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The Development and Validation of the Memory Support Treatment Provider Checklist

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Abstract

Patient memory for the contents of treatment is staggeringly poor, and poor memory for treatment is associated with worse treatment outcome. Accordingly, the Memory Support Intervention was developed to improve patient memory for treatment as an adjunct to treatment as usual. As plans to disseminate the Memory Support Intervention are developed, it is important to have efficient, accurate methods of measuring fidelity to the intervention. However, the existing method of assessing fidelity to the Memory Support Intervention, the Memory Support Rating Scale (MSRS), is burdensome and requires trained independent-raters to spend multiple hours reviewing session recordings, which is not feasible in many routine mental health care settings. Hence, a provider-rated measure of fidelity to the MSI has been developed. The goal of this study is to examine the reliability and validity of scores on this measure – the Memory Support Treatment Provider Checklist. A sample of Memory Support Treatment Provider Checklists (N = 319) were completed by providers (N = 8) treating adults with depression (N = 84). Three metrics of the Memory Support Treatment Provider Checklist were evaluated: (1) the internal consistency and structural validity using confirmatory factor analysis based on prior research on the MSRS and the Memory Support Intervention, (2) construct validity, and (3) predictive validity. Results indicate that the Memory Support Treatment Provider Checklist yields reliable and valid scores of fidelity to the Memory Support Intervention. Overall, this checklist offers a viable, brief method of evaluating fidelity to the Memory Support Intervention.

Keywords

memory support; fidelity; adherence; scale development

Patient memory for the contents of treatment is strikingly poor. On average, patients recall approximately one third of the contents of a physician visit (Bober, Hoke, Duda, & Tung, 2007; Jansen et al., 2008; Laws, Lee, Taubin, Rogers, & Wilson, 2018) or of a psychological treatment session (Chambers, 1992; Lee & Harvey, 2015), with recall as low as 3% for some

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recommendations (Hahlweg & Richter, 2010). Additionally, patient memory is particularly poor for health behavior change advice (Flocke & Stange, 2004). These findings are troubling given the emerging evidence indicating that poor memory for the contents of treatment is associated with worse treatment adherence and outcome (Zieve, Dong, & Harvey, 2019).

In order to improve patient memory for treatment, the Memory Support Intervention was developed (Harvey et al., 2014, 2016). The Memory Support Intervention is an adjunctive treatment designed to improve patient memory for the content of treatment. It was distilled from the cognitive science and education literature based on carefully honed criteria (Harvey et al., 2014). It is composed of eight memory-promoting strategies: Application, Attention Recruitment, Categorization, Cue-based Reminder, Evaluation, Practice Remembering, Praise Recall, and Repetition. For detailed descriptions of the individual strategies, see the Appendix. These eight memory support strategies are proactively, strategically, and intensively integrated into treatment-as-usual to support encoding. Memory support is delivered alongside a “treatment point,” which is defined as a main idea, principle, or experience that the treatment provider wants the patient to remember or implement as part of the treatment (Harvey et al., 2016). The Memory Support Intervention is designed to be useful across disorders (transdiagnostic) and alongside various treatments (pantreatment). Memory support can be incorporated alongside both structured and unstructured treatments. Initial research integrating the Memory Support Intervention alongside treatment-as-usual signals its promise in improving treatment outcome (Dong, Lee, & Harvey, 2017; Harvey et al., 2016).

As the Memory Support Intervention continues to be tested and plans evolve to disseminate the approach to “real-world” settings, it is important to develop an approach to efficiently evaluate its delivery. The gold-standard method of measuring fidelity, or the extent to which a treatment is delivered as intended (Perepletchikova, Treat, & Kazdin, 2007), is observational and includes audio or video review of sessions (Borrelli, 2011). Indeed, the observational method of assessing fidelity to the Memory Support Intervention is the Memory Support Rating Scale (MSRS), which requires independent-raters to spend two to three hours reviewing each session tape for the presence of memory support (Lee, Worrell, & Harvey, 2015). Clearly, this method is very burdensome and not feasible in most clinical settings (Schoenwald, 2011). Measuring fidelity within routine clinical practice settings is important because it (a) allows for monitoring of the dose of treatment that patients receive and (b) it provides information about whether treatment effect is due to the treatment itself or due to its administration (Borrelli, 2011; Schoenwald, 2011). Hence, developing and validating a quick, accurate measure of fidelity to the Memory Support Intervention is essential. Provider-rated fidelity measures show promise. Specifically, several provider-rated fidelity measures are significantly correlated with observer-rated measures, with correlations ranging from low (e.g., 0.15) to moderate (e.g., 0.66) depending on the item (Beehler, Funderburk, Possemato, & Dollar, 2013; Gumport, Yu, Mullin, Mirzadegan, & Harvey, 2020; Hogue, Dauber, Lichvar, Bobek, & Henderson, 2015). In the present study, we sought to examine the reliability and validity of a provider-rated fidelity measure of memory support: the Memory Support Treatment Provider Checklist.

