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Development and psychometric validation of a comprehensive end-of-life care competence scale: A study based on three-year surveys of health and social care professionals in Hong Kong

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Abstract

Objective. This study aimed to develop an assessment tool measuring comprehensive interdisciplinary competence in end-of-life care (EoLC) and investigate its content, construct validity, reliability, and their correlates.

Method. Items of the *Comprehensive End-of-Life Care Competence Scale* (CECCS) were developed according to a comprehensive core competence framework in EoLC and refined by a multi-disciplinary panel of experts. The psychometric properties were further tested through region-wide surveys of self-administered questionnaires completed by health and social care professionals in Hong Kong.

Results. Participants comprised social workers, nurses, physicians, and allied health care professionals (445 participants in 2016, 410 in 2017, and 523 in 2018). Factor analysis validated the construct of the questionnaire which encompassed 26 items describing EoLC core competences in seven domains with satisfactory internal reliability (confirmatory factor analysis: $\chi^2/df = 3.12$, GFI = 0.85, TLI = 0.93, CFI = 0.94, RMSEA = 0.07; Cronbach's alphas ranged from 0.89 to 0.97): overarching value & knowledge, communication skills, symptom management, psychosocial and community care, end-of-life decision-making, bereavement care, and self-care. Higher perceived levels in these competences were correlated with a higher level of job meaningfulness and satisfaction (r ranged from 0.17 to 0.39, $p < 0.01$) and correlated with lower perceived stress (r ranged from -0.11 to -0.28 , $p < 0.05$). Regression analysis found that age and work involvement in EoLC were positively associated with the perceived competences in all domains; professionals working in hospices reported higher levels of competence than workers in other settings; social workers showed lower perceived competences in symptom management, but higher levels in bereavement care than other health care professionals.

Significance of results. The validity and internal reliability of CECCS were demonstrated. The levels of perceived competences working in EoLC were significantly associated with professionals' job-related well-being. Practically, there is still room for improvement in comprehensive competences among health and social care workers in Hong Kong.

Introduction

Due to the global growth in the aging population and increases in morbidities related to cancer and chronic diseases, improving end-of-life care (EoLC) has become a priority in public policy and health care strategies in many countries, particularly in terms of the quality of care (Giovanni, 2012; Harding and Higginson, 2014; Chung and Yeoh, 2019; Carlson, 2010). EoLC refers to a type of coordinated and integrated care encompassing both medical and non-medical support for patients approaching death, often with life expectancies of less than 12 months, and their families (National Institute for Health and Care Excellence [NICE], 2017). People with life-limiting conditions may access services from multiple agencies; both they and their families have complex physical, psychosocial, and spiritual needs (Worldwide Palliative Care Alliance & WHO, 2014) that require an interdisciplinary approach from a range of service providers to ensure holistic and person-centered care (Ryan et al., 2014). Therefore, the foreseeable growth in numbers of patients with heightened complexities of needs necessitates the development of education and training to strengthen the integrative skills and competence of health and social care professionals to enable them to positively influence the course of illness at the end of life. A core competence framework plays an integral role in detailing the content and expected learning outcomes of essential training programs.

This study focused on the holistic interdisciplinary EoLC core competences that required all health-care and social care professionals in various settings and represent the primary

