Psychometric Evaluation of the Depression and Family Functioning Scale

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ABSTRACT

OBJECTIVES: Patient-reported outcomes (PROs) are necessary to assess disease impacts from the patient's perspective. In line with the Food and Drug Administration's (FDA's) guidance on PROs, the Depression and Family Functioning Scale (DFFS) was developed to assess the impact of major depressive disorder (MDD) on family functioning. Psychometric analyses were conducted to establish the reliability, validity, and responsiveness of the DFFS according to the FDA PRO guidance.

METHODS: Data from PERFORM, a longitudinal multicenter, prospective, 2-year observational study in the United Kingdom (UK) and Spain, were analyzed (NBaseline = 478, NMonth2 = 433). The 15 DFFS items use a 5-point rating scale to assess partner and family interactions and quality of relationships; higher scores indicate greater (worse) impacts. Test-retest reliability (intraclass correlations), construct validity (correlations and factor analysis), discriminating ability (analysis of variance), and responsiveness (effect size estimates) were evaluated.

RESULTS: Factor analyses resulted in a single factor, confirmed by highly satisfactory Cronbach's alphas (0.85 at baseline, 0.89 at month 2). The DFFS demonstrated satisfactory test-retest reliability (intraclass correlation = 0.75). Hypothesized correlations with other measures provided evidence of validity. For example, the correlation of the DFFS with the SF-12 mental component scores was −0.35 (baseline) and −0.49 (month 2), and with SF-12 physical component scores, −0.05 (baseline) and −0.31 (month 2). Hypothesis tests were generally in the predicted direction, and many were statistically significant, substantiating the discriminating ability of the DFFS. Effect size estimates of responsiveness were 0.44 to 0.84, demonstrating that the items were capable of detecting change.

CONCLUSIONS: The psychometric analyses strongly support the reliability, validity, and responsiveness of the DFFS and its usefulness for assessing the impacts of depression on family functioning. It has the potential to provide important information not traditionally captured in clinical practice or research and will facilitate a more comprehensive evaluation of treatments of MDD.

BACKGROUND

- Depression is the leading cause of disability, and the literature indicates that depression negatively impacts family functioning.
- PROs are necessary to assess disease impacts from the patient perspective, but there is lack of PROs that measure the impact of depression on the family.

Depression and Family Functioning Scale

- The DFFS was developed to understand and assess the impact of depression on family function from patient and partner perspectives.[1]
- The DFFS was developed using a rigorous qualitative methodology in line with recommendations in the European Medicines Agency's (EMA's) reflection paper on the use of health-related quality of life measures[2] and the FDA's PRO guidance.[3]
  - Concepts for the DFFS and content for each of the items were generated primarily through in-depth interviews with patients with MDD and their partners, supplemented with expert opinion and a targeted literature review.
  - A comprehensive set of items was drafted and then tested in two iterative rounds of cognitive debriefing interviews with patients with MDD and partners of patients with MDD.
  - The DFFS consists of 15 items, each scored from 0 to 4, with low scores indicating better family functioning.

OBJECTIVES

- The objective of the present study was to evaluate the reliability, validity, and responsiveness of the patient version of the DFFS, as well as to determine its threshold for clinically meaningful change.
- The evaluation was aligned with the FDA's PRO guidance to facilitate future consideration of the DFFS for use in clinical trials of patients with MDD to assess treatment impact.

METHODS

Study Design

- Data from PERFORM,[4] a multicenter, prospective, 2-year longitudinal observational study conducted in five European countries (the UK, Spain, Sweden, France, and Germany), were analyzed to assess the psychometric properties of the DFFS in patients with MDD.
  - DFFS data were collected in the UK and Spain at baseline, 2 months, 6 months, and 12 months; the present analyses used data from the patient DFFS collected at baseline and month 2.
- The study population consisted of outpatients aged 18 to 65 years with a current or new diagnosis of MDD according to the *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision* (DSM-IV-TR).

