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A concise self-report scale can identify high expressed emotions and predict higher relapse risk in schizophrenia

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ABSTRACT

Purpose: Although high expressed emotions (EE) is one of the most significant predictors for schizophrenic relapse, the assessment of EE is often impeded by the demanding Camberwell Family Interview (CFI) that is required to be conducted by specifically trained staff. To enable a more efficient assessment of EE, we developed the 12-item Concise Chinese Level of Expressed Emotion Scale (CCLEES) and reported its predictive and concurrent validity in this study.

Methods: A one-year prospective study design was adopted. Totally 101 participants diagnosed with schizophrenia were recruited from the department of psychiatry of a major acute hospital in Hong Kong. CCLEES was administered and subsequent relapse information was collected from all participants. At baseline, 10 family members of the participants were also administered CFI.

Results: Participants who scored above the optimal cut-off point (Score 13 on Criticism, and/or 13 on Hostility, and/or 15 on Emotional Over-involvement) showed a 6.3 times elevated 12-month schizophrenic relapse rate compared to those who scored below cut-off. The CCLEES also demonstrated excellent correspondence with CFI, the widely-recognized golden benchmark of EE assessment.

Conclusions: The results support the CCLEES as a brief and psychometrically sound self-report measurement for EE in Chinese people with schizophrenia.

1. Introduction

High expressed emotions, often referred to as "high EE" by mental health practitioners, has long been identified as a strong risk factor of relapse in schizophrenia [1,2]. The notion of high EE was first proposed by pioneer social psychiatrists in the UK in the 1960s. High EE is defined as having a member in the family showing the following behaviors excessively on the person with schizophrenia: (a) criticism, and/or (b) emotional over-involvement (EOI), and/or (c) hostility. The classic study by Vaughn and Leff [3] showed that the 9-month relapse rates were respectively 10%, 15%, 53% and 92% for the following groups of people with schizophrenia (a) low EE, on drugs; (b) low EE, no drugs; (c) high EE, on drugs; and (d) high EE, no drugs. Subsequent reviews [4–6] have consistently supported the role of high EE on relapse and its clinical significance. Although the investigation on high EE is relatively rare in the Chinese population [7,8]. Ng and his colleagues [9] followed 33 Chinese individuals with schizophrenia and found that the 9-month relapse rates were 11.1% and 60.0% respectively for the low and the high EE groups.

Traditionally, EE was measured by the Camberwell Family Interview (CFI), which is still considered as the golden benchmark in assessing EE [2,3,10]. However, CFI is impractical in clinical practice as it requires specially trained staff, interviewing of family members of patients and about 3 h for each assessment, including subsequent coding of the recorded interview. From both pragmatic and theoretical perspectives, a concise scale basing on self-report by patients is highly desirable [11]. After all, the impact of EE is a personal experience of the person with schizophrenia. His/her subjective appraisal matters more than the "objective" observation of EE exhibited by the family member. The 60-item Level of Expressed Emotion Scale (LEES) [12] and its 52-item Chinese validated version [13] assess EE experienced by persons with schizophrenia using self-report. Along similar rationale, an even simpler measure of EE, perceived criticism (PC) was developed by Hooley and Teasdale [14]. PC has been shown to predict poor clinical outcomes in depression, anxiety disorders, substance abuse and bipolar disorder [15,16]. In schizophrenia and related psychoses, PC has been revealed to have good agreement with CFI in identifying high EE [17]. Decrease in PC has been shown to predict better clinical outcomes in individuals at clinical high risk for psychosis, which includes schizophrenia [18]. The factor structure of the Chinese validated Chinese LEES scale was unstable [13] and 52 items are still too tedious to be used in clinical or research context. The inclusion of numerous positively-worded items

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(for examples, “make patient feel valuable as a person”, “is understanding when patient makes mistakes”) may not be culturally relevant, especially in the Chinese context, as the absence of positive comments may not necessarily reflect hostility or rejection against the person with schizophrenia. Along this rationale, the 12-item Concise Chinese Level of Expressed Emotion Scale (CCLEES) was constructed [11]. Validated with a sample of 188 persons with schizophrenia in Hong Kong, the CCLEES demonstrated a 3-factor structure coherent with the original conceptualization of high EE (criticism, hostility, EOI) with satisfactory factor loadings, internal consistencies (Cronbach alphas = 0.84 for the whole scale, and ranging from 0.75 to 0.77 for the three subscales) and construct validity. The scale was significantly positively related to anxiety and depression, negatively with the SF-12 mental health score and non-significantly with the SF-12 physical health score. Nonetheless, before the CCLEES can be widely used in clinical settings, the agreement with the golden benchmark, that is CFI, and the cut-off score that effectively predicts schizophrenic relapse should be established. Hence, this study was conducted with the following objectives:

