

# Construct validity of the Empowerment Scale in patients with schizophrenia

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## ABSTRACT

The Empowerment Scale contains eight domains that are divided into three subscales. The sum score of the three individual subscales represents three different aspects of empowerment (i.e., second-order models), such as personal, interpersonal, and social political aspects. The total score of the eight domains reflect the overall empowerment status (i.e., third-order factor). However, factor structures of the Empowerment Scale have not been evaluated in patients with schizophrenia in Taiwan. Therefore, the main purpose of this study was to examine construct validity (i.e., one 8-factor model [first-order], three second-order models, and one third-order model) of the Empowerment Scale using confirmatory factor analysis (CFA). We also examined floor/ceiling effects and internal consistency in patients with schizophrenia. We obtained 339 self-administered data of the Empowerment Scale in patients with schizophrenia. The CFA results of the 8-factor model showed that item 27 (Social reality cannot be changed by people) with low factor loading (0.06). We deleted this item and reconstructed first-order CFA. The Empowerment Scale with 33 items (ES-33) showed a good model fit ( $\chi^2/df=1.11$ , CFI=1.00, TLI=1.00, and RMSEA=0.018) and all 33 items had sufficient factor loadings (0.63-0.85). The three second-order models and one third-order model also represented good model fits ( $\chi^2/df=1.09-1.77$ , CFI=0.99-1.00, TLI=0.99-1.00, and RMSEA=0.017-0.048). The ES-33 had no floor or ceiling effects (0.3%-3.5% and 1.5%-18.0%, respectively) and also demonstrated acceptable internal consistency ( $\alpha=0.72-0.90$ ). In summary, the ES-33 had satisfactory psychometric properties. Future users may use the ES-33 to capture the multiple dimensions of empowerment and overall empowerment status in patients with schizophrenia.

## Keywords

Empowerment, Schizophrenia, Construct validity

## Introduction

“Empowerment” is defined as “both individual determination over one’s own life and democratic participation in the life of one’s community, often through mediating structures” or as “a process by which people, organizations, and communities gain mastery over their affairs” [1]. The concept of empowerment is a process of obtaining control over one’s life and people should have

power to influence their personal and social lives [2,3]. Similarly, the concepts of empowerment are applied as guiding principles to facilitate health care promotion and maintenance of high quality health care standards. Some examples are found in the eHealth services that assist patients with diabetes, and cardiovascular diseases [4-6].

Empowerment is one of the main beneficial factors assisting the recovery and achievement of

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treatment goals for patients with schizophrenia [7,8]. Research on a group of 157 schizophrenia or schizoaffective disorder patients measured the impact of social network, stigma and empowerment on quality of life. Path analysis results found that the recovery program improved patients' social networks, enhanced empowerment and reduced stigma. This recovery program also reduced depression in patients with psychosis and improved their QOL [9].

In another recent study, Štrkalj-Ivezic and colleagues found that with intervention, all schizophrenia participants showed a positive trend for empowerment and were assisted in recovery [10]. These two research studies provide strong additional evidence that empowerment is an aid to recovery in schizophrenia.

Empowerment enables patients to improve their ability to cope with symptoms and to increase their capacity to have control over their life [11]. Patients gain benefits from empowerment such as increased self-confidence and improved quality of life [12,13]. Therefore, both clinicians and researchers need to address and accurately measure empowerment issues in order to optimize treatment plans.

The Empowerment Scale formulated in Chinese by Dr. Song conforms to Taiwanese Culture and is designed to measure empowerment in multidimensional constructs [14]. Dr. Song used the concepts of personal, interpersonal, and political dimensions as a base for her Empowerment Scale. She then added the following elements: self-esteem, self-efficacy, power, community action, autonomy, optimism, control of the future, legitimate anger [15], interactive knowledge/skill, self-affirmation, perceived influence, partnerships, perceived support from others [16,17], and empowerment in Chinese culture [18]. Song consulted with experts and used exploratory factor analysis (EFA) to construct the items and domains of the Empowerment Scale. The resulting Empowerment Scale consists of 8 subscales and 34 items [14]. The Empowerment Scale has eight domains that profile the patients' strengths and weakness in all domains. These eight domains were divided into three subscales that represent a second-order factor (**Figure 1**). The three second-order factors are three different aspects of empowerment (i.e., personal, interpersonal, and social political empowerment). The total score

of eight domains reflects overall empowerment status (third-order factor), which is useful to express the patients' empowerment status in a comprehensive manner.