The present study was conducted in the context of a randomized controlled trial of cognitive therapy (CT) for depression. The rationale for focusing on CT is that it is well-studied and is a frontline treatment for depression (Cuijpers, Berking, et al., 2013; Cuijpers, Hollon, et al., 2013). However, there is room for improvement (Bockting, Hollon, Jarrett, Kuyken, & Dobson, 2015; Johnsen & Friborg, 2015). The rationale for focusing on depression is three-fold and centers on the evidence that depression is associated with problems with memory. First, depression is associated with deficits in working memory and declarative memory (Behnken et al., 2010; Gotlib & Joormann, 2010; Hertel, 1998). Second, depression is characterized by the experience of negative emotion and the experience of negative emotion is associated with attentional bias and narrowing, which impacts the encoding of information (Peckham, McHugh, & Otto, 2010). Third, depression is often characterized by negatively-biased schema. These schema also facilitate faulty information processing, often negatively-biased (A. T. Beck & Haigh, 2014).

The first aim of this study was to assess the internal consistency and structural validity of the Memory Support Treatment Provider Checklist. Two models were evaluated. The first model included a single latent factor, as prior research on the MSRS extracted a single factor solution (Lee et al., 2015). The second model included two latent factors based on Zieve et al. (2019), which divided the memory support strategies into two groups based on if the memory support strategies were more or less likely to elicit constructive learning behavior, or activities that require the learner to generate new ideas or conclusions that go beyond the material that was initially presented (Chi & Wylie, 2014). The second aim was to establish the construct validity of Memory Support Treatment Provider Checklist scores by assessing the relationship between Memory Support Treatment Provider Checklist scores and MSRS scores, and observer-ratings of the quality of CT as measured by the Cognitive Therapy Rating Scale (CTRS). For this aim, two hypotheses were tested. First, since the Memory Support Treatment Provider Checklist and the MSRS both assess the same construct (frequency of therapist use of memory support strategies within a single session), it was hypothesized that Memory Support Treatment Provider Checklist scores will be positively associated with the MSRS scores (convergent validity). Second, since memory support targets patient memory for treatment and is not intended to influence the fundamental aspects of the treatment being delivered, in this case cognitive therapy, it was hypothesized that Memory Support Treatment Provider Checklist scores will not be associated with CTRS scores (discriminant validity). The third aim was to establish the predictive validity of the Memory Support Treatment Provider Checklist. As memory support targets patient memory for treatment, the hypothesis tested is that scores on the Memory Support Treatment Provider Checklist will be associated with scores on a measure of patient memory for treatment, the Patient Recall Task (Lee & Harvey, 2015).

Methods

Participants

Participants were 84 adults who met diagnostic criteria for major depressive disorder. Participants were drawn from a National Institute of Mental Health funded randomized

controlled trial of cognitive therapy for depression (Harvey et al., 2017). Participant characteristics are presented in Table 1.

Participants were assessed via an in-person interview for inclusion. Participants were included if they (1) were at least 18 years old, (2) were willing and able to give informed consent, (3) were willing to consent to being video recorded and to NIMH data sharing, (4) were fluent English speakers, (5) met DSM-5 (American Psychiatric Association, 2013) criteria for a diagnosis of a major depressive episode based on the Structured Clinical Intervention for DSM-5, (6) had a score of 26 or above on the Inventory of Depressive Symptomatology – Self-Report (IDS-SR; Trivedi et al., 2004) which denotes at least “moderate” depression, and (7) were taking medications at a stable level for four weeks if they were taking medications.

Participants were excluded if they (1) had a history of bipolar disorder, (2) had a history of psychotic disorder or psychotic features, (3) had a lifetime history of failure to respond to four or more sessions of CBT/CT for depression, (4) had a current non-psychotic disorder if it constituted the principal diagnosis and if it requires treatment other than that offered in the current study. Principal is defined as the disorder that is most distressing and disabling using a rating scale that captures distress and interference (Di Nardo, Moras, Barlow, Rapee, & Brown, 1993), (5) had moderate or severe substance use in the past six months, where moderate is defined as 4–5 symptoms and severe is defined as 6 or more symptoms of those listed in the DSM-5 for each of the substance use disorders, (6) had a medical disorder or condition that could cause depression, preclude participation in CT, and/or is associated with medical problems, that is not currently stabilized and/or managed under the care of a physician, or if they have an active and progressive physical illness or neurological degenerative disease, (7) experienced current suicide risk sufficient to preclude treatment on an outpatient basis or current homicide risk, or (8) were pregnant or breastfeeding.

Treatment

Treatment was provided by eight, masters-level therapists. Therapist characteristics are displayed in Table 2. All sessions were videotaped.

