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Pilot validation study on the Tavistock Relationships Observational Scale (TROS) for the assessment of the quality of dyadic relationships in couples in which one partner has dementia.

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Abstract

Background and Purpose: Many people with dementia are cared for by their spouses. Poor quality of the dyadic relationship is a known risk factor for carer burden and mistreatment of the person with dementia. This study aimed to design and cross-validate the Tavistock Relationships Observational Scale (TROS) for assessment of the quality of the relationship in such couples. **Methods**: The study was conducted within the context of the therapeutic intervention with n=11 couples. Couples' video-recorded interactions were assessed independently by three psychologists using the 13-item TROS. **Results:** Cronbach alphas of the scale computed for the three raters were in the range 0.76-0.88 (on average 0.83), thus demonstrating high internal consistency of the scale. Fleiss Kappa coefficient for the three rates computed for 22 assessed videos ranged between 0.45 (moderate agreement) to 0.85 (almost perfect agreement) with 50% of coefficients being above 0.50, suggesting the good performance of the TROS in terms of yielding a satisfactory inter-rater agreement. The TROS also showed good external validity when using as validation criteria caregiving partner's burden (measured with the Zarid Burden Interview: the scales *Social burden* (Rho=-0.65, *p*=0.021), and *Role strain* (Rho=-0.68, *p*=0.014)), depression of the person with dementia (measured with the Cornell Scale for Depression in Dementia: Rho=-0.78, *p*=0.020), and relationship satisfaction of the caregiving partner (measured with the Dyadic Adjustment Scale: Rho=0.52, *p*= 0.038). The TROS also showed a good capacity to detect the change in scores from time 1 to time 2; moreover, power analysis showed that the TROS can detect the change in scores even in very small samples (n=5 couples). **Conclusions:** The TROS may be a useful tool for a standardized assessment of the quality of dyadic relationships in couples with dementia in research, nursing or clinical settings to assist clinical psychologist, nurses or social workers in a preliminary evaluation of the situation of couples with dementia, to choose a suitable care or intervention, to assess the effectiveness of interventions focusing on improvement of dyadic relationships, or to assess the risk of spousal abuse or neglect of a person with dementia.

Introduction

It is estimated that around 850 thousand people in the UK (Alzheimer's Research UK, 2018) and around 5.8 million in the USA (Alzheimer's Association, 2019) are currently living with dementia, accounting for 1.25% of the UK and 1.76% of the USA population. These numbers are expected to rise within the coming years. Many people are looked after by their partners at home, at least in the early stages of dementia, and efforts in health and social policy are at present directed towards encouraging home treatment. Studies consistently show that a good quality of couple relationship is crucial for sustaining compassionate and effective care for the person with dementia (Ablitt, Jones, & Muers, 2009; Braun et al., 2009; Fjellström et al., 2014) and predicts slower progression of dementia (Norton et al., 2009) and better functional ability of the person with dementia (Burgener & Twigg, 2002). Self-rated relationship quality was found to be associated with own life satisfaction and well-being for both caregiving and care-receiving partners (Rippon et al., 2019) and was predictive of lower depression and strain in the caregiving partner (Ablitt et al., 2009; Riley, 2019; Riley, Evans, & Oyebode, 2018). At the same time, caregivers of people with dementia have higher stress compared to non-carers, as indicated by their cortisol levels (Hodgson & Craemer, 2013; Stalder et al., 2014) and report higher levels of burden and depression compared to caregivers of physically frail older adults (Pinquart & Sörensen, 2005).

Studies also show that dementia puts a lot of strain on a spousal relationship and has a negative impact of its quality (Baikie, 2002; Holdsworth & McCabe, 2018; Wadham, Simpson, Rust, & Murray, 2016), and while many couples strive to maintain their bond (Clark, Prescott, & Murphy, 2019; Davies, 2011), and caregiving partners report some positive aspects of care, such as satisfaction, transcendence and expression of love to their spouse (Searson, Hendry, Ramachandran, Burns, & Purandare, 2008; Shim, Barroso, Gilliss, & Davis, 2013), many caregiving partners report burden (Etters, Goodall, & Harrison, 2008), stress (Pinquart & Sörensen, 2003) and tension between meeting their own and their spouse's needs (O'Shaughnessy, Lee, & Lintern, 2010). Caregiving partners also report reduced shared activities, loss of emotional support from their spouse and a diminution in the quality of verbal communication, leading to low marital satisfaction (Baikie, 2002). The results also suggest that many caregiving partners experience grief (Meuser & Marwit, 2001), as well as anger and resentment towards the care recipient (Croog, Burleson, Sudilovsky, & Baume, 2006; Martin-Cook, Remakel-Davis, Svetlik, Hynan, & Weiner, 2003; Shim, Barroso, & Davis, 2012) and may experience a heightened psychiatric and physical morbidity (Garand, Dew, Eazor, DeKosky, & Reynolds, 2005; R. Schulz, O'Brien, Bookwala, & Fleissner, 1995; Richard Schulz & Martire, 2004).