level of understanding required to provide quality EoLC (UK Department of Health, 2009; Gamondi et al., 2013; Ryan et al., 2014). The UK National End of Life Care Programme emphasizes that developing competences should support workforce development to ensure all workers are confident and able to provide quality care and support that meet the needs, wishes, and priorities of the individuals at the end of their lives (UK Department of Health, 2009). A series of frameworks of common core competences in EoLC have been proposed according to local practices in different social-cultural contexts (e.g., Bosma et al., 2009; Health & Social Care Northern Ireland, 2016; Whittaker et al., 2018; Chan and Chow, 2019). Generally, these frameworks consist of competences in multiple primary domains in EoLC practice: communication skills, assessment and care planning, symptom management, maintaining comfort and well-being, advance care planning, and overarching values and knowledge (UK Department of Health, 2009), loss, grief and bereavement (Health & Social Care Northern Ireland, 2016), as well as competences related to coordination and interdisciplinary teamwork across all settings, professionals' self-awareness, and professional development (Gamondi et al., 2013). Integrating these frameworks, an EoLC project in Hong Kong developed a core competency framework that reflects the unique features of the local capacity-building program that emphasized family-oriented, community-based, and culturally relevant psychosocial care (Chan and Chow, 2019). This framework reorganizes and adds new domains, and encompasses core competences commonly shared by all health and social care professionals in providing quality EoLC: (1) overarching values, attitudes, and knowledge related to EoLC (e.g., the principles of palliative care, ethics); (2) integral care for patients and their family including *symptoms and disease management, psychosocial and spiritual care, and bereavement care*; (3) the process of applying the care approach, such as *EoLC decision-making* (e.g., advanced care planning, legal and ethical issues), and *communication skills* (e.g., communication with patients and families, and interdisciplinary coordination). Additionally, this framework covers a domain on *self-care and self-reflection* which refers to professionals' emotional competence (Chow, 2013), as well as self-competence to cope with emotional and existential challenges in death work (Chan et al., 2015).

Validated assessment tools are needed to identify development/training needs and monitor the quality of training programs and practices. Competence level can be assessed in terms of objective knowledge, which is usually tested impartially discipline-specifically, and perceived knowledge which refers to subjective cognitive appraisals (Thiel et al., 2019). As EoLC competence involves a range of knowledge and attitudes which it might be difficult to capture by simple tests, many of the assessment tools used to measure professionals' competence level in the existing literature involved self-reported or perceived competences (see review by Thiel et al., 2019). Subjective competence or perceived competence is a key psychological construct in an individual's motivation system and self-conception (Marsh et al., 2017). According to Bandura's social cognitive theory, perceived competence also corresponds to the construct of self-efficacy, which is a determinant of effort, perseverance, choice of behavior and performance during competence learning, development, and implementation (Bandura, 1997; Banerjee et al., 2017). Also, studies on social and health care workers show that a person's belief that he or she is not able to professionally perform well increases his or her risk of job stress and burnout, and decreases job satisfaction, which has a negative effect on work performance (Acker

and Lawrence, 2009; Wright, 2011). Therefore, we emphasized the importance of the perceived competence level, assuming that it would be associated with professionals' well-being working in EoLC, such as job meaningfulness, satisfaction, and stress.

Several assessment tools have been developed to assess professionals' perceived self-efficacy working in palliative care (Mason and Ellershaw, 2004; Phillips et al., 2011) or perceived competence level working in EoLC (Weissman et al., 1998; Desbiens and Fillion, 2011; Whittaker et al., 2018). A review by Frey et al. (2011) found that most tools in the field of EoLC were poorly validated, designed to be project-specific, and mainly focus on narrow scores, such as physical aspects of symptom management. Alternatively, although some tools aim to assess multiple domains of competence in EoLC, they only focused on the self-efficacy or self-perceived competences of specific professionals, such as nurses in clinical settings (Mason and Ellershaw, 2004; Phillips et al., 2011; Nguyen et al., 2014). Whittaker et al. (2018) developed and validated a tool according to the UK model of five core competences for generalist practitioners. However, this scale lacked indicators measuring competences in EoLC in community settings and only focused on competences of bereavement care in practice. Overall, there is a need to develop a comprehensive competence-referred assessment tool measuring common multiple clinical domains of EoLC common for professionals of different disciplines, which can provide guidance to capacity-building programs within one social-cultural context.

The main aim of the current study was to develop a valid comprehensive EoLC competence assessment tool widely applicable across disciplines through assessed psychometric properties. Given the psychological meaning of perceived competences, it was expected that a higher level of perceived competences would be associated with better well-being related to work (i.e., employee's perception on his or her physical, psychological, and social well-being at large). Besides psychological factors, competence level may differ across work settings, professionals, and personal experiences (Cheung et al., 2018). Thus, we further applied the newly developed assessment tool to identify work-related and social-demographical factors predicting the perceived level of EoLC-related competences among various health and social care workers in Hong Kong. The findings inform professionals' needs in EoLC in Hong Kong and contribute to the development of training programs for professionals in EoLC.

