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Assessing Satisfaction with Differentiation of Self through Circle Drawing: Validation of a Revised Self-Report Instrument (SFI-R)

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Abstract

This study revalidates an inventory of satisfaction with differentiation of self through drawn circles (SFI-R). The SFI-R (Revised version) improves upon the previous version in that it displays pairs of circles with differing levels of overlap and asks participants to select the diagram that best expresses closeness/distance between themselves and others, using a 6-point Likert-like scale. The sample consisted of 630 college students. We examined the psychometric properties of the SFI-R, assessing its associations with differentiation of self (DSI-R), differentiation from partner (DIFS), and inclusion of other in the self (IOS). We also assessed its contribution to trait anxiety and quality of life. The revealed associations between the SFI-R, on the one hand, and the IOS, DIFS and almost all DSI-R subscales, on the other, strengthen its validity. Results also indicated that this instrument is reliable. Our findings support Bowen's contention that differentiation of self is an important aspect of psychological well-being. Further, theoretically, this research offers new insights into the association of quality of life and trait anxiety with familial characteristics.

Keywords: Satisfaction with differentiation of self; SFI-R; Family; Instrument

Introduction

One of the most important family and individual patterns that have been investigated is differentiation of self. Bowen [1] claimed that family processes should be verified by systemic and varied instruments. Existing measures, which tend to be textual self-report questionnaires, do not reflect how individuals feel about relationships with their parents and whether they would like to change them. With this in mind, a recent study [2] assessed the psychometric properties of a newly developed visual and projectional instrument (SFI: Scale of Satisfaction with Differentiation of Self), looking at its associations with well-known existing measures of differentiation of self (DSI-R) and family differentiation (DIFS). Results yielded significant high correlations between the SFI and three of the DSI-R subscales (emotional reactivity, emotional cutoff and fusion with others), and between it and differentiation from mother and father (DIFS), indicating that this instrument is reliable and valid. The researchers recommended further empirical validation and psychometric revision. In addition, due to difficulties in analyzing the data, they suggested reevaluating the instrument's psychometric properties, using different scoring. Based on these results, the current study aimed at correcting and revalidating the SFI (using a Likert-type scale), by verifying its associations with differentiation of self (DSI-R), differentiation from partner (DIFS), and inclusion of other in the self (IOS), as well as by examining the contribution of differentiation of self (as measured by the revised SFI-R scale) to reducing trait anxiety and enhancing quality of life.

Differentiation of self

According to the Family Systems theory, four components are related to a person's level of differentiation of self: emotional reactivity, the ability to take an I-position, emotional cutoff and fusion with others [3,4]. People who are not well differentiated are unable to maintain steady contacts, take an I-position (being assertive) in relationships or handle stressful situations, whereas those who are highly differentiated tend to maintain satisfying relations with their families of origin, remain in more satisfying marriages, and be self-determining and effective problem solvers [1]. The latter pattern is expected to lead to higher levels of adjustment and coping during times of pressure [4].

The relation of differentiation of self to well-being

Bowen's assumptions about the relation between differentiation of self on the one hand, and well-being on the other hand, have gained empirical support. Peleg and Idan-Biton [2] found differentiation of self to be associated with less health anxiety, greater adjustment to college and higher self-efficacy. Highly differentiated individuals have been found to enjoy good mental and physical health [5,6] and to be more contented with their lives [7,8] and marital relations [9]. Differentiation of self was found to be negatively associated with psychological and physiological symptoms [3,10,11] and various anxieties [12], particularly trait anxiety [3]. A study of young adults found an association between greater differentiation of self and well-being [13]. A second study, which examined cultural differences, found this relationship to be stronger among European-American than Korean-American students [14].

A few studies found differentiation of self to be positively associated with emotional adjustment and well-being [13,15,16]. It should be noted that the terms "well-being" and "quality of life" (QOL) have been used inconsistently, with some researchers regarding them as interchangeable [17], while others see well-being as just one component of the broader concept of QOL [18]. The World Health Organization [19,20] defines quality of life as individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad concept affected in a complex way by the person's physical health, psychological state, level of independence, social relationships,

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personal beliefs and relationship to salient features of the environment. There is a growing field of research that examines quality of life in relation to health status, life domain, mental health and well-being. However, to the best of our knowledge, no studies have examined its relation to differentiation of self. The present research aims, among other things, to address that very issue.

Measuring differentiation of self

Self-report questionnaires are a common method of measurement in general and of differentiation of self in particular. Given the increasing importance of the concept, it is not surprising that several self-report and forced-choice measures have been attempted and applied. Usually, differentiation of self has been assessed by one of the following tools: Differentiation of Self Inventory [3,16], Differentiation in the Family System Scale (DIFS: [21]), Level of Differentiation of Self Scale (LDSS: [22]) and Emotional Cutoff Scale [23]. As stated by Miller, Anderson and Keala (2004), the DSI and LDSS are the two scales most often used to measure this concept.

The DSI and its derivatives [3,16] have been used widely to study differentiation of self because of the multiple aspects they assess and owing to their psychometric properties. This self-report inventory is designed to examine the capability to balance closeness with distance, as well as one's opinions with one's feelings. It focuses on adults, their significant contacts and contemporary relations with family of origin. The questionnaire is comprised of four subscales: emotional reactivity, I-position, emotional cutoff and fusion with others [16].

The DIFS scale [21], also a self-report questionnaire, is used to examine differentiation in reciprocal relationships (e.g., differentiation from mother, father, or partner). Each family member is asked to respond to Likert-type items in regard to dyadic relationships with parents or other family members.

Haber's [22] LDSS is a re-assessment of the Differentiation of Self Scale (DOSS; [24]). The LDSS uses both positively and negatively scored items to measure differentiation of self from one's family of origin. It consists of three factors: separation of thinking and feeling, emotional maturity and emotional autonomy. However, items do not reflect interactions with partners or spouses. Though adequate at the time of its creation, the LDSS is not as complete as the DSI-R. It has also been challenged in terms of structural validity and has had limited empirical use since the development of the DSI-R [22,25].

McCollum's [23] Emotional Cutoff Scale is a good measure of the degree to which people manage their emotional attachment to each parent through cutoff. The weakness of this scale is its focus on child-parent interactions and disregard of relationships with significant others.