1. To establish the cut-off score on CCLEES in differentiating high EE from low EE based on the risk of 12-month schizophrenic relapse using receiver operating characteristics (ROC) analysis;
2. To examine the predictive validity of CCLEES; and
3. To examine the degree of agreement with CFI

2. Methods

2.1. Study design

A one-year longitudinal study design was adopted. The CCLEE scale and CFI were administered with the participants at baseline. The relapse information of the patients in the subsequent year was collected from clinical notes.

2.2. Sampling and recruitment

Participants were conveniently sampled and recruited from the Department of Psychiatry of the Pamela Youde Nethersole Eastern Hospital (PYNEH), a major acute hospital in Hong Kong. Eligible participants were diagnosed with schizophrenia on ICD-10-CM, receiving follow-up at the specialist out-patient department at PYNEH, Chinese people living in Hong Kong and could communicate in Cantonese or read Chinese, aged 18 or above and living with at least one family member or caregiver and would continue to live with them for the coming year. Patients who were cognitively or intellectually incapable of giving consent or living alone or in institutions were excluded. To achieve the current sample of 101 valid responses for the 1-year predictive validity study, totally 142 patients had been approached, suggesting a response rate of 71.1%.

Eligible family members were those who were living with a person with schizophrenia, Chinese people living in Hong Kong and could communicate in Cantonese, and aged 18 or above. Family members who were cognitively or intellectually incapable of giving consent, did not agree to taking audio records of the interview, or did not give consent to the investigator for contacting their family member with schizophrenia for the completion of CCLEE scale were excluded. Family members were conveniently sampled and approached by the medical social services unit of the Department of Psychiatry of PYNEH as well as social workers in a local Integrated Community Centre for Mental Wellness (ICCMW) when they were requesting services or participating in support programs. No specific efforts were paid to ask the patients to invite their family members to take part in the study. This is to avoid a possible bias that those family members with better relationship with the patients would be more willing to participate, resulting probably in high ratio of low EE relatives. To achieve the current sample of 10 pairs of patient-family member for the concurrent validity study, totally 18 family members had been approached. Twelve of them agreed to participate in the study. Since 2 patients refused to join the study, the eventual effective sample size was 10 pairs, with the family members received CFI and the patients completed the CCLEES.

2.3. Measures

2.3.1. CCLEES

The CCLEES is a 12-item self-report scale measuring the subjective experience of EE of the most significant family member of a person with schizophrenia [11]. Patient participants answered on a scale ranging from 1 to 4 for each item. Hence, it has a theoretical range of 12 to 48, with higher scores indicating higher level of EE. It consists of three factors, namely Criticism, Hostility, and EOI, with four items for each factor.

2.3.2. CFI

The CFI is also a measure of EE, but by means of conducting a semi-structured interview with a family member by a trained interviewer. The interview was primarily about taking a brief psychiatric history of the patient and usually lasted for 1 to 2 h. The interview process was audiotaped, and was subsequently rated by the interviewer following a standardized coding protocol. The level of EE was determined by 5 dimensions, namely critical comments (by frequency count), hostility (on a 4-point scale ranging from 0 to 3), EOI (on a 6-point scale ranging from 0 to 5), warmth (on a 6-point scale ranging from 0 to 5), and positive remarks (by frequency count). The family member was categorized as high EE if the criticism count was 6 or more, and/or the hostility rating was 1 or above, and/or EOI rating was 3 or more.

2.3.3. Relapse

The exacerbation of positive symptoms within 12 months after taking the CCLEES was taken as the criterion to identify a schizophrenic relapse. This included re-appearance of symptoms after remission from a previous episode and marked worsening of the symptoms. Hospital records of the participants were obtained within the 12-month period after taking the CCLEES, including hospitalization records, medication records, follow-up appointments, and clinical notes of psychiatrists. For participants who had a hospitalization into the psychiatric ward, clinical notes of the psychiatrist or discharge notes of hospitalization were scrutinized to identify if the admission was due to increase or re-appearance of positive symptoms. For participants without hospitalization, possible signs of relapse were initially indicated by a complete shift from one type of medication to another, increase of dosage of medication to 200% or more of the original, or speeding up of the next follow-up appointment to half or less than half of the previous period. If the participants had one or more of these criteria matched, the clinical notes of the psychiatrists were scrutinized to look for any signs of increase or re-appearance of positive symptoms. The recorders of these information, mainly the psychiatrists providing the treatment for the respective participants, were blind to whether the participants have taken the CCLEES and their scores.