The strong link between relationship quality and outcomes in dementia (for both the caregiver and care-recipient) has been recently recognized in policies and clinical practice by exploring the effectiveness of therapeutic programs focusing on the dyad, rather than a care recipient or a caregiving partner (Edwards et al., 2018; Nordheim et al., 2019). Indeed, there is some evidence to suggest that certain interventions are more effective when they involve both partners than when they involve patients alone (see the literature reviewed in the next section). However, the progress in the assessment of the effectiveness of couple interventions (in terms of benefits for the dyadic relationship quality) is hindered by the lack of validated, easy-to-use observational scales for assessment of relationship quality in couples with dementia.

Micro-analytic systems such as the Marital Interaction Coding System-IV (MICS-IV (Heyman, Weiss, & Eddy, 1995)) and the Specific Affect Coding System (SPAFF) (Shapiro & Gottman, 2004) have been criticized for being particularly burdensome for coders; coders have to pause and code every change in affect, thus the time required to code a 10-15 min couple interaction is very long (from 1.5 hours (Heyman, 2004) to 20 hours (Giles-Sims &

Gottman, 2006)). Moreover, such coding systems yield very low inter-coder reliability and low frequency of codes (Baucom, Baucom, & Christensen, 2012). Above all, these are generic measures, rather than specifically developed for couples living with dementia. Given this, there is a need to develop psychometric tools to enable a robust assessment method for evaluation of the quality of couple relationship in dementia. Such tools would have applicability in both clinical and research settings within dementia care.

Background and framework

A number of interventions designed for couples with dementia have been recently developed and tested (Lamotte, Shah, Lazarov, & Corcos, 2017; Laver, Milte, Dyer, & Crotty, 2017; Moon & Adams, 2013; Nordheim et al., 2019; Prick, de Lange, Scherder, Twisk, & Pot, 2016; Van't Leven et al., 2013). For example, Neely, Vikstrom, & Josephsson (2009) used a collaborative memory intervention for people with dementia and their spouse caregivers, and results were superior to the same intervention focused on individuals. Among the interventions specifically designed to address the emotional needs of couples, Ingersoll-Dayton et al. (2013) proposed a dyadic intervention (five one-hour sessions) described as a *"Couple's life story"* that addresses the need for meaningful engagement, shared communication and pleasurable activities for both partners. Social workers observed increased expression of affection (e.g., holding hands) after this intervention, however, no psychometric assessment of the relationship quality was used in this study. Baker, Grocke, and Pachana, (2012) proposed an intervention model (delivered three times per week for 20-30 minutes per session for six weeks) that focused on music therapy to facilitate the sharing of meaningful experiences within couples, reduce apathy and agitation in those with dementia, and improve in both partners their mood, communication and quality of life. Post-intervention interviews with five couples showed that this intervention had a positive effect on both partners, however, similar to Ingersoll-Dayton et al. (2013), this study did not formally assess relationship quality before and after the intervention with a psychometric tool. Similarly, two randomized controlled trials by Särkämö et al. (2014) and Davidson and Almeida (2014), as well as one qualitative investigation by Unadkat and co-workers (2017) reported that singing couple therapy had beneficial effects for both partners, but neither study included formal psychometric assessment of the effects of the intervention on the quality of dyadic relationship.

Balfour (2014) proposed an eight-session intervention (usually delivered in 2-4 weeks intervals), which uses shared everyday activities of life to support dyadic emotional contact and mutuality. Utilizing video recording as a tool to help couples to reflect upon and improve their daily interactions, the intervention involves filming the couples performing everyday activities together and then playing the video (or some selected fragments of it) back to them, particularly focusing on the moments when the partners respond in an attuned way to each other, or when they did not communicate effectively. During these feedback sessions, the therapist and the couple reflect collaboratively on what they are doing and formulate together goals for change. The model assumes that in this approach, caregiving partners are helped, through the filming and feedback sessions, to become more sensitive to the communicative attempts of their partner with dementia, and to develop greater awareness of how they can respond in an attuned way. By looking at themselves on screen, caregiving partners are able to gain distance from themselves and to see more objectively how they interact with their spouse with dementia. Although it is not rigidly defined by the intervention manual (Balfour, 2006), the recorded sessions took place twice: usually during the second or third session (time 1 (T1)), when couples feel safe with the therapist and with the idea of being video-recorded, and then during the sixth session (time 2 (T2)). Both recorded sessions were followed by feedback sessions, while the last session has a reflective and closing character. Questionnaire data were collected from both spouses using self-report questionnaires, and the assessment of cognitive skills of the partner with dementia was carried out by the clinician before and after the intervention. The Tavistock Relationships Observational Scale (TROS) observational checklist was used to assess video-recorded interactions between the couples at T1 and T2.

