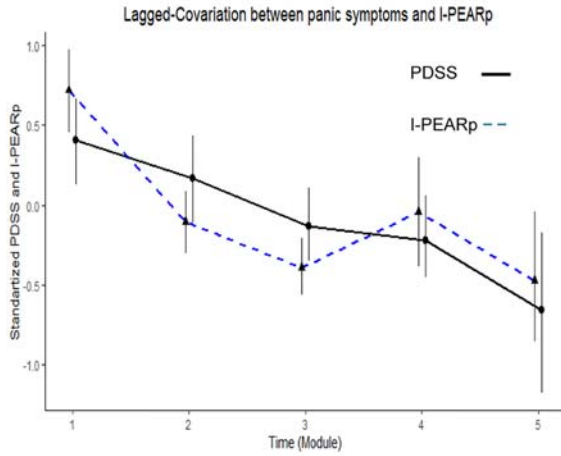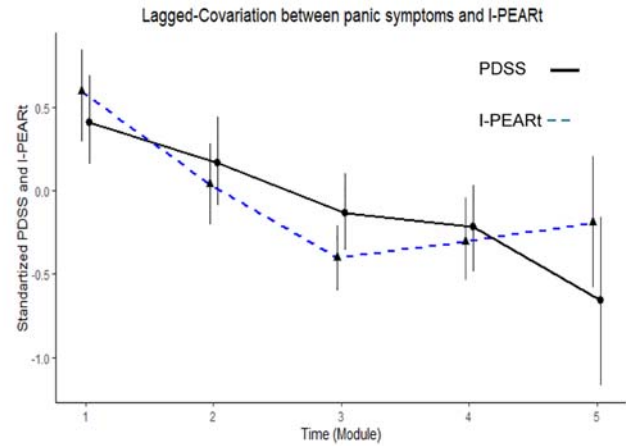
Figure 1a.

Lagged-Covariation between panic symptoms and I-PEARp



Figure 1b.

Lagged-Covariation between panic symptoms and I-PEARt



Figure 1c.

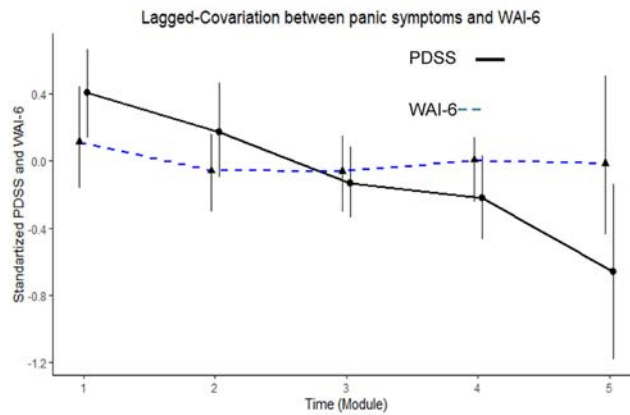Lagged-Covariation between panic symptoms and WAI-6



Figure 1. Lagged-covariation of session-by-session analysis between standardized PDSS and I-PEARp (Figure 1a), the I-PEARt (Figure 1b), and the WAI-6 (Figure 1c). The scoring of the alliance scales was reversed to be in the same direction as the PDSS (such that the decreases over time in alliance scales represent actual increases in alliance). I-PEAR*p* = Internet Patients Experience of Attunement related to the Program; I-PEARt = Internet Patients Experience of Attunement related to the Therapist; WAI-6= Working Alliance Inventory, 6-item version; PDSS = Panic Disorder Severity Scale, self-report version.

symptoms was bidirectional, suggesting a reciprocal, broaden and build-type of relationship such that increased resonance with the content of the program leads to symptom improvement which thereby further strengthens the belief in the
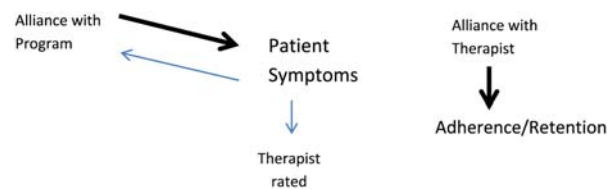


Figure 2. Schematic summary of the relationship between I-PEAR scales and outcomes.

