A preliminary investigation of dissociation between subjective cognitive complaints and objective cognitive impairments in female patients with fibromyalgia: a role of information processing speed

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Abstract

Objective

Fibromyalgia (FM) is a chronic condition characterised by widespread pain, and cognitive difficulties represent one of the most common symptoms of FM. However, subjective cognitive complaints (SCC) may not necessarily indicate significant abnormalities in objective cognitive performances, and there is limited research investigating the relationship between these two aspects. This study thus aims to analyse the differences between SCC and objective cognitive performance in FM patients and to explore their associations.

Methods

A total of 32 FM female patients (age: 50.91±7.06; years since diagnosis: 4.34±4.53) recruited in this study underwent a comprehensive assessment covering four domains: pain, depression, trait anxiety, SCC, and objective cognitive functions (memory, executive function, and information processing speed).

Results

Eighty-seven percent of patients experienced significant negative impacts from pain; meanwhile, 91% and 62% showed marked tendencies towards trait anxiety and depression, respectively. Additionally, 56% of patients reported significantly higher levels of SCC. However, less than one-third of patients demonstrated impairments in various cognitive functions. SCC significantly correlated with pain intensity, depression, information processing speed, and trait anxiety, with pain intensity being a significant predictor (R^2=0.30). Furthermore, patients with significant SCC exhibited more abnormalities in pain, information processing speed, and trait anxiety compared to those without significant SCC.

Conclusion

SCC may not necessarily correlate with objective cognitive impairments and might be specifically linked to defective information processing speed. It thus merits that clinical assessments for FM patients should incorporate measurements of information processing speed to gain a comprehensive understanding of SCC in FM patients.

Key words

fibromyalgia, subjective cognitive complaints, memory impairment, information processing speed, emotional disturbances

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Introduction

Fibromyalgia (FM), defined in the International Classification of Diseases (ICD) Eleventh Edition, is characterised as a "widespread chronic primary pain," primarily manifested by complex and widespread pain along with common symptoms such as fatigue, sleep disturbances, socio-psychological distress, and functional issues (1-8). According to epidemiological data from the American College of Rheumatology (ACR), the global prevalence of FM in the general population is estimated to be around 2–4% (2-4, 9). Due to a lack of clear aetiology and reliable diagnostic or prognostic biomarkers for FM, patients often experience delays, frustration, and even despair during the diagnostic process. This medical uncertainty transforms into a source of stress for patients (10), leading to varied subjective complaints that significantly reduce their functional outcomes in the physical, psychological, and social domains. This condition negatively impacts their interpersonal relationships, parenting, work, daily activities, mental health, and social connections (11, 12).

Among individuals with FM, 43-76% report significant cognitive impairments (13-15). Memory impairment is one of the most commonly reported cognitive complaints among FM patients (16-18). Gelonch *et al*. (17). discovered that up to 84% of female FM patients experienced cognitive difficulties. Recent studies (19) have also confirmed that FM patients scored significantly poorer across all cognitive domains in a self-reported questionnaire encompassing five cognitive areas compared to healthy participants. Moreover, if these patients also have rheumatoid arthritis, over half (52.3%) reported significant thinking or memory difficulties. These cognitive difficulties were even collectively termed as "FibroFog," which encompassed memory lapses, mental fogginess, confusion, word confusion or reduction, and decreased attention, among various cognitive difficulties (20).

Interestingly, subjective cognitive complaints in FM patients may not necessarily correlate with deficits of objective cognitive performances. Some researchers argued that subjective memory complaints in FM patients aligned with objectively measured memory impairments (2), and certain cognitive performance has been proven to more accurately predict and improve treatment outcomes (13). However, others (21, 22) did not reveal the corresponding difficulties between subjective cognitive complaints and objective cognitive performances. They indicated that FM patients showed no differences in working memory performance compared to healthy participants. Additionally, some studies (23, 24) have also demonstrated that subjective memory deficits in FM patients may be more pronounced than their objective memory performance declines. For instance, Kratz *et al*. (25). compared subjective and objective cognitive functions between FM patients and healthy participants, revealing that while patients' differences in objective neurocognitive testing with the healthy participants averaged only about 0.5 standard deviations, their subjective complaint levels were lower by one standard deviation compared to the healthy ones.

This study thus addresses the limited assessment of both subjective cognitive complaints and objective cognitive functions in previous research, and aims to concurrently evaluate pain levels, subjective memory complaints, emotional disturbances (depression and anxiety), and multidimensional cognitive functions, including memory, executive function, and information processing speed, in order to understand the association between subjective cognitive complaints and objective cognitive deficits in FM patients. In addition, the study further analyses potential influencing and predictive factors related to patients' subjective cognitive complaints.