For patient participants, demographic data including their name, sex, age, number of family members living together, relationship with the family member with the most significant influence and contact hours with that family member were collected, in addition to clinical data including diagnosis and onset years. For family member participants, only their name, the patients' name as well as their relationship and contact methods were recorded.

2.4. Procedures

For patient participants whose family members were not involved in the CFI, the data collection sessions were administered by trained community psychiatric nurses, personal care workers, or medical social workers in PYNEH or social workers at the ICCMW. After explaining

the study to the participants and obtaining their informed consent, participants were asked to fill in the CCLEES and demographic data themselves. If the participants have difficulties in reading the questions, the administrator would read out the questions to them with minimal interpretation.

For family member participants who agreed to participate in the CFI, an appointment was set up between the investigator and the family member through the respective medical social workers at PYNEH or social workers of the ICCMW. At the appointment, the investigator obtained the informed consent of the family member and conducted the semi-structured interview. The audio record of the interview was subsequently rated by the investigator. The person with schizophrenia in the family would then be separately invited by the concerned medical social worker or ICCMW worker for informed consent and administration of the CCLEES. Neither the patient participants nor the workers administering the CCLEES were informed of the CFI scores or the interview content.

Data collection began in March 2013 and ended in March 2016. The study was approved by the Social Welfare Department, Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster and Ethics Committee of Hospital Authority Hong Kong East Cluster.

2.5. Statistical analyses

Descriptive statistics were used to examine the sample characteristics, relapse profile and scale scores of the CCLEES and the CFI. The associations between CCLEES with relapse and CFI were assessed using the Fisher's Exact Tests, odds ratios, and non-parametric Spearman Rho coefficients.

Since the CCLEES was a newly developed scale, no former reference could be drawn on regarding which score would best separate high and low EE groups. The evaluation of the optimal cut-off point involved several steps. First, based on Vaughn and Leff [3] the threshold level for each subscale was determined through testing the predictive power on relapse for each high score of the subscale (that is score 10 to 16) by a batch of association tests including the Fisher's Exact Tests and the computation of odds ratios. Second, after the threshold level was found for each subscale, the optimal cut-off point for the entire CCLEES was determined through subjecting a combination of threshold levels and second-best thresholds on each subscale to predictive power testing for relapse using association tests. A similar procedure was also conducted to test the predictive power of candidates of optimal cut-off scores on the total scale score. The effectiveness of using the threshold approach and the total score approach was compared based on their predictive power on relapse. All analyses were conducted with SPSS 24.0.

3. Results

3.1. Sample characteristics

A total of 117 responses were obtained with 101 valid responses, 10 invalid responses and 6 duplicated responses. Reasons for the 10 invalid responses included non-psychotic diagnosis (n = 6), death within 12 months after administering CCLEES (n = 1), non-Chinese ethnicity (n = 1), not living with any family members (n = 1), and the lack of available medical records (n = 1). For the 6 duplicated responses, their first responses were included whereas the subsequent responses were discarded. The characteristics of the 101 valid participants are presented in Table 1.

Among the 101 participants, 53.5% were female, and the mean age was 44.7 years (ranging from 18 to 84). The average duration of years of illness was 9.0 years, with most participants having the illness for 1 to 10 years. Three-quarters of participants (75.3%) lived with 1 to 3 relatives, with the average number of co-living relatives being 2.6.

Table 1
Participant characteristics (N = 101).