Cognitive therapy with memory support (CT+Memory Support) was administered in 2026 weekly or bi-weekly sessions over the course of 16 consecutive weeks. CT was first described by Aaron T. Beck and colleagues (A. T. Beck, 1979) and is based on cognitive theories of depression. It was conducted according to the published manuals (J. Beck, 2011; Greenberger & Padesky, 2015). The Memory Support Intervention was delivered alongside CT. It is composed of eight memory-promoting strategies that are described in greater detail in the Appendix: Application, Attention Recruitment, Categorization, Cue-based Reminder, Evaluation, Practice Remembering, Praise Recall, and Repetition. We acknowledge that some memory support is a standard part of certain treatments, including CT (J. Beck, 2011). However, in a relatively ideal setting in which providers were carefully trained and supervised, providers delivered on average 8.23 instances of memory support per session (Harvey et al., 2016). In contrast, in the present study, providers were encouraged to try to use an average 19 instances of memory support per treatment session. This recommendation was made based on initial estimates as to the optimal dose of memory support for improving

patient memory for treatment. It is important to note that the optimal dose of memory support, based on a small sample, was recently estimated to be 12.5 instances of memory support per treatment session (Lee, Dong, Gumport, & Harvey, 2020).

Measures

Table 3 displays descriptive statistics for the included measures.

Memory Support Treatment Provider Checklist.—The Memory Support Treatment Provider Checklist is a treatment provider-rated measure of the use of the eight memory support strategies that comprise the Memory Support Intervention: Application, Attention Recruitment, Categorization, Cue-based Reminder, Evaluation, Practice Remembering, Praise Recall, and Repetition. The eight types of memory support are listed. Providers are asked to rate the extent to which they delivered each memory support strategy in a given session on a 4-point scale: never (0 times), a few (1–2 times), often (3–5 times), and many (6+ times). These were scored as never (0 times) = 0, a few (1–2 times) = 1, often (3–5 times) = 2, and many (6+ times) = 3. These eight variables were included in the present study. Two additional variables were calculated: the total number of times memory support was utilized by summing the scores for each type of memory support on the scale (total number of memory supports used) and the total number of distinct memory support categories used out of a maximum possible total of eight (total number of categories of memory support used). As the items on the scale are a range (e.g., 3–4 times), the total number of memory supports used represents a general estimate of memory support used, rather than a precise estimate. A copy of the checklist is available in Supplement 1. Therapists completed this measure after the treatment sessions conducted at weeks 4, 8, 12, and 16 of treatment based on the protocol from which the data were drawn. The data for the present report consisted of 319 checklists for 84 participants completed by eight therapists.

Memory Support Rating Scale (MSRS).—The MSRS is an observer-rated, reliable, and valid measure of the use of memory support by treatment providers (Lee et al., 2015). The validation data for this measure (Lee et al., 2015) found that inter-rater reliabilities were “fair” for MSRS scores based on Cicchetti’s (1994) guidelines with intraclass correlation coefficients ranging from 0.72–0.74. Independent coders rated videotapes of treatment sessions. MSRS coders were independent of the treatment provider and assessment teams and blind to treatment condition. This coding process is time consuming, taking about two to three hours per tape. Coders rated the treatment sessions that occurred during weeks 4, 8, 12, and 16 of treatment, which are the same sessions during which providers completed the Memory Support Treatment Provider Checklist. A total of 304 MSRS scores from 84 participants were included in the analyses. This discrepancy of 15 fewer MSRS scores compared to the Memory Support Treatment Provider Checklist is due to missing data (e.g., no video recording available for MSRS scoring due to technical issues at a session).

Cognitive Therapy Rating Scale (CTRS).—The CTRS (Young & Beck, 1980) is an observer-rated scale assessing therapist competence in the delivery of CT. It contains 11 items rated on a 6-point Likert-scale. Higher scores indicate greater quality of CT. Past research has demonstrated that CTRS scores can accurately discriminate between acceptable

and unacceptable therapist performance (Vallis, Shaw, & Dobson, 1986). In a prior study, the CTRS has demonstrated discriminant validity with the MSRS (Lee et al., 2015). In the present study, the CTRS was scored by AGH, a licensed psychologist and trained CT clinician as well as by other trained raters who previously established reliability with AGH. Recordings of sessions were randomly selected and scored throughout the duration of the larger randomized controlled trial for the purposes of therapist training and supervision. A total of 37 CTRS from a subsample of 28 participants were included in the analyses as these were the CTRS scales that coincided with the sessions at which the Memory Support Treatment Provider Checklist was completed.

Patient Recall Task.—The Patient Recall Task (Lee & Harvey, 2015) is a free recall task. Patients were handed a sheet of paper and asked to take 10 minutes to recall the session content for all of the sessions they have had so far as well as their most recent session. The instructions were: “list as many distinct treatment points as you can recall since the start of your treatment” (referred to as “Cumulative Points Recalled”) and “after you’re finished, please use arrows to indicate all treatment points that were discussed in your MOST RECENT session” (referred to as “Past Session Recall”). The task was administered at weeks 4, 8, 12, and 16 of treatment. Trained coders determined the number of treatment points recalled using the scoring rubric established in a previous study (Lee & Harvey, 2015). According to the rubric, recall responses needed to be consistent with CT in order to count as a treatment point. For example, “my thoughts impact my feelings” would count as a treatment point, but “keep my feelings positive” would not. If a patient writes the same idea more than once, only one treatment point is awarded to the group of responses. The Patient Recall Task has demonstrated excellent inter-coder reliability and predictive validity of the amount of memory support received in previous studies (Lee & Harvey, 2015; Lee et al., 2015). Intercoder reliability was also high for the Patient Recall Task in the current study, with an intraclass correlation coefficient of 0.89 among a group of five coders. A total of 313 tasks from 83 participants were included in the analyses.