Methods

Participants

This study recruited a total of 32 FM patients from the pain clinic of medical centre based on the following criteria: (1) Females aged 18 to 60 years old; (2) FM was primarily based on the criteria of the ACR(19), diagnosed by physicians according to the following three conditions: 1. Widespread Pain Index

Table I. Demographical and clinical information of participants with fibromyalgia.

	Age	Education	BMI	Symptoms onset of fibromyalgia (years)	Diagnosis of fibromyalgia (years)
Patients with fibromyalgia (n=32)	50.91±7.06	13.47±3.03	22.39±3.70	9.41±8.38	4.34±4.53

n: number of patients; BMI: body mass index.
Education: years of formal education; Data: mean ± standard deviation.

Table II. Measurements of pain, emotional disturbances, subjective cognitive complaints and objective cognitive functions.

	Tests	Measures
Pain	FIQR-T	Pain and its adverse impacts
Emotional disturbances	BDI-II	Depression
	STAI-T	Trait anxiety
Subjective cognitive complaints	SCDS	Subjective memory and cognitive complaints
Objective cognitive functions		
Memory	TWSLT	Verbal episodic memory
Executive functions	VFT	Productivity
	MCST	Conceptual formation and mental shifting
Processing speed	Coding*	Speed of information processing and visuomotor coordination
	Symbol search*	Speed of information processing and visual scanning

FIQR-T: Taiwanese version of the Fibromyalgia Impact Questionnaire Revised; BDI-II: Taiwanese version of the Beck Depression Inventory - second edition; STAI-T: Trait Anxiety segment of the State Trait Anxiety Inventory; SCDS: Subjective Cognitive Decline Scale; TWSLT: Taiwanese version of the Word Sequence Learning Test; VFT: Semantic Association of Verbal Fluency Test; MCST: Modified Wisconsin Card Sorting Test.
*These two subtests originate from the Wechsler Adult Intelligence Scal, Fourth edition.

(WPI) ≥7 and Symptom Severity Scale (SSS) ≥5, or WPI between 4 and 6 and SSS ≥9; 2. Presence of generalized pain symptoms, defined as having at least one or more painful points in at least four of the five body regions (left upper, right upper, left lower, right lower, axial skeleton); (3) Persistence of symptoms for over three months. Additionally, individuals unable to comprehend or express Mandarin were excluded from participating in the study. Demographical and clinical information of all participants is presented in Table I.

All participants were required to provide informed consent after understanding the purpose of the study and procedures before participating in the research. This study has received approval from the Research Ethics Committee of the Medical Centre (no: 202208084RIND).

Instruments

The primary evaluation in this study includes four aspects: pain, emotional disturbances (depression and anxiety), subjective cognitive complaints and objective cognitive impairments (Table II).

Pain. The Taiwanese version of the Fibromyalgia Impact Questionnaire Revised (FIQR-T), developed from the Fibromyalgia Impact Questionnaire Revised (FIQR) (27), was used. The FIQR-T primarily assesses pain and its impact across three dimensions: functional ability, overall impact, and severity of individual symptoms. Participants rate their condition over the past 7 days using an 11-point scale (ranging from 0 to 10, where 10 represents the worst condition). Higher scores indicate a greater adverse impact of the disease.

Depression. The Taiwanese version of the Beck Depression Inventory-II (BDI-II) (28, 29) was used in this study. The BDI-II assesses "depressive symptoms in the past two weeks," and comprises 21 items, primarily evaluating symptoms in the realms of "cognitive," "emotional," and "physical symptoms" over the past week. Each item is scored from 0 to 3, with a total score ranging from 0 to 63. BDI-II demonstrates good psychometric properties, with an overall internal consistency of 0.92, a test-retest reliability of 0.93, and a significant correlation (r=0.68) with the severity of clinical depressive symptoms.

Anxiety. The study utilised the Trait Anxiety (STAI-T) segment of the State Trait Anxiety Inventory (STAI) (30, 31) to measure participants' subjective anxiety, reflecting their inherent anxiety tendency, considered a stable personality trait (32).

Subjective cognitive complaints. This study utilised the Subjective Cognitive Decline Scale (SCDS) (33), which mainly involved items from several related scales (*e.g*. Subjective Cognitive Decline Questionnaire, SCDQ) (34). The SCDS evaluates the extent of subjective cognitive decline, primarily measuring the subject's perception of orientation, executive function, memory, and language abilities, consisting of 14 items. SCDS prompts participants to compare their present cognitive activities' difficulty to those engaged in one year ago, rated on a five-point scale. Higher scores indicate a more severe level of subjective cognitive decline. The SCDS has good psychometric properties, which includes high internal consistency (α=0.93) and a three-factor construct compatible with its theoretical basis.