The Empowerment Scale has been examined for construct validity, discriminative validity, internal consistency, and test-retest reliability in healthy population and clients with domestic violence problems in Taiwan [14,19]. However, to our knowledge, no studies have evaluated the construct validity (i.e., first-, second-, third-order factor structures) in patients with schizophrenia using confirmatory factor analysis (CFA), which limits the explanations of the scores of the Empowerment Scale in Taiwan.

The purpose of this study was to apply CFA to evaluate construct validity for the first-, second- and third-order models of the Empowerment Scale for schizophrenic patients. In addition, we examined floor/ceiling effects and internal consistency of each domain in the Empowerment Scale in patients with schizophrenia.

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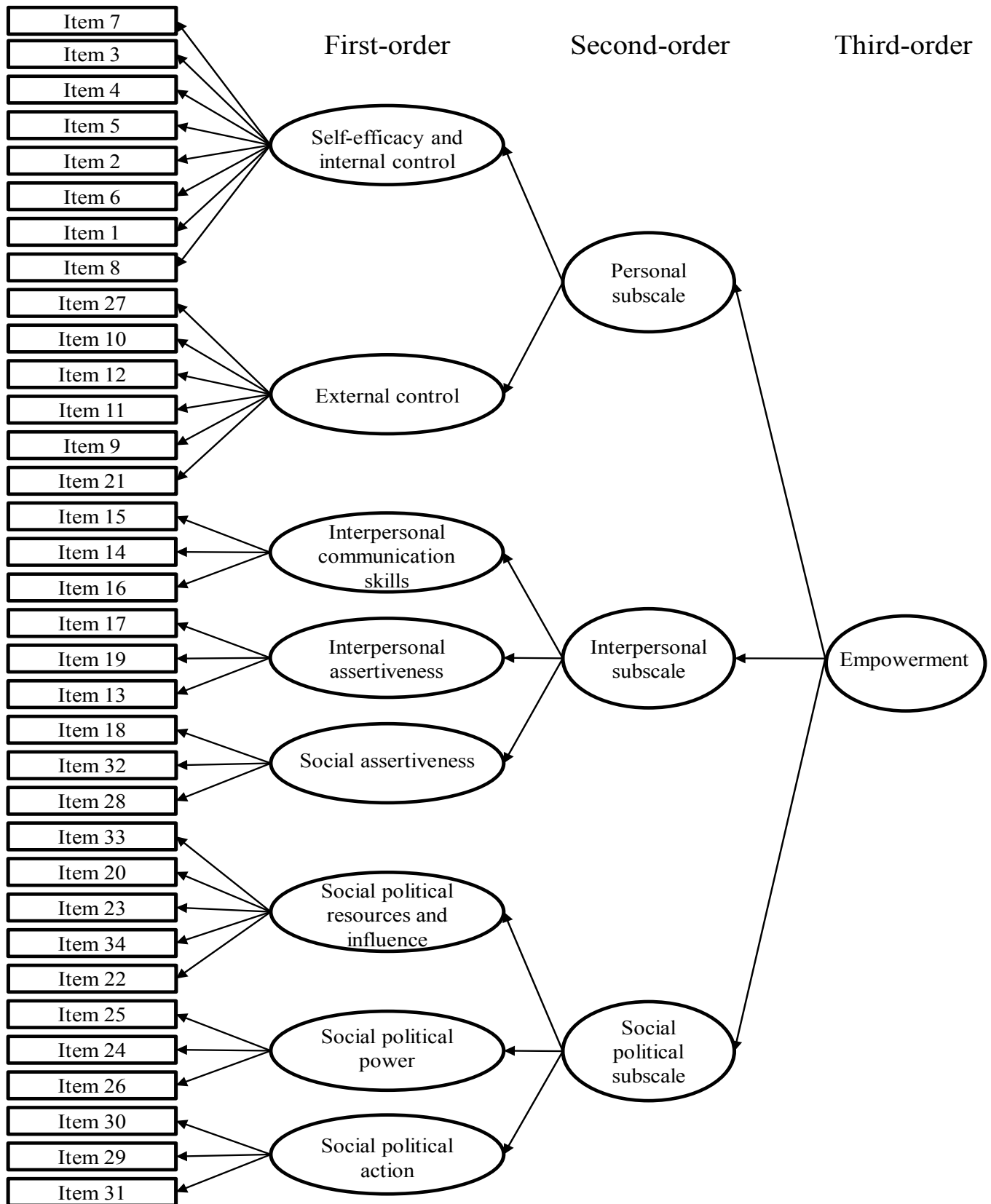
## Methods

### ■ Participants and ethics

This study used a secondary dataset of schizophrenic patients that was part of "the Examination on the Unity Model of Recovery-the Development of the Stage of Recovery Instrument and the Application of Strengths Perspective (E98010)" located in the Survey Research Data Archive [20]. The Institutional Review Board at Chang Gung Memorial Hospital approved the study.