Measures

- DFFS[1]
- Arizona Sexual Experiences Scale (ASEX)[5]
- Clinical Global Impression of Severity (CGI-S)[6]
- EuroQol 5 Dimensions (EQ-5D)[7,8]
- Hamilton Anxiety Rating Scale (HAM-A)[9,10]
- Montgomery-Åsberg Depression Rating Scale (MADRS)[11]
- Patient Health Questionnaire-9 (PHQ-9)[12]
- Sheehan Disability Scale (SDS)[13,14] work/school, social life/leisure, and family life/home scores
- Short Form Health Survey-12 (SF-12)[15,16] physical component score (PCS) and mental component score (MCS)
- Work Productivity and Activity Impairment Questionnaire (WPAI)[17,18]

Analytic Methods

- DFFS structure: Principal components analysis (PCA) and exploratory factor analyses (EFA)
- Reliability
  - Internal consistency: Cronbach's coefficient alpha[19] and item-total correlations
  - Test-retest reliability: Intraclass correlation coefficients (ICCs) were computed using the subset of patients who were assumed to be stable from baseline to month 2 because their scores on the SDS family life/home rating were the same at baseline and month 2.
- Construct validity: Correlations (at baseline, month 2, and change from baseline to month 2) between DFFS scores and clinician-assessed (CGI-S, MADRS, and HAM-A) and patient-reported measures (SDS, ASEX, SF-12, PHQ-9, WPAI, and EQ-5D)
- Discriminating ability: Known-groups analyses of variance (ANOVAs) examined mean differences in DFFS scores between patients classified into groups on the basis of the CGI-S (less mentally ill: CGI-S ≤ 3 vs. more severely ill: CGI-S ≥ 5) and ASEX (normal: ASEX < 19 vs. sexual dysfunction: ASEX ≥ 19)
- Responsiveness
  - Standardized effect sizes calculated as mean change divided by the standard deviation (SD) of the baseline score
  - PHQ-9 responder standardized effect sizes computed as the difference in mean change between responders (≥ 5 points improvement on the PHQ-9 from baseline to month 2)[20] and nonresponders, divided by the SD of change in nonresponders
- Responder threshold: Identify patients who experienced a clinically meaningful change in their depression symptom severity and report that they have responded positively to treatment
  - Anchor-based thresholds computed as the average DFFS change for patients who self-reported an improvement of 5 points on the PHQ-9[20] or 1 point improvement on the SDS family life/home question[21] from baseline to month 2
  - Distribution-based methods: half-SD, standard error of measurement (SEM), and reliable change index (RCI)
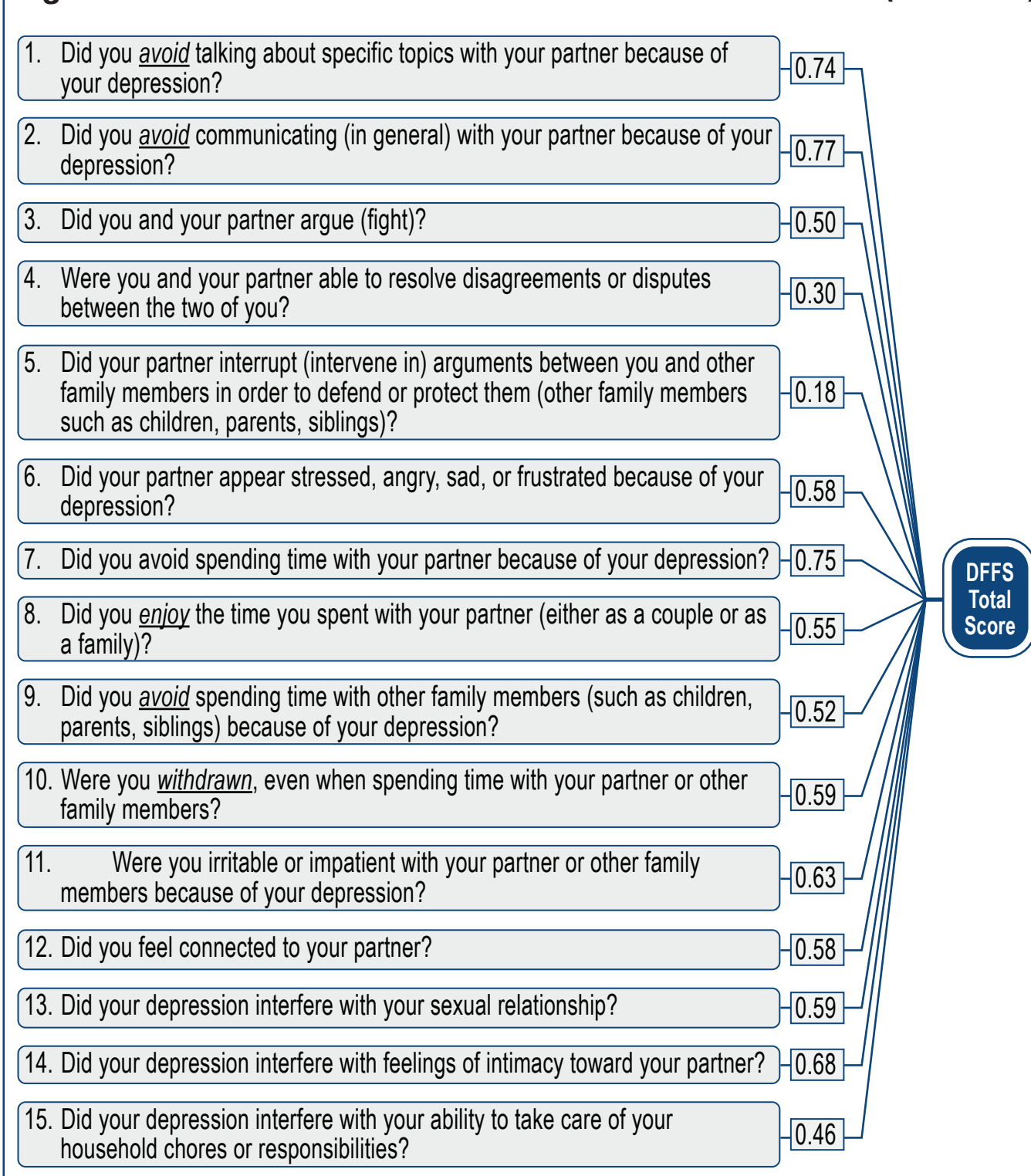
RESULTS