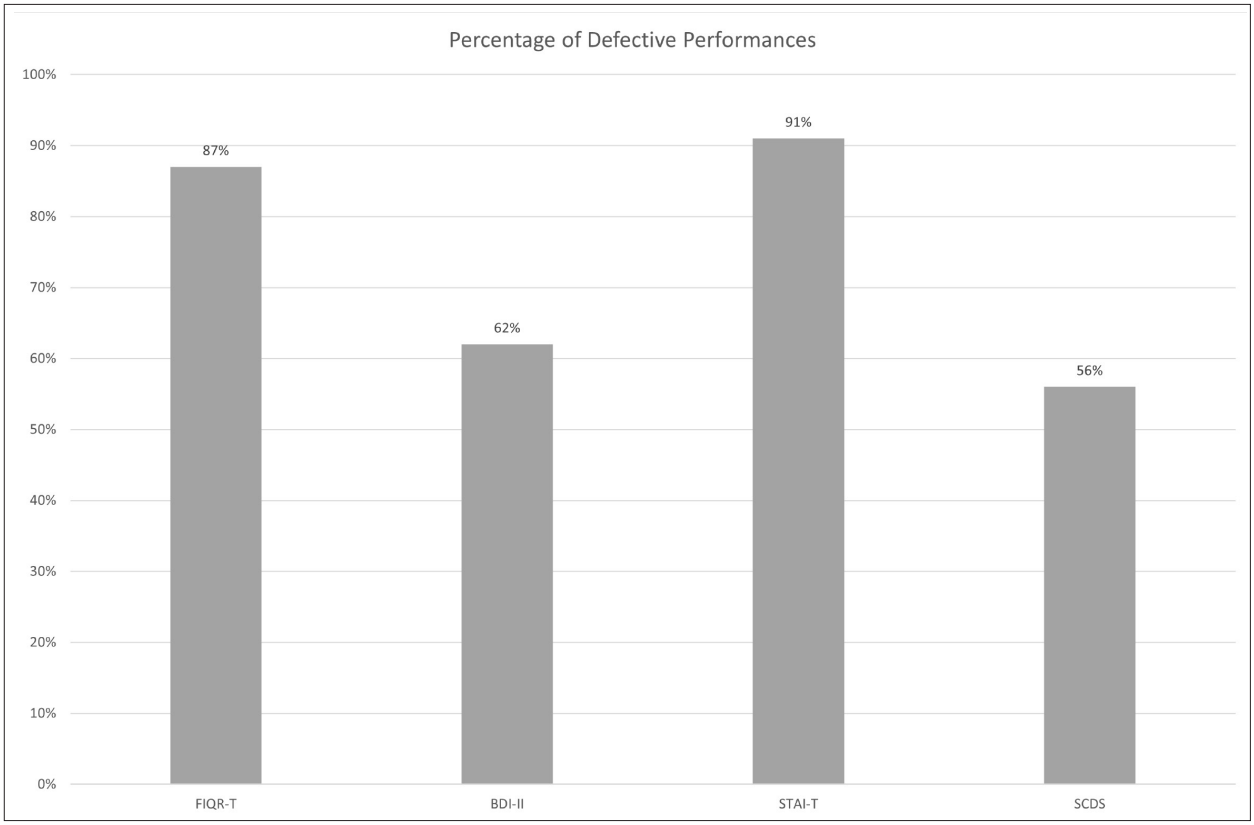

Fig. 1. The percentage of fibromyalgia patients reporting significantly higher pain, subjective cognitive complaints, and emotional disturbances.

Memory. The study employed the Taiwanese version of the Word Sequence Learning Test (TWSLT) (35), which has demonstrated robust psychometric properties (36). This test primarily assesses verbal episodic memory, and comprises two main segments: (1) Immediate Recall (IR), where participants are asked to recall Chinese words learned immediately; and (2) Free Recall (FR), conducted ten minutes after IR, prompting participants to freely recall the learned Chinese words. This is followed by Cued Recall (CR), providing cues to aid participants in recalling words. Finally, participants are presented with a mix of learned and novel words for Recognition (RG).