Procedure

The University of California Berkeley, Committee for the Protection of Human Subjects approved the study. All participants provided informed consent. Eligible participants were randomly allocated to receive cognitive therapy plus the adjunctive Memory Support Intervention (CT+Memory Support) or cognitive therapy-as-usual (CT-as-usual). In weeks 4, 8, 12, and 16 of treatment, therapists providing treatment in the CT+Memory Support condition completed the Memory Support Treatment Provider Checklist and these treatment sessions were scored by independent raters for the therapist’s use of memory support via the Memory Support Rating Scale. At a select number of these sessions, supervisors rated recordings of the session using the CTRS. To keep the therapists who provided for the CT-as-usual group blind to the study hypotheses, only therapists in the CT+Memory Support condition completed the Memory Support Treatment Provider Checklist. Hence, only participants in the CT+Memory Support group are included in the present study.

Data Analysis

Factor analyses were conducted in R (R Core Team, 2016) using the lavaan package (Huang, 2017; Rosseel, 2012). All other analyses were conducted in Stata 15 (StataCorp, 2017). A significance level of 0.05 was used throughout. Internal consistency of the Memory Support Treatment Provider Checklist was assessed by examining interitem correlations for Memory Support Treatment Provider Checklist scores (reported instances of each type of memory support per session) and Cronbach's alpha using the sample of sessions with checklist scores. Factor structure of the Memory Support Treatment Provider Checklist was established using confirmatory factor analysis (CFA) across the sample of completed checklists. As the data is nested by therapists, we first examined the intraclass correlation coefficients (ICC) to determine if a standard CFA or a multilevel CFA was more appropriate. As the eight items had low to high ICCs (range = 0.09–0.37), there are no definitive guidelines on when to use a multilevel CFA (Reise, Ventura, Nuechterlein, & Kim, 2010), and all therapists were instructed to deliver the same amount of memory support and received comparable training in its delivery, we elected to run the simpler model – a regular, one-level CFA (Pornprasertmanit, Lee, & Preacher, 2014). To account for possible clustering, we used group mean centered variables in the one-level CFA. Group mean centered variables no longer contain group-level effects (Huang, 2017). We tested two models based on prior research. The first model included one latent factor, consistent with the factor structure extracted from the MSRS (Lee et al., 2015). The second model included two latent factors based on Zieve et al. (2019), which differentiated between the memory support strategies that are more likely to elicit constructive learning behavior (Application, Categorization, Cue-based Reminder, Evaluation) and those which are less likely to do so (Attention Recruitment, Practice Remembering, Praise Recall, Repetition). Constructive learning behavior can be defined as activities that require the learner to generate new ideas or conclusions that go beyond the material that was initially presented (Chi & Wylie, 2014). Model fit was evaluated using the combination of the comparative fit index (CFI), Tucker–Lewis index (TLI), the root-mean-square error of approximation (RMSEA), and standardized root-mean-square residual (SRMR). We used guidelines suggested in the literature: CFI and TLI greater than 0.95 for reasonably good fit (Hu & Bentler, 1999) and values between 0.90 and 0.95 for acceptable model fit (Bentler, 1990); RMSEA = 0.08 for adequate fit and = 0.05 for close fit (Browne & Cudeck, 1993); SRMR = 0.08 for acceptable fit (Hu & Bentler, 1999).

Convergent validity was assessed via Pearson's correlations between Memory Support Treatment Provider Checklist scores and MSRS scores (total instances, different categories used, and individual strategy totals). Discriminant validity was assessed via Pearson's correlations between the Memory Support Treatment Provider Checklist (memory support total items used and memory support categories used) and CTRS scores. Predictive validity was assessed via Pearson's correlations between the Memory Support Treatment Provider Checklist (total number of memory supports used and total number of categories of memory support used) and the Patient Recall Task (Cumulative Points Recalled and Past Session Recall).

Results

Internal Consistency and Factor Structure

Internal consistency.—Interitem correlations of Memory Support Treatment Provider Checklist scores are available in Supplement 1. The mean interitem correlation was $r = 0.20$, within Cohen and Swerdlik's (2005) ideal range of 0.20–0.40 for mean inter-item correlations. The internal consistency estimate for the Memory Support Treatment Provider Checklist was $\alpha = 0.67$, just below Nunnally's (1978) recommendation that research tools possess an alpha equal to or greater than 0.70 and described as acceptable by Hinton et al. (2004).