Data from 339 schizophrenic patients with a mean age of 36.6 years were used in this study. 57.8% were males. The average age of onset of schizophrenia was 24.0 years. 72.6% of the patients had at least a high school education. Additional demographic characteristics are shown in **Table 1**.

The inclusion criteria of recruiting the participants in this study were as follows: (1) diagnosis with schizophrenia; (2) aged over 18 years; and (3) hospitalized at least once for treatment of schizophrenia. We excluded any patient who had also been diagnosed with dementia or substance abuse. The participants were recruited from both past and present in-patients of 24 psychiatric rehabilitation centers. All participants filled out the Empowerment Scale with the assistance from a research assistant.



**Figure 1:** Third-order model of the Empowerment Scale with 34 items

**Table 1: Characteristics the patients with schizophrenia (n=339).**

Characteristic		
<b>Gender, n (%)</b>		
Male	196	(57.8)
Female	143	(42.2)
Age, mean (SD)	36.6	(9.3)
Onset age, mean (SD)	24.0	(7.9)
<b>Education, n (%)</b>		
Elementary school and below	9	(2.7)
Middle school	62	(18.3)
High school	175	(51.6)
College and above	93	(27.4)
<b>Marriage, n (%)</b>		
Unmarried	274	(80.8)
Married or cohabitation	20	(5.9)
Divorced or separated	45	(13.3)

■ **Instrument**

The Empowerment Scale is a questionnaire with 34 items. A 4-point Likert scale is used for each item. Six items were reverse coded, including item 9, 10, 11, 12, 21, and 27. A higher score designates the greater function. The Empowerment Scale contains eight domains as follows: (1) self-efficacy and internal control (8 items); (2) external control (6 items); (3) interpersonal communication skills (3 items); (4) interpersonal assertiveness (3 items); (5) social assertiveness (3 items); (6) social political resources and influence (5 items); (7) social political power (3 items); and (8) social political action (3 items) [14]. The personal subscale includes two domains (i.e., “self-efficacy and internal control” and “external control”). The interpersonal subscale consists of three domains, such as “interpersonal communication skills”, “interpersonal assertiveness”, and “social assertiveness”. The social political subscale contains three domains, such as “social political resources and influence”, “social political power”, and “social political action”.

■ **Data analyses**

CFA was performed using the LISREL 8.8 software. We first examined the first-order factor structure of the Empowerment Scale (i.e., 8-factor model). A diagonally weighted least square method was used to estimate CFA parameters because the scale was ordinal [21,22]. We used four goodness-of-fit indices that were considered as a whole to evaluate the level of fit between the overall model and data. The goodness-of-fit is the ratio of the chi-square value to the degrees of freedom ( $\chi^2/df$ ), comparative fit index (CFI), Tucker-Lewis index (TLI), and the root mean

square error of approximation (RMSEA). The criterion of  $\chi^2/df$  was  $<2.00$  [23]. A value of CFA and TLI values  $\geq 0.95$  is recognized as a good fit [24]. A value lower or equal to 0.05 for RMSEA indicated a good fit [25]. Moreover, we examined the factor loadings of all items. Items with low factor loading ( $<0.40$ ) were removed [26] and the first-order CFA was reconstructed.

After the first-order factor structure was supported, we conducted three second-order models (i.e., personal subscale, interpersonal subscale, and social political subscale). If the three second-order models showed a good model fit, we further verified the third-order model (i.e., empowerment as the three-order factor). The second- and third-order models were also evaluated by the four goodness-of-fit indices (i.e.,  $\chi^2/df$ , CFI, TLI, and RMSEA).

After deleting items under validation with CFA, we further examined floor and ceiling effects and internal consistency reliability for each domain. Floor and ceiling effects were calculated by the percentage of participants with lowest and highest scores, respectively. 20% or higher represented a noticeable floor and ceiling effect [27]. Cronbach’s alpha ( $\alpha$ ) was used for examining internal consistency. The standard for the reliability coefficient was greater or equal to 0.70 [28]. We also examined corrected item-total correlation for the deleted items. Corrected item-total correlation is the correlation between an item and sum score of the other items in the corresponding subscale. The standard of corrected item-total correlation is more than 0.3 [29].

**Results**

The CFA results of the first-order factor structure met the preset criteria of four fit indices ( $\chi^2/df=1.13$ , CFI=1.00, TLI=1.00, and RMSEA=0.019). However, one item (item 27: Social reality cannot be changed by people) showed low factor loading (0.06). We deleted item 27 and reconstructed the first-order CFA and the results then showed a good model fit (Table 2). The retained items (i.e., 33 items) demonstrated sufficient factor loadings (0.63-0.85) (Table 3).