All the above measures are self-reported and textual. The first attempt to apply another type of instrument to the measurement of closeness in interpersonal relationships was Aron et al.'s [26] questionnaire, the Inclusion of Other in the Self Scale (IOS), a semi-projective tool based on diagrams representing the self and others [27]. In this pictorial measure, respondents choose the figure that best defines their relationship with others from a set of Venn-like diagrams, each representing different levels of overlap of two circles. The main shortcoming of the IOS is that it is limited to a single item.

A recent study reported the construction and validation of a measure of satisfaction with differentiation of self (SFI) through circle drawing [2]. The first part of the study examined the psychometric properties of the SFI, as well as its associations with self-efficacy. Results provided good reliability and partial construct validity for the inventory. The second part of the study revalidated the SFI by comparing it to the DSI-R and DIFS, and examined associations between differentiation of self, on the one hand, and health anxiety and adjustment to college, on the other. Results yielded significant high correlations between the SFI and three of the DSI-R subscales (emotional reactivity, emotional cutoff and fusion with others), and between it and differentiation from father (DIFS), as well as between differentiation of self and health anxiety, providing additional evidence of reliability and validity.

Due to the difficulty in measuring the distances and overlaps between circles drawn freely by participants, Peleg and Idan-Biton [2] suggested refining the tool to display a series of Venn-like diagrams, with differing levels of overlap between circles to represent closeness/distance, from which participants could choose to describe their interpersonal relations, and to score responses along a Likert-type scale. The current study evaluates this revised instrument (SFI-R). The SFI-R improves upon the previous version in that: (a) it is comprised of 16 items (instead of 14) and therefore assesses more interactions with partner (items 12-16); and (b) it enables a simplified method of scoring. We also examine construct validity by looking at the associations between the SFI-R and three questionnaires with similar content: differentiation of self (DSI-R), differentiation from partner (DIFS) and inclusion of other in the self (IOS). In addition, we test reliability in terms of internal consistency (correlations between SFI-R items and the total score).

Given that highly differentiated people tend to manage satisfying relationships, another goal of the present research was to examine differentiation of self by calculating gaps between actual and ideal scores. Finally, we aimed at verifying the contribution of the SFI-R to trait anxiety and quality of life, under the assumption that highly differentiated people enjoy well-being and have lesser anxiety [3].

The following hypotheses were tested for the purpose of construct validity:

1. Differentiation of self (as measured by total SFI-R and subscales – maternal, paternal, parents, partner) and satisfaction with differentiation of self (lower SFI-R gap score) will be positively correlated with differentiation of self (as measured by DSI-R and subscales - emotional reactivity, I-position, emotional cutoff, fusion with others).
2. Differentiation of self (same as above, including satisfaction) will be positively correlated with differentiation from partner (DIFS).
3. Differentiation of self (same as above, including satisfaction) will be positively correlated with inclusion of other in the self (IOS).

The following hypotheses were tested to examine the contribution of differentiation of self to reducing trait anxiety and enhancing quality of life:

4. Differentiation of self (as measured by total SFI-R and subscales – maternal, paternal, parents, partner) and satisfaction with differentiation of self (lower SFI-R gap score) will be negatively correlated with trait anxiety.
5. Differentiation of self (same as above, including satisfaction) will be positively correlated with quality of life (physical health, psychological health, social relationships and environment).

Method

Participants

We used two-stage cluster sampling. After choosing a college in northern Israel, we recruited all first-year students at the faculties of Education, Behavioral Science, Nursing, Health Care, Psychology and Economics. Of the 632 students who received the questionnaires, 2 were excluded for failing to answer any of the scales of interest. The final sample consisted of 394 (62.5%) Jewish students, 210 (33.3%) Arab students, 18 students from other ethnic groups and 8 students who failed to specify ethnicity. Of these, 455 were undergraduates (72.2%) and 175 (27.8%) were graduate students. Participants' ages ranged from 18 to 48 years (mean=28.6, SD=8.3). Nearly all (92.8%) the students were native-born Israelis. There were 185 (29.4%) men and 431 (68.4%) women (14 failed to specify gender). Of all participants, 238 (37.8%) were married, 242 were single (38.4%), 61 (9.7%) lived with a boyfriend/girlfriend, and 70 (11.1%) had a boyfriend/girlfriend but did not live together (3% did not answer this question). In addition, 289 (45.9%) respondents lived with their partner, 267 (42.4%) lived with their parents and 66 (10.5%) lived alone (1% failed to reply). In regard to socioeconomic terms, 508 (80.63%) were middle class, 64 (10.1%) were upper class and 58 (9.2%) were lower class.

Instruments

The Scale of Satisfaction with differentiation of self-Revised (SFI-R; Appendix 1), created specifically for the present study, aims at measuring the individual's differentiation of self and his/her satisfaction with it. The measure is an improved version of a semi-projectional tool (SFI), which was built and validated in a recent study [2]. As mentioned, the original instrument (14 items) required circle drawing, which created difficulty in measuring distances and overlaps. The revised version (16 items) displays pairs of circles with differing levels of overlap and asks participants to select the diagram that best expresses closeness/distance between themselves and others (mother, father, partner), and between their parents, currently and in the past (during childhood and adolescence), both in terms of the actual relationship and in terms of the ideal relationship (sample item: "Please choose the circles that describe the closeness/distance between you and your mother currently"). In 12 of the items, the first circle represents the respondent and the second represents his/her mother (#1-4), father (#5-8) or partner (#13-16); in the remaining 4 items, the circles represent the respondent's parents (#9-12). Items with respect to a partner refer to spouse or boyfriend/girlfriend and were skipped by participants not currently in a relationship.

Responses fall in a 6-point Likert-like scale, from 1 (greatest distance) to 6 (greatest fusion). The scale is curvilinear: the middle scores, 3-4, reflect optimal distances (both intimacy and autonomy), and therefore receive 3 points; scores 2 and 5 reflect medium distances (either high levels of fusion with others or emotional cutoff) and therefore get 2 points; and scores 1 and 6 reflect the lowest differentiation of self (highest levels of emotional cutoff or fusion with others), and therefore count as 1 point. The total score is the mean score of all 16 items, yielding a range of 1–3, with higher scores indicating greater differentiation of self. To examine satisfaction with differentiation of self, the gap between actual and ideal rankings is calculated: the lower the gap, the greater the satisfaction. Internal consistency and construct validity were both high, as is reported in the Results section. Cronbach's alpha=0.91, of the four subscales 0.85, 0.86, 0.84 and 0.80 for maternal, paternal, parents and partner, respectively, and of the gap score 0.82.

