Working alliance with an avatar: How far can we go with internet interventions?

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ABSTRACT

Objective: To examine the working alliance between users and an avatar and users' treatment expectations in an unguided Internet intervention for the treatment of insomnia.

Methods: The sample included participants from the treatment condition ($N = 29$) of a randomised controlled trial. The *task* and *goal* subscales of the Working Alliance Inventory Short Revised (WAI-SR) were applied in week three. Five items of the Bern Post-Session Report and one question about the extent to which users had missed a human therapist were administered after each session. Treatment expectations were measured with the Credibility Expectancy Questionnaire (CEQ), and the Insomnia Severity Index (ISI) was used as the primary outcome measure.

Results: The mean scores for the WAI-SR *task* and *goal* subscales were relatively high ($M = 3.24$, $SD = 0.79$; $M = 3.16$, $SD = 0.91$, respectively). The mean score of the five Bern Post-Session Report items remained stable over time, but some users increasingly indicated that they missed a real therapist over the course of the intervention, with a strong linear effect ($t(87) = 3.16$, $p < 0.01$). ISI chance score was predicted by the mean score of the Bern Post-Session Report ($b = -0.3.83$, $t(21.80) = -2.97$, $p < 0.01$), missing a human therapist ($b = -0.0.13$, $t(20.47) = -2.72$, $p = 0.01$) and the CEQ ($b = 0.18$, $t(19.03) = -2.69$, $p = 0.01$), but not by WAI-SR *task* and *goal* subscales.

Conclusions: Results indicate that users established a working alliance with the avatar. The affective bond remained stable over time, but towards the end of the intervention some users indicated that they missed having a human therapist. Affective bond and missing a real therapist predicted symptom change.

1. Introduction

Internet-delivered interventions have proved effective for the treatment of mental health conditions (Andersson et al., 2014), and for promoting healthy behaviours (Hou et al., 2014). The amount of therapeutic support offered in these interventions varies, ranging from unguided self-help to e-mail-based programmes with high therapist investment. It seems that in general there is a curvilinear relationship between the amount of personal support provided to the user and effectiveness of the programme: Guided self-help programmes tend to be more effective than unguided self-help interventions, but this relationship levels off above a certain amount of weekly support time (Titov, 2011).

Insomnia research is one field in which there has been rapid development in Internet-delivered interventions over the past decade (Zachariae et al., 2016). A variety of Internet-delivered self-help tools have been developed and tested, with promising results. One meta-

analysis (Zachariae et al., 2016) identified eleven published randomised controlled trials, all of which used cognitive behavioural therapy (CBT). The global effect size was high for self-reported insomnia severity (Hedge's $g = 1.09$, 95% CI 0.74–1.45) and satisfactory for a broad range of secondary outcomes, such as sleep onset latency, wake after sleep onset, and total sleep time. In this meta-analysis, the effect of Internet-based treatment on insomnia severity was positively moderated by personal support provided to users. Similar results have been reported in meta-analyses of Internet-based treatment for other disorders such as depression (e.g. Johansson and Andersson, 2012).

Most surprisingly, two of the most effective interventions were fully-automated self-help programmes with no additional human support (Espie et al., 2012; Ritterband et al., 2009). One of these programmes (Espie et al., 2012) used an automated, virtual sleep coach that guided the user through the programme by giving feedback on data from the sleep diary, the current sleep status and progress made since the start of the intervention. Information delivery was governed by an algorithm of

sufficient complexity to ensure that the feedback and advice was tailored. The second intervention (Ritterband et al., 2009) did not use an animated sleep coach, but it delivered tailored feedback on the weekly self-reports of insomnia variables and also included a broad range of interactive features such as vignettes, quizzes and short games. A recent study of this intervention found a high effect size ($d = 2.32$) for change between baseline and 12-month follow-up in the treatment condition (Ritterband et al., 2017).

Thus it seems that to some extent therapist contact can be replaced with technological features that simulate human interaction. One of the important issues in this context is users' perception of the working alliance with the automated programme. Bordin (1979) distinguished three aspects of the working alliance in face-to-face therapy: the affective bond between patient and therapist, and agreement between patient and therapist on the tasks and goals of therapy. The Working Alliance Inventory (WAI, Horvath and Greenberg, 1989) is based on Bordin's conceptualisation of working alliance and is widely used in psychotherapy research. In recent years the WAI has been used in studies of Internet-based interventions (e.g. Andersson et al., 2012; Knaevelsrud and Maercker, 2007; Preschl et al., 2011). Berger (2017) summarised this evidence and differentiated between Internet-based interventions on the basis of the amount of support they provide.

Interventions with high therapist investment, such as Interapy (Lange et al., 2003; Lange et al., 2001), are characterised by manualised e-mail exchange between a clinician and a patient. Knaevelsrud and Maercker (2007) showed that a good working alliance could be established in Interapy-based treatment for post-traumatic stress disorder. They reported that the working alliance improved over the course of treatment and that quality of working alliance at the end of treatment correlated with treatment outcome. Similarly, Preschl et al. (2011) found a correlation between working alliance and therapy outcome in an Interapy-based treatment for depression, but working alliance did not predict the residual gain score.