Regarding the higher order CFA models of the Empowerment Scale with 33 items (ES-33), the three second-order models showed good model fits ( $\chi^2/df=1.09-1.77$ , CFI=0.99-1.00, TLI=0.99-1.00, and RMSEA=0.017-0.048) (Table 2). The

**Table 2: Results of fit indices for the first-, second-, and third-order models.**

Index	First-order CFA with 33 items	Personal subscale (Second-order CFA)	Interpersonal subscale (Second-order CFA)	Social political subscale (Second-order CFA)	Empowerment (Third-order CFA)
$\chi^2$	517.25	68.81	37.19	72.65	603.60
<i>df</i>	467	63	24	41	484
$\chi^2/df$	1.11	1.09	1.55	1.77	1.25
CFI	1.00	1.00	1.00	0.99	1.00
TLI	1.00	1.00	0.99	0.99	1.00
RMSEA	0.018	0.017	0.040	0.048	0.027

CFA: confirmatory factor analysis; CFI: comparative fit index; TLI: Tucker-Lewis index; RMSEA: root mean square error of approximation.

**Table 3: Factor loadings of the first-order model of the Empowerment Scale with 33 items.**

Dimensions	Item	Factor loading
<b>Self-efficacy and internal control</b>	7. After setting goals, I work hard to achieve.	0.82
	3. I feel valuable.	0.81
	4. I feel capable.	0.82
	5. As long as I think that I can do, then I can make it.	0.80
	2. I am confident of my decisions.	0.84
	6. I am able to decide most things in my life.	0.81
	1. When I make plans, I am sure that I would be successful.	0.76
	8. I can optimistically face setbacks	0.72
<b>External control</b>	10. I know that I can't fight powerful people.	0.63
	12. I usually feel lonely.	0.63
	11. I believe that bad luck causes misfortune in my life.	0.74
	9. I feel powerless in life.	0.64
	21. I think that other people ignore my existence.	0.74
<b>Interpersonal communication skills</b>	15. I am able to express my ideas clearly to others.	0.82
	14. I know how to maintain good communication with others.	0.84
	16. I am able to communicate and coordinate with others who have different views.	0.83
<b>Interpersonal assertiveness</b>	17. When I need help, I would ask others	0.76
	19. I remain calm even when I disagree with others' opinions.	0.69
	13. I have courage when I face difficulties.	0.79
<b>Social assertiveness</b>	18. I express opinions different from others in public.	0.66
	32. When I see social injustice, I feel confident to speak out.	0.80
	28. I would challenge authority when it's the right thing.	0.65
<b>Social political resources and influence</b>	33. If I want to fight for my rights, I know that I can find someone to help.	0.71
	20. People would pay attention to what I say.	0.66
	23. I feel that I can change my situations.	0.77
	34. If I need to express myself to the community or the government, I can find a way.	0.76
	22. I can convince others to accept my suggestions	0.73
<b>Social political power</b>	25. If people cooperate, they can produce greater social forces.	0.85
	24. If people work together, they can change the society.	0.83
	26. It is possible to take action and solve social problems.	0.80
<b>Social political action</b>	30. I am willing to take part in collective action to improve social problems.	0.82
	29. I am willing to take part in collective action to improve neighborhood problems.	0.83
	31. I am willing work to correct social injustice.	0.85

third-order model also demonstrated a good model fit ( $\chi^2/df=1.25$ , CFI=1.00, TLI=1.00, and RMSEA=0.027).

**Table 4** illustrates the floor and ceiling effects and Cronbach's  $\alpha$  of each domain of the ES-33. No obvious floor and ceiling effects were found in the eight domains (0.3%-3.5% and 1.5%-18.0%, respectively). These domains had sufficient internal consistency ( $\alpha=0.72-$

0.90), except for the social assertiveness domain ( $\alpha=0.68$ ). The ES-33 all items met the criteria of corrected item-total correlation with the exception of item 27 that measured 0.3.

### Discussion

This study employed CFA to determine the factor structures of the Empowerment Scale in patients with schizophrenia. We examined the

**Table 4: Floor/ceiling effects and internal consistency of the Empowerment Scale with 33 items.**

Domains	Mean (SD)	Floor effect	Ceiling effect	Cronbach's $\alpha$
Self-efficacy and internal control	24.0 (4.6)	0.6	10.0	0.90
External control	12.7 (3.1)	1.2	2.4	0.76
Interpersonal communication skills	9.1 (1.8)	0.9	17.4	0.81
Interpersonal assertiveness	9.1 (1.7)	0.3	13.9	0.72
Social assertiveness	8.2 (2.0)	1.8	7.4	0.68
Social political resources and influence	13.9 (3.0)	0.9	6.5	0.80
Social political power	9.3 (1.9)	1.5	18.0	0.81
Social political action	8.1 (2.2)	3.5	10.0	0.83

SD = standard deviation.