The Inclusion of Other in the Self Scale (IOS; [26]) was translated to Hebrew for the present study. This is a single-item, pictorial measure of closeness. Respondents select the picture that best describes their relationship from a set of Venn-like diagrams, each representing different degrees of overlap of two circles. The figures were designed so that (a) the total area of each figure is constant (thus, as the overlap of the circles increases, so does the diameter), and (b) the degree of overlap progresses linearly, creating a seven-step, interval-level scale. Greater closeness (higher interconnectedness) is indicated by higher scores. Reliability (test-retest) was 0.75. Convergent and construct validity were found with marital satisfaction and commitment and with a reaction-time-based cognitive measure of closeness in married couples.

The Differentiation of Self Inventory-Revised (DSI-R; [3,16]), translated to Hebrew [11,28], was used to assess levels of differentiation of self. The DSI-R consists of 46 items divided into four subscales: emotional reactivity, I-position, emotional cutoff and fusion with others (sample item="I'm overly sensitive to criticism"). Participants rate each item on a scale from 1 (not at all like me) to 6 (very much like me). Subscale scores were calculated by averaging the mean scores of the items in each category. Higher differentiation of self is indicated by lower scores for emotional reactivity, emotional cutoff and fusion with others, and by higher scores for I-position. Internal consistency (Cronbach's alpha) was 0.88 for the total score in the original sample. Reliability for the present research was 0.70 for the total score, 0.84 for emotional reactivity, 0.68 for I-position, 0.75 for emotional cutoff and 0.71 for fusion with others.

The Differentiation in the Family System Scale (DIFS; [21]), translated into Hebrew [29], was used to assess the levels of differentiation in relationships between the participant and his/her partner. The instrument is made up of 11 items scored along a Likert-like scale (sample item: "My partner respects my privacy"). Possible responses range from 1 (never) to 5 (always). Means were calculated to arrive at a final score, with higher scores indicating higher differentiation. Internal consistency for the DIFS scale was 0.83.

The Trait Anxiety Inventory (TAI; [30]) was translated into Hebrew by Teichman and Melnick [31]. The questionnaire consists of 20 items (sample item: "I have a good feeling"). Participants rated their feelings on a scale from 1 (almost never) to 5 (always). Internal consistency (Cronbach alpha) in the current study was 0.96.

The World Health Organization Quality of Life-Brief (WHOQOL-BREF) scale [19,20] is a 26-item short form of the WHOQOL quality of life questionnaire. In the present study, we used the Hebrew version of the scale [32]. The instrument is divided into four subscales (domains) related to the respondent's subjective evaluation of his/her quality of life: physical health, psychological health, social relationships and environment. Sample items include: "How satisfied are you with your health?", "How safe do you feel in your daily life?", "Have you enough money to meet your needs?" Responses fall along a 5-point Likert scale, with higher scores indicating greater perceived quality of life. Internal reliability (Cronbach's alpha) in the current study was 0.72, 0.72, 0.67, and 0.76 for the subscales of physical health, psychological health, social relationships and environment, respectively.

Procedure

After obtaining consent for the research from the college's Committee of Ethics, an appeal was made to all lecturers teaching in the above-mentioned faculties for their students to participate in the study. Upon receipt of permission and coordination with teachers,

inventories were distributed during class time in the classroom by eight assistants. Students were told that participation was voluntary and that they could stop filling out the questionnaires at any time. They were promised anonymity and discretion. The completed questionnaires were collected 30 minutes later.

Results

Preliminary analyses

Table 1 presents means, standard deviations, ranges, skewness and kurtosis of all study variables. All scores, with the exception of IOS and SFI-R gap, approximated a bell shaped distribution (i.e., small amount of skewness and kurtosis) enabling the use of parametric statistical methods. Nonparametric statistics (Mann-Whitney test, Kruskal-Wallis test and Spearman correlations) were performed for analyses of IOS and the SFI-R gap (Table 1).

There were statistically significant gender and ethnic group differences for the differentiation from partner (DIFS) scale, with women reporting higher levels of differentiation than men ($t(518)=3.10$, $p<0.002$, partial eta=0.02) and Jewish students reporting higher levels of differentiation than Arabs ($t(506)=8.57$, $p<0.001$, partial eta=0.14). Age was not correlated with differentiation from partner ($r=0.088$, $p>0.04$).

There was a statistically significant gender difference [$Z=1.93$, $p<0.05$, effect size=0.085] for the Inclusion of Other in the Self (IOS) scale with women (Median=4.0) reporting higher levels of closeness than men (Median=3.0). No ethnic group difference was found [$Z=1.87$, $p>0.06$, effect size=0.083]. IOS was negatively correlated with age ($r=-0.203$, $p<0.001$), indicating that older students reported lower levels of differentiation of self.

No statistically significant differences were found for trait anxiety between men and women [$t(598)=-1.86$, $p>0.06$), partial eta=0.005] or between Jewish and Arab students [$t(585)=-0.75$, $p>0.46$, partial eta=0.001]. Trait anxiety was negatively correlated with age ($r=-0.203$, $p<0.001$).

With respect to quality of life, statistically significant gender differences were found [Wilk's Lambda $F(4,599)=4.94$, $p<0.001$, partial eta=0.03], but tests of the subscales indicated this to be the case only for psychological health: men reported a significantly higher level of psychological health (M=3.95, SD=0.54) than women (M=3.80, SD=0.58; $t(602)=2.95$, $p<0.003$, partial eta=0.01). Statistically significant ethnic group differences were revealed as well [Wilk's Lambda $F(4,587)=15.46$, $p<0.001$,` partial eta=0.095]; tests of subscales revealed that Jewish students reported significantly higher levels of social and environmental aspects of quality of life (M=3.88, 3.88 SD=0.76, 0.54; respectively) than their Arab counterparts (M=3.64, 3.60, SD=0.81, 0.59, $t(590)=2.69$, 3.24, partial eta=0.02, 0.05; respectively). Age was positively correlated with each of the subscales (physical health: $r=0.301$, $p<0.001$; psychological health: $r=0.208$, $p<0.001$; social relationships: $r=0.119$, $p<0.01$; environment: $r=0.167$, $p<0.001$).

Validity and reliability of the SFI-R

Our main research objective was to examine the reliability and validity of the SFI-R.