Table 1.   Patient Characteristics

Characteristic	Baseline (n = 478)	Month 2 (n = 433)
Age (years), mean (SD)	43.8 (12.4)	43.5 (12.5)
Median, minimum–maximum	44, 18–65	44, 18–65
Sex, n (%)		
Male	142 (29.7)	126 (29.1)
Female	336 (70.3)	307 (70.9)
Marital status, n (%)		
Single	107 (22.4)	102 (23.6)
Married or living as a couple[a]	280 (58.6)	227 (52.4)
Divorced/separated	78 (16.3)	57 (13.2)
Widowed	13 (2.7)	6 (1.4)
Number of children living in household, mean (SD)	1.0 (1.1)	0.9 (1.1)
Median, minimum–maximum	1, 0-6	1, 0-5
Employment status, n (%)		
Full-time paid employment or self-employed	228 (47.7)	182 (42.0)
Part-time paid employment or self-employed	81 (16.9)	68 (15.7)
Unemployed	99 (20.7)	87 (20.1)
Student	9 (1.9)	9 (2.1)
Nonworking spouse	29 (6.1)	23 (5.3)
Retired	27 (5.6)	15 (3.5)
Disability pension	8 (1.7)	11 (2.5)
This is the patient's first depressive episode, n (%)	208 (43.5)	181 (41.8)
This patient has been hospitalized for depression, n (%)	14 (2.9)	12 (2.8)
This patient has attempted suicide, n (%)	36 (7.5)	6 (1.4)
Other comorbid mental disorders, n (%)	27 (5.6)	21 (4.8)