program. Given this, it is surprising that the I-PEARp was not related to adherence. It is interesting to consider that the patient might form a connection with the content of the treatment which is distinct from his/her relationship with the therapist; this could also occur in FTF CBT as well as in other treatments. For example, Webb et al. (2011) found that agreement on tasks and goals (i.e., therapy content) was predictive of outcome in CBT for depression, whereas the therapeutic bond was not predictive. In this study, the relationship with the program was predictive of symptom improvement whereas the relationship with the therapist was not. Our findings regarding the primacy of the alliance with the program in ICBT are in line with the

meta-analysis by Probst et al. (2019) that found that the task and the goal subscales were a slightly more associated with outcome rather than the bond with the therapist. More research is needed to understand these processes.

Results indicated that the association between symptom improvement and the alliance with the program was significant whereas the association of the alliance with the therapist was not, both when considered alone and when considered in the same model. Thus, the association of alliance with the program is relatively robust, whereas the association of alliance with the therapist seems less consistent. Indeed, this smaller, less stable effect might explain inconsistent findings in the ICBT literature regarding the differential effect sizes with or without therapist guided ICBT (e.g., Stech et al., 2020; vs. Königbauer, Letsch, Doebler, Ebert, and Baumeister, 2017). That is, the program consistently affords a reasonably good outcome whereas the addition of the therapist might vary in its impact. These results corroborate the previous studies that found association between the program rating and symptoms (e.g., Herrero et al., 2020; Meyer et al., 2015).

Interestingly, we found the opposite pattern when predicting adherence. The relationship between adherence and alliance with the therapist was significant whereas the relationship with alliance with the program was not. In the current study, and in many studies of ICBT, adherence and dropout were defined separately. This is an attempt to parse internet interventions in a similar way that FTF treatments are examined. However, in cases such as ours, where adherence (doing the tasks of treatment) are contingent for the opening of next module, the number of modules overlaps with the notion of attrition or retention. That the relationship with the therapist is predictive of retention is partially consistent with recent findings in FTF treatments (Flückiger et al., 2018). Similarly, findings that therapist-assisted ICBT has fewer dropouts than unguided ICBT further reinforces the notion that alliance with the therapist might be an important factor for retention in most types of treatment (Baumeister et al., 2014). Overall, this finding is consistent with the notion that alliance with the therapist may serve more as the "glue" of treatment, facilitating adherence, motivation, and retention (Blackwell, 1997), but might not serve as the operative mechanism of symptom change (cf. Zilcha-Mano, 2017), at least in ICBT as administered in this study.

Dropout rates in FTF psychotherapy range from 0 to 50% (Hans & Hiller, 2013), compared to dropout rates for ICBT, which range from 0 to 75% (Schmidt et al., 2019). This finding is one of the greatest concerns regarding ICBT. Our failure to find a strong predictor of attrition suggests that much more work is needed to understand the predictors of dropout in ICBT.

Therapist–rated alliance improved over time, and symptom reduction predicted the level of therapist–rated alliance, but therapist–rated alliance did not predict symptom reduction, adherence, or attrition. These findings raise questions regarding the role of the therapist's perspective of alliance in ICBT and the discrepant predictive validity of the therapist's perspective in internet-based interventions versus FTF treatments (though more research is needed on both). In the current ICBT program therapists were regularly exposed to patients' weekly symptom improvement while in supervision, whereas therapists only completed alliance ratings post module (which was independent from supervision). Therefore, the association between symptom reduction and therapist–rated alliance might have been affected by therapists' knowledge of symptom reduction rather than their estimations of the patient's alliance.

In addition, the correlations between therapist-rated and patient-rated alliance were very low: much lower than those typically observed in FTF studies (Tryon et al., 2007). This finding raises questions about a therapist's ability to rely on her/his impression of the alliance; rather she/he needs to elicit the patient's perspective or provide direct measures such as the I-PEAR to get feedback. Interestingly, also different from FTF treatment (e.g., Tryon et al., 2007), therapist's average alliance ratings were similar or higher than that of their patients' ratings. Research on the therapist's perspective of the alliance in ICBT is still uncommon, and further research is necessary to better understand this construct.