Confirmatory factor analysis.—The sample of 319 completed Memory Support Treatment Provider Checklists were used for CFA. The results using a single latent factor were not indicative of good model fit due to the TLI value (RMSEA = 0.06, CFI = 0.91, TLI = 0.87, SRMR = 0.05). The CFA using two latent factors demonstrated good model fit (RMSEA = 0.05, CFI = 0.94, TLI = 0.91, SRMR = 0.04). Therefore, the two-factor solution was selected over the one-factor model. The latent factors mapped onto Zieve et al.'s (2019) categorization of two types of memory support strategies. Factor loadings are presented in Table 4. The first factor consists of the memory support strategies that are more likely to elicit constructive learning behavior: Application, Categorization, Cue-based Reminder, Evaluation. The second factor consists of the memory support strategies which are less likely to elicit constructive learning behavior: Attention Recruitment, Practice Remembering, Praise Recall, Repetition.

Construct Validity

Convergent validity.—Correlations between the Memory Support Treatment Provider Checklist total number of memory supports used and total number of categories of memory support used and the observer-rated MSRS are presented in Table 5. The total number of memory supports used and total number of categories of memory support used on the Memory Support Treatment Provider Checklist were significantly associated with the total number of memory supports used ($r = 0.29$, $p < .001$) and the total number of categories of memory support used ($r = 0.39$, $p < .001$) on the MSRS. Table 6 displays the correlations between specific memory support strategies on the Memory Support Treatment Provider Checklist and the MSRS. Six of the eight categories of memory support, specifically Application, Categorization, Cue-Based Reminder, Evaluation, Practice Remembering, and Praise Recall, were significantly correlated with each other on both of these measures.

Discriminant validity.—Correlations between the Memory Support Treatment Provider Checklist and the CTRS are displayed in Table 5. None of the Memory Support Treatment Provider Checklist scores (total number of memory supports used and total number of categories of memory support used) were significantly associated with the CTRS, although they were small to medium effect sizes ($r = 0.32$, $p = 0.06$ – 0.07).

Predictive Validity

Correlations between the Memory Support Treatment Provider Checklist and the Patient Recall Task are displayed in Table 5. The total number of memory supports used on the Memory Support Treatment Provider Checklist was significantly associated with Cumulative Points Recalled ($r = 0.15, p < .01$) and Past Session Recall ($r = 0.16, p < .001$) on the Patient Recall Task, although the effects were small. The total number of categories of memory support used on the Memory Support Treatment Provider Checklist were significantly associated with Cumulative Points Recalled ($r = 0.24, p < .001$) and Past Session Recall ($r = 0.27, p < .001$) on the Patient Recall Task with a small effect size.

Discussion

The overarching goal of this study was to develop and assess the internal consistency, factor structure, and validity of the Memory Support Treatment Provider Checklist, which is a brief, provider-reported measure of fidelity to the Memory Support Intervention. The first aim was to assess the internal consistency and factor structure of the Memory Support Treatment Provider Checklist. The Memory Support Treatment Provider Checklist items were intercorrelated with one another and demonstrated acceptable internal consistency. Internal consistency was on the low end of acceptable, which is likely due to the few items on the scale, as the number of items on a scale contributes this value (Tavakol & Dennick, 2011). CFA results supported the two-factor model based on Zieve et al. (2019) over the one-factor model based on Lee et al. (2015). While this finding is inconsistent with the single factor solution of the MSRS (Lee et al., 2015), it is consistent with Zieve et al. (2019)'s proposal that there are two clusters of memory support strategies that are more (Application, Categorization, Cue-based Reminder, Evaluation) or less (Attention Recruitment, Practice Remembering, Praise Recall, Repetition) likely to elicit constructive learning behavior, or behavior that requires the learner to draw conclusions or inferences beyond the material that was initially presented (Chi & Wylie, 2014). Together, these results provide additional evidence for these two groupings of memory support strategies.

The second aim was to establish the construct validity of the Memory Support Treatment Provider Checklist. First, we aimed to establish the convergent validity of the Memory Support Treatment Provider Checklist. As predicted, the total number of memory supports used and the total number of categories of memory support used on the Memory Support Treatment Provider Checklist and the MSRS were significantly and positively correlated with each other. Additionally, in partial support of our hypothesis, six out of the eight individual memory support strategies were significantly and positively correlated with each other on the two scales. The memory support strategies that were not correlated were Attention Recruitment and Repetition. Taking Attention Recruitment first, more often than not (181 instances on the Memory Support Treatment Provider Checklist vs. 95 instances on the MSRS), providers over-rated their delivery of this strategy on the Memory Support Treatment Provider Checklist compared to the MSRS. This finding is consistent with existing literature on provider-reported fidelity measures demonstrating that providers at times over-rate their fidelity compared to independent observers (e.g., Hurlburt, Garland, Nguyen, & Brookman-Fraze, 2010; Mullin, Saver, Savageau, Forsberg, & Forsberg, 2016).