Executive function. This study primarily utilised two tests to evaluate executive function. Firstly, the Semantic Association of Verbal Fluency Test (VFT) (37, 38) is used to assess "productivity." The VFT involves three categories: fruits, fish, and vegetables, where participants are asked to verbalise as many items as possible for a given category within a one-minute timeframe. Scoring is based on the total number of items listed across the three categories. Secondly, the Modified Wisconsin Card Sorting Test (MCST) (39) is utilised. MCST comprises a total of 52 cards, consisting of 4 key cards and 48 stimulus cards, aiming to mitigate the time-consuming nature associated with the traditional card sorting test. The assessment primarily measures the patient's scores in three aspects: "Completed Categories" (CC), "Non-perseverative Responses" (NPR), and "Perseverative Responses" (PR).

Processing speed. This study used two subtests from the Wechsler Adult Intelligence Scale - Fourth Edition (WAIS-IV) (40) to assess processing speed: (1) Symbol Search (SS): SS primarily assesses visual processing speed. Participants are required to scan sets of symbols within a given time limit, identifying whether the target symbols appear in a search group and responding accordingly. (2) Coding (CD): CD mainly evaluates processing speed and psychomotor coordination. In this test, participants have 120 seconds to match numbers to specific symbols based on provided examples, placing the corresponding symbols in the appropriate boxes. Scores for both subtests are calculated using the scale scores from the WAIS-IV.

Table III. Pain, emotional disturbances and subjective cognitive complaints from patients' reported questionnaires (n=32).

	Tests	Mean	SD	Range
Pain	FIQR-T	49.01	20.02	9 – 84.33
Emotional disturbances	BDI-II	20.31	13.39	1 – 54
	STAI-T	50.84	10.58	32 – 74
Subjective cognitive complaints	SCDS	42.22	11.38	19 – 65

n: number of patients; SD: standard deviation; FIQR-T: Taiwanese version of the Fibromyalgia Impact Questionnaire Revised; BDI-II: Taiwanese version of the Beck Depression Inventory - second edition; STAI-T: Trait Anxiety segment of the State Trait Anxiety Inventory; SCDS: Subjective Cognitive Decline Scale.