Finally, we found that brief version of traditional measures of alliance (WAI-6 and WAI-T) were unrelated to any outcome measures, even though the alliance with the therapist (I-PEARt) was moderately correlated with the WAI-6 and the thI-PEAR was highly correlated with the WAI-T. The latter correlation indicates convergent validity of the new scales (that WAI-T and thI-PEAR scales tap into the same construct). The fact that the I-PEAR scales were related to differential outcomes (i.e., symptom reduction or adherence) whereas the WAIs were not related to any outcomes, emphasizes the importance of using fully tailored instruments to measure nuanced differences in alliance in different treatments.

The current study had several limitations. The study was conducted with a moderately sized sample that was relatively homogeneous (i.e., patients with a primary PD). Thus, we cannot be sure that the results would generalize to other forms of internet interventions or to other disorders.

However, results of most studies on the alliance in CBT for PD and other anxiety disorders are typically similar to those in other disorders (e.g., Flückiger et al., 2018; 2020). In addition, a control group was not included. This design prevents the determination of how well the findings generalize to other internet-based treatments or disorders. More research is needed to examine whether the relationships found in the current study can be replicated in similar samples and whether they extend to additional disorders, and to other orientations of internet interventions such as psychodynamic internet interventions. Given the use of a novel measure for measuring the alliance (i.e., I-PEAR), more studies are needed to examine its psychometrics and predictive validity. We suggest that further research is needed to examine indirect ways to measure the alliance in internet interventions that are not based on self-report. For example, measuring alliance through website usage analytics, language usage of text exchanges and worksheets. Further examination of "state-like" vs. "trait-like" aspects of the alliance in ICBT and of the discrepancies between therapist and patient ratings of therapist alliance and their relationship to outcomes in ICBT are also necessary (cf. Zilcha-Mano, 2017).

This study used a novel alliance scale that was based on patients' actual experience with ICBT and differentiated aspects of the alliance in internet interventions from alliance with the program and alliance with the therapist. Results using the I-PEAR suggest that alliance can have different facets, which are differentially related to distinct aspects of treatment outcomes (i.e., symptom reduction vs. adherence). Most research on alliance in ICBT to date describes early alliance rather than the development of the alliance over treatment and mostly focuses on patient-rated alliance ratings. In contrast, this time-lagged, session-by-session analysis provides a practical example of investigating the impact of alliance over time and enables a robust and nuanced exploration of alliance effects during internet treatments. This study is a step in developing an empirical foundation of the different aspects of alliance in internet interventions, both from patients' and therapists' perspectives.

## Funding

## Supplemental data

## ORCID

*David Daniel Ebert* http://orcid.org/0000-0001-6820-0146
*Jonathan D. Huppert* http://orcid.org/0000-0002-0537-4701

## References

Aaronson, C. J., Shear, M. K., Goetz, R. R., Allen, L. B., Barlow, D. H., White, K. S., Ray, S., Money, R., Saksa, J. R., Woods, S. W., & Gorman, J. M. (2008). Predictors and tie course of response among panic disorder patients treated with cognitive-behavioral therapy. *The Journal of Clinical Psychiatry*, *69*(3), 418–424. https://doi.org/10.4088/JCP.v69n0312

Andersson, G., Titov, N., Dear, B. F., Rozental, A., & Carlbring, P. (2019). Internet-delivered psychological treatments: From innovation to implementation. *World Psychiatry*, *18*(1), 20–28. https://doi.org/10.1002/wps.20610

Barlow, D. H., & Craske, M. G. (2007). *Mastery of your anxiety and panic*. Oxford University Press.

Baumeister, H., Reichler, L., Munzinger, M., & Lin, J. (2014). The impact of guidance on internet-based mental health interventions – A systematic review. *Internet Interventions*, *1*(4), 205–215. https://doi.org/10.1016/j.invent.2014.08.003 doi:10.1016/j.invent.2014.08.003

Berger, T. (2017). The therapeutic alliance in internet interventions: A narrative review and suggestions for future research. *Psychotherapy Research*, *27*(5), 511–524. https://doi.org/10.1080/10503307.2015.1119908

Berger, T., Boettcher, J., & Caspar, F. (2014). Internet-based guided self-help for several anxiety disorders: A randomized controlled trial comparing a tailored with a standardized disorder-specific approach. *Psychotherapy*, *51*(2), 207–219. https://doi.org/10.1037/a0032527

Blackwell, B. (1997). *Treatment compliance and the therapeutic alliance*. Harwood Academic.