In guided self-help contact between therapist and patient is limited to short e-mails or telephone conversations. Andersson et al. (2012) analysed WAI data from three studies of guided self-help interventions for major depression, generalised anxiety disorder and social anxiety. They found that in all three samples WAI ratings were comparable with those for face-to-face treatments; however working alliance was uncorrelated with treatment outcome. Jasper et al. (2014) compared WAI scores for group-based and guided Internet-based cognitive behaviour therapy for tinnitus (Jasper et al., 2014). In the Internet condition WAI scores on all three subscales were lower than in the group condition in the second and fifth weeks of treatment, but comparable in week nine. Treatment outcome was correlated with the *task* subscale in the Internet-based condition and with the *bond* subscale in group therapy.

Berger et al. (2014) argued that the main component of a guided Internet-based intervention is the programme itself, not the therapist providing guidance. They used adapted versions of the WAI *goal* and *task* subscales to measure users' agreement with the *program* in a guided, Internet-based treatment for several anxiety disorders. Comparing a tailored and a standardised version of the intervention, they found that the adapted WAI subscales correlated with change score in the tailored condition, but not in the standardised condition. Finally, Meyer et al. (2015) looked at alliance ratings in an unguided intervention for depression. In line with Berger et al. (2014) they acknowledged that the "alliance" between a programme user and a software is not equivalent to the alliance between a patient and a human therapist. They therefore administered an adapted version of the Helping Alliance Questionnaire (HAQ; Alexander and Luborsky, 1986) to assess the extent to which users felt that the programme was helpful, seemed to view problems in the same way as them, and seemed to share their goals. The authors found that early HAQ scores (i.e. three weeks after the start of treatment) predicted treatment response after three months.

The research reviewed above suggests that it is possible for users to establish a working alliance even with fully automated programmes. This is by no means a new insight; in a qualitative analysis of self-help books, Richardson et al. (2010) showed that it is possible to foster a working alliance with a self-help intervention by formulating texts in such a way that the user perceives that there is an understanding clinician behind the text material. In Internet-based interventions, this effect can be intensified by using an avatar. Working alliance with an avatar is a special case: although formally the alliance is established with a programme and not a human therapist - as Berger et al. (2014) and Meyer et al. (2015) observed - an avatar nonetheless simulates human interactional behaviour and this may have an impact on working alliance. To the best of our knowledge this is the first study to examine working alliance in the special case of and intervention with an avatar.

An automated intervention with an element of simulated human interaction might be perceived as more credible and enhance patients' expectations of treatment outcome, both crucial aspects of psychotherapy (Greenberg et al., 2006). The most frequently used measure, the Credibility Expectancy Questionnaire (CEQ, Devilly and Borkovec, 2000), encompasses both components. Boettcher et al. (2013) examined CEQ ratings amongst participants in a randomised controlled trial of an unguided intervention for social anxiety. Positive expectations (i.e. high scores on the CEQ) were associated with improvement in symptoms and also predicted treatment adherence. El Alaoui et al. (2016) looked at the effect of CEQ scores on symptom change in a large sample of adult patients ($N = 1738$) who had been treated for depression as part of routine care in an Internet psychiatry clinic. They found that higher CEQ scores were associated with faster recovery and lower levels of depression at the end of treatment. Thus perceived treatment credibility expectation of success seem to play an important role in Internet-based interventions as well as face-to-face therapy.

A final point to note is that working alliance is a dynamic process, and research on face-to-face psychotherapy has focused on monitoring it over time (Flückiger et al., 2010). Current evidence shows that there is a relationship between good working alliance at the moment-to-moment level and therapeutic change (Mellado et al., 2017). In face-to-face settings the therapist has an immediate influence on the working alliance, whereas in unguided self-help the therapeutic process is fully automated, making it more likely that users will be "lost" over the course of the treatment, with potential consequences for treatment outcome. For this reason, measurements of working alliance at the beginning of the intervention does not provide the full picture. Tracking alliance over time should reveal more detailed information about the course of the therapeutic process.

This study looked at users' perceived working alliance with an avatar in an unguided self-help programme for the treatment of insomnia, and their expectations of treatment success. Working alliance was measured using the *task* and *goal* subscales of the German version of the short, revised WAI (WAI-SR; Munder et al., 2010). The *bond* subscale was not used because the items are formulated in a way that is not suitable for assessing a patient's relationship with an avatar (e.g. 'I feel that the therapist cares about me even when I do things that he/she does not approve of'). To get a general impression of the strength of the working alliance we compared mean WAI-SR subscale scores for the avatar-based intervention with those of the outpatient sample used in the German validation study (Munder et al., 2010), as well as those reported in a study of a guided Internet intervention for tinnitus (Jasper et al., 2014).

We also used a process measure to assess the affective bond component of the working alliance. The Bern Post-Session Report (Flückiger et al., 2010) was developed to track various aspects of the therapeutic process and working alliance in face-to-face therapy and can be administered after each session. For reasons of parsimony and usability we selected the five items with the greatest face validity as indicators of the bond component in Bordin's (1979) conceptualisation of working alliance. As mentioned above, the content of self-help interventions can