Circles reflected the ability to distinguish and balance the capacity for intimacy with and autonomy from four significant others: mother, father, parents and partner. We used a principal-components analysis to identify the SFI-R dimensionality and determine final item selection. Subscales were developed on the basis of the responses of 393 adults [2]. A principal-components analysis was conducted using an orthogonal rotation. We used a principal-components analysis because we were interested in identifying a few coherent dimensions that best reflected the various relationships in the family. Four factors were identified with eigenvalues greater than 1.0. Results showed a substantial break after four factors, which counted for 69.9% of the variance. The

	Men n=185					Women n=431					Jewish n=394					Arab n=210					Total n=630				
	R	M	SD	SK	K	R	M	SD	SK	K	R	M	SD	SK	K	R	M	SD	SK	K	R	M	SD	SK	K
DSI-R ER	1.45-5.64	3.10	0.84	.60	.21	1.40-5.73	3.48	0.86	.26	.58	1.60-5.73	3.46	0.88	.39	-.59	1.40-5.44	3.22	0.83	.17	-.34	1.40-5.73	3.37	0.87	.33	-.45
IP	1.91-5.91	4.22	0.74	-.24	-.10	1.86-5.73	4.02	0.68	-.01	-.07	2.45-5.64	4.01	0.70	.02	-.42	1.86-5.91	4.18	0.71	-.23	.50	1.86-5.91	4.08	0.70	-.06	-.14
EC	1.17-4.67	2.73	0.73	.36	-.37	1.00-5.42	2.64	0.78	.39	.15	1.00-4.67	2.51	0.73	.32	-.29	1.33-5.42	2.92	0.74	.46	.33	1.00-5.42	2.66	0.77	.38	.004
FWO	1.67-5.67	3.42	0.68	-.23	.25	2.00-5.42	3.70	0.66	-.03	-.15	1.67-5.67	3.67	0.68	.04	-.05	1.75-5.40	3.52	0.68	-.32	.07	1.67-5.67	3.61	0.69	-.11	.10
DIFS	2.55-4.82	3.93	0.56	-.43	-.98	1.36-5.00	4.10	0.56	-.86	1.10	2.40-5.00	4.20	0.47	-.71	.22	1.36-4.91	3.75	0.60	-.42	.17	1.36-5.00	4.04	0.56	-.69	.26
IOS	1.00-7.00	3.47	2.01	.41	-1.10	1.00-7.00	3.78	1.85	.22	-.97	1.00-7.00	3.79	1.97	.16	-1.19	1.00-7.00	3.43	1.73	.51	-.57	1.00-7.00	3.67	1.90	.28	-1.03
SFI-R																									
total	2.25-6.00	4.51	0.87	-.20	-.79	1.36-6.00	4.41	0.88	-.38	.03	1.36-6.00	4.39	0.87	-.26	-.11	1.50-6.00	4.54	0.89	-.46	-.21	1.36-6.00	4.44	0.88	-.33	-.18
gap	-.63-2.88	0.53	0.65	1.31	2.00	-.67-3.00	0.53	0.62	1.08	1.32	-.67-3.00	0.58	0.59	1.15	1.70	-.67-2.63	0.41	0.64	1.29	1.92	-.67-3.00	0.53	0.62	1.16	1.61
maternal	1.00-6.00	4.62	1.01	-.51	-.14	1.36-6.00	4.55	1.04	-.51	-.12	1.00-6.00	4.51	1.04	-.44	-.10	1.50-6.00	4.66	1.00	-.65	-.08	1.00-6.00	4.56	1.03	-.50	-.13
Paternal	1.25-6.00	4.17	1.10	-.14	-.66	1.00-6.00	4.17	1.10	-.22	-.55	1.50-6.00	4.07	1.08	-.02	-.80	1.00-6.00	4.33	1.12	-.59	.11	1.00-6.00	4.17	1.10	-.20	-.59
parents	1.33-6.00	4.39	1.13	-.49	-.47	1.00-6.00	4.14	1.31	-.54	-.38	1.00-6.00	4.10	1.34	-.47	-.61	1.00-6.00	4.44	1.11	-.82	0.72	1.00-6.00	4.22	1.27	-.58	-.29
partner	2.00-6.00	4.71	1.02	-.65	-.20	1.00-6.00	4.65	0.97	-.78	.87	1.00-6.00	4.70	0.94	-.85	1.30	1.00-6.00	4.57	1.09	-.60	-.25	1.00-6.00	4.65	0.99	-.76	.62
TAI	1.00-2.89	1.85	0.44	.47	-.47	1.00-3.21	1.92	0.43	.21	-.17	1.00-3.21	1.89	0.43	.40	.01	1.00-3.00	1.92	0.43	.01	-.72	1.00-3.21	1.90	0.43	.27	-.31
											WHOQOL														
physical	2.00-4.67	3.31	0.44	-.26	.15	1.00-4.57	3.28	0.50	-.46	.18	1.00-4.57	3.20	0.47	-.34	1.09	1.43-4.29	3.30	0.48	-.63	0.97	1.00-4.67	3.28	0.48	-.41	.98
psych	2.00-5.00	3.95	0.54	-.36	.28	1.83-5.00	3.80	0.58	-.55	.43	1.83-5.00	3.85	0.56	-.67	.73	2.00-5.00	3.85	0.58	-.30	.17	1.83-5.00	3.84	0.57	-.50	.43
social	1.33-5.00	3.75	0.73	-.42	-.16	1.00-5.00	3.82	0.80	-.86	.89	1.00-5.00	3.87	0.76	-.89	1.08	1.33-5.00	3.64	0.81	-.51	-.05	1.00-5.00	3.80	0.78	-.74	.50
environ	1.88-4.88	3.78	0.58	-.58	.12	1.43-5.00	3.78	0.58	-.48	.82	1.88-5.00	3.88	0.54	-.55	.854	1.43-5.00	3.60	0.59	-.29	.62	1.43-5.00	3.78	0.58	-.49	.58

Table 1: Ranges, means, standard deviations, skewness and kurtosis for all research variables. **Note:** SK=Skewness K=Kurtosis DSI-R=Differentiation of Self Inventory–Revised (ER=Emotional Reactivity; IP=I-Position; EC=Emotional Cutoff; FWO=Fusion with Others); DIFS=Differentiation from Partner; IOS=Inclusion of Other in the Self; SFI-R=Scale of Satisfaction with Differentiation of Self–Revised (total=mean differentiations; gap=mean difference between actual and ideal; maternal=self with mother; paternal=self with father; parents=relations between parents; partner=self with partner); TAI=Trait Anxiety; WHOQOL=World Health Organization Quality of Life–Brief (physical=physical health; psych=psychological health; social=social relationships; environ=environment).