Bryk, A. S., & Raudenbush, S. W. (1992). *Hierarchical models: Applications and data analysis methods*. Sage Publications, Inc.

Carlbring, P., Andersson, G., Cuijpers, P., Riper, H., & Hedman-Lagerlöf, E. (2018). Internet-based vs. face-to-face cognitive behavior therapy for psychiatric and somatic disorders: An updated systematic review and meta-analysis. *Cognitive Behaviour Therapy*, *47*(1), 1–18. https://doi.org/10.1080/16506073.2017.1401115

Falkenström, F., Finkel, S., Sandell, R., Rubel, J. A., & Holmqvist, R. (2017). Dynamic models of individual change in psychotherapy process research. *Journal of Consulting and Clinical Psychology*, *85*(6), 537–549. https://doi.org/10.1037/ccp0000203

Falkenström, F., Hatcher, R. L., Skjulsvik, T., Larsson, M. H., & Holmqvist, R. (2015). Development and validation of a 6-item working alliance questionnaire for repeated administrations during psychotherapy. *Psychological Assessment*, *27*(1), 169. https://doi.org/10.1037/pas0000038

Flückiger, C., Del Re, A. C., Wampold, B. E., & Horvath, A. O. (2018). The alliance in adult psychotherapy: A meta-analytic

synthesis. *Psychotherapy: Theory, Research & Practice*, *55*(4), 316–340. https://doi.org/10.1037/pst0000172

Flückiger, C., Rubel, J., Del Re, A. C., Horvath, A. O., Wampold, B. E., Crits-Christoph, P., Atzil-Slonim, D., Compare, A., Falkenström, F., Ekeblad, A., Errázuriz, P., Fisher, H., Hoffart, A., Huppert, J. D., Kivity, Y., Kumar, M., Lutz, W., Muran, J. C., Strunk, D. R., … Barber, J. P. (2020). The reciprocal relationship between alliance and early treatment symptoms: A two-stage individual participant data meta-analysis. *Journal of Consulting and Clinical Psychology*, *88*(9), 829–843. http://doi.org/10.1037/ccp0000594

Hans, E., & Hiller, W. (2013). Effectiveness of and dropout from outpatient cognitive behavioral therapy for adult unipolar depression: A meta-analysis of nonrandomized effectiveness studies. *Journal of Consulting and Clinical Psychology*, *81*(1), 75–88. https://doi.org/10.1037/a0031080

Heim, E., Rötger, A., Lorenz, N., & Maercker, A. (2018). Working alliance with an avatar: How far can we go with internet interventions? *Internet Interventions*, *11*, 41–46. https://doi.org/10.1016/j.invent.2018.01.005

Herrero, R., Vara, M., Miragall, M., Botella, C., García-Palacios, A., Riper, H., Kleiboer, A., & Baños, R. M. (2020). Working alliance inventory for online interventions-short form (Wai-tech-sf): The role of the therapeutic alliance between patient and online program in therapeutic outcomes. *International Journal of Environmental Research and Public Health*, *17*(17), 6169. https://doi.org/10.3390/ijerph17176169

Houck, P. R., Spiegel, D. A., Shear, M. K., & Rucci, P. (2002). Reliability of the self-report version of the panic disorder severity scale. *Depression and Anxiety*, *15*(4), 183–185. https://doi.org/10.1002/da.10049

Huppert, J. D., Kivity, Y., Barlow, D. H., Gorman, J. M., Shear, M. K., & Woods, S. W. (2014). Therapist effects and the outcome–alliance correlation in cognitive behavioral therapy for panic disorder with agoraphobia. *Behaviour Research and Therapy*, *52*, 26–34. https://doi.org/10.1016/j.brat.2013.11.001

Jaeger, B. (2016). r2glmm: Computes R squared for mixed (multilevel) models (LMMs and GLMMs) [Software]. https://cran.r-project.org/web/packages/r2glmm/.