Taking Repetition next, independent observers rated the presence of this strategy more often than providers on the Memory Support Treatment Provider Checklist (152 instances on the MSRS vs. 119 instances on the Memory Support Treatment Provider Checklist). In other words, provider memory for how often they repeat themselves appears to be more difficult for providers to report. Overall, the correlations of the two checklists that range in size from small to large provide evidence in support of the convergent validity of the Memory Support Treatment Provider Checklist and are consistent with previous research that has demonstrated that provider-reported fidelity measures are correlated with observer-rated measures with low to moderate effect sizes (e.g., Beehler, Funderburk, Possemato, & Vair, 2013; Gumport et al., 2020).

We next sought to establish the discriminant validity of the Memory Support Treatment Provider Checklist. As expected, the total number of memory supports used and the total number of categories of memory support used on the Memory Support Treatment Provider Checklist were not significantly correlated with the CTRS, a measure of CT quality, although the correlations indicate a small to medium effect size. While this finding is consistent with prior research that has established that the MSRS is not correlated with the CTRS (Lee et al., 2015), these correlations are higher than expected. Perhaps the strength of these correlations is due to the small CTRS sample. Taken together, these findings suggest that the Memory Support Treatment Provider Checklist is associated with related constructs and is not associated with separate constructs.

The third aim was to investigate the predictive validity of the Memory Support Treatment Provider Checklist. Although the effects were smaller than expected, as hypothesized, Memory Support Treatment Provider Checklist scores were significantly correlated with scores on the Patient Recall Task, which is a measure of patient memory for treatment contents. This finding is consistent with prior work that has demonstrated that MSRS scores are correlated with patient recall (Lee et al., 2015). This significant relationship between the Memory Support Treatment Checklist and the Patient Recall Task is exciting as it highlights that a simplified, provider-reported measure of fidelity can accurately predict treatment outcome. A quick measure of treatment fidelity is important as fidelity is a theoretical mechanism by which improvement occurs during treatment (Carroll et al., 2007) and provider-rated measures of fidelity are less burdensome in routine practice compared to reviewing recordings of sessions (Schoenwald, 2011).

There are several limitations to the present study. First, the factor structure and validity of the Memory Support Treatment Provider Checklist were evaluated in a sample of adults receiving CT for depression. While a strength of this study is that this evaluation is consistent with the population and treatment used to assess the psychometric properties of the MSRS (Lee et al., 2015), future research should examine these psychometric properties with different patient populations and treatments in order to increase generalizability. Second, the factor loading for Evaluation was low, falling below 0.30, which is generally considered acceptable (Hair, Black, Babin, Anderson, & Tatham, 2006). Third, the sample of CTRS scores used to establish discriminant validity was small. Fourth, this measure compared independent observer ratings with provider ratings on two different, yet closely related, scales. A future study could directly compare provider and independent observer

ratings on the Memory Support Treatment Provider Checklist. Fifth, this study was conducted in a research clinic with providers trained and supervised by the treatment developer. Future studies are needed with the Memory Support Intervention delivered by clinicians in routine practice settings in order to determine if the findings replicate (Schoenwald, 2011). Sixth, patient engagement in the Patient Recall Task likely constitutes a form of memory support. Hence, we cannot rule out the possibility that this task contributes to the amount of memory support each patient receives throughout the course of treatment.

In summary, the data support the validity of the Memory Support Treatment Provider Checklist, a measure of fidelity to the Memory Support Intervention. The present study extends prior research on the Memory Support Intervention as an intervention that may improve treatment outcome by further characterizing the memory support strategies by whether they are more or less likely to elicit constructive learning behavior. This may allow for the simplification of the Memory Support Intervention (Zieve, Dong, Weaver, et al., 2019). Additionally, this provider-report measure has potential to offer a psychometrically-valid alternative to the burdensome, observer-rated MSRS and may serve as an efficient tool as the Memory Support Intervention is disseminated into “real world” settings.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Trial Registration: clinicaltrials.gov identifier: [NCT02938559](https://clinicaltrials.gov/ct2/show/study/NCT02938559). This research was funded by National Institute of Mental Health grant R01MH108657. We are grateful to Jason Lee, Caitlin Gasperetti, Michael Dolsen, and Courtney Armstrong for helpful discussions on these topics.

APPENDIX

Appendix.

Memory Support Strategies (from Lee et al., 2015)

Attention Recruitment.

Involves the treatment provider using language that explicitly communicates to the patient that a treatment point is important to remember (e.g., “if there is one thing I would like you to remember in ten years time, it is this” or “this is a key point to remember”), or multimedia/diverse presentation models (e.g., handouts, poems, songs, note taking, role-playing, imagery, using a white board) as a means to recruit the patient’s attention.

Categorization.

Involves explicit effort by the treatment provider to work with the patient to discuss treatment points discussed into common themes/principles (e.g., “Let’s create a list of ways we can work on waking up at the same time each morning.”).

Evaluation.