	Component				
	Mother	Parents	Partner	Father	Total Communality
CR1	0.676	0.207	0.113	0.196	0.551
CR2	0.763	0.104	0.229	0.350	0.768
CR3	0.689	0.465	0.103	0.003	0.702
CR4	0.799	0.244	0.095	0.231	0.760
CR5	0.190	0.365	0.101	0.749	0.740
CR6	0.479	0.070	0.178	0.694	0.748
CR7	0.243	0.535	0.132	0.562	0.678
CR8	0.443	0.349	0.213	0.560	0.677
CR9	0.237	0.705	0.081	0.413	0.730
CR10	0.557	0.143	0.325	0.366	0.570
CR11	0.193	0.870	0.095	0.169	0.832
CR12	0.367	0.591	0.315	0.163	0.610
CR13	-0.068	0.006	0.775	0.323	0.710
CR14	0.170	-0.025	0.771	0.318	0.725
CR15	0.233	0.330	0.700	-0.118	0.667
CR16	0.339	0.238	0.739	-0.052	0.720
Explained variance	21.34%	16.66%	16.50%	15.42%	
Eigenvalues	3.41	2.67	2.64	2.47	
Alpha Cronbacronbach (items)	0.850 (4)	0.835 (3)	0.798 (4)	0.859 (4)	

Table 2: Factor analysis, rotated component matrix. Extraction method: Principal Component Analysis.
Rotation method: Varimax with Kaiser normalization. Rotation converged in 7 iterations.

following factors were identified: Factor 1, with 4 items, was defined as differentiations from mother; Factor 2 with 4 items was defined as differentiation from father; Factor 3 with 3 items was defined as parents' differentiation of self; and Factor 4 with 4 items was defined as differentiation from partner. Table 2 presents the rotated component weights (using weight of 0.56 as cutoff). The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.86 and Bartlett's test of Sphericity was significant (χ^2=4846, p<0.001) (Table 2).

Next, we conducted analyses on the SFI-R's total and gap score and the four subscale scores. We found good internal consistency of the total score (Cronbach's alpha=0.91), of the four subscales (0.85, 0.86, 0.84 and 0.80 for maternal, paternal, parents and partner, respectively) and of the gap score (0.82).

We investigated the instrument with respect to demographic variables. Tests of the SFI-R total score and the gap score (representing satisfaction with differentiation of self) revealed no gender [t(579)=1.08, p>0.28; partial eta=0.002; Z=-0.12, p>0.90, effect size=0.005, respectively] or family status differences [F(3, 574)=2.36, p>0.07; partial eta=0.012; Chi-square(1)=5.78, p>0.06, effect size=0.045, respectively]. There were no ethnic group differences for the total score [t(569)=1.86, p>0.06, partial eta=0.006] but there was for the gap score [Z=3.86, p<0.001, effect size=0.163] with Jews reporting a higher gap (median=0.38) than Arabs (median=0.25). Recall that the gap is the difference between "ideal" and "actual" so that the Jews report a larger difference between their ideal and actual. There were significant differences in total and gap score with respect to living arrangements [F(2, 587)=7.41, p<0.001; partial eta=0.025; Chi-square(2)=14.42, p<0.001, respectively] with students living with their parents reporting a higher total score and smaller gap (Median=0.28) than students living alone (Total: t(316)=3.24, p<.004; Gap: Median=0.67, Z=-3.36, p<0.001).

Multivariate testing of the 4 subscales revealed no gender differences [F(4,499)=2.10, p>0.08, partial eta=0.017]. There were however, significant ethnic group [F(4,490)=3.73, p<0.005, partial eta=0.030] and living arrangement differences [F(8,1010)=9.84, p<0.001, partial eta=0.072]. In particular there was a statistically significant ethnic difference in the paternal and parental SFI-R sub scores, with Jewish students reporting lower levels than their Arab counterparts (t=2.15, 2.09, p<0.03, 0.04; partial eta squared=0.009, 0.009, respectively). Moreover, there was statistically significant differences between living arrangements in all subscales [Maternal: F(2, 509)=6.62, p<0.001, partial eta=0.025; Paternal: F(2,509)=10.02, p<0.001, partial eta=0.038; Parental: F(2, 509)=3.11, p<0.05, partial eta=0.012; Partner: F(2, 509)=11.22, p<0.001, partial eta=0.042]. Post hoc testing revealed that students who lived with a parent reported a lower level of satisfaction with differentiation of self than students who lived at home (p<0.001, p<0.001, p<0.04, p<0.03, maternal, paternal, parental, partner respectively).

With regard to family status, multivariate analysis revealed a statistically significant difference for family status [F(12,1315)=7.62, p<0.001; partial eta=0.057)]. This was true for all but the parental subscale [Maternal: F(3,500)=4.73, p<0.003, partial eta=0.028; Paternal: F(3,500)=4.89, p<0.002, partial eta=0.029, Partner: F(3,500)=8.64, p<0.001, partial eta=0.049]. Married students reported higher levels of paternal and partner differentiation of self than single students (p<0.004, p<0.001, respectively) and higher levels of maternal and paternal differentiation of self than students who were not living with a partner (p<0.005, p<0.04, respectively).