Variables	Categories	Frequencies	Percentages
Gender	Male	47	46.5%
	Female	54	53.5%
Age	20 or under	3	3.0%
	21–30	14	13.9%
	31–40	20	19.8%
	41–50	29	28.7%
	51–60	28	27.7%
	60 or above	7	6.9%
Years of illness	0	2	2.0%
	1–10	70	69.3%
	11–20	19	18.8%
	21–30	5	5.0%
	31 or more	5	5.0%
No. of co-living family members	1	21	20.8%
	2	33	32.7%
	3	22	21.8%
	4	19	18.8%
	5 or more	6	5.9%
Relationship with patient	Spouse/heterosexual friend	30	29.7%
	Siblings	12	11.9%
	Children	13	12.9%
	parents	46	45.5%
Contact hours per week	Under 35	27	26.7%
	36–84	56	55.4%
	Over 84	18	17.8%

About half of the sample was living with their parents (45.5%), and another one-third living with the spouse/heterosexual friend (29.7%). Most participants were in contact with their relatives for more than 35 h per week (73.3%). The average contact hours were 60.9 per week, that is close to 9 h per day.

3.2. Threshold levels for CCLESS

Sixteen participants (15.8%) were identified to have relapse within the 12 months after administering CCLEES. Since each subscale has a theoretical range from 4 to 16, with the median score being 10, the 7 scores from 10 to 16 were regarded as “high scores” for the purpose of deducing the threshold levels for each subscale. For each designated threshold, participants who scored on or above than the cut-off score were regarded as high EE, whereas those who scored below were regarded as low EE. A 2 × 2 contingency table with EE group (High vs Low) and relapse (Yes vs No) was constructed for each high score. Fisher's Exact Test and Odds Ratios were computed for each score on each subscale. Table 2 shows the association test results for each high score on Criticism, Hostility and EOI. The thresholds of 13, 13, and 15 on criticism, hostility EOI respectively demonstrated the highest predictive power for relapse (Table 2). With these cut-off points, the odds ratios of criticism, hostility and EOI in predicting relapse were 9.11, 3.25 and 2.50 respectively.

According to the coding scheme of CFI, an optimal cut-off point for the full CCLEES could be defined as a combination of the threshold levels of the three subscales. Thus, to determine the optimal cut-off scores for CCLEES, 2 × 2 contingency tables (EE group × relapse) were constructed for the possible combinations subscale scores. In addition to the three thresholds identified above, we also included the second-best threshold for each subscale in deriving the candidate combinations. Thus, the association tests were conducted on 8 candidate combinations. Association tests result show that the combination of threshold scores of 13, 13, and 15 respectively on criticism, hostility and EOI (C13, H13, E15) yielded the best prediction with relapse (Table 3). The relapse rate was 33.3% (11 relapses out of 33 participants)

Table 2
Association test results for the threshold levels of criticism, hostility and EOI.

Cut-off point	p-value of Fisher's Exact test	Odds ratio	p-value of odds ratio
Criticism*			
10	0.0064	4.7857	0.0060
11	0.1799	3.0579	0.0775
12	0.0214	5.0649	0.0152
13	0.0114	9.1111	0.0073
14	0.1170	5.9286	0.0873
Hostility			
10	0.0929	2.4750	0.1591
11	0.0699	2.6263	0.0860
12	0.2280	1.7419	0.3116
13	0.0348	3.2500	0.0358
14	0.1161	2.4000	0.1334
15	0.4341	1.5918	0.5856
16	0.2408	2.8929	0.2447
EOI			
10	0.5559	1.0732	0.8969
11	0.2862	1.5758	0.4060
12	0.5739	1.0452	0.9375
13	0.2798	1.6919	0.3817
14	0.1896	2.2424	0.2223
15	0.1548	2.5000	0.1704
16	0.5659	0.6417	0.6860

Note. EOI = Emotional over-involvement.
*Since no participant scored over 14, association tests were not run on scores 15 and 16.

in the High EE group and 7.9% in the low EE group (5 relapses out of 68 participants), resulting in an odds ratio of 6.3.

Another approach for deriving the optimal cut-off point for CCLEES was based on the predictive power of total CCLEES scores. Thus, association tests were conducted on a range of total scores of the CCLEES. From the computation results, both scores 34 and 36 yielded the best predictive power (34: odds ratio = 3.63, p-value of Fisher's exact test = 0.0282; 36: odds ratio = 3.65, p-value of Fisher's Exact test = 0.0360).

3.3. Association between CCLEES and CFI

Ten valid CFI and CCLEES records were obtained in the study. For the family members who participated in CFI, 4 were male, 4 of them were parents of the patients, 3 were the spouses or heterosexual friend, 1 was a sibling, and 2 were the children. Among the 10 patients, 4 were male. Their average age was 43.6, with a range from 20 to 72. The average contact hours were 113.2 h per week, with a range from 56 to 168 h. There was an average of 2.6 cohabitating family members.