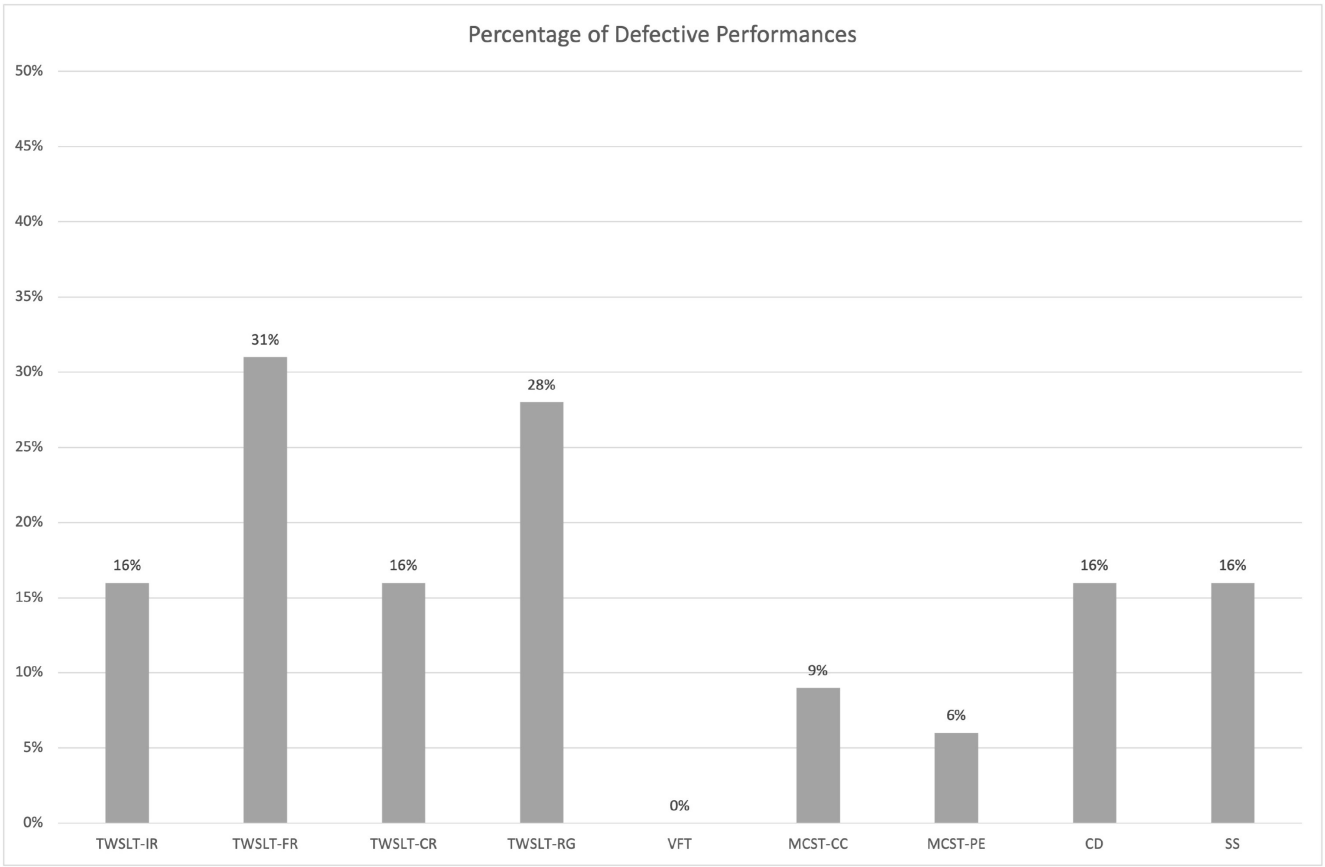

Fig. 2. The percentage of fibromyalgia patients exhibiting significantly defective performances of memory, executive functions, and information processing speed.

Data analysis

This study initially presented the percentage of patients exhibiting abnormalities or deficits in various tests based on normative data. Pearson correlation analysis was used to demonstrate the associations between the SCDS and other measurements. Subsequently, participants were stratified into two groups, namely 'Subjective Cognitive Complaints (SCC)' and 'Non-Subjective Cognitive Complaints (NSCC),' based on their performance on the SCDS. A t-test was used to compare the differences in performance across various tests between these two groups. Finally, stepwise regression analysis was conducted to identify the most significant measures that can predict the SCDS score. The statistical analysis mentioned above was conducted using commercially available software (SPSS v. 22.0).

Results

Pain

Our results (Fig. 1 and Table III) indicated that a substantial 87% (28/32) of FM patients experienced significant pain-related adverse impacts based on the healthy control data from the original FIQR study (27).

Emotional disturbances

According to the BDI-II (31), it indicates that 62% (20/32) of FM patients scored 14 or above, which is considered indicative of varying degrees of depressive symptoms. In addition, referencing the STAI literature (30, 41), the trait anxiety can be classified as 'no or low anxiety' (score: 20–37), 'moderate anxiety' (score: 38–44), and 'high anxiety' (score: 45–80). It reveals that as high as 91% (29/32) FM patients exhibit moderate to severe trait anxiety tendencies (Fig. 1 and Table III).

Subjective memory and cognitive complaints

Based on the scoring method of the SCDS, the total score was primarily utilised to assess the severity of subjective cognitive complaints. The results indicated that over half (56%) of FM patients scored above 1.5 standard deviations (>39.44) higher than the mean score of cognitively normal participants on the SCDS (33), indicating significant impairment (Fig. 1 and Table III).

Objective cognitive performances

In terms of memory functions, our results (Fig. 2 and Table IV) indicated that compared to the norms of TWSLT (31), 16% (5/32) of FM patients showed significant deficits in IR scores. Additionally, 31% (10/32) exhibited significant deficits in FR, 16% (5/32) in CR, and 28% (9/32) in RG scores when compared to the norms. Regarding executive functions, in comparison to the norms, 9% (3/32) of FM patients displayed markedly poorer performance in MCST-CC, while only 6% (2/32) showed significant abnormalities in MCST-PE. On the other hand, no patients performed defectively on the VFT (37). In terms of information processing speed, based on the normative data from the WAIS-IV (42), 16% (5/32) of FM patients exhibited defec-

Table IV. Patients' performances on tests of memory, executive functions and processing speed (n=32).

	Tests	Mean	SD	Range
Memory	TWSLT - IR	52.06	7.54	34–60
	TWSLT - FR	2.41	1.85	0–6
	TWLST - CR	3.75	1.34	1–6
	TWSLT - RG	26.50	2.79	19–30
Executive functions	VFT	37.03	7.45	25–52
	MCST - CC	4.56	1.61	2–7
	MCST – PE	4.66	4.57	0–19
Processing speed	Coding	10.16*	3.10	5–17
	Symbol Search	9.78*	2.76	4–15

n: Number of patients; TWSLT: Taiwanese version of the Word Sequence Learning Test; IR: Immediate Recall of TWSLT; FR: Delayed free recall of TWSLT; CR: Delayed cued recall of TWSLT; RG: Delayed recognition of TWSLT; VFT: Semantic Association of Verbal Fluency Test; MCST: Modified Wisconsin Card Sorting Test; CC: Completed categories of MCST; PE: Perseverative errors of MCST. *Scale score of the Wechsler Adult Intelligence Scale – Fourth edition.

tive scores (less than 6) in both SS and CD subtests.

Associations between subjective cognitive complaints and objective cognitive performances

Our findings revealed no significant correlations between the SCDS performance and age (r=-0.11), education level (r=-0.22), BMI (r=-0.20), years since FM diagnosis (r=0.23), or years of symptoms onset (r=0.00). Additionally, there were no significant associations observed between the SCDS scores and measures of memory function or executive function. Notably, the SCDS scores demonstrated significant correlations with scores of FIQR-T, BDI-II, CD, and STAI-T. On the other hand, among FM patients, all objective memory function measurements exhibited no significant correlations with FIQR-T, BDI-II, and STAI-T. Regarding objective executive function performance, only a significant negative correlation was found between VFT and STAI-T, while MCST-PE showed a significant negative correlation with BDI-II.

The t-test was used to reveal the difference between objective cognitive performances, emotional disturbances, and pain between the SCC group and the NSCC group. The results indicated that the SCC group exhibited significantly higher abnormalities in FIQR-T (t=2.58, p=0.02), STAI-T (t=2.42, p=0.02), and CD (t=2.61, p=0.01) compared to the NSCC group (Table V).

Predictors of subjective cognitive complaints in FM patients

Based on the data from correlation analysis, a significant association existed between subjective cognitive complaints (SCDS) and pain (FIQR-T), depression (BDI-II), information processing speed (CD), and anxiety (STAI-T). Consequently, a stepwise regression analysis was conducted to further elucidate the factors explaining SCDS, and the results indicated that FIQR-T significantly explains SCDS (adjusted R^2=0.30, β=0.32, p<0.01). On the other hand, regression analysis also revealed that the extent of negative impact experienced by FM patients due to pain can primarily be explained by information processing speed, depression, and trait anxiety (adjusted R^2=0.73, p<0.01; CD: β= -4.28, p<0.01; BDI-II: β=1.31, p<0.01; STAI-T: β= -1.18, p<0.01).

Table V. Pearson correlations between subjective cognitive complaints, pain, emotional disturbances and objective cognitive functions.

	SCDS	FIQR-T	BDI-II	STAI-T	TWSLT -IR	TWSLT-FR	TWSLT-CR	TWSLT-RG	VFT	MCST -CC	MCST -PE	Coding	Symbol Search
SCDS	1												
FIQR-T	0.57**	1											
BDI-II	0.55**	0.64**	1										
STAI-T	0.44*	0.41*	0.79**	1									
TWSLT-IR	-0.07	0-.13	-0.16	-0.28	1								
TWSLT-FR	-0.06	-0.08	0.11	-0.02	0.12	1							
TWSLT-CR	-0.20	-0.15	0.00	-0.07	0.19	0.77**	1						
TWSLT-RG	-0.17	-0.04	0.14	0.19	0.17	0.73**	0.69**	1					
VFT	-0.22	-0.07	-0.32	-0.42*	0.33	0.22	0.18	0.19	1				
MCST-CC	0.11	-0.03	0.14	0.02	0.33	0.18	0.22	0.26	-0.10	1			
MCST-PE	-0.01	0.02	-0.36*	-0.16	-0.09	-0.15	-0.04	-0.24	0.09	-0.69**	1		
Coding	-0.46**	-0.68**	-0.38*	-0.51**	0.28	0.12	0.18	-0.01	0.29	0.24	-0.31	1	
Symbol Search	-0.22	-0.35*	-0.34	-0.36*	0.30	-0.03	0.07	-0.03	0.42*	0.26	-0.18	0.62**	1

FIQR-T: Taiwanese version of the Fibromyalgia Impact Questionnaire Revised; BDI-II: Taiwanese version of the Beck Depression Inventory - second edition; STAI-T: Trait Anxiety segment of the State Trait Anxiety Inventory; SCDS: Subjective Cognitive Decline Scale; TWSLT: Taiwanese version of the Word Sequence Learning Test; IR: Immediate Recall of TWSLT; FR: Delayed free recall of TWSLT; CR: Delayed cued recall of TWSLT; RG: Delayed recognition of TWSLT; VFT: Semantic Association of Verbal Fluency Test; MCST: Modified Wisconsin Card Sorting Test; CC: Completed categories of MCST; PE: Perseverative errors of MCST.
* p<0.05; ** p<0.01.