Involves the treatment provider working with the patient to (a) discuss the pros/cons of a treatment point (e.g., “What would be some advantages/disadvantages of waking up at the same time each morning?”); or (b) use comparisons to compare a new treatment point to an existing or hypothetical alternative (e.g., “How would this new strategy of exercising more compare to your current habit of lying in bed all day when you are feeling depressed?”).

Application.

Involves the treatment provider working with a patient to apply a treatment point to past, present, or future (real or hypothesized) scenarios (e.g., “Can you think of an example in which you might try this new method of coping to deal with your stress at work?”).

Repetition.

Involves the treatment provider restating, rephrasing, or revisiting information discussed earlier in treatment (e.g., “in other words,” “as we talked about earlier,” or “in sum”).

Practice Remembering.

Involves the treatment provider facilitating the patient to regenerate, restate, rephrase, and/or revisit a treatment point (e.g., “Can you tell me some of the main ideas you’ve taken away from today’s session?”).

Cue-Based Reminder.

Involves the treatment provider helping the patient develop new or existing cues (e.g., colored wrist bands, reminder text messages/phone calls/emails, smart phone apps, acronyms, rhymes, and other mnemonics) to facilitate memory for treatment points.

Praise Recall.

Involves the treatment provider rewarding the patient for successfully recalling a treatment point (e.g., “It’s really great you remembered that point!”) or remembering to implement a desired treatment point (e.g., “I’m so glad you remembered to step back and look at the evidence.”)

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Highlights

- Patient memory for the contents of treatment is poor and associated with outcomes
- The Memory Support Intervention was created to improve patient memory for treatment
- A provider-rated fidelity measure for the Memory Support Intervention was created
- A confirmatory factor analysis supported a two-factor solution
- The Memory Support Treatment Provider Checklist yielded reliable and valid scores

Table 1

Participant Characteristics

Characteristic	MS Treatment Provider Checklist and MSRS (N=84)		CTRS (n=28)		Patient Recall Task (n=83)	
	N	%	N	%	N	%
Sex						
Male	24	28.57	11	39.29	24	28.92
Female	60	71.43	17	60.71	59	71.08
Gender						
Man	25	29.76	11	39.29	25	30.12
Woman	55	65.48	14	50.00	54	65.06
Not specified	2	2.38	2	7.14	2	2.41
Declined to answer	2	2.38	1	3.57	2	2.41
Race						
White	52	61.90	18	64.29	51	61.45
Asian	15	17.86	6	21.43	15	18.07
American Indian/Alaskan Native	1	1.19	0	0.00	1	1.20
Black or African American	5	5.95	1	3.57	5	6.02
Mixed	10	11.90	3	10.71	10	12.05
Declined to respond	1	1.19	0	0.00	1	1.20
Ethnicity						
Hispanic/Latino	15	17.86	4	14.29	15	18.07
Not Hispanic/Latino	68	80.95	24	85.71	67	80.72
Declined to respond	1	1.19	0	0.00	1	1.20
Marital Status						
Single	51	60.71	17	60.71	50	60.24
Common law partnered	1	1.19	1	3.57	1	1.20
Married	18	21.43	6	21.43	18	21.69
Divorced	7	8.33	3	10.41	7	8.43
Separated	5	5.95	1	3.57	5	6.02
Widowed	2	2.38	0	0.00	2	2.41
Employment						

Characteristic	MS Treatment Provider Checklist and MSRS (N=84)			CTRS (n=28)			Patient Recall Task (n=83)		
	N	%	SD	N	%	SD	N	%	SD
Caring for others	3	3.57		1	3.57		3	3.61	
Full-time	29	34.52		9	3.21		29	34.94	
Part-time	16	19.05		4	14.29		16	19.28	
Unemployed	11	13.10		5	17.86		11	13.25	
Retired/Unemployed not looking	13	15.48		5	17.86		12	14.46	
Volunteer	4	4.76		0	0.00		4	4.82	
Other	13	15.48		4	14.29		13	15.66	
Highest Education Level									
Some high school	1	1.19		1	3.57		1	1.20	
Graduated high school	1	1.19		0	0.00		1	1.20	
Completed vocational school	1	1.19		0	0.00		1	1.20	
Some college	27	32.14		3	10.71		26	31.33	
Completed bachelor's degree	22	26.19		11	39.29		22	26.51	
Completed post baccalaureate training	2	2.38		0	0.00		2	2.41	
Some graduate school	4	4.76		3	10.71		4	4.82	
Completed master's degree	15	17.86		5	17.86		15	18.07	
Graduate training beyond masters	7	8.33		3	10.71		7	8.43	
Completed doctoral degree	4	4.76		2	7.14		4	4.82	
	M	SD		M	SD		M	SD	
Age (years)	37.19	16.22		35.07	14.00		37.39	16.22	
Household income (\$)	75,177 ²	68,768		65,833 ³	67,725		76,410 ⁴	68,644	

Note. M=Mean, SD=Standard Deviation, MS = Memory Support, MSRS = Memory Support Rating Scale, CTRS = Cognitive Therapy Rating Scale.

¹ Participants could select multiple categories.

² n = 62.