The scores of the CFI and the CCLEES of the ten participants are presented in Table 4. Three participants were identified as High EE group by CFI. For the CCLEES data, if the (C13, H13, E15) cut-off was adopted, 4 participants were allotted to the High EE group according to the optimal cut-off points for CCLEES using the combination of thresholds of the three subscales. Discrepancy was found in only 1 participant who was identified as Low EE by CFI but High EE by CCLEES. The Fisher's Exact Test was highly significant (one-tailed p = .033). The non-parametric correlation, indicated by Spearman's rho was 0.80 (p = .003), which indicates a high level of correspondence. It is worthwhile noting that if only the criticism subscale was used and a cut-off of 13 was adopted, there was a 100% correspondence between CFI and CCLEES.

Table 3
Association test results for the candidate combinations of optimal cut-off points for the CCLEES.

Cut-off point	p-value of Fisher's Exact test	Odds ratio	p-value of odds ratio
C10, H11, E14	0.0298	3.5385	0.0406
C10, H11, E15	0.0298	3.5385	0.0406
C10, H13, E14	0.0107	4.2483	0.0135
C10, H13, E15	0.0107	4.2483	0.0135
C13, H11, E14	0.0128	4.2857	0.0185
C13, H11, E15	0.0128	4.2857	0.0185
C13, H13, E14	0.0015	6.3000	0.0019
C13, H13, E15*	0.0015	6.3000	0.0019

Note. CCLEES = Concise Chinese Level of Expressed Emotion Scale
*While the point 14 and 15 of EOI produced exactly the same results in this association test, this combination (C13, H13, E15) was chosen as the optimal cut-off point for the CCLEES as point 15 produced more robust association with relapse than point 14 in the determination of the threshold for EOI.

Table 4
Scores of CFI and CCLEES.

Participant	CFI				CCLEES			
	Criticism	Hostility	EOI	EE	Criticism	Hostility	EOI	EE
1	11	2	3	High	16	12	13	High
2	0	0	2	Low	6	7	12	Low
3	3	0	2	Low	4	10	11	Low
4	2	0	2	Low	9	7	5	Low
5	1	0	1	Low	4	7	9	Low
6	4	0	1	Low	5	4	4	Low
7	3	0	1	Low	4	6	4	Low
8	3	0	1	Low	12	14	14	High
9	9	3	3	High	16	14	14	High
10	10	3	3	High	14	16	12	High

Note. CFI = Camberwell Family Interview; CCLEES = Concise Chinese Level of Expressed Emotion Scale; EOI = Emotional over-involvement; EE = expressed emotion.

4. Discussion

In view of the burdensome administration of existing assessments of EE, there is a pressing demand for a concise self-report instrument that provides sufficient administrative convenience as well as psychometric rigour for applications in clinical and research settings. This study reports the predictive and concurrent validity of a concise self-report measure of EE, namely the CCLEES. Results show that the optimal cut-off point for the CCLEES is score 13 on Criticism and/or 13 on Hostility and/or 15 on EOI. Participants who scored beyond the optimal cut-off point were 6.3 times more likely to have a schizophrenic relapse within the 12 months after the administration of the instrument. Furthermore, the CCLEES has excellent correspondence with the CFI, supporting its concurrent validity. However, findings of the current study suggest that the Criticism subscale may be an even simpler measure of EE. The Hostility and EOI subscales do not seem to add value in detecting high EE or predicting clinical outcomes. For clinical practice, the Hostility and EOI subscales may inform intervention though.

4.1. Optimal cut-off-point of the CCLEES

Considering that the median of each subscale was 10, the optimal cut-off point was rather high. One of the possible reasons for this sample to need a high optimal cut-off point for best relapse prediction might be related to the higher general stress level of the Hong Kong community. Hong Kong has been known for the community's high stress level due to factors including high density of population, dense living area, few public facilities, high work stress and high cost of living. Citizens in Hong Kong would be accustomed to tolerating and expressing high stress levels. Some schizophrenic patients might have developed a greater capacity to tolerate stress or high EE social environment, for example, some being numb or apathetic to talk-backs. Therefore, it takes a relatively high EE level to best predict their relapse. Nonetheless, further empirical studies are needed to re-confirm whether this high optimal cut-off point is a product of socio-cultural impetus. Although a variable, or pro rata, cut-off point may take a more neutral stance in relation to the character of the sample. However, the proportion of High vs Low EE may differ by population. Thus, such an approach may reduce the predictive validity of the optimal cut-off point.