Campbell and Fiske [33] argued that a "novel" measure should correlate highly with other measures of the same construct that use different methods (convergent validity). The main research objective was to assess construct validity by analyzing the relationships between the SFI-R and questionnaires with similar content. Bivariate Pearson correlations were used to assess convergent validity by measuring the relationship between scores on the SFI-R (total, subscales and gap score), on the one hand, and scores on the DSI-R subscales, the DIFS and the IOS, on the other. Table 3 presents correlations between the

		SFI-R					
		total	gap	maternal	paternal	parents	partner
Age		-0.14*	0.06	-0.18**	-0.14**	-0.11	-0.01
DSI-R	ER	-0.16*	0.06	-0.09	-0.13*	-0.20**	-0.14*
	IP	0.19**	0.10	0.13**	0.14**	0.12*	0.19**
	EC	-0.29**	0.12*	-0.28**	-0.25**	-0.20**	-0.25**
	FWO	0.12*	0.01	0.20**	0.10	-0.01	0.01
DIFS		0.28**	0.00	0.26**	0.19**	0.16**	0.30**
IOS		0.34**	-0.08	0.36**	0.31**	0.19**	0.30**
TAI		-0.24**	0.08	-0.16**	-0.15**	-0.18**	-0.28**
WHOQOL	physical	0.15**	-0.05	0.12*	0.09	0.09	0.20**
	psych	0.28**	-0.09	0.21*	0.18**	0.21**	0.30**
	social	0.29**	-0.18*	0.24**	0.20**	0.21**	0.32**
	environ	0.25**	-0.09	0.19**	0.15**	0.24**	0.27**

Table 3: Pearson correlations between SFI-R and all other study variables (N=593). *p<0.01, **p<0.001 [1]Spearman Correlation. **Note:** DSI-R= Differentiation of Self Inventory–Revised (ER=emotional reactivity; IP=I-position; EC=emotional cutoff; FWO=fusion with others); DIFS=differentiation from partner; IOS=Inclusion of Other in the Self; TAI=trait anxiety; WHOQOL=World Health Organization Quality of Life–Brief (physical=physical health; psych=psychological health; social=social relationships; environ=environment); SFI-R=Scale of Satisfaction with Differentiation of Self–Revised (total=mean differentiations; gap=mean difference between actual and ideal; maternal=self with mother; paternal=self with father; parents=relations between parents; partner=self with partner).

SFI-R scores and all other study variables. We used an alpha level of 0.01 to test the significance of the beta coefficients, in order to control for inflation of Type I error (Table 3).

As seen in Table 3, the total SFI-R score was positively associated with differentiation of self as measured by the DSI-R (positively correlated with I-position and fusion with others and negatively correlated with emotional reactivity and emotional cutoff), as well as positively correlated with differentiation from partner (DIFS) and inclusion of other in the self (IOS). The SFI-R gap score was positively correlated with emotional cutoff (DSI-R). Maternal SFI-R was negatively correlated with emotional cutoff and positively correlated with I-position, fusion with others, differentiation from partner (DIFS) and inclusion of other in the self (IOS). Paternal SFI-R was negatively correlated with emotional reactivity and emotional cutoff, and positively correlated with I-position, differentiation from partner (DIFS) and inclusion of other in the self (IOS). Parental SFI-R was negatively correlated with emotional reactivity and emotional cutoff, and positively correlated with I-position, differentiation from partner (DIFS) and inclusion of other in the self (IOS). Partner SFI-R was negatively correlated with emotional reactivity and emotional cutoff, and positively correlated with I-position, differentiation from partner (DIFS) and inclusion of other in the self (IOS). All these correlations point to the construct validity of the SFI-R. In addition, there were negative correlations between age and total SFI-R, maternal SFI-R and paternal SFI-R, indicating lower levels of differentiation of self and of satisfaction with differentiation of self among older students.

The relationship of the SFI-R with trait anxiety and quality of life

To examine the predictive ability of the SFI-R, we opted to perform a series of hierarchical stepwise regression analyses to predict trait anxiety and quality of life. We used demographic variables (age, ethnic group, gender, family status and living arrangement) as potential predictors in the first step and ran a stepwise regression to select the significant ones, and then we added the new instrument (SFI-R: gap score and the four subscales) in the second step.

Table 4 presents the regression analyses of the dependent variable trait anxiety. Again, we used an alpha level of 0.01 to test the significance of the beta coefficients, in order to control for inflation of Type I error rate. As seen in the table, age and family status (married/single) were the only significant demographic predictors of trait anxiety, accounting for 6.9% of the variance. In the second step, after adjusting for age and family status, trait anxiety was positively predicted by the SFI-R gap score and negatively predicted differentiation from partner (SFI-R) with these variables accounting for an additional 7.4% of the variance. The model shows that anxiety decreased with age and increased differentiation from partner and increased with increasing SFI-R gap score, i.e., the larger the difference between the ideal and actual the higher the anxiety.

In the second set of regression analyses, the dependent variables were the quality of life subscales (WHOQOL). Again, we used an alpha level of 0.01 to test the significance of the beta coefficients, in order to control for inflation of Type I error rate. Table 5 presents the relationships between these variables (Table 5).

Regarding physical health, in the first step, a positive correlation was found with age (7.7%). In the second step, physical health was positively predicted by partner SFI-R accounting for 4.1% of the variance. The model shows that physical health increased with age, as well as with higher levels of differentiation from partner. With respect to psychological health, the regression yielded a positive correlation with age in the first step, explaining 7% of variance. In the second step, psychological health was positively predicted by partner SFI-R, and negatively correlated with the SFI-R gap score with SFI-R variables accounting for 10% of the variance. The model indicates that psychological health increased with age and differentiation from partner and decreased with increasing gap between ideal and actual.

Age, ethnicity and living arrangement were significant predictors of social relationships, accounting for 8% of the variance. As seen in Table 1, Jewish students reported higher levels of this QOL variable than their Arab counterparts. Students who lived with their partner (M=3.97, SD=0.68) reported higher levels of this QOL variable than those who lived with their parents (M=3.74, SD=0.79) who reported higher levels of this QOL variable than those who lived alone (M=3.28, SD=0.87).

In the second step, social relationships were positively predicted by differentiation from their mother and from their partner and negatively predicted by the SFI-R gap score with these variables accounting for 13.5% of the variance. According to the model, social relationships increased with age, differentiation from mother and partner (SFI-R) and a higher level of satisfaction with differentiation of self (smaller gap).

Finally, age and ethnic group were also significant predictors of environmental aspects of quality of life, accounting for 7.7% of the variance. Again, Jewish students reported higher levels of environmental quality of

	Predictor	Subscales	*β*	*t*	*B*	F	*F change*	*Adj. R²*
Step 1	**Age**		-0.150	-2.65*	-0.008			
	Family status		0.151	2.65*	-0.33			
	Gender		---	0.45	0.021			
	Ethnic group		---	1.92	0.087			
	Living arrangement		---	-1.63	-0.096	17.84**	7.01*	0.069
Step 2	**Age**		-0.170	-3.13*	-0.009			
	Family status		0.103	1.88	0.088			
	SFI-R	gap	0.132	3.05*	0.094			
		maternal	---	-1.11	-0.028			
		paternal	---	-0.35	-0.020			
		parents	---	-0.04	-0.001			
		partner	-0.251	-5.78**	-0.110	20.36**	9.01**	0.145

Table 4: Hierarchical regression analyses, with trait anxiety as dependent variable and demographic and SFI-R as independent variables (N=457). * p<0.01, ** p<0.001.
Note: SFI-R=Scale of Satisfaction with Differentiation of Self–Revised (gap=ideal-actual; maternal=self with mother; paternal=self with father; parents=relations between parents; partner=self with partner).