³ n = 18.

⁴ n = 61.

Table 2

Therapist Characteristics (N = 8)

Characteristic	Mean or N	SD or %
Age (years)	27.38	2.77
Female	7	87.50
Race		
African American	1	12.50
Asian	1	12.50
Caucasian	4	50.00
Mixed Race	2	25.00
Ethnicity		
Hispanic or Latino	1	12.50
Not Hispanic or Latino	7	87.50
Highest level of education completed		
Some graduate school	5	62.50
Completed master's degree	1	12.50
Graduate training beyond master's degree	1	12.50
Completed doctorate	1	12.50
Area of Education/Field		
Clinical Psychology	3	37.50
Social Work	5	62.50
Prior experience delivering CBT (years)	1.38	2.14
Prior experience delivering treatment for depression (years)	1.50	2.14
Number of participants each therapist treated in this study ¹		
Memory Support Treatment Provider Checklist	10.63	8.52
Memory Support Rating Scale	10.63	8.52
Cognitive Therapy Rating Scale	3.50	1.77

Note.

¹One participant had to switch therapists due to scheduling concerns, which results in this participant being counted across two therapists.

Table 3

Descriptive Statistics of Study Variables

Variable	Mean	Standard Deviation
MS Treatment Provider Checklist (n = 319 checklists) ¹		
Total amount of MS	10.39	3.12
Number of MS categories	6.41	1.12
Application	1.27	0.64
Attention Recruitment	2.18	0.76
Categorization	0.54	0.70
Cue-based Reminder	0.62	0.69
Evaluation	0.94	0.75
Practice Remembering	1.40	0.61
Praise Recall	1.60	0.76
Repetition	1.89	0.74
MSRS (n = 304 checklists)		
Total amount of MS	17.92	9.11
Number of MS categories	5.69	1.30
Application	3.45	2.41
Attention Recruitment	3.60	2.53
Categorization	0.88	1.65
Cue-based Reminder	0.50	0.82
Evaluation	0.73	0.86
Practice Remembering	3.42	2.55
Praise Recall	1.37	1.43
Repetition	3.98	2.44
CTRS (n = 37 scales)		
Patient Recall Task (n = 313 tasks)	48.34	7.13
Patient Recall Task (n = 313 tasks)		
Cumulative Points Recalled	10.74	4.91
Past Session Recall	5.51	4.02

Note. MS = Memory Support. MSRS = Memory Support Rating Scale. CTRS = Cognitive Therapy Rating Scale.

¹MS Treatment Provider Checklist for each strategy is scored as Never (0 times) = 0, A few (1–2 times) = 1, Often (3–5 times) = 2, and Many (6+ times) = 3.

Table 4

Factor loadings for the two-factor model of the Memory Support Treatment Provider Checklist

Memory Support Treatment Provider Checklist items	Factor Loadings	Standard Error
Factor 1: Memory support strategies that promote constructive learning behavior		
Application	0.55	0.05
Categorization	0.52	0.05
Cue-Based Reminder	0.44	0.05
Evaluation	0.21	0.05
Factor 2: Memory support strategies that do not promote constructive learning behavior		
Attention Recruitment	0.33	0.05
Practice Remembering	0.47	0.04
Praise Recall	0.65	0.05
Repetition	0.46	0.04

Note. All factor loadings are standardized. All factor loadings are significant ($p < 0.01$). The correlation between the two latent factors is 0.77.

Table 5
Correlations Between Memory Support Treatment Provider Checklist Scores and Validity Measure

Validity measure	MS Total Used	MS Categories Used
Convergent Validity		
MSRS MS Total Used (n=304)	r = 0.29, p = .00 ^{***}	r = 0.29, p = .00 ^{***}
MSRS MS Categories Used (n=304)	r = 0.35, p = .00 ^{***}	r = 0.39, p = .00 ^{***}
Discriminant Validity		
CTRS (n=37)	r = 0.31, p = .06	r = 0.31, p = .07
Predictive Validity		
Patient Recall Task: Cumulative Points Recalled (n=313)	r = 0.15, p = .01 ^{**}	r = 0.24, p = .00 ^{***}
Patient Recall Task: Past Session Recall (n=313)	r = 0.16, p = .00 ^{**}	r = 0.27, p = .00 ^{***}

Note.

* p < 0.05

**

p < 0.01

p < 0.001. MS = memory support. MSRS = Memory Support Rating Scale. CTRS = Cognitive Therapy Rating Scale.

^aThis value is 0.009, which rounds to 0.01.

Table 6

Correlations between Specific Memory Support Items on the MSRS and Memory Support Treatment Provider Checklist

Memory Support Type	r	p
Application	0.31	.00***
Attention Recruitment	0.08	.15
Categorization	0.47	.00***
Cue-Based Reminder	0.52	.00***
Evaluation	0.28	.00***
Practice Remembering	0.18	.00**
Praise Recall	0.19	.00**
Repetition	0.08	.17

Note.

*
p < 0.05

**
p < 0.01

p < 0.001