Discussion

Pain

Our results indicated that most of FM patients (87%) experienced a significant adverse impact due to pain, consistent with previous findings (43-45). A large-scale study (45) confirmed that 41% of FM patients reported mild to moderate disruptions in their relationships with spouses/partners, and some patients even reported being doubted by their spouses/partners about the reality of pain due to FM (19%), or perceived as exaggerating their suffering (23%). Nearly half of the FM patients (45%) reported being blamed for their inability to handle things jointly with their partners. In addition, the adverse impact of pain on the professional lives is equally significant (44), with 34-77% of female FM patients reporting lower workability due to pain, fatigue, impaired physical abilities, or restricted mobility.

Emotional disturbances

Our findings demonstrated a high prevalence of depression and anxiety among FM patients, particularly with over 90% of patients exhibiting anxiety traits. Earlier study (46) had confirmed that 20–80% of FM patients were diagnosed with depressive disorders, while 13–63.8% were diagnosed with anxiety disorders. Subsequent researchers (47) also found that when assessing emotional distress in 95 FM patients using BDI and the Health Anxiety Inventory – Short Form (HAI-SF) (48), the results indicated significantly higher depression and anxiety scores in FM patients compared to the healthy participants. Ferrari *et al*. (49). further established that compared to patients with Rheumatoid Arthritis (RA) who similarly complained of issues like pain, sleep disturbances, or depression, FM patients still exhibited significantly higher levels of depression and anxiety.

Recent research has revealed that depression and trait anxiety are primary predictors of the psychological aspects of quality of life in FM patients, and pain might escalate the levels of depression and anxiety, subsequently exacerbating FM symptoms. Galvez-Sánchez *et al*. (11). assessed their clinical FM patients' symptoms (pain, sleep problems, and fatigue) and emotional disturbances (depression and anxiety) before analysing their health-related quality of life. The findings indicated that patients scored significantly lower on quality-of-life measures compared to the healthy participants, and clinical symptoms and emotional disturbances showed a significant negative correlation with quality of life.

Subjective memory and cognitive complaints

Over half of FM patients in this study exhibited significant subjective cognitive and memory difficulties. In fact, FM patients commonly experienced subjective cognitive complaints (50, 51), often referred to as "FibroFog," encompassing memory problems, mental confusions, attention difficulties, and various cognitive challenges (15).

Many researchers (2, 17, 18, 52) have identified cognitive difficulties among FM patients. For instance, in five cognitive domains encompassing language ability, visual perceptual ability, language memory, visual memory, and attention, FM patients scored significantly higher on cognitive difficulties questionnaire compared to healthy participants (18). Recently, Castel *et al*. (23). further compared subjective cognitive complaints between FM patients and individuals with chronic pain. They found that even after controlling for medication usage and depressive symptomatology, FM patients still exhibited a significantly higher cognitive complaints compared to healthy participants.

Objective cognitive performances

As shown in Figure 2, the results indicated that fewer than one-third of FM patients exhibited defective performances on memory, executive function, and information processing speed. However, this result contrasted with past findings. Glass (53) compared FM patients with two control groups— one similar in age and another over 20 years older—measuring episodic and semantic memory. The results showed that the extent of memory impairment in FM patients was compatible with that observed in the older control group, suggesting a similarity in cognitive impairment between FM patients and memory decline associated with aging. More recently, Ferrera *et al*. (54). evaluated FM patients' performance using the Wechsler Memory Scale-III (55), focusing on the Digit Span and Spatial Span Subtests to compose a Working Memory Index (WMI). They compared the performance between FM patients and healthy participants and found significant differences in backward and overall spatial span scores, highlighting deficits in the working memory capacity of FM patients.

The primary reason for the discrepancy between this study and previous findings might be attributed to the significantly lower adverse impact of pain (t=2.37, p=0.019) on the FM patients in this study (FIQR-T: 49.01±20.02), as compared to prior research (56.6±19.9) (27). Indeed, numerous studies (2, 24, 56) have established a strong association between the pain intensity and cognitive impairments. Earlier researchers (57) analysed cognitive impairments in FM patients and further assessed their pain intensity using the McGill Pain Questionnaire (MPQ) (58) and the Arthritis Impact Measurement Scale (AIMS) Pain subscale (59). The results indicated a significant correlation between the AIMS Pain subscale and information processing speed, memory and working memory, while the MPQ score was significantly associated with memory performance. Verdejo-Garcia *et al*. (56). also supported these findings. They evaluated the relationship between pain and executive function (*e.g*. cognitive flexibility and decision-making) in 36 female FM patients, and revealed a significant correlation between pain intensity and the number of categories in the Wisconsin Card Sorting Test (WCST) (60) and block 3 net score in the Iowa Gambling Task (IGT) (61). Therefore, it is plausible to suggest that the lower pain impact observed in FM patients in this study may contribute to the less pronounced cognitive impairments.