	Predictor	Subscales	*β*	*t*	*B*	F	*F change*	*Adj. R²*
Physical health								
Step 1	**Age**		0.280	6.25**	0.016			
	Family status		---	-0.54	-0.034			
	Gender		---	0.89	0.040			
	Ethnic group		---	0.41	0.018			
	Living arrangement		---	0.42	0.018	39.11**	---	0.077
Step 2	**Age**		0.275	6.26**	0.016			
	SFI-R	gap	---	-2.25	0.094			
		maternal	---	1.47	0.040			
		paternal	---	-0.49	-0.013			
		parents	---	0.15	0.003			
		partner	0.201	4.61**	0.093	31.05**	21.28**	0.116
Psychological health								
Step 1	**Age**		0.269	5.98**	0.019			
	Family status		---	-0.55	-0.042			
	Gender		---	-1.24	- 0.068			
	Ethnic group		---	-1.05	-0.055			
	Living arrangement		---	1.22	0.063	35.72**	---	0.070
Step 2	**Age**		0.275	6.26**	0.016			
	SFI-R	gap	-0.156	-3.67**	-0.144			
		maternal	---	1.60	0.051			
		paternal	---	-0.20	-0.006			
		parents	---	0.83	0.020			
		partner	0.280	6.60**	0.157	32.57**	13.44**	0.171
Social relationships								
Step 1	**Age**		0.030	2.69*	0.003			
	Family status		---	-0.60	-0.059			
	Gender		---	2.31	0.163			
	Ethnic group		-0.135	-3.15*	-0.221			
	Living arrangement		0.243	5.33**	0.285	15.59**	---	0.080
Step 2	**Age**		0.090	2.10	0.008			
	Ethnic group		-0.157	-3.92**	-0.257			
	Living arrangement		0.186	4.26**	0.218			
	SFI-R	gap	-0.195	-4.79**	-0.247			
		maternal	0.156	3.36**	0.119			
		paternal	---	-0.20	-0.006			
		parents	---	0.83	0.020			
		partner	0.199	4.33**	0.157	23.93**	18.77**	0.215
Environment								
Step 1	**Age**		0.164	3.82**	0.011			
	Family status		---	0.42	0.035			
	Gender		---	-0.40	- 0.022			
	Ethnic group		-0.230	-5.36**	-0.279			
	Living arrangement		---	1.98	0.099	21.97**	---	0.077
Step 2	**Age**		0.184	4.54**	0.013			
	Ethnic group		-0.253	-6.17**	-0.307			
	SFI-R	gap	-0.158	-3.61**	-0.149			
		maternal	---	3.36**	0.119			
		paternal	---	-0.20	-0.006			
		parents	0.127	2.61*	0.058			
		partner	0.194	4.33**	0.113	24.28**	13.02**	0.188

Table 5: Hierarchical regression analyses, with WHOQOL subscales as dependent variable and SFI-R as independent variables (N=502). *p<0.01, **p<0.001. **Note:** SFI-R=Scale of Satisfaction with Differentiation of Self–Revised (gap=mean difference between actual and ideal; maternal=self with mother; paternal=self with father; parents=relations between parents; partner=self with partner).

life than did Arab students (Table 1). In the second step, environment was positively predicted by differentiation from parents and partner SFI-R and negatively predicted by the SFI-R gap score (t=-4.22, p<0.001), with these variables accounting for 11% of the variance. Environmental health rose with age, higher levels of differentiation from parents and partner (SFI-R) and satisfaction with differentiation of self.

Discussion

The primary aim of the present study – to build a reliable and valid self-report measure of differentiation of self, using a construct approach – was realized. In the revised version of the original SFI [2], a Likert-type scale was used, items were reworded, some items were added and the tool's multidimensional structure was improved.

We ran several tests to gather evidence of reliability and construct validity for the SFI-R. Exploratory factor analyses demonstrated support for the four factors of differentiation from mother, father and partner and between parents as empirically distinct dimensions of a single construct of differentiation of self. The good internal consistency results of the total score, the gap score and all subscale scores support the reliability of this instrument. It should, however, be noted that the first factor, which we called Maternal SFI-R could have included the question regarding the desired closeness/distance between the subject and their parents currently. We decided to omit it as the question dealt with parental relationship rather than a purely maternal one.

Construct validity was verified by examining correlations with three measures of the same construct of family patterns: the DSI-R, the DIFS and the IOS (convergent validity). The revealed associations between the SFI-R, on the one hand, and the DSI-R, DIFS and IOS, on the other, corroborate hypotheses 1-3 almost fully. Specifically, emotional reactivity was negatively associated with total SFI-R and three subscales (paternal, parental and partner). IP was positively associated with total SFI-R and all four subscales. Emotional cutoff was negatively associated with total SFI-R and all four subscales, and positively associated with the gap score. Fusion with others was positively associated with the total SFI-R and only with the maternal SFI-R. DIFS was positively associated with total SFI-R and all subscales, but not with the gap score. Finally, IOS was positively associated with total SFI-R and all subscales, and not associated with the gap score.

Two SFI-R scores predicted trait anxiety – differentiation from partner and the gap score (representing satisfaction with differentiation). This is a remarkable indicator of construct validity, because, according to Bowen theory [3], low levels of differentiation are linked to chronic anxiety. These results also reinforce previous findings that poorly differentiated people are more anxious and nervous [2,3].

Trait anxiety was also found to have a strong negative relationship with differentiation from partner (partner SFI-R). As stated by Bowen [24] spousal difficulties are generated when partners are poorly differentiated, and the subsequent reaction or cutoff intensifies their anxiety. Thus, relationships with partner can have great impact on trait anxiety. Another possible explanation for this result is that people who are not well differentiated and have unsatisfying differentiation of self are more reliant on significant others and are likely to experience intensified pressure in stressful situations, to which they respond with augmented emotional intensity. These are all likely to raise worry and anxiety levels and yield a series of physical and emotive symptoms.