Aim of this study

The aim of this study was to develop the Tavistock Relationships Observational Scale (TROS) for the assessment of the quality of couples' interactions in couples where one partner has dementia and to carry out a preliminary validation of this checklist. As external validation criteria, we used data from caregiving partners (measures of carer burden and relationship satisfaction) and data from partners with dementia (a measure of depression). The instrument was initially designed to assess the effectiveness of a couple intervention aiming at the improvement of the dyadic relationship (Balfour, 2006); however, we believe that this scale could, potentially, also be useful as a tool for the assessment of the risk of mistreatment or neglect in cases of a very poor relationship quality.

Method

Sample

The couples recruited to the intervention program were residents of London and Bristol, referred through various contacts in memory services, carers' associations and from professionals in Older Adults' Services. The inclusion criteria were that the couple must be able to speak English, and one of the partners has dementia in early to mid-stage. Couples in which one partner had a concurrent diagnosis of a major psychiatric disorder would be excluded from the intervention. N=11 couples (see more details in *Descriptives*) meeting these criteria were video recorded to assess the quality of their interactions at T1 and T2 and also provided questionnaire data before and after the intervention (see *Measures* section). Participants' age ranged from 66 to 82, with a mean age of 74.88 years (*SD*=5.46); on average, the partners with dementia were about one year older (mean age=75.25) than their partner without dementia (mean age=74.5). This difference was not statistically significant (*p*=0.862). All but one couple were white Caucasians; three caregiving partners were non-UK born (reflecting the composition of the population of London (UK) including 42% of non-UK born individuals). There was no statistically significant difference (tested with t-test) between participants of London and Bristol on age or any of the measures used in this study.

Ethical approval

Ethical approval for the intervention and data collection were obtained from the Integrated Research Approval System, the National Health Service (IRAS NHS project numbers: #137317/930923/14/876 and #137317/1031558/13/505/60357).

Procedures

Video recording

Couples were instructed that they would be video recorded when they spent 15 minutes together on an everyday activity of their choice (e.g., sorting out the washing; cooking something together; tidying up). Prior to this, the therapist obtained couples' consent for video recording (in addition to their consent for participation in the intervention and questionnaire data collection). The couples were also told that the therapist would bring back the video recording to the next session. The aim of the recording was explained in the following way: "*it involves filming both of you and then, during the next session, watching the recordings to notice things you might wish to change in the way you communicate*". The recordings were stored securely and anonymously in encrypted files. Video recordings at T1 and T2 were conducted on average 4.54 months apart (min=2 months / max=8 months); the average length of the recording was 23 minutes (min=8 minutes / max=38 minutes). The recordings were then independently watched and assessed by three psychologists using the observational checklist (TROS). One rater was a research trainee with two years of clinical experience; another was a research trainee with six years of clinical experience, and the third was an experienced researcher with 10 years of research experience. The intervention was delivered by experienced couple therapists with more than 20 years of clinical practice.

Development of the observational checklist for the assessment of relationship quality

First, we conducted a literature search to identify existing observational scales for the assessment of relationship quality in couples where one of the partners has dementia, however, we did not find any relevant scales. As follows, based on two studies using observational assessment of marital and family relationships (Melby, Conger, Ge, & Warner, 1995; Williamson, Bradbury, Trail, & Karney, 2011) we generated a list of 28 items assessing relevant behaviors in couples when they interact, such as making/avoiding eye contact, turning towards/away from the partner, closed/open body language, etc. Next, using this 28-item checklist, the three raters independently assessed one video, recording the frequency of these behaviors on a 5-point Likert-type scale ranging from *Very frequently* to *Never*. The obtained rating was entered into an Excel spreadsheet and the Fleiss Kappa coefficient of the obtained ratings was computed to assess inter-rater agreement (Fleiss, 1971).

The inter-rater agreement of the initial 28-item rating scale was 0.2, which was deemed very low, thus we modified the scale to improve Kappa: we changed the items and the rating strategy. Instead of focusing on particular behaviors, 28 items focused on expressions of feelings such as contempt, anger or warmth by the partners during their recorded interaction. Also, instead of rating the frequency of occurrence of behaviors on a 5-point scale, the raters were to assess *to what extent this feeling was expressed during the interaction*, using the 4-point scale: 1-*Not at all*, 2-*To some extent*, 3-*To moderate extent*, 4-*To a great extent*. The raters were asked to watch the same recording again and assess it using this modified scale. We computed the raters agreement score for every single item and we excluded in an iterative manner 15 items (out of all 28), which had an agreement score of zero (i.e. items where there was zero agreement between the three raters); we tested Kappa coefficient for the scale after each item deletion. The final 13-item TROS reached Kappa of .85, which was deemed very high[1]. Next, using the 13-item TROS, the remaining 21 video recordings (i.e., two recordings per couple) were rated.