A few researchers did argue that objective cognitive impairment in FM patients wasn't prominently evident. Grace *et al*. (24). have revealed that

both FM patients and the healthy participants exhibited cognitive performance within the normal range. More recently, Kratz *et al*. (25). confirmed these findings, indicating that the average differences between FM patients and healthy participants in objective neurocognitive tests fell within 0.5 standard deviations, failing to reach statistical significance.

Dissociation between subjective cognitive complaints and objective cognitive performances

Our results evidenced that over half (56%) of FM patients reported subjective cognitive complaints, yet less than one-third exhibited objective cognitive impairments. This finding aligned with prior research (22, 25), reaffirming the inconsistency between subjective cognitive complaints and objective cognitive impairments in FM patients. Walitt *et al*. (22). evaluated subjective cognitive difficulties, working memory, and corresponding functional magnetic resonance imaging (fMRI) performance in 16 FM patients. They indicated that the working memory performance was compatible with that of healthy participants. However, subjective cognitive difficulties were remarkable and significantly correlated with the intensity of pain symptoms.

A minority of researchers (23, 62, 63) have directly analysed the association between subjective cognitive complaints and objective cognitive impairments. Tesio *et al*. (63). utilised the FACT-Cog scale (64) to assess subjective cognitive functions in 30 FM patients while measuring their episodic memory, executive function, and working memory. The findings revealed a significant correlation between the Verbal Fluency subscale of FACT-Cog, working memory and mental shifting. Castel *et al*. (23). employed the Memory Failures in Everyday Memory (MFE) (65) scale to analyse subjective memory complaints in 70 FM patients. They further evaluated the relationship between depression, catastrophic reactions to pain, and verbal episodic memory, inhibition, and attention. The results indicated that FM patients' subjective memory complaints were significantly explained by depression (30% variance), with pain intensity and verbal episodic memory being the predictors for subjective memory complaints.

Although our results did not confirm the association between subjective complaints and objective deficits in executive or memory functions as demonstrated in the aforementioned studies, we did find a significant association between subjective cognitive complaints and information processing speed, and also revealed that FM patients with subjective cognitive complaints performed significantly poorer on the information processing speed test (Coding Subtest from WAIS-IV) than ones without. Fewer researchers analysed the relationship between subjective cognitive complaints and information processing speed in FM patients; however, the relationship between these two factors can be inferred from past aging-related studies (66, 67). Mol *et al*. (66). assessed subjective memory complaints, emotional distress, and objective cognitive functions in 557 individuals aged 55 to 85. The results showed that 27% of participants reported forgetfulness, and those individuals exhibited significantly poorer performance in processing speed and delayed recall compared to those without significant forgetfulness. In a four-year longitudinal study, Xu *et al*. (67). tracked subjective memory concerns and objective cognitive performances in 1236 middle-aged and older adults. Their findings revealed that 18% of participants with subjective memory concerns exhibited significantly poorer attention and information processing speed compared to those without subjective memory concerns.

Limitations

This study directly investigated subjective cognitive complaints in FM patients and the factors influencing them, but some methodological limitations still weakened its representativeness. Firstly, the sample size was relatively small and comprised exclusively females. While the higher proportion of females among FM patients is acknowledged, this limited sample does not offer a comprehensive FM patient population. Secondly, although the objective cognitive function measures used in this study covered cognitive impairments commonly associated with FM, there might be gaps in the assessment, such as working memory and inhibitory control (13), that were not fully addressed. Thirdly, although patient's effort has been recognised as a significant factor influencing both SCC and objective cognitive assessments in FM patients (68, 69), it was not measured in this study. However, the impact of patient's effort might be less pronounced in our country, potentially due to the high accessibility and low cost of the National Health Insurance system. Under this system, FM patients can undergo various medical examinations almost anytime and are more willing to accurately demonstrate their cognitive functioning in the context of better doctor-patient relationships.

Conclusions

From the perspective of cognitive ability, this study found that subjective cognitive complaints of FM patients did not significantly correlate with objective cognitive deficits but showed a significant association with information processing speed. Given that subjective cognitive complaints are one of the most common clinical presentations among FM patients, it's essential to include information processing speed as a necessary clinical assessment, alongside considering the impact of pain and emotional disturbances.

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