In regard to QOL, significant ethnic differences were found: Jews reported higher levels of social and environmental aspects of quality of life than Arabs. Living arrangements also impacted social aspects of quality of life with students living with a partner having higher levels of social QOL than those living alone. In addition, all four subscales of QOL were predicted by age, with older respondents reporting greater quality of life. This might be explained by the better financial situation that tends to come with age, or to being more settled and having less anxiety. In addition, it is possible that Jewish people, being part of the majority, enjoy better conditions financially and socially.

As expected, SFI-R scores predicted the various aspects of quality of life. Specifically, partner SFI-R were positively related to physical health. The other three subscales of QOL (psychological health, social relationships and environment) were positively related to interconnectedness with partner and negatively associated with the SFI-R gap score (i.e., positively related to satisfaction with differentiation of self).

Several models describe the relationships between health and QOL in adults [33-36]. Most of these models emphasize assessing quality of life from the perspective of the individual, based on the proposition that alterations in health status affect other conditions in life, such as physical and psychological functioning and social and environmental conditions [34-36]. The current study sheds light on the relation between quality of life and differentiation of self and family differentiation – an association that is new to the literature, to the best of our knowledge.

It is important to note that the current study used several tools to measure differentiation. The new instrument was found to predict quality of life, providing important psychometric support for the SFI-R.

Interestingly, age was positively correlated with the SFI-R total score, the SFI-R gap score and maternal and paternal SFI-R, as well as trait anxiety and each of the quality of life subscales. This suggests that older adults maintain more balanced relationships, are more satisfied with their relationships, enjoy better quality of life and experience lower levels of trait anxiety.

Bowen [1] asserted that there are no gender differences in terms of levels of differentiation of self. Indeed, no differences were found between men and women in the current study in scores for the SFI-R, the DSI-R or trait anxiety. However, women reported higher levels of DIFS, suggesting that they enjoy a higher level of differentiation from partners than men. This may possibly be traced to the feminist revolution, which led to more women having professional careers, independence and liberty [7]. Perhaps these changes have encouraged women to stand their ground in their personal relationships and to express their wishes more assertively and clearly. This interesting supposition merits further investigation.

As for ethnic differences, Jewish students reported higher levels of DIFS and paternal SFI-R, as well as lower levels of inclusion of others in the self, than their Arab counterparts. This indicates that Jewish participants enjoyed higher levels of differentiation from partner and interconnectedness with father and lower levels of closeness. These differences can be explained by social norms in Arab society, where traditional collective values dominate. Emphasis is placed on preserving social ties, honor and devotion to one's parents, and commitment to social values and norms, such as the woman's concern for the home and the children, while the husband's role is as head of household [37]. According to these norms, Arab family members are expected to be closer to their families and to respect the father as head of the family. Relationships between father and offspring tend to be more distant, and decision-making depends on the consent of the father [7,14,38].

Research limitations and implications

Some shortcomings of the current study need to be noted. First, although efforts were made to sample a large heterogeneous group of adults, it is difficult to generalize our findings; different samples may yield different results in the exploratory factor analysis. In fact, analysis of men and women separately revealed that the integrity of the factors remained in women but not in men. This may be due to the small number of men in the sub sample rather than a flaw in the instrument.

We found a similar result when we divided the sample into young (<25 yrs) and old (≥25 yrs) students. The exploratory analysis factors were valid in the young students but not in the old. Again, this may be due to the lack of older students.

Further investigation, with similar-sized gender and ethnic groups, is needed to provide cross-validation of the SFI-R for gender and cultural differences and to test the assumption that differentiation of self is universally applicable. In addition, the instrument requires further empirical validation and psychometric revision for adolescents and children, to shed light on those populations to which outcomes may be generalized.

Second, while test-retest reliability estimates were obtained for the original version of the SFI [2], we did not examine them for the SFI-R in the current research. Future studies of the instrument need to include such analyses.

Third, given that all our instruments were subjective and depended solely on self-reports, other unmeasured variables could have confounded the reported correlations. As mono-method bias may lead to errors, further support for the validity of the SFI-R is needed through structured clinical interviews. If the therapists' assessments closely replicate their clients' self-reported scores, such a result would further strengthen the measure's construct validity.

Forth, item 10 in the SFI-R needs to be reexamined due to low weight in the factor analysis.

Finally, the correlations of SFI-R with IOS could be reflecting method variance since both measures use circles. Yet, it is very important to examine the correlations with another projective instrument.

Notwithstanding the above limitations, the current study offers several contributions to existing research. Taken as a whole, our results support Bowen's [1] contention that differentiation of self is an important aspect of psychological well-being. Further, theoretically, this research offers new insights into the association of quality of life and trait anxiety with familial characteristics, particularly differentiation from partner. Methodologically, it provides proof of consistency in the SFI-R measure, raising the possibility that it can be utilized to explore differentiation of self and satisfaction with it in clinics and in research. The SFI-R offers investigators who study Bowen's Family System Theory a tool that may supplement the DSI-R, DIFS and IOS. Indeed, in the current study, some of the SFI-R subscales were good predictors of trait anxiety and quality of life. It is likely that the use of a visual instrument enabled participants to express their feelings and family relationships more intuitively.

The study findings have important implications. The SFI-R has proven to be an effective, easy to use and brief measure with which to analyze differentiation of self, and it can be administered to young people (items 1-12) as well as adults. It is therefore valuable for psychologists, family therapists and researchers alike. Specifically, it is proposed that, in order to improve quality of life, one should attempt to enhance differentiation of self. For instance, our findings suggest that therapists may help patients improve their relationships by focusing on differentiation from partner. Furthermore, the SFI-R may provide a means for classifying individual differences in various aspects of differentiation of self that are ostensibly stable and essential to a patient's intra-psychic well-being. As the construct of differentiation of self is multidimensional, comparative analysis of a client's scores on SFI-R subscales may also help pinpoint his/her strengths and weaknesses, as well as which dyadic relationship should be treated first (father, mother, partner). Finally, embellishing on Skowron and Friedlander's [3] suggestion, it is recommended to examine whether families could benefit from counseling that incorporates use of the SFI-R. The scores of family members on the four SFI-R subscales, as well as the gap score, can be used to plan therapy goals before treatment and to examine their post-therapy achievements.

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