- Factor analysis: PCA strongly suggested the DFFS was unidimensional, so EFAs extracted one factor at baseline and month 2.
  - This supports the scoring of the DFFS as a unidimensional total or overall score.
  - The 15 DFFS item scores were summed to create a DFFS total score ranging from 0 to 60, with lower scores reflecting better partner relationship and family functioning.
  - Figure 1 displays the items of the patient DFFS and item-total correlations.

Figure 1. DFFS Item Correlations With DFFS Total Score (Month 2)

1. Did you *avoid* talking about specific topics with your partner because of your depression? — 0.74
2. Did you *avoid* communicating (in general) with your partner because of your depression? — 0.77
3. Did you and your partner argue (fight)? — 0.50
4. Were you and your partner able to resolve disagreements or disputes between the two of you? — 0.30
5. Did your partner interrupt (intervene in) arguments between you and other family members in order to defend or protect them (other family members such as children, parents, siblings)? — 0.18
6. Did your partner appear stressed, angry, sad, or frustrated because of your depression? — 0.58
7. Did you avoid spending time with your partner because of your depression? — 0.75
8. Did you *enjoy* the time you spent with your partner (either as a couple or as a family)? — 0.55
9. Did you *avoid* spending time with other family members (such as children, parents, siblings) because of your depression? — 0.52
10. Were you *withdrawn*, even when spending time with your partner or other family members? — 0.59
11. Were you irritable or impatient with your partner or other family members because of your depression? — 0.63
12. Did you feel connected to your partner? — 0.58
13. Did your depression interfere with your sexual relationship? — 0.59
14. Did your depression interfere with feelings of intimacy toward your partner? — 0.68
15. Did your depression interfere with your ability to take care of your household chores or responsibilities? — 0.46

DFFS Total Score

- Reliability
  - Internal consistency: Cronbach's alpha was 0.85 at baseline and 0.88 at month 2, corroborating the unidimensionality of the DFFS and providing support for the computation of a total or overall composite.
  - Test-retest reliability: The ICC for the DFFS total score was 0.76, based on 52 patients who responded the same at baseline and month 2 on the SDS family life/home rating.
- Construct validity (Table 2) correlations supported the validity of the DFFS.
  - Correlations between change scores supported the convergent validity of the DFFS and its ability to detect change.
    - Improvements in DFFS scores were associated with improvements in SDS scores, particularly with SDS family life/home responsibility and SDS social life/leisure, and with SF-12 MCS scores.

Table 2.   Construct Validity: Correlations With DFFS Total Score

| Characteristic	Baseline (n = 58 to 463)[a]	Month 2 (n = 47 to 412)[a]	Change All Patients (n = 34 to 340)[a]	Change Married or Living as Couple (n = 23 to 194)[a]
CGI-S	0.18*	0.26*	0.10	0.10
MADRS	0.11	0.24	0.06	0.22
HAM-A	0.22	0.15	0.07	0.18
SDS work/school	0.28*	0.45*	0.33*	0.35*
SDS social life/leisure	0.43*	0.59*	0.43*	0.46*
SDS family life/home	0.46*	0.61*	0.51*	0.55*
ASEX	0.32*	0.35*	0.08	0.03
PHQ-9	0.46*	0.65*	0.49*	0.55*
SF-12 MCS[b]	−0.37*	−0.51*	−0.48*	−0.59*
SF-12 PCS[b]	−0.06	−0.33*	−0.12	−0.04
WPAI Absenteeism	0.17	0.10	0.09	0.15
WPAI Presenteeism	0.36*	0.44*	0.19	0.16
WPAI Overall Impairment	0.33*	0.35*	0.08	0.05
WPAI Activity Impairment	0.50*	0.55*	0.41*	0.43*
EQ-5D[b]	−0.20*	−0.49*	−0.27*	−0.30*
EQ-5D Global Visual Analog Scale[b]	−0.23	−0.47*	−0.24*	−0.37*

* P < 0.01.
[a] Subgroup sample size may vary due to missing data
[b] Because the SF-12 and EQ-5D are scored such that higher values reflect better outcomes, they correlated negatively with the DFFS. Correlations between the DFFS and all other measures were positive because each is scored such that higher values reflect worse outcomes.

- Discriminating ability (Figure 2): ANOVAs demonstrated that the DFFS was able to distinguish between subgroups of patients rated as less or more ill on the CGI-S and normal or with sexual dysfunction on the ASEX.

Figure 2. Discriminating Ability: Average DFFS Total Scores Across Known Groups
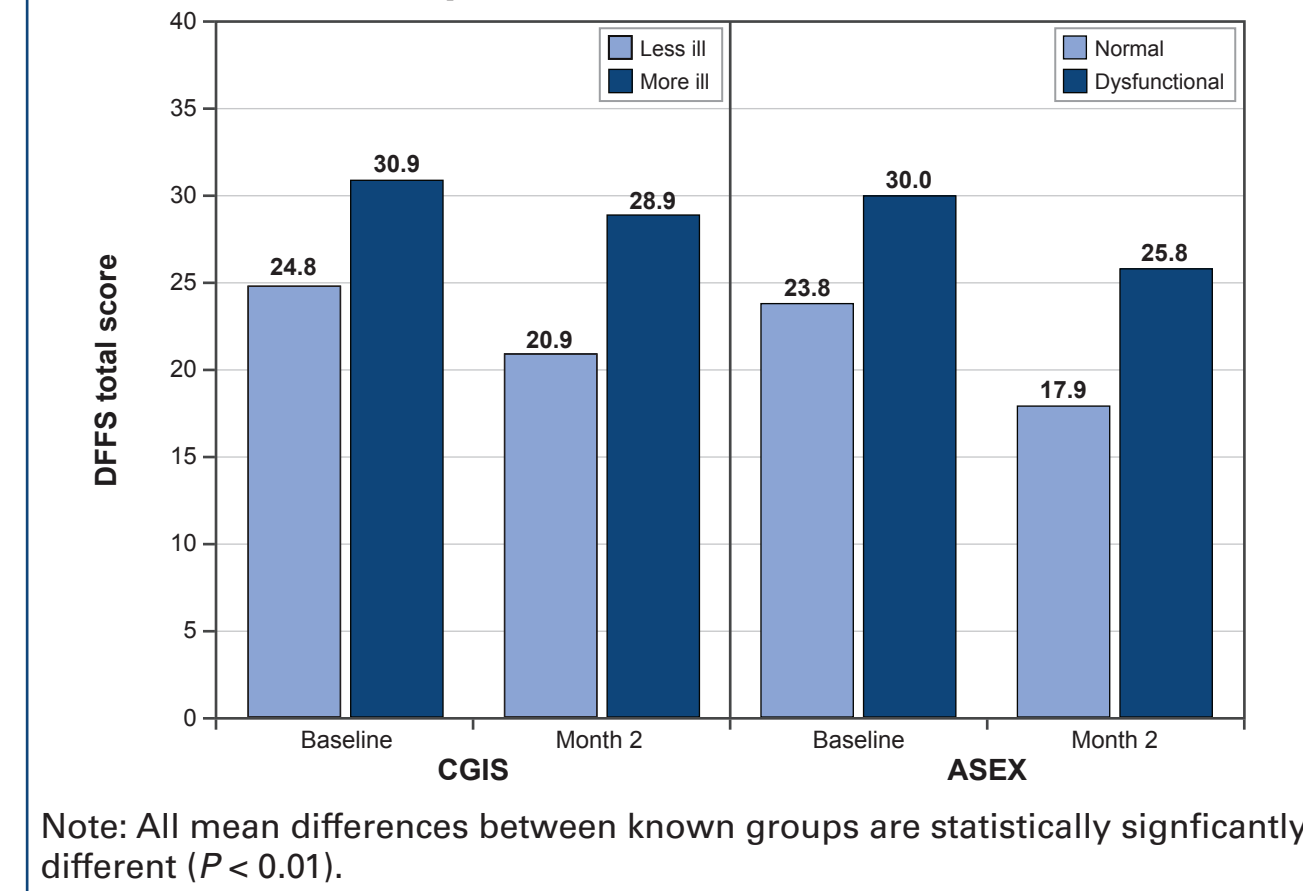
Note: All mean differences between known groups are statistically significantly different (P < 0.01).