Methods

Measure development and content validity

The measure development process was undertaken through a literature review, item generation by expert group discussion, and psychometric analysis. As mentioned above, a Hong Kong EoLC competence framework that encompasses seven domains of core competences in interdisciplinary EoLC was created based on a literature review of interdisciplinary EoLC competency frameworks (for more details, see Chan and Chow, 2019). During item generation, the East Midlands Evaluation Tool (EMET) developed by Whittaker et al. (2018) was the major reference for items in the five overlapping domains. Additional competences related to bereavement care, EoLC community care, evidence-based psychosocial interventions, family communication and support, and legal and practical support for patients and families were added according to the framework of Chan and Chow (2019). Items for the self-care and self-reflection

domain were added according to the emotional and existential competences regarding death work (Chan et al., 2015). The competences were also adapted to fit the local context (e.g., removing items on the Gold Standards Framework and an item which asks about cultural differences) or to use local terms (e.g., for medical orders). The first version of the measure consisted of 47 items.

To evaluate to what extent this questionnaire included all aspects of the comprehensive core competence for interdisciplinary providers of EoLC, the content validity process was examined by a panel of seven experts. Three rounds of discussions and circulation of the items of each competence were undertaken within the project team that involved three senior researchers from medicine or social work backgrounds, one nurse with approximately 18 years' experience working in palliative care, one experienced social worker with over 30 years' experience working in the elderly care and rehabilitation field, and two post-doctoral fellows with a psychology background or linguistic training respectively. The team was asked if the items were important in providing basic EoLC, whether the items could generally apply to various disciplines, and whether the items reflected the interdisciplinary competence framework of the project. Based on the team's comments, 11 items were removed because they were considered to overlap with other items, did not measure any of the domains in the project's interdisciplinary core competence framework, or were less contextually relevant. On the other hand, an important communication skill "recognize and address verbal and non-verbal communication cues" was broken down into two to reflect two levels of practice competence. The revised measure comprised 37 statements covering the seven domains of EoLC.

Data collection

To assess the psychometric properties, the original 37-item measure accompanied with measures for concurrent validity were administered to a wide range of health and social care professionals throughout Hong Kong over a three-year period from 2016 to 2018. Professional staff working in public or private hospitals, hospices, private physician's clinics, social service organizations, and community elderly service units were recruited through partner professional bodies to complete either an online or a hard copy questionnaire. The questionnaires took about 15–20 min to complete. This study was approved by the Research Ethics Committees of The University of Hong Kong (EA1602078). Participants were provided with information about the survey and gave online or written consent before completion of the questionnaire.

Measures

Comprehensive end-of-life care competences scale

The original scale included 37 items covering seven domains in EoLC. Participants were asked to rate their level of confidence in each competence, using a 10-point Likert scale where 1 = "Not confident at all" and 10 = "Very confident". The average score of items in each domain represents the level of perceived competence; a higher perceived competence represents greater confidence in their competence in a specific EoLC domain.

Self-Competence in Death Work Scale (Chan et al., 2015)

This scale comprises 16 items and two subscales. The existential subscale (10 items) refers to coping with the challenges related to their existence, such as their life and death perspective, and

meaning in life; the emotional subscale (six items) refers to coping with the challenges related to their emotions, such as their own grief and sense of helplessness. This scale shows satisfactory consistency among Hong Kong Chinese (Cronbach's alpha of 0.88 for the entire scale, 0.84 and 0.78 for existential and emotional subscales). Participants were asked to rate the extent to which the items were compatible with their current condition, on a scale of 1 = "completely incompatible" to 5 = "completely compatible". This study utilized the average scores of the entire scale and the subscales to represent the self-competence in death work and their emotional and existential self-competences.

Perceived job well-being

Three items were developed to assess participants' perceived level of stress, satisfaction, and meaningfulness of work using a 10-point Likert scale. For example, "how stressful do you feel in your job?" with 1 = "Not at all", and 10 = "very stressed".

Participants' demographic and background information, such as age, gender, profession, work settings, how much their work involved EoLC, and how many years they had worked in EoLC was collected.

Statistical analysis

A three-year survey dataset was used for psychometric analysis and the investigation of covariates. To control the bias of year, the data were randomly divided into three sets.