Statistical analysis

We used Stata and Excel for data management and analysis. The TROS scores for the three independent raters were entered into Excel spreadsheets for each video recording and the inter-raters agreement coefficients, Fleiss Kappa (Shrout & Fleiss, 1979), were computed for every recording separately. Questionnaire data for T1 and T2 were entered into Stata and the

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[1] Shrout & Fleiss (1979) suggested the following Indicative Kappa values interpretation: less than 0 - Poor agreement; 0.01-0.20 – Slight agreement; 0.21-0.40 – Fair agreement; 0.41- 0.60 – Moderate agreement; 0.61-0.80 – Substantial agreement; 0.81-1.00 – Almost perfect agreement.

scores were calculated according to the questionnaires' manuals. The TROS scores were also entered into Stata and total scores were calculated for every rater and then averaged over the three rates to obtain the total score at T1 and T2 for each of n=11 couples. As a validation test, non-parametric correlation coefficients (Spearman Rho) were computed between the TROS scores (T1) and the following measures collected at T1: career burden and relationship satisfaction reported by the caregiving partner, and depression reported by the partner with dementia.

The sensitivity to change of the TROS was established by calculating the Minimal Clinically Important Difference (MCID) with a 95% confidence interval (Donoghue et al., 2009; Mcdowell, 2006). The MCID is the minimum amount of change in a client's score that ensures the change is *not* the result of a measurement error. MCID values are being increasingly used to assist in determining whether a change between repeated tests is due to random variation, or a true change in a person's score due to the intervention (Haley S.M., M.A. & Fragala-Pinkham, 2006). There are various methods for calculating the MCID (Crosby, Kolotkin, & Williams, 2003), which, overall, can be divided into distribution-based and anchor-based approaches (Lydick & Epstein, 1993; Rai, Yazdany, Fortin, & Aviña-Zubieta, 2015). Here we took a distribution-based approach based on measurement error. We calculated the MCID with 95% CI using the formula: SEM × 1.96 (Mcdowell, 2006), where SEM (Standard Error of Measurement) is the standard error in an observed score estimated by the standard deviation of the instrument (here we used T1 score) multiplied by the square root of one minus its reliability coefficient (i.e., the correlation between scores at T1 and T2) (Wyrwich, Tierney, & Wolinsky, 1999): $\sigma_x\sqrt{1 - r_{xx}}$.

Measures

Measures completed by the partners with dementia

The Mini-Mental State Examination (MMSE**)** (Pangman, Sloan, & Guse, 2000) was used with the partners with dementia for screening and descriptive purposes. It is an 11-item measure that tests cognitive mental state. The first section of the questionnaire, which covers memory, attention, and orientation, is administered by the clinician but requires vocal responses from the participant. The second part of the questionnaire tests the ability to follow written and verbal instructions, spontaneous sentence formulation, and visuospatial skills. Alongside physical examinations and case histories, the MMSE can be used to formulate a diagnosis of dementia (Alzheimer's Research UK, 2018). The maximum score on the MMSE is 30, with higher scores indicating healthier cognitive functioning. Previous studies that have used the MMSE report mean scores of 18.1 for people with dementia who are able to complete the MMSE, compared to a mean score of 4.1 for those who cannot; those with normal cognitive function have scores of 27.6 or above; the score of 17 is a benchmark for a significant cognitive impairment.

Measures completed by the couple together with the therapist (information was provided by both partners):

The 19-item Cornell Scale for Depression in Dementia (CSDD) (Alexopoulos, Abrams, Young, & Shamoian, 1988) was used to rate symptoms of depression in partners with dementia. The CSDD is the most common measure of depression in dementia populations and has performed well when compared against psychiatrist-diagnosed depression (r=0.83) (Alexopoulos et al., 1988). The CSDD ratings are based on behavioral observations and the information provided by both partners to overcome threats to validity inherent in self-reports by individuals with impairments of concentration, memory, or judgement. The time frame for most of the 19 items in the questionnaire is the previous week. Internal consistency reliability reported in previous studies has ranged from 0.76 to 0.84 (Alexopoulos et al., 1988; Kurlowicz, Evans, Strumpf, & Maislin, 2002). Each item is rated for severity on a scale of 0-2 (0=absent, 1=mild or intermittent, 2=severe). The item scores are added. Scores above 10 indicate a probable major depression. Scores above 18 indicate a definite major depression. Scores below 6, as a rule, are associated with an absence of significant depressive symptoms.

Measures completed by the partner without dementia

The Zarit Burden Interview (ZBI) (Rankin, Haut, Keefover, & Franzen, 2011), is a 22-item instrument that measures the level of burden that caregivers of people with dementia perceive that they are under. Responses are given on a five-point scale, ranging from 0 (never) to 4 (always). In addition to the total score, the items can be grouped to form five subscales: *Burden in the relationship*, *Emotional well-being*, *Social and family life*, *Finances* and *Loss of control over one's life.* Alternatively, the items can be also grouped to form two dimensions: *Personal strain* and *Role strain*. The total scores range from 0 to 88 with higher scores indicating greater levels of perceived caregiver burden. Caregivers' scores can indicate little or no burden (0 to 20), mild to moderate burden (21 to 40), moderate to severe burden (41 to 60), or severe burden (61 to 88). The Cronbach's alpha value for the ZBI items reported in previous studies was 0.93 and the intra-class correlation coefficient for the test-retest reliability was 0.89 (Seng et al., 2010).

The abbreviated Dyadic Adjustment Scale (DAS-7) (Hunsley, Best, Lefebvre, & Vito, 2001) was administered to measure marital adjustment and satisfaction of caregiving partners. Adapted from the original measure developed by (Spanier, 1976), the abbreviated version of this measure is composed of seven items from the original measure that have been found to be the best at discriminating between well-adjusted and distressed marriages. Six of the items assess specific aspects of marital functioning (e.g., “How often do you and your partner calmly discuss something?”) and are presented on a Likert-type scale, ranging from 0 to 5. The last question assesses general satisfaction with the relationship and is rated on a scale from 0 (extremely unhappy) to 6 (perfect). Scores are derived by summing a total for all items, with higher scores indicating higher levels of marital adjustment. Hunsley et al. (2001) explored the validity and reliability of these seven items within the context of their original measure – that is, they looked at archival data of fully completed DAS instruments and extracted the questions that appear on the DAS-7. The Cronbach’s alpha for the DAS-7 in community samples ranged from 0.75 to 0.79 (Hunsley et al., 2001). The measure showed good validity in a study on an elderly population (Villeneuve et al., 2014) and in studies with spouses of people with dementia (Davies, 2011; Lea Steadman, Tremont, & Duncan Davis, 2007).

The Tavistock Relationships Observational Scale: scoring and application

The 13-item TROS (see http://hdl.handle.net/10197/11251) includes the following instruction for the rater(s): *On the scale from 1 to 4 provide your ratings of the quality of the interaction between partners focusing on the degree of expressions of feelings or behaviors listed below*. The scale has nine reversely scored items (1, 2, 3, 4, 5, 7, 9, 10, 13). The total score is computed by summing up the scoring for each item (after the above items have been reversed). The total score can range from 13 to 52, with higher scores indicating better relationship quality. Where scoring is available from more than one rater, the total scores can be averaged over all raters (i.e. total scores from all raters can be summed up and then divided by the number of raters). Although this validation study has used data where raters watched videos of couples’ interactions, it is foreseen that the TROS can be used when the rater observes life interactions between partners (e.g. in their home, or a care home). A rater should carry out an observation lasting for 20-25 minutes when a couple performs an everyday task or activity, or discusses things together (preferably without the involvement of the rater), prior to the rating of their relationship quality.

Results

Descriptive statistics

There were *n*=3 female partners and *n*=8 male partners with dementia in our sample. Participants' ages ranged from 66 to 82, with a mean age of 74.88 years (*SD*=5.46); on average the partners with dementia were about one year older (mean age=75.25) than their partner without dementia (mean age=74.50), this difference was not statistically significant (*p=*0.862*)*. The average score on the measure of cognitive ability (MMSE) among partners with dementia was 16.55 (*SD*=7.33) at T1 and 14.88 (*SD*= 8.92) at T2, indicating significant cognitive impairment. The level of cognitive deterioration of partners with dementia varied at intake (T1) from just below the cut-off point for the normal range 26-25 (*n*=2) to the low 21-16 (*n*=5) and the very low 12-9 (*n*=4) range.

In terms of data provided by caregiving partners, the average total score for Zarit Burden Interview (ZBI) at T1 was 39.10 (*SD*=3.11), and 38.96 (*SD*=2.59) at T2, indicating moderate levels of carers' burden. The average total score for DAS-7 was 17.16 (*SD*= 1.24) at T1 and 17.45 (*SD*= 1.09) at T2. In terms of the data provided by partners with dementia, the mean score on the CSDD depression measure was 13 (*SD*=5.18) at T1 and 11.88 (*SD*=6.73) at T2. These scores indicated that 75% of the participating partners with dementia had depression scores within the severe range.

The total score for TROS averaged over the three raters was 37.40 (*SD*=1.47) at T1 and 40.26 (*SD*=1.44) at T2. Cronbach alphas of the scale computed for the three raters were in the range 0.76-0.88 (on average 0.83), thus demonstrating high internal consistency of the scale. Paired-sample *t*-tests comparing the means at T1 and T2 for the above measures showed that only TROS detected some improvement from T1 to T2 (see the results reported below); the TROS score at T1 and T2 were correlated, r=0.74, p=0.001, showing very good test-retest reliability.

Validation of the TROS

We used for validation of the TROS the measure of caregiving partner burden (Zarid Burden Interview (ZBI) and relationship satisfaction (Dyadic Adjustment Scale (DAS-7)) and the measure of depression of the partner with dementia (Cornell Scale for Depression in Dementia (CSDD). Doornik-Hansen univariate and multivariate tests of normality (Doornik & Hansen, 2008) showed that all the above variables and pairs of variables tested through correlations were normally distributed except for the pair TROS score and ZBI sub-scale *social burden* (χ^2=12.14, p=0.016). To account for possible small deviation from normality we calculated non-parametric (rather than parametric) correlations – Spearman *Rho* between the TROS scores at T1 and the above measures. The TROS scores were positively correlated with relationship satisfaction of the caregiving partner (Rho=0.52, p=0.038) and negatively with their burden (assessed with the two subscales of the ZBI): *Social burden* (Rho=-0.65, p=0.021), and *Role strain* (Rho=-0.68, p=0.014), and negatively correlated with depression of the partner with dementia (Rho=-0.78, p=0.020).

Minimal Clinically Important Difference (MCID) and clinical cutoff

The results of paired-samples *t*-test calculated for the sample of n=11 couples comparing T1 and T2 TROS scores showed improvement from the mean of M=37.40 (*SD*=1.47) at T1 and to M=40.26 (*SD*=1.44) at T2; *t*(10)=-2.19, *p*=0.046. The effect size (Cohen's d) calculated for the score difference diff=2.85 was of medium magnitude (*d*=0.52).

We calculated MCID based on the standard error of measurement (SEM) for T1 scores (SEM=1.47) and *r*=0.60. The MCID with 95% CI, calculated based on these values, was 0.93. This value indicated relatively high sensitivity of the TROS in detecting MCID: just one point of difference in scores before and after the intervention is likely to yield a minimal clinically important difference.

We suggest that the clinical cutoff indicating that a couple might be at high risk of having a very poor relationship (and what is associated with it, might be at very high risk of the occurrence of mistreatment) is a score below two standard deviations from the mean (2 SD), i.e., a score of 25 or less (which would account for about 2.5% of the population – in line with approximate estimates of prevalence of abusive spousal relationships in dementia (Cooper, Selwood, Blanchard, & Livingston, 2010; Cooper et al., 2009)). This indicative cutoff score coincides with the two cases of the couples who had the score 28.33 at TROS at T1, who, based on the clinical judgment, had low-quality relationships.

Power analysis for the minimal detectable difference

Next, we computed in Stata the power analysis for the minimal detectable difference and the corresponding effect sizes (assuming power of 0.80) for a paired samples *t*-test comparing T1 and T2 data, for the range of sample sizes (between n=10 to n=40 individuals, i.e. between 5 and 20 couples) and the range of correlations between T1 and T2 scores from a coefficient of

0.40 to 0.70 (see Table 1). These results indicated that the sample of 11 couples is sufficient to detect a statistical difference between T1 and T2 TROS scores when a difference is of a medium magnitude (i.e., an effect size is d=0.52), given the high correlation (in a range of 0.60 – 0.70) between T1 and T2 scores.

[Table 1 about here]

Discussion

With the growing number of people affected by dementia worldwide, and with many of these people looked after by their partners at home, there is a requirement for validated diagnostic tools to assess the functioning of couples living with the condition. To our knowledge, the Tavistock Relationships Observation Scale (TROS) is the first such instrument developed specifically to assess the quality of the relationship in couples where one partner has dementia.

We used as external validation criteria a range of psychometric instruments which measured caregiver burden, relationship satisfaction and care-recipient depression. Our results suggested that the TROS shows good validity, very high test-retest reliability, high internal consistency (indicated with Cronbach alpha), and relatively small standard measurement error. The TROS also yielded high inter-rater agreements (indicated by Fleiss Kappa) and performed well in the detection of a minimal clinically important difference in comparisons of pre- and post-intervention scores. Moreover, power calculations suggested that TROS is likely to detect changes in scores before and after interventions even in very small samples (n=5 couples).

Implications for clinical practice

There is a growing recognition of the significance of the quality of relationship between partners for the outcomes in dementia (Braun et al., 2009; Fjellström et al., 2014). In particular, the studies suggest that good relationship quality is predictive of slower progression of dementia (Norton et al., 2009), higher well-being of both partners and lower burden of caregiving spouses (Quinn, Clare, & Woods, 2009). More importantly, research suggests that good relationship quality is a protective factor against early institutionalization (Spijker et al., 2008; Spitznagel, Tremont, Davis, & Foster, 2006). Negative relationship quality is, on the other hand, a predictor of a range of negative outcomes both for the caregiving and care-receiving partner (Croog et al., 2006; Martin-Cook et al., 2003; Shim et al., 2012) and dyadic interventions in such relationships may not be suitable for such couples. Nordheim et al. (2019) reported an adverse effect of a dyadic intervention on performance as a caregiver of those caregiving spouses who reported poor relationship quality, whereas there was a beneficial intervention effect (of a milder decline in cognitive functioning of the person with dementia) in the group where caregivers reported good relationship quality. Given that the possible effect (positive versus adverse) of dyadic interventions is linked to relationship quality, it is of great importance to assess couples' relationship quality prior to the intervention, in order to check couple suitability for a dyadic intervention. Therefore, relationship quality assessment is crucial as an initial step in dementia care to establish the most optimal care arrangements and to offer the optimal program for a caregiver and/or care-recipient dyad from a wide range of available interventions (Dam, De Vugt, Klinkenberg, Verhey, & Van Boxtel, 2016). We suggest the TROS could be utilized for the assessment of couples' relationship quality (and their suitability for dyadic interventions).

High reported carer burden in combination with low relationship quality might be the "warning signs" revealing a carer burnout. A systematic review by Yee & Schulz (2000) showed that female caregivers may be at greater risk for higher carer burden and psychiatric symptomatology because they are less likely to obtain assistance with caregiving, as the caregiving role is generally not expected of men, who are therefore more likely to obtain formal support. Therefore, assessment procedures should focus on detecting these early "warning signs" in particular in female carers to provide timely support of the professional nurses and health workers.

Relevance to Nursing Practice and Research

The co-occurrence of burnout and psychiatric morbidity in caregiving spouses may lead to a heightened risk of abusive spousal relationship, sub-optimal care for a person with dementia, or even neglect or mistreatment. Cooper et al. (2009) suggested that in the context of dementia, the caregiver's subjective burden, the dementia patient's cognitive and behavioral disturbances, and the patient's inability to communicate the existence of the maltreatment are important risk factors for maltreatment of the person with dementia (Cooper et al., 2009). Cooney, Howard, and Lawlor (2006) reported that high psychological distress in carers was related to self-reported mistreatment of spouses with dementia. The poor quality of marital relationships has not been considered by the above studies as a risk factor, although, with the majority of home care of dementia patients being provided by a spouse, it seems that poor quality of dyadic relationship may be an important risk factor of mistreatment.

The prevalence of physical abuse of elderly dementia patients by caregivers is estimated to occur in 5 to 12 percent of patients (Coyne, Potenza, & Berbig, 1996) and over a third of family carers report significant abuse from the people with dementia they care for (Cooper et al., 2010). Evidence points to the reciprocal nature of abusive behavior involving dementia patients and their caregivers; aggressive, combative, or violent patient behavior tends to trigger abuse from caregivers. A history of family violence prior to the onset of dementia also appears to be associated with a greater likelihood of abusiveness between caregivers and patients once dementia occurs (Coyne et al., 1996). Also, a positive correlation was found between abuse of a family member and caregiver's burden and depression (Coyne et al., 1996).

The scales designed to detect the maltreatment of older adults rely on patient self-report (Cooney et al., 2006; Wiglesworth et al., 2010), and thus are not suitable for people with dementia (Reichenheim, Paixão, & Moraes, 2009). In turn, the scales, which rely only on caregivers' report as the sole source of information (Reis & Nahmiash, 1995; Rivera-Navarro et al., 2018), may introduce biases or even distort the reliability of the assessment. Although TROS was initially designed for monitoring the effectiveness of the intervention aiming to improve the dyadic relationship, we believe that it could also be a useful screening tool for practitioners such as nursing home personnel, psychiatric nurses, psychologists and social workers to assess the risk of mistreatment of the partner with dementia. Further validation studies are needed that would investigate the usefulness of TROS and provide exact clinical thresholds for the detection of high-risk dyads.

White (2000) points out the critical role of nurses in detecting elderly mistreatment and abuse. We believe that the assessment of the carer-care recipient relationship with a psychometric tool such as TROS would aid the nurses in hospitals and care home settings to assess the major risk factor of sub-optimal care and spousal abuse stemming from a poor dyadic relationship quality.

Going beyond assessment (which should be seen as a preliminary step to provide a shorter intervention or prolonged care) Fawdry (2001) proposed a holistic approach to the care provided by nurses and family members through establishing collaborative partnerships with caregivers. Admiral nurses (and other types of nurses) can empower family members not only through assisting in care for a person with dementia but also promoting self-care among the caregivers or seeking support through psychological interventions, support groups or pastoral care (Gamble & Dening, 2017).

The case management approach for families affected by dementia in the UK is a relatively new concept (Koch et al., 2012). Case management is a collaborative process that involves assessment, planning, implementation, care coordination, monitoring, advocacy and evaluation, using communication and available resources to promote optimal and cost-effective outcomes (Case Management Society of America, 2016). Dening et al. provided the Admiral Nurse assessment framework, which includes various domains of assessment (e.g., physical and mental health of the person with dementia, managing medication, skills in coping with behavior and symptoms, risk, etc.) (Dening, Aldridge, Pepper, & Hodgkison, 2017; Harrison Dening, Knight, & Love, 2018), the assessment of relationship quality has been omitted in this framework. Buckwalter et al. (1999) highlighted the pivotal role of psychiatric nurses in the assessment and treatment of depression among caregivers of persons with Alzheimer’s Disease. Interventions such as supportive counseling and individual or family psychotherapy for caregivers, respite or in-home care services for patients, and alternative living situations have also been shown to be effective in improving caregivers' and care receivers' coping mechanisms (Banerjee, 2014; Cooper, Barber, Griffin, Rapaport, & Livingston, 2016; Coyne et al., 1996).

Broader policy implications

The American Psychiatric Association, in their Practice Guideline for the Treatment of Patients with Alzheimer’s Disease and other Dementias of Late Life (American Psychiatric Association, 1997) emphasizes that the management of the patient must be based on a solid alliance with the patient and family. The American Medical Association (AMA) takes a similar view (American Medical Association, 2002). The AMA advocates a physician-caregiver-patient partnership approach, in which physicians provide information and referral to caregivers as well as monitor caregiver functioning to ensure their health and well-being. Further to this, the model of the monitoring proposed by REACH (Resources for Enhancing Alzheimer's Caregiver Health (Richard Schulz & Martire, 2004; Wisniewski S, Belle SH, Coon DW, et al., 2003)) suggests the assessment of key risks, which includes include the caregiver and person with dementia safety, caregiver's self-care and preventive health behaviors, caregiver support, depression and distress, and problem behaviors of the care-recipient. These guidelines for assessment do not however include the assessment of quality of caregiver and care-recipient relationship, which seems an important omission in light of the evidence (cited in the introduction and the discussion) about the links between quality of relationship and outcomes for caregiver and care-recipient. We suggest that this gap should be addressed; an appropriate, validated psychometric tool could aid such an assessment.

Limitations

Firstly, the sample was small and lacked homogeneity in terms of stages of dementia, the time-lapse between T1 and T2 videos, and the activities performed by couples when being video-recorded. These limitations may have affected the reliability of the comparisons between T1 and T2 scores, thus we cannot draw robust conclusions about the effectiveness of the intervention based on the TROS scores. Further, we used the measure of relationship quality, the Dyadic Adjustment Scale, which was not validated in the context of dementia (despite that it was used in the dementia context in a few earlier studies). We have limited information about the demographic characteristics of the study participants (e.g., more detailed information about their socioeconomic status was missing) and we did not have information about the type of dementia, if the couples availed of other forms of treatment and the time elapsed from the diagnosis. However, the above factors are unlikely to affect the psychometric qualities of the TROS measure. Given the strong association between dementia and psychiatric co-morbidity (in particular depression) the exclusion of participants with major psychiatric disorder might have biased our sample (and, what follows, our results). Nevertheless, these preliminary results are encouraging and future studies on a larger scale may pursue the investigation of the psychometric qualities and usefulness of the TROS.

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Table 1. Power calculation for the MCID

Correlation between T1 and T2 scores	**Sample size**	**The minimum detectable difference between T1 and T2 total scores**	**Minimum detectable effect size**
.40	10	5.85	0.99
	20	3.87	0.66
	30	3.10	0.52
	40	2.66	0.45
.50	10	5.34	0.99
	20	3.54	0.66
	30	2.83	0.52
	40	2.43	0.45
.60	10	4.77	0.99
	20	3.16	0.66
	30	2.53	0.52
	40	2.17	0.45
.70	10	4.13	0.99
	20	2.74	0.66
	30	2.19	0.52
	40	1.88	0.45