- Responsiveness
  - The standardized effect size estimate for the DFFS total score was moderate (−0.44).
  - The standardized effect size estimate for the DFFS total score using the PHQ-9 responder definition (≥ 5 points improvement) was large (−0.84).
- DFFS responder threshold
  - Anchor-based thresholds
    - Mean DFFS change = 5.17 for patients (n = 23) with a 5-point improvement on the PHQ-9 (baseline to month 2); r = 0.49 between DFFS change and PHQ-9 change
    - Mean DFFS change = 4.14 for patients (n = 28) with a 1-point improvement on the SDS family life/home rating (baseline to month 2); r = 0.51 between DFFS change and change in SDS family life/home scores
  - Distribution-based thresholds: half-SD = 5.25; SEM = 5.04; RCI = 7.12

DISCUSSION

The DFFS was developed as a measure of partner relationship and family functioning[1] according to methods and standards outlined in the EMA's reflection paper (2005)[2] and the FDA's PRO guidance (2009).[3] The present study evaluated the psychometric properties of the DFFS and found them to be highly satisfactory and to support the use of the DFFS in patients with MDD.

- Factor analyses indicated that the correlations among the 15 DFFS items were best explained by a single factor, supporting the scoring of the DFFS as a unidimensional score.
  - Summing the 15 DFFS item scores yields a DFFS total score that theoretically ranges from 0 to 60, with lower scores reflecting better partner relationship and family functioning.
- Both internal consistency and test-retest reliability of the 15-item DFFS total score were strong.
- Solid evidence of construct validity was established—the pattern of correlations supports the convergent and divergent validity of the DFFS total score.
- Known-groups ANOVAs comparing average DFFS total scores across various subgroups demonstrated that the DFFS is capable of distinguishing between patients classified according to clinician-rated disease severity and levels of sexual functioning.
- Responsiveness effect size estimates were moderate to large, showing that the DFFS is sensitive to change.
- Possible responder definitions for the DFFS were empirically explored, and although the establishment of a final responder definition occurs as a process over multiple assessments and across a wide range of studies, a preliminary working value for the responder threshold defining a meaningful DFFS change is between 4.1 and 7.1 points on the 0 to 60 DFFS total score scale.

A limitation of this study is that the majority of the psychometric analyses were conducted using a sample of patients that included individuals who were single, divorced, separated, or widowed; however, the DFFS was developed in a population of patients with MDD who were monogamous and residing with their partners. It is noteworthy that the DFFS performed well in this broader population with less formally recognized couple relationships.

CONCLUSIONS

The results of the psychometric evaluation build on the qualitative research evidence for the DFFS and strongly support the reliability, validity, and responsiveness of the DFFS and its utility for assessing the impact of depression on partner relationship and family functioning. The DFFS has the potential to provide important information not traditionally captured in clinical practice or research and will facilitate a more comprehensive evaluation of treatments of MDD.

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