Factor analysis was used for construct validity, by identifying and confirming factors or latent constructs that measured the intended construct (Worthington and Whittaker, 2006), i.e., domains of core competences. First, one set of data was used for exploratory factor analysis (EFA). In SPSS 25, EFA was run to explore the factor structure of the scale, using principal axis factoring as the extraction method and varimax as the rotation method. For the item selection, the item-total correlation of the scale was also examined using Pearson's Correlation. Following the suggestions of Worthington and Whittaker (2006), items were deleted when they had: (1) the lowest factor loadings (<0.40) in EFA, (2) the highest cross-loadings (less than 0.15 difference from an item's highest factor loading), (3) high item-total correlation ($r > 0.85$), and (4) low conceptual consistency with other items on the factor. Nevertheless, some items were retained after a group discussion as they were meaningful and necessary for content reliability. Moreover, construct validity of the refined scale was further established by confirmatory factor analysis (CFA) in AMOS 20 using the second set of data.

Cronbach's alpha (>0.70) was used as a test of the reliability of internal consistency of items for the entire scale and within each domain (Cronbach, 1951).

Additionally, the third set of data was used to explore the Pearson correlation among each domain of the comprehensive end-of-life care competences scale (CECCS), the subscales of the SC-DWS, and job-related well-being. Regression analysis was used to identify the significant sociodemographic covariates associated with perceived competence level.

Results

Construct validity and item selection

This study included valid responses from 445 professionals in 2016, 410 in 2017, and 523 in 2018. Table 1 lists the demographics

Table 1. Demographic characteristics of respondents to the 2016, 2017, and 2018 surveys

	2016 wave	2017 wave	2018 wave	Group difference (χ^2 / t)
Valid number of respondents	445	410	523	
Profession [n (%)]				24.83***
Social workers/counselors	140 (31.5)	130 (31.7)	126 (24.1)	
Nurses	142 (31.9)	130 (31.7)	222 (42.4)	
Physicians	110 (24.7)	107 (26.1)	98 (18.7)	
Others ^a	42 (9.4)	43 (10.5)	38 (7.3)	
Missing data	11 (2.5)	0	39 (7.5)	
Gender (male) [n (%)]				6.65*
Male	127 (28.5)	135 (32.9)	132 (25.2)	
Female	316 (71.0)	275 (67.1)	391 (74.8)	
Missing	2 (.4)	0	0	
Age [n (%)]				6.49
18–34	129 (29)	105 (25.6)	142 (27.2)	
35–45	217 (48.8)	221 (53.9)	280 (53.5)	
55–64	73 (16.4)	62 (15.1)	84 (16.1)	
65 or above	26 (5.8)	22 (5.4)	17 (3.3)	
Religious (yes) [n (%)]	270 (60.7)	242 (59.0)	292 (55.8)	2.18
Missing data	2 (.4)	3 (.7)	5 (1.0)	
Service Setting [n (%)]				41.25***
Hospice	11 (2.5)	19 (4.6)	15 (2.9)	
Hospital	162 (36.4)	170 (41.5)	249 (47.6)	
Private practice	30 (6.7)	107 (26.1)	23 (4.4)	
Elderly LTC	85 (19.1)	46 (11.2)	88 (16.8)	
Other social services	99 (22.2)	19 (4.6)	75 (14.3)	
Missing data	58 (13.0)	49 (12.0)	73 (14.0)	
Involvement in end-of-life care [n (%)]				13.47*
None	99 (22.2)	74 (18.0)	86 (16.4)	
Small proportion (<1/3)	231 (51.9)	212 (51.7)	252 (48.2)	
Substantial proportion (1/3–2/3)	75 (16.9)	83 (20.2)	120 (22.9)	
Most of the practice (>2/3)	38 (8.5)	40 (9.8)	65 (12.4)	
Missing data	2 (.4)	1 (.2)	0	
Years working with end-of-life patients and their families [mean (SD)]	7.34 (4.55)	6.27 (8.99)	6.29 (9.76)	5.76**

^aThis includes occupational therapist, physiotherapist, chaplain or other religious workers, and trainers.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

of survey respondents. For the subsequent analysis, the total data were randomly assigned into three sets ($N_1 = 471$, $N_2 = 450$, $N_3 = 457$). No significant group differences were found in survey year, gender, age category, religion, profession, work setting, or work involvement in EoLC (χ^2 test, all $p > 0.05$).

Using one group of randomly assigned data ($N_1 = 471$), EFA without factor restriction suggested a six-factor structure for the CECCS, explaining 79.32% of the variance. However, in this structure, all items of “bereavement care” overlapped two to three factors (all loadings > 0.40) with loading differences less than 0.15. We further explored whether a seven-factor structure could better

explain the data variance and clearly identified the domain of competences in *bereavement care*. In Table 2, the seven-factor solution explained 81.36% of the variance and successfully identified the seven domains (58.98% for factor 1, 5.87% for factor 2, 4.74% for factor 3, 3.69% for factor 4, 3.12% for factor 5, 2.92% for factor 6, 2.03% for factor 7), consistent with our conceptualization of categories in the core common competence (Chan and Chow, 2019). Hence, the seven-factor structure was adopted. In addition, seven items with high cross-loadings (difference between the loadings < 0.15), and six items highly inter-correlated with other items within the same factor ($r > 0.85$, Supplementary Table 1) needed

Table 2. Factor loadings in exploratory factor analysis for original comprehensive competence scale (37 items) in randomly assigned group ($N_1 = 471$)

	EFA fixed in 7 factors							Actions
	Factor 1: communication skill	Factor 2: symptom management	Factor 3: EoLC decision-making	Factor 4: psychosocial & community care	Factor 5: OVK	Factor 6: bereavement care	Factor 7: self-care	
Overarching values and knowledge								
1. Understanding EoLC options in different settings				0.45	0.45			Deleteda
2. Understanding social and cultural influence	0.41				0.58			
3. Handling ethical issues					0.63			
4. Maintaining appropriate professional boundaries					0.67			
5. Understanding available community resources and services				0.62				Transferred to <i>Psychosocial care</i>
Communication skills								
6. Listening to and talking with patients	0.71							
7. Listening to and talking with family members	0.74							Deletedc
8. Discussing spiritual issues	0.67							Deletedc
9. Discussing psychosocial needs and concerns	0.75							
10. Recognizing verbal/non-verbal communication cues	0.76							
11. Addressing verbal/non-verbal communication cues	0.79							Deletedc
12. Facilitating communications	0.73							
13. multi-disciplinary collaboration	0.63							
Symptoms management								
14. Helping patients with their pain		0.88						
15. Using non-pharmaceutical, complementary and alternative therapies		0.70						
16. Helping accessory symptoms		0.88						
17. Discussing anxieties over the dying process	0.47	0.54						Deleteda
18. Empowering family caregivers	0.47	0.43		0.40				Deleteda
19. Recognizing death signs		0.75						

Psychosocial and spiritual care					
20. Understanding the needs and challenges	0.49		0.43	Deleted ^a	
21. Using holistic assessment	0.48		0.48	Retained ^c	
22. Understanding evidence-based psychosocial interventions			0.69	Deleted ^c	
23. Applying evidence-based psychosocial interventions			0.74		
24. Applying individual EoLC plan	0.44		0.54	Retained ^c	
25. Informing available support			0.60		
EoLC decision-making					
26. Understanding ACP		0.69			
27. Initiating ACP discussion		0.74		Deleted ^c	
28. Finding out patients' wishes over care decisions if they lose capacity		0.67			
29. Preparing death discussion		0.64		Deleted	
30. Building consensus and mediating conflicts		0.57	0.44	Deleted ^a	
31. Understanding legal issues relating to EoLC		0.68			
32. Discussing AD and DNACRP	0.45	0.65			
Bereavement care					
33. Understanding theories of grief, mourning, and bereavement	0.43		0.64	Deleted ^c	
34. Understanding normal and complicated grief			0.68		
35. Offering bereavement counseling			0.44	0.59	Retained ^c in bereavement care
Self-care					
36. Coping with emotions induced by death work				0.62	
37. Acceptance of the life and death of patient				0.52	

Note: This table only reports factor loadings larger than 0.4. EoLC, end-of-life care; OVK, overarching values and knowledge; PSCC, psychosocial and community care; ACP, advance care planning; DNACRP, do-not-attempt cardiopulmonary resuscitation.

^aThese items were deleted due to high cross-factor loading (less than 0.15 difference from the item's highest factor loading)

^bThese items were deleted due to high inter-correlation with other items ($r > 0.85$).

^cThese items were retained after group discussion on content reliability.

Table 3. Mean, standard deviations (SD) of perceived competences in the revised CSCCS

Competences in multiple domains of EoLC (mean score)	2016 wave		2017 wave		2018 wave		Whole sample	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Overarching value and knowledge (OVK)	6.87	1.96	7.00	1.92	6.86	1.83	6.90	1.90
Communication skills	6.96	1.97	7.20	1.84	6.95	1.73	7.03	1.85
Symptom management	6.25	2.28	6.43	2.23	6.45	2.00	6.38	2.16
Psychosocial and community care (PSCC)	6.02	2.17	6.25	2.10	6.19	1.97	6.15	2.08
EoLC decision-making	6.16	2.29	6.67	2.14	6.55	2.00	6.46	2.15
Bereavement care	6.62	2.21	6.65	2.17	6.60	2.05	6.62	2.14
Self-care	8.27	1.47	8.37	1.41	8.17	1.33	8.26	1.40

Table 4. Correlations among different scales ($N_3 = 457$)

	Pearson correlation (r) with each domain of PCCS-EoLC								
	Mean	SD	OVK	Communication skill	Symptom management	PSCC	EoLC decision-making	Bereavement care	Self-care
Self-competence in death work scale (SC-DWS)	3.99	0.59	0.41***	0.44***	0.32***	0.35***	0.41***	0.41***	0.71***
Existential competence in SC-DWS	3.80	0.78	0.37***	0.42***	0.30***	0.33***	0.40***	0.38***	0.76***
Emotional competence in SC-DWS	4.03	0.60	0.42***	0.39***	0.31***	0.31***	0.36***	0.38***	0.75***
Perceived job stress	6.06	2.25	-0.22***	-0.14**	-0.11*	-0.16***	-0.16**	-0.13**	-0.28***
Self-rated job satisfaction	7.01	1.91	0.26***	0.30***	0.17**	0.23***	0.24***	0.31***	0.34***
Self-rated job meaningfulness	7.92	1.67	0.29***	0.32**	0.21***	0.23***	0.28***	0.31***	0.39***

Note: the abbreviations are the same as in Table 2.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

to be deleted. Of these, two items were retained after group discussion on content reliability. One item on community care was transferred to competences in psychosocial care and regrouped as *psychosocial and community care*. As a result, the CECCS was modified as a 26-item scale with 7 factors (see Supplementary Table 2).

Using the second set of randomly assigned data ($N_2 = 450$, completer data $N = 400$), the seven-factor structure of CECCS was confirmed by CFA (Supplementary Figure). This model showed a satisfactory index in model fit: $\chi^2/df = 3.12$, GFI = 0.85, TLI = 0.93, CFI = 0.94, RMSEA = 0.07.

Table 3 illustrates the mean score in each domain of EoLC for all respondents from 2016 to 2018.

Internal reliability

Using the second set of randomly assigned data, the entire scale and each subscale showed high internal consistency, with Cronbach's alphas = 0.97 for the entire scale, 0.87 for overarching knowledge and values, 0.95 for communication skill, 0.93 for symptom

management, 0.90 for psychosocial and community care, 0.94 for EoLC decision-making, and 0.89 for bereavement care.

Association with other scales

With the third set of randomly assigned data ($N_3 = 457$), we explored the correlations of each core competence with the self-competence in death work scale (SC-DWS) and professionals' job well-being in Table 4. Medium positive correlation was found between professionals' competence levels in all seven factors of the EoLC and self-competence in death work. These competences were also significantly positively correlated with the level of job satisfaction and job meaningfulness and negatively correlated with perceived job stress.

Covariates associated with perceived competence level

Moreover, Table 5 presents the results of the regression analysis of each domain across the three-year surveys. Age and work

Table 5. Regression analysis of sociodemographic factors to predict perceived competence level in the whole sample (Beta, $n = 1378$)

Parameter	OVK	Communication skill	Symptom management	PSCC	EoLC decision-making	Bereavement care	Self-care
Intercept	5.89***	5.56***	5.48***	4.10***	4.82***	4.81***	7.60***
[Gender = Female]	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a
[Gender = Male]	-0.14	0.03	-0.14	0.01	0.02	0.19	-0.00
[Age = 18–34]	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a
[Age = 35–54]	0.27*	0.22	0.27*	0.22	-0.09	0.14	0.22*
[Age = 55–64]	0.66***	0.53***	0.63**	0.66**	0.48*	0.54***	0.68***
[Age = >65]	0.85*	0.86*	1.19**	1.31***	1.05**	0.73	0.42
[Religious = No]	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a
[Religious = Yes, any]	0.10	0.25*	0.10	0.19	0.12	0.21	0.10
[Profession = Physicians]	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a
[Profession = Nurse]	-0.07	-0.20	0.04	0.18	-0.17	0.18	-0.02
[Profession = Social worker/counselors]	-0.10	0.07	-1.73***	0.21	-0.33	0.65**	0.18
[Profession = Others]	-0.21	-0.03	-0.64*	0.23	-0.23	0.30	-0.04
[Setting = Hospital]	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a
[Setting = Hospice]	0.48	0.74**	1.06***	0.99***	0.87***	0.66*	0.21
[Setting = LTC combined]	-0.01	0.06	-0.18	0.11	0.21	-0.16	-0.16
[Setting = Social Service]	0.08	0.16	0.16	0.34	0.17	0.10	0.01
[Setting = Private clinic]	-0.10	-0.04	-0.24	-0.14	-0.47	0.18	0.16
Involvement in EoLC	0.36***	0.44***	0.50***	0.56***	0.56***	0.45***	0.13**
Years working in EoLC	0.02**	0.02**	0.01	0.02**	0.03**	0.02**	0.01*
[2016 survey]	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a
[2017 survey]	0.00	0.15	0.12	0.17	0.45**	0.03	0.07
[2018 survey]	-0.19	-0.13	-0.02	0.01	0.27	-0.10	-0.15

LTC, long-term care institutions.

^aThis parameter is set to zero because it is redundant.* $p < 0.05$.** $p < 0.01$.*** $p < 0.001$.

involvement in EoL were positively associated with a greater level of perceived competence in all the domains. Years of working in EoLC were positively associated with the majority of competences, except symptom management and self-care. Professionals with any religious affiliation showed higher perceived levels of competence in communication skills ($F [1, 1,132] = 5.51, p = 0.02$). The main effect of a professional group was found in *symptom management* ($F [1, 1,130] = 41.04, p < 0.001$) and *bereavement care* ($F [1, 1,133] = 3.28, p = 0.02$). Compared with physicians and nurses, social workers and counselors showed a significantly lower competence level in symptom management, but a higher level in bereavement care. The main effects of work settings were in symptom management ($F [4, 1,130] = 4.42, p = 0.002$), psychosocial and community care ($F [4, 1,136] = 3.02, p = 0.02$), and EoLC decision-making ($F [4, 1,132] = 3.34, p = 0.01$). Specifically, compared with professionals working in hospitals, those working in hospices showed a significantly higher level of perceived competence in the multiple domains of EoLC, but those working in a private clinic showed a lower perceived competence level in EoLC decision-making. Notably, after controlling for these sociodemographic covariates, the main effect of year still

remained significant in competences of EoLC decision-making ($F [2, 1,132] = 4.17, p = 0.02$).

Discussion

The purpose of developing the EoLC competence framework and measure was to provide a clear framework for evidence-based, safe, and effective palliative care for practitioners; this framework should be capable of informing curriculum development or supporting continued professional development and life-long learning in the clinical environment (Connolly et al., 2012). The present study developed a questionnaire based on a framework that incorporates the UK model, the concept of palliative care proposed by WHO and local considerations.

Different from previous assessment instruments that merely involved one or several domains of core competences due to the lack of a comprehensive framework (see reviews in Frey et al., 2011; Thiel et al., 2019), the CECCS measure that was created for this study to assess perceived competence working in EoLC across seven core areas supported Chan and Chow's (2019) