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Evaluation of the Decisional Fatigue Scale Among Surrogate Decision Makers of the Critically Ill

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Abstract

Intense emotional distress and impaired information processing have been implicated in reducing a surrogate decision maker's ability to formulate informed healthcare decisions for a critically ill patient. The heightened intensity of negative emotions, mental effort, and impaired judgment is consistent with the manifestation of decision fatigue. The aim of this article is to describe the validity and reliability of the Decision Fatigue Scale (DFS) among surrogate decision makers of the critically ill. A convenience sample of 101 surrogate decision makers were administered the DFS and a battery of psychosocial instruments at two time points. The DFS was specified as a unidimensional measure with adequate internal consistency (Cronbach's alpha = 0.87, 0.90) and stability reliability. Discriminant validity was established with measures of emotion regulation, anxiety, and depressive symptoms. The DFS is the first subjective measure of decision fatigue for surrogate decision makers of the critically ill that demonstrates satisfactory psychometric properties.

Keywords

decision fatigue; reliability and validity; surrogate decision makers; exploratory factor analysis

Making health and healthcare decisions is a complex and cognitively taxing process performed by patients and, in some cases, their surrogate decision makers (Nelson et al., 2017). Researchers and clinicians in the fields of decision and nursing science routinely use explanatory paradigms for health and healthcare decision making under uncertainty that have neglected the notion that decision makers have a finite capacity for processing information, including their emotions, which can significantly alter the quality of their health and healthcare decision making ability (Hagger, Wood, Stiff, & Chatzisarantis, 2010; Tice, Baumeister, Shmueli, & Muraven, 2007). New linkages among brain function, cognition, and emotion regulation have led to a better understanding of the impact of a relatively novel construct, *decision fatigue*, which can affect an individual's ability to select a course of action or judgement (Baumeister, 2002a, 2014). The manifestation of decision fatigue, a state of cognitive and emotion dysregulation, is a shift from conventional nursing and decision science paradigms towards dual-process models of decision making that underscore

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a competing relationship between emotional and cognitive processing among individuals that significantly influences the quality of their decision making (Baumeister, 2014). Despite a growing body of empirical evidence of the presence of decision fatigue, there are no published self-report instruments that capture the intensity of decision fatigue among individuals who are faced with healthcare decisions under conditions of risk and high uncertainty.

In the intensive care unit (ICU), surrogate decision makers of critically ill patients are often asked to make high-stakes decisions about life-sustaining critical care. Under conditions of heightened psychological stress and uncertainty, surrogate decision makers, commonly spouses, adult children, or legal proxies, will assume this role on behalf of a decisionally impaired patient. For individuals who are abruptly placed in the role of a surrogate decision maker, acquisition and performance of their new role is unanticipated and with little, if any, preparation. Camhi et al. (2009) reported that less than 20% of long-term critically ill patients had a designated surrogate decision maker or possessed advanced directives on admission to an ICU. Adding to the psychological insult of surrogate decision makers is the repetitive and tumultuous states of uncertainty and emotional distress (i.e., stress, anxiety, and depression) that alter the efficiency of their cognitive function and the quality of their subsequent judgments (Hickman & Douglas, 2010; Hickman, Daly, & Lee, 2012; Wendler & Rid, 2011). The persistent states of heightened emotional distress can erode a surrogate decision maker's internal and external adaptive resources, resulting in a state of *ego depletion.* Individuals who experience ego depletion have an amplified likelihood of myopic decisions, which in this context holds significant implications for the critically ill patient and the surrogate decision maker (Hartley & Phelps, 2012; Loewenstein & Lerner, 2003; Yuen & Lee, 2003). Surrogate decision makers of the critically ill experience heightened states of emotional distress and ego depletion, which is suspected to make them susceptible to decision fatigue and healthcare decisions that may not align with the patient's preferences.

Purpose

In the ICU, surrogate decision makers make a variety of high stakes decisions about the care of a critically ill patient while experiencing decision fatigue. Despite corroborating evidence acknowledging the manifestation of decision fatigue among surrogate decision makers of the critically ill, there are no reliable or valid measures of this construct. Therefore, the purpose of this article is to present the preliminary construct validity and reliability estimates of the Decision Fatigue Scale (DFS) among surrogate decision makers of the critically ill.

Theoretical Premise and Scale Construction

Decision fatigue, a condition that manifests as a result of mental exhaustion, impaired emotion regulation, and dysregulated cognitive processing that predisposes individuals to erratic decision making behavior, is derived from the Strength Model of Self-Control posited by Baumeister, Bratslavsky, Muraven, & Tice (1998). Baumeister et al. (1998) describe the psychological and behavioral consequences associated with volitional acts of executive function, such as self-control, making choices, and initiating action, that affect the efficiency of cognitive processing and the effectiveness of decision making behaviors. Ego depletion is a temporary partial or total reduction in the self's capacity or willingness to engage in an action (e.g., decision making) as a result of reduced psychological and cognitive resources exhausted by prior volitional acts and emotion regulation deplete these finite, but replenishable, resources within the self, which impairs an individual's ability to engage in subsequent activities, such as making a health or healthcare decision (Baumeister & Vohs, 2007; Baumeister, 2002a). Given the reproducibility of the effects of ego depletion across experimental studies (Hagger et al., 2010) and a several descriptive studies (Ahrens, Yancey, & Kollef, 2003; Azoulay et al., 2000, 2004; Nelson, Kinjo, Meier, Ahmad, & Morrison, 2005) providing corroborating evidence of decision fatigue among surrogate decision makers of the critically ill, the logical and warranted next step was to establish a self-report measure of decision fatigue.

Scale Development

The construction of the DFS was guided by Baumeister et al.'s (1998) Strength Model of Self-Control and extant literature on decision making under risk and uncertainty. Conceptually, the authors constructed the DFS to capture the dominant features of decision fatigue: altered emotional regulation and cognitive processing, increased mental effort expended to make decisions, and impulsive decision making. It is intended to be a brief, subjective measure that can be easily administered across settings and types of decisions. The initial DFS was initially developed by the authors and consisted of 13 items. Subsequently, individual interviews with scientific experts in the fields of ethics and behavioral decision making, and surrogate decision makers of critically ill patients, were conducted to assess content validity. During the interviews, these content experts were asked to affirm that the scale items represented the dominant features of decision fatigue, and they provided feedback for revising the phrasing of the scale's items. Based on their recommendations, three items were removed, resulting in the 10-item version of the DFS used in this psychometric evaluation.

The 10-item version of the DFS was evaluated in this report. It was designed as a unidimensional measure to capture the influence of dysregulation in emotion regulation (emotional distress), cognitive processing (mental exhaustion), and impulsive decision making (behaviors) as perceived by the respondent across one week. Having the respondents recall their level of decision fatigue perceived across a specified period of time overcomes the within and between-day variations in decision fatigue severity (Norquist, Girman, Fehnel, Demuro, & Santanello, 2012). Respondents were prompted to reflect on how they felt when making decisions during the last week and endorse the scale items on a 4-point Likert scale from 0 (strongly disagree) to 3 (strongly agree). Total scores for the DFS are derived by summing the scale items, and the range of total scores is 0 to 30; higher total scores are posited to correlate with the intensity of perceived decision fatigue by the rater.

The DFS was intended to be easily administered using conventional interview formats and comprehended by individuals with low literacy. According to the Flesch-Kincaid readability tests, the 10-item DFS is fairly easy to read (Flesch reading ease score of 73% range: 0% = very difficult to 100% = very easy to read). Further, the Flesch-Kincaid grade level estimate indicated that the DFS scale items can be read and comprehended by individuals with a 5th

grade U.S. education level or higher (Kincaid, Fishburne, Rogers, & Chissom, 1975). Thus, the DFS has been conceptualized as a brief, subjective measure of decision fatigue that can be easily administered across individuals with varied levels of education and literacy.

Methods

Design

This psychometric evaluation used data generated from a descriptive correlational study of surrogate decision makers of decisionally impaired patients verified by an attending physician or advanced practice nurse in an ICU. Surrogate decision makers were administered a battery of psychosocial measures, such as the DFS, the Emotion Regulation Questionnaire (ERQ), the Hospital Anxiety Depression Scale (HADS), Decision Conflict Scale (DCS), and a neurocognitive task, approximately 24-96 hours following the presentation of a healthcare decision by the critical care team (T1), and administered the battery of self-report measures eight weeks later (T2).

Sample

A convenience sample of 101 surrogate decision makers was recruited from one of three (i.e., surgical, medical, and neurosciences) ICUs at an academic medical center located in Northeast Ohio. All participants met the following eligibility criteria: (1) aged 18 years or older, (2) able to understand English, (3) the next of kin or legal representative for healthcare decision making for a decisionally impaired patient (i.e., Glasgow Coma Scale Motor score < 6 and Eye response score <3) who required three continuous days of acute mechanical ventilation and a healthcare decision (e.g., tracheostomy, hemodialysis, gastrostomy, artificial nutrition, do-not-resuscitate [DNR] order, or surgical procedure). Individuals were excluded from participating if they: (1) had a preexisting psychiatric disorder with current medication and/or psychotherapy, (2) history of a neurocognitive impairment, or (3) profound vision and/or hearing impairment that would preclude variable measurement.

Instruments

Subjective measures of emotion regulation, emotional distress (e.g., anxiety and depressive symptoms), and decision conflict were used in this psychometric evaluation to assess the discriminant validity of the DFS with the following well-established psychosocial measures:

Emotional Regulation Questionnaire—The Emotion Regulation Questionnaire (ERQ) is a 10-item instrument measuring the degree to which an individual uses two specific emotion regulation strategies. The first strategy, *cognitive reappraisal,* refers to the construing of a potentially emotion-laden situation in a way that changes its emotional impact (Gross & John, 2003; Lazarus & Alfert, 1964). The second strategy, *expressive suppression,* refers to the inhibition of emotionally expressive behavior (Gross & John, 1998, 2003). The ERQ does not call for the calculation of a total score; instead, scoring is kept continuous, and mean subscale scores are calculated. Six items of the ERQ pertain to cognitive reappraisal and the four remaining items capture behaviors associated with expressive suppression. Individuals rate how much they agree or disagree with the items by using a 7-item Likert scale, with “1” indicating “strongly disagree,” “4” indicating “neutral,” and “7” indicating “strongly agree” (Gross & John, 2003). Higher subscales scores are indicative of higher intensity in the use of cognitive reappraisal and expressive suppression for emotion regulation.

The ERQ has established validity and reliability, and demonstrates appropriate convergent and discriminant validity with the Big Five personality dimensions (John & Srivastava, 1999; Gross & John, 2003). Internal consistency reliability coefficients have been sufficient: cognitive reappraisal (Cronbach's alpha of 0.85) and expressive suppression (Cronbach's alpha of 0.73). In this sample of surrogate decision makers, the ERQ internal consistency reliability estimates were 0.85 and 0.73 for the cognitive reappraisal and expressive suppression subscales, respectively.

Hospital Anxiety and Depression Scale—The Hospital Anxiety and Depression Scale (HADS) is a 14-item measure of anxiety and depressive symptoms among adults. As developed by Zigmond and Snaith (1983), this instrument has two subscales (each with seven items) that assess symptoms associated with generalized anxiety and depression. Each item reflects a symptom associated with either anxiety or depression, and a Likert-type scale is used to score the items (range 0-3). The items of the HADS can generate (1) a total score reflective of an individual's psychological distress, (2) a subscale score for anxiety symptom severity, and (3) a subscale score for depressive symptom severity. To generate scale scores, items are summed, and higher scores indicate higher intensity of the individual's symptoms.

The HADS is a reliable and valid measure of anxiety and depressive symptoms. Across several clinical studies, anxiety and depression subscale scores had sufficient internal consistency reliability coefficients (Cronbach's alpha of 0.76 to 0.89, and 0.76 to 0.87, respectively) (Aben, Verhey, Lousberg, Lodder, & Honig, 2002; Johnston, Pollard, & Hennessey, 2000; Olssøn, Mykletun, & Dahl, 2005; Rodgers, Martin, Morse, Kendell, & Verrill, 2005). Furthermore, the HADS possesses concurrent validity with the Beck Depression Inventory and Spielberger's State-Trait Anxiety Inventory (Bjelland, Dahl, Haug, & Neckelmann, 2002). In this sample, the anxiety (Cronhach's alpha of 0.86) and depression (Cronhach's alpha of 0.79) subscales of HADS had sufficient internal consistency estimates.

Decisional Conflict Scale—The Decisional Conflict Scale (DCS) is a measure of the uncertainty about a course of action or judgment. According to O'Connor (1994), the DCS is a 10-item self-report measure that has three subscales (uncertainty, factors contributing to uncertainty, and perceived effectiveness of decision making). Each of the 10 items are measured on a 3-point Likert scale: 0 “yes”, 1 “unsure”, or 2 “no”. A total score and subscale scores are calculated by summing items, dividing by 10, and then multiplying by 25 to produce scores that range from 0 (no decisional conflict) to 100 (extremely high decisional conflict). In the present study, a total decisional conflict score was calculated as described.

According to O'Connor (1994), the DCS has adequate internal consistency (Cronbach's alpha of 0.83 - 0.86) and test-retest reliability ($r = 0.81$ across two weeks). Additionally, the DCS has established construct, convergent, and discriminant validity among patients making end-of-life care decisions (Song & Sereika, 2006). In this sample of surrogate decision makers of the critically ill, the internal consistency reliability of the DCS was 0.67.

Procedures

Prior the initiation of the study screening and recruitment procedures, institutional review board approval (IRB) was obtained. Screening consisted of a two-staged process to determine a patient's eligibility conducted by research assistants each weekday to eligible patients. Once a patient was deemed eligible for this study, the research assistant approached the attending physician or nurse practitioner providing care to the patient to: (1) verify the patient's cognitive status, (2) confirm that the patient has an available surrogate decision maker, and (3) determine if the critical care team had presented a healthcare decision to the surrogate decision maker. If the critical care team confirmed the eligibility status of the patient and identified a surrogate decision maker, the attending physician or nurse practitioner introduced the research assistant to the eligible surrogate decision maker. At that time, the research assistant conducted secondary eligibility screening of the surrogate decision maker, and if that individual remained eligible to participate, the research assistant asked for written informed consent.

All subjective data were collected through structured interviews (e.g., face-to-face or via telephone). Each interview was approximately 45-60 minutes and, on average, the DFS was completed in less than 5 minutes. Participants who completed an interview received a $20 gift card to a retailer of their choice. The data generated by the conduct of this research was directly entered by a research assistant into the Research Electronic Data Capture (REDCap) system (Harris, Taylor, Thielke, & Payne, 2009) and then exported to the Statistical Package for the Social Sciences (SPSS) for data analysis.

Approaches to the Assessment of Validity & Reliability

Using SPSS, the statistical approach was carried out in three stages. In the first stage of the statistical analysis, descriptive statistics (e.g., frequencies, means, and standard deviations) were conducted to describe the sample characteristics and the endorsement of the scale items. The second stage consisted of the conduct of an exploratory factor analysis and assessments of the bivariate correlation coefficients among the total scores of the Decision Fatigue Scale, Emotion Regulation Questionnaire, Hospital Anxiety Depression Scale, and Decision Conflict Scale were used to assess discriminant validity with the DFS. In the final stage, evaluation of the internal consistency reliability of the DFS was assessed by interpretation of the Cronbach's alpha coefficients. A detailed review of the statistical approaches used to determine the construct validity and internal consistency reliability is provided hereafter.

Construct Validity—Two forms of validity, *factorial* and *discriminant,* were evaluated for the DFS among surrogate decision makers of the critically ill. A form of construct validity, *factorial validity* is the comparison of the theoretical and empirical organization of instrument items, which are most often assessed through the conduct of an exploratory factor analysis (EFA; Bagozzi, Yi, & Phillips, 1991; Nunnally & Bernstein, 1978, p.111). Conceptually, the DFS was designed as a unidimensional measure of decision fatigue that captures several dimensions of decision fatigue. Therefore, the authors conducted an EFA using principal axis factoring as the extraction method with a nonorthogonal rotation, *direct oblimin rotation,* to evaluate the interrelatedness of the scale items within latent dimensions (or factors) of the DFS.

Exploratory Factor Analysis—Several procedures were implemented to ensure the quality of the exploratory factor analysis. Prior to the determination of factor structure of the DFS, an assessment of the sample adequacy was performed. The Kaiser-Meyer-Olkin (KMO) test [KMO = 0.83] and Bartlett's test of sphericity [$\chi^2 = 395.1$, $p < .001$] were used to verify the adequacy of the 10:1 ratio of participants ($N = 101$) to the total number of scale items ($n = 10$). Based on these statistics, the sample size of 101 subjects was sufficient to proceed with the conduct of the EFA.

Specification of Factor Structure—Inspection of the Cattell's scree plot, a graphical representation of eigenvalues plotted in descending order, and the application of the K1 method proposed by Kaiser (1960), which specifies that only factors with eigenvalues greater than one are retained for interpretation, were used to specify the number of factors (dimensions) to retain.

Item Retention—Items with primary factor loading coefficients > 0.40 were retained and items with secondary factor loading coefficients >0.20 were not retained. For those items that did not meet the retention criterion, each item was sequentially removed and the EFA repeated until a parsimonious factor structure was identified that compromised of items that met the item retention criterion. In the event that more than one factor was identified for the DFS factor structure, a thematic analysis of the content of the items within a factor was planned to label each factor.

Assessment of Discriminant Validity—According to Zait and Bertea (2011), discriminant validity assumes that constructs which are not alike will not have a strong statistical association. Discriminant validity was evaluated after identification of the most parsimonious factor structure revealed by the conduct of the EFA. Given the hypothesized positive relationships among decision fatigue, impaired emotional regulation, severity of anxiety and depressive symptoms, and decisional conflict, it was assumed that discriminant validity would be confirmed if the scores for these constructs produced bivariate correlation coefficients of $|r| < 0.70$ (Zait & Bertea, 2011).

Evaluation of Internal Consistency and Stability Reliability—The internal consistency and stability (test-retest) reliability of the DFS was determined by assessing the Cronbach's alpha and correlation coefficients. Using a conventional approach, an alpha coefficient was calculated. In this study, a conventional criterion to confirm sufficient internal consistency reliability was an alpha coefficient equal to or greater than 0.70 (Nunnally & Bernstein, 1978). The stability reliability was assessed by the examination of the correlation coefficients between the total DFS scores at baseline and eight weeks after the baseline interview. Given the hypothesized variance in decision fatigue across time, the authors selected the a priori criterion of $r > 0.30$ between the DFS total scores across eight weeks.

Results

Sample Characteristics

One hundred one surrogate decision makers were recruited to participate in this study. A significant proportion of the sample consisted of female (63%), White (70%), spouses (42%), or an adult child (34%) of a critically ill patient. Participants were recruited from three ICUs: surgical (33%), medical (38%), or neurosciences (29%). The mean of age of participants was 55 years (*SD* = 13.7). Participants were modestly educated (97% had earned a high school diploma or an equivalent). The majority of participants (77%) made decisions about treatments or procedures (e.g., tracheostomy, feeding tubes, surgical procedures, and central line placement) and approximately one-quarter of participants (23%) were responsible for making an end-of-life care decision for a critically ill patient.