Jaeger, B. C., Edwards, L. J., Das, K., & Sen, P. K. (2016). An $R^2$ statistic for fixed effects in the generalized linear mixed model. *Journal of Applied Statistics*, *44*(6), 1086–1105. https://doi.org/10.1080/02664763.2016.1193725

Jasper, K., Weise, C., Conrad, I., Andersson, G., Hiller, W., & Kleinstäuber, M. (2014). The working alliance in a randomized controlled trial comparing internet-based self-help and face-to-face cognitive behavior therapy for chronic tinnitus. *Internet Interventions*, *1*(2), 49–57. https://doi.org/10.1016/j.invent.2014.04.002

Königbauer, J., Letsch, J., Doebler, P., Ebert, D., & Baumeister, H. (2017). Internet-and mobile-based depression interventions for people with diagnosed depression: A systematic review and meta-analysis. *Journal of Affective Disorders*, *223*, 28–40. https://doi.org/10.1016/j.jad.2017.07.021

Koo, T. K., & Li, M. Y. (2016). A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of Chiropractic Medicine*, *15*(2), 155–163. https://doi.org/10.1016/j.jcm.2016.02.012

McNeish, D., & Stapleton, L. M. (2016). Modeling clustered data with very few clusters. *Multivariate Behavioral Research*, *51*(4), 495–518. https://doi.org/10.1080/00273171.2016.1167008

Meyer, B., Bierbrodt, J., Schröder, J., Berger, T., Beevers, C. G., Weiss, M., Jacob, G., Späth, C., Andersson, G., Lutz, W., Hautzinger, M., Löwe, B., Rose, M., Hohagen, F., Caspar, F., Greiner, W., Moritz, S., & Klein, J. P. (2015). Effects of an internet intervention (Deprexis) on severe depression

symptoms: Randomized controlled trial. *Internet Interventions*, *2*(1), 48–59. https://doi.org/10.1016/j.invent.2014.12.003

Nakagawa, S., & Schielzeth, H., & O'Hara, R. B. (2013). A general and simple method for obtaining $R^2$ from generalized linear mixed-effects models. *Methods in Ecology and Evolution*, *4*(2), 133–142. https://doi.org/10.1111/j.2041-210x.2012.00261.x

Pinheiro, J., Bates, D., DebRoy, S., & Sarkar, D. (2016). R core Team (2015) nlme: Linear and nonlinear mixed effects models. *R Package Version 3.1–122*, http://CRANR-projectorg/package=nlme.

Probst, G. H., Berger, T., & Flückiger, C. (2019). The alliance-outcome relation in internet-based interventions for psychological disorders: A correlational meta-analysis [Elektronnyi resurs]. *Verhaltenstherapie*, 1–12. https://doi.org/10.1159/000503432

Rodriguez, B. F., Bruce, S. E., Pagano, M. E., Spencer, M. A., & Keller, M. B.. (2004). Factor structure and stability of the Anxiety Sensitivity Index in a longitudinal study of anxiety disorder patients. *Behaviour Research and Therapy*, *42*(1), 79–91. http://doi.org/10.1016/S0005-7967(03)00074-3

Rosseel, Y., Oberski, D., Byrnes, J., Vanbrabant, L., Savalei, V., Merkle, E., & Rosseel, M. Y. (2017). Package 'lavaan'. Retrieved June, 17, 2017.

Schmidt, I. D., Forand, N. R., & Strunk, D. R. (2019). Predictors of dropout in internet-based cognitive behavioral therapy for depression. *Cognitive Therapy and Research*, *43*(3), 620–630. https://doi.org/10.1007/s10608-018-9979-5

Sharf, J., Primavera, L. H., & Diener, M. J. (2010). Dropout and therapeutic alliance: A meta-analysis of adult individual psychotherapy. *Psychotherapy: Theory, Research, Practice, Training*, *47*(4), 637–645. https://doi.org/10.1037/a0021175

Shear, K. M., Brown, T. A., Barlow, D. H., Money, R., Sholomskas, D. E., Woods, S. W., Gorman, J. M., & Papp, L. A. (1997). Multicenter collaborative panic disorder severity scale. *American Journal of Psychiatry*, *154*(11), 1571–1575. https://doi.org/10.1176/ajp.154.11.1571

Shear, M. K., Rucci, P., Williams, J., Frank, E., Grochocinski, V., Vander Bilt, J., Houck, P., & Wang, T. (2001). Reliability and validity of the panic disorder severity scale: Replication and extension. *Journal of Psychiatric Research*, *35*(5), 293–296. http://doi.org/10.1016/S0022-3956(01)00028-0

Sheehan, D. V. (2014). *The mini-international neuropsychiatric interview, version 7.0 for DSM-5 (MINI 7.0)*. Medical Outcomes Systems.

Shi, D., Maydeu-Olivares, A., & Rosseel, Y. (2020). Assessing Fit in Ordinal Factor analysis models: SRMR vs. RMSEA. *Structural Equation Modeling: A Multidisciplinary Journal*, *27*(1), 1–15. https://doi.org/10.1080/10705511.2019.1611434

Shin, T., Davison, M. L., & Long, J. D. (2017). Maximum likelihood versus multiple imputation for missing data in small longitudinal samples with nonnormality. *Psychological Methods*, *22*(3), 426–449. https://doi.org/10.1037/met0000094

Snyder, J., & Silberschatz, G. (2017). The patient's experience of attunement and responsiveness scale. *Psychotherapy Research*, *27*(5), 608–619. https://doi.org/10.1080/10503307.2016.1147658

Stech, E. P., Lim, J., Upton, E. L., & Newby, J. M. (2020). Internet-delivered cognitive behavioral therapy for panic disorder with or without agoraphobia: A systematic review and meta-analysis. *Cognitive Behaviour Therapy*, *49*(4), 270–293. https://doi.org/10.1080/16506073.2019.1628808

Taylor, S. Z., Zvolensky, M. J., Cox, B. J., Deacon, B., Heimburg, R. G., Ledley, D. R., & Cardenas, S. J. (2007). Robust dimensions of anxiety sensitivity: Development and initial validation of Anxiety Sensitivity Index-3. *Psychological Assessment*, *19*(2), 176–188. https://doi.org/10.1037/1040-3590.19.2.176

Tracey, T. J., & Kokotovic, A. M. (1989). Factor structure of the working alliance inventory. *Psychological Assessment: A Journal of Consulting and Clinical Psychology*, *1*(3), 207–210. http://doi.org/10.1037/1040-3590.1.3.207

Tryon, G. S., Blackwell, S. C., & Hammel, E. F. (2007). A meta-analytic examination of client-therapist perspectives of the working alliance. *Psychotherapy Research*, *17*(6), 629–642. https://doi.org/10.1080/10503300701320611

van Ballegooijen, W., Cuijpers, P., van Straten, A., Karyotaki, E., Andersson, G., Smit, J. H., & Riper, H., García, A. V. (2014). Adherence to internet-based and face-to-face cognitive behavioural therapy for depression: A meta-analysis. *Plos One*, *9*(7), e100674. https://doi.org/10.1371/journal.pone.0100674

Wang, L. P., & Maxwell, S. E. (2015). On disaggregating between person and within-person effects with longitudinal data using multilevel models. *Psychological Methods*, *20*(1), 63–83. https://doi.org/10.1037/met0000030

Webb, C. A., DeRubeis, R. J., Amsterdam, J. D., Shelton, R. C., Hollon, S. D., & Dimidjian, S. (2011). Two aspects of the therapeutic alliance: Differential relations with depressive symptom change. *Journal of Consulting and Clinical Psychology*, *79*(3), 279–283. http://doi.org/10.1037/a0023252

Wieder, G., Fischer, M. S., Einsle, F., Baucom, D. H., Hahlweg, K., Wittchen, H. U., & Weusthoff, S. (2020). Fundamental frequency during cognitive preparation and its impact on therapy outcome for panic disorder with Agoraphobia. *Behaviour Research and Therapy*, *135*, 103728. https://doi.org/10.1016/j.brat.2020.103728

Yu, C. Y. (2002). *Evaluating cutoff criteria of model fit indices for latent variable models with binary and continuous outcomes (Vol. 30)*. University of California, Los Angeles.

Zalaznik, D., Weiss, M., & Huppert, J. D. (2019). Improvement in adult anxious and avoidant attachment during CBT for panic disorder. *Psychotherapy Research*, *29*(3), 337–353. https://doi.org/10.1080/10503307.2017.1365183

Zilcha-Mano, S. (2017). Is the alliance really therapeutic? Revisiting this question in light of recent methodological advances. *American Psychologist*, *72*(4), 311. https://doi.org/10.1037/a0040435