In fact, it is possible for examining the optimal cut-off point by two methods. One is by setting up a cut-off point for the total score of the entire scale (the Total Score Method). The other is by a combination of threshold levels of the subscales, such that if the total score of any subscale is above their respective threshold level, the case will be regarded as high EE (the Threshold Method). Although the Total Score Method is more straightforward, we see multiple merits in adopting the Threshold Method for the CCLEES. The strength of the Threshold Method lies in its sensitivity to high score of each subscale. For instance, a low overall EE score could be due to the sum of 3 medium to low scores, or a combination of a very high score and 2 relatively low scores (for example, high criticism, low hostility and EOI). The Threshold Method, but not the Total Score Method, can capture the high EE of the latter case. The increased sensitivity is revealed in the higher odds ratio for 12-month schizophrenic relapse captured by the optimal cut-off point obtained through the Threshold Method (OR = 6.3) compared to that obtained through the Total Score Method (odds ratio = 3.6). We also see the possibility for the subscales of the CCLEES to be used in isolation with their respective thresholds, especially the criticism subscale. However, further validation of the psychometric properties will be necessary.

4.2. Proportion of High vs Low EE cases

With the optimal cut-off point derived from the Threshold Method (that is C13, H13, E15), the percentage of High EE cases was 32.7%, which is not high compared with other studies. Consider that the percentage of High EE as assessed by CFI were 44.6% [10] and 56.8% [3] in classic studies, 54.3% aggregated in 26 studies by Kavanagh [4], and 39.4% in Hong Kong [9], the current percentage was relatively low. One reason for the low proportion of high EE cases could be due to the tendency for the scale to capture false-negative results. As the Chinese population in Hong Kong are more reserved or covert in their expression of negative emotions, their adverse reaction to the persons with schizophrenia may not be easily expressed and be picked up. Only by CFI which involved in-depth interviews would negative feelings of the relatives toward the patients and illnesses be excavated. The CCLEES, being a short self-report scale, might not be sufficient in revealing more subtle and covert expressions of EE.

5. Limitations

One major limitation involves the sampling of the participants. The small sample size for CFI may have limited inferences for the concurrent validity of the CCLEES. A larger random sample from multiple hospitals and districts may generate more generalizable results.

6. Conclusion

The CCLEES is developed out of the quest for a convenient and localized tool to measure EE for Chinese people in Hong Kong. The 12-item scale in 4-point Likert scale requires only 3 min or less to complete, which makes it a handy tool for research and clinical applications. No specialist training is needed for the administrator of the tool. There is also no need for family members to be present in the assessment. Our findings revealed a cut-off score of 13 on Criticism and/or 13 on Hostility and/or 15 on EOI using the Threshold Method. Participants who scored beyond the optimal cut-off point had a 6.3 times elevated risk for schizophrenic relapse within the 12 months after the administration of the assessment. The assessment also had excellent correspondence with the CFI. The findings of the current study also suggest that the criticism subscale can be an even simpler measure of EE. The hostility and EOI subscales do not seem to add value in detecting high EE or predicting clinical outcomes. Further studies on perceived criticism as a measure of EE among Chinese persons suffering from schizophrenia are worth pursuing.

In Hong Kong, much effort has been made in developing a comprehensive early intervention program for the first-onset psychosis in the past two decades [19]. A focus of the program is on family relationship. The CCLEES, or even simpler the criticism subscale only, may help identify patients in great distress in family and ensure that these patients will receive the necessary help, including family intervention as appropriate.

Declarations

Ethics approval and consent to participate: The study was approved by the Social Welfare Department, Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster and Ethics Committee of Hospital Authority Hong Kong East Cluster. Informed consents were obtained from all participants prior to the beginning of the study. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

Consent to publish: Not applicable.

Availability of data and materials: The dataset generated and/or analyzed during the current study are not publicly available as the interview data are idiosyncratic and sensitive. Non-sensitive and anonymized data are available from the corresponding author on reasonable request.

Competing interests: On behalf of all authors, the corresponding author states that there is no conflict of interest.

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Authors' contributions: The study was designed by SMN and CHY, and implemented by CHY. Data analysis was conducted by SMN and CHY. The first draft of the manuscript was authored by SMN, and all authors contributed intellectually to its revision and agreed with its submission.

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