As anticipated at baseline, participants reported normative states of emotional regulation (suppression subscale: *M* = 3.2, *SD* = 1.4; reappraisal subscale: *M* = 5.0, *SD* = 1.4), a modest level of anxiety (*M* = 7.8, *SD* = 4.7), normal severity of depressive symptoms (*M* = 3.9, *SD* = 3.8), and low states of decisional conflict (*M* = 3.5, *SD* = 5.6). Additional sample characteristics are presented in Table 1.

Descriptive Scale and Item Statistics

Descriptive scale and item statistics were estimated for the 10-item version of the DFS (Table 2). The mean DFS scores at baseline (T1) and eight-weeks post-baseline (T2) were 5.2 (*SD* = 4.0) and 6.8 (*SD* = 5.0), respectively. Across the time points, the mean item scores ranged from 0.37 to 1.2 (*SD* range: 0.54 to 0.83). The item scores were relatively distributed normally at T1 and T2, skewness = 0.22, 0.46; and kurtosis = -0.97, -0.20. Based on these findings, scale and item scores indicate a floor effect in the DFS scores in this cohort of surrogate decision makers.

Evaluation of Construct Validity

To evaluate construct validity, an EFA (exploratory factor analysis) and assessment of the correlation coefficients between the scores of the DFS and established psychosocial measures were conducted to confirm the structural and discriminant validity of the DFS. The evaluation of the structural validity of the DFS identified that the most parsimonious structure was a single factor (unidimensional) consisting of nine items. Item seven of the 10-item version of the DFS, “I have made decisions quickly in order to move on,” was removed because it did not load. The remaining nine scale items all loaded on a single factor (eigenvalue of 4.5) and accounted for 49% of the explained variance in the latent construct, decisional fatigue. The factor loading coefficients for the 9-item version of the DFS are presented in Table 3.

The 9-item DFS has sufficient discriminant validity with established measures of emotion regulation, anxiety, and depressive symptoms. At baseline, the bivariate correlation coefficients between the DFS and measures of decisional conflict, emotion regulation, and negative affect were: the DCS score ($r = 0.23$, $p = 0.02$), suppression ($r = 0.35$, $p > .001$) and reappraisal ($r = -0.03$, $p = 0.79$) subscale scores of the ERQ, as well as the anxiety ($r = 0.28$,

$p = 0.01$) and depression ($r = 0.09$, $p = 0.36$) subscales of the HADS. All of these bivariate correlation coefficients between the DFS scores and established instruments met the criterion for discriminant validity ($|r| < 0.70$).

Internal Consistency and Stability Reliability

Internal consistency and stability (test-retest) reliability of the 9-item DFS was confirmed through the interpretation of the Cronbach's alpha and bivariate correlation coefficients across an eight-week period. The DFS had sufficient internal consistency reliability, with Cronbach's alpha coefficients of 0.87 and 0.90 at T1 and T2, respectively. Across eight weeks, the total scores were stable ($r = 0.56$, $p <.001$) and met the a prioricriterion of $r >$ 0.30. Thus, the modified 9-item version of the DFS achieved sufficient internal consistency and stability reliability estimates.

Discussion

Decision fatigue is a construct that can manifest from psychologically and cognitively taxing conditions, and contributes to self-regulatory failure and diminished decision making quality. Given its theoretical linkages to health and healthcare decision making, decision fatigue is a relatively novel construct that may provide new insights on why people choose to engage in certain behaviors or choose a course of action. Despite the broad application of this construct, there has been minimal effort made to develop a self-report measure of decision fatigue. This article presents the reliability and validity of the Decision Fatigue Scale (DFS), the first self-report measure of decision fatigue, in a cohort of surrogate decision makers who have made a healthcare decision for a critically ill patient.

As a unidimensional measure, the DFS is valid and reliable among surrogate decision makers of the critically ill. An EFA was conducted to assess the factor structure of the 10-item DFS. The findings from the EFA revealed that the most parsimonious factor structure was a 9-item, single factor solution. To further examine the validity of the modified, 9-item version of the DFS, discriminant validity assessments were conducted between DFS scores and scores of two reliable and valid measures of emotional regulation and decisional conflict. Based on the a priori criterion for discriminant validity, the DFS was established to possess sufficient discriminant validity with subscales scores of the Emotion Regulation Questionnaire (ERQ) and the Hospital Anxiety Depression Scale (HADS), as well as the total scores of the Decisional Conflict Scale (DCS). Additionally, the valence (e.g., positivity or negativity) of the correlation coefficients between the DFS scores and the ERQ, HADS, and DCS scores were as hypothesized.

The reliability of the modified version of the DFS was captured through the assessments of internal consistency and stability (test-retest) reliability. Our reliability estimates confirmed that the modified DFS had satisfactory internal consistency and stability reliability across eight weeks. Yet, with no prior subjective measure of decision fatigue available, we are unable to comparatively evaluate the DFS with other measures of decision fatigue or its performance across clinical populations at this time. This article provides the initial psychometric data that establishes the 9-item version of the DFS as a valid and reliable measure of decision fatigue among surrogate decision makers of the critically ill.

Decision fatigue is a construct that varies across time. However, the construction of the DFS may have contributed to recall bias, resulting in a floor effect in the measurement of decision fatigue across time. In the present study, there was a relatively low intensity of decision fatigue at baseline and eight weeks in this cohort of surrogate decision makers, as evidenced by the mean total DFS scores and the range of the scores. Despite the relatively low intensity of decision fatigue, there was a modest increase in decision fatigue among surrogate decision makers across the eight-week period. This trend in the intensity of decision fatigue is consistent with the theory underpinnings of the construct and a body of empirical evidence that adds credence to our suspicion that individuals exposed to psychologically and cognitively taxing conditions for prolonged periods of time can experience self-regulatory failure, cognitive burden, and chronic states of negative affect (e.g., depression, anxiety), which has been posited to precipitate symptoms of decision fatigue. As suspected, the intensity of decision fatigue varied across time, which likely a response to the magnitude of noxious stimuli (e.g., stress, anxiety, depression, grief, sleep deprivation) that enhance an individual's state of cognitive and psychological burden.

The construction of the DFS aimed to account for the daily variation in decision fatigue and may have contributed to the low intensity of decision fatigue reported in this cohort of surrogate decision makers. Recall bias may account for the low self-report ratings of decision fatigue demonstrated in this sample. It is our supposition that asking the respondent to reflect on their level of decision fatigue across a week attenuated the daily variations in the rating of decision fatigue and produced recall bias. To address recall bias, previous studies have recommended shortening the interval of recollection to enhance validity and accuracy of the desired data (Kjellsson, Clarke, & Gerdtham, 2014). Another plausible contributor to the floor effect is that two-thirds of this sample of surrogate decision makers reported prior decision making experience on the behalf of another individual. It is plausible that prior performance in the surrogate decision maker role resulted in cognitive and psychological priming that may have contributed to the lower than anticipated scores on the DFS. Nonetheless, we recommend that instructions to the respondents be augmented to address recall bias and instructions that prompt the respondents to reflect on how they felt across the last 24 hours be used in future studies which use this scale to capture decision fatigue.

This psychometric evaluation of the DFS has several limitations. The first limitation is relatively small sample size ($N = 101$). Although the sample size provided the minimum number needed to conduct an EFA, a larger sample size would provide more than sufficient statistical power for the assessments of construct validity and reliability. The second limitation is the lack of diversity of the sample, which affects the external generalizability of the findings. Despite this lack of diversity, the sample does adequately represent the characteristics of surrogate decision makers of the critically ill. Lastly, the likelihood of recall bias due to the original scale's instructions prompted participants to reflect on their intensity of decision fatigue across a week. The rationale for the instructions to recall symptoms of decision fatigue was to mitigate the effects of time on a participant's report of decision fatigue. However, based on the floor effect demonstrated, the authors recommend a shorter recall period or simply asking the participant how they feel at the moment in an effort to reduce recall bias and the likelihood of measurement error. Despite these limitations, this report provides preliminary evidence that the modified version of the DFS is a reliable and valid self-report measure which captures the intensity of decision fatigue in a cohort of surrogate decision makers.

Given the promise of this new measure of decision fatigue to the advancement of nursing and behavioral science, the authors recommend that the modified version of the DFS be used as a tailoring variable in future interventional research or to describe the effectiveness of decision support interventions. Although this preliminary investigation provides evidence to support its use in a clinical population of surrogate decision makers who have contemplated a healthcare decision for a critically ill patient, the DFS has been constructed for use for any individual faced with selecting a course of action under conditions of uncertainty, broadening its applicability beyond the context of health and healthcare decisions.

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Table 1

Sample Characteristics (*N* = 101)

Variables	*n* (%)
Gender	
Female	63 (62.4)
Male	38 (37.6)
Race/Ethnicity	
White	71 (70.3)
Non-White	30 (29.7)
Relationship to Patient	
Spouse	42 (42)
Child	34 (34)
Guardian/Durable Power of Attorney	11 (11)
Other Relative	13 (13)
Education	
High school or less	26 (26)
1-4 Years of College	63 (63)
Graduate studies	10 (10)
Employment Status	
Employed	58 (58)
Retired/Disabled	28 (28)
Unemployed	10 (10)
Annual Household Income	
$20,000 and less	12 (12)
$21,000 to $49,999	28 (28)
$50,000 and greater	58 (58)
Marital Status: Yes	66 (65)
Prior Decision Making Experience: Yes	56 (55)

Table 2

Item Statistics for the Decisional Fatigue Scale

	T1 (*n*=100)		T2 (*n*=68)	
Scale Items	***M***	***SD***	***M***	***SD***
1. I can't make a decision because I am too tired and stressed.	.56	.57	.84	.73
2. Making decisions is difficult because I can't concentrate.	.69	.72	.96	.91
3. It is hard for me to take in information and use it to make decisions.	.63	.66	.79	.72
4. I don't have enough confidence in myself to make good decisions.	.55	.69	.60	.69
5. It takes too much effort to make decisions.	.49	.60	.75	.78
6. Someone else should make decisions for me.	.37	.54	.50	.61
7. I have made decisions quickly in order to move on.	1.0	.91	1.2	.83
8. I can't make up my mind about which option is best.	.77	.69	.90	.69
9. I have made decisions without carefully thinking about them.	.53	.66	.68	.72
10. My mood has made it difficult for me to make decisions.	.63	.63	.79	.68

Note. The internal reliability consistency (Cronbach's alpha) coefficients for the initial 10-item version of the Decision Fatigue Scale was 0.83 at baseline (T1) and 0.87 two months later (T2), respectively. The mean total scores for the 10-item version of the Decision Fatigue Scale were 5.2 (*SD*= 4.04) and 6.8 (*SD* = 4.91).

Table 3

Unidimensional Factor Structure of the Decision Fatigue Scale (*N*=101)

Items	Factor 1
5. It takes too much effort to make decisions.	.84
2. Making decisions is difficult because I can't concentrate.	.74
10. My mood has made it difficult for me to make decisions.	.72
3. It is hard for me to take in information and use it to make decisions.	.70
I can't make a decision because I am too tired and stressed.	.67
8. I can't make up my mind about which option is best.	.63
4. I don't have enough confidence in myself to make good decisions.	.58
6. Someone else should make decisions for me.	.57
9. I have made decisions without carefully thinking about them.	.42

Note. Extraction method was principal axis factoring with oblique rotation (direct oblimin rotation using the following parameters: $\delta = 0$, $\kappa = 4$). According to a priori criteria for item retention, Item seven, “I have made decisions quickly in order to move on,” was removed. The internal consistency reliability (Cronbach's alpha) is 0.87 for the 9-item version of the Decision Fatigue Scale.