8-factor model (i.e., first-order factor structure) to determine its robustness for further application and validation. Then, we examined the higher order models (i.e., second- and third-order factor structures) to verify appropriateness of using the sum score of each subscale and the total score of the scale. The CFA results displayed that the factor structures of the ES-33 were well supported in the first-, second, third-order models.

The 8-factor model of the ES-33 met the criteria of the four CFA fit indices, indicating the ES-33 is useful to measure multidimensional empowerment in patients with schizophrenia. The ES-33 with eight domains is applicable to express and identify the multiple influences of empowerment in patients with schizophrenia [30]. Item 27 of the Empowerment Scale was deleted because of low factor loading. Corrected item-total correlation of this item was also low. A possible reason could be low consistency of subject emphasis for item 27 with other items in the external control domain. The content of item 27 is whether “general people” could change the current situations. However, the other items focus on feelings and perceptions of “self” for the current situations. The retained 33 items of the Empowerment Scale had sufficient factor loadings, which indicate each item was a suitable indicator of its corresponding domain [31]. For the clinical implication, the ES-33 could be used as patient-reported outcome to reflect patients’ perceptions of multiple influences of empowerment in the process of recovery at clinical and research settings [32].

The higher order models of the ES-33 showed good model fits. For one of the three second-order models, which have a single second-order factor (i.e., personal, interpersonal, and social political factors), each CFA model fit the data well. Our results indicate that the sum score of domains for each second-order model can be used to represent its subscale-aspect of empowerment. For example, the scores of two

domains (i.e., “self-efficacy and internal control” and “external control”) of the personal subscale can be summed up to reflect the empowerment in the personal aspect of empowerment. Moreover, the CFA results of the third-order model were satisfactory, indicating that a total score of the ES-33 is an appropriate representation of the overall empowerment status in patients with schizophrenia. Clinicians and researchers can apply the total score as an outcome indicator.

The eight domains did not have floor and ceiling effects. These domains can distinguish patients’ domain-specific functions among the low and high score ranges. However, two domains (i.e., “interpersonal communication skills” and “social political power”) had higher percentage of patients within highest score (17.4% and 18.0%, respectively). A possible explanation may be that the sample recruited from past and present rehabilitation center patients who may have already reached a certain level of functioning. The acceptable ceiling effects might restrict the ability of these two domains to distinguish their domain-specific functions. Further studies are needed to recruit patients with a variety of severities to evaluate the ceiling effect of these two domains. Regarding the internal consistency, our results were similar to a previous study [14], except the “interpersonal assertiveness” domain ( $\alpha > 0.7$  in this study;  $\alpha < 0.7$  in the previous study) and the “social assertiveness” domain ( $\alpha < 0.7$  in this study;  $\alpha > 0.7$  in the previous study). The reason may be that the characteristics of the sample in this study were different from those in the previous study (e.g., healthy population and clients with domestic violence problems). However, indicators of the psychometric property (e.g. reliability, discrimination, difficulty) are “sample dependent” [33]. A questionnaire needs to be validated in several different samples before the questionnaire can be applied. Our findings provide further evidences of psychometric properties of the ES-33 in

patients with schizophrenia.

Two limitations of this study should be noted. First, our data were taken from another's dataset. The original data collectors did not provide any information of the severity of the psychiatric condition or the cognitive level. This in turn may restrict our ability to accurately predict if severity of symptom level of patients affects the benefits of using the ES-33. Further studies are needed to assess these variables, and should be conducted in diverse populations

A second limitation for generalized use of the ES-33 arises from its development using only Taiwanese Chinese speaking patients. Our results from the Taiwanese population may be affected by cultural, linguistic or other factors not present in other countries, especially when compared to Western populations. Further studies could translate the ES-33 into different languages and further examine the factor structures.

Construct validity of the ES-33 was well supported from the first-, second-, and third-order CFA models. The sum score of the three individual subscales is appropriate to represent different aspect of empowerment (i.e., personal, interpersonal, and social political aspects). Moreover, the total score of the ES-33 is able to explain the overall empowerment status in patients with schizophrenia. The ES-33 is recommended for use to capture the multiple dimensions of empowerment and overall empowerment status on perspective of patients with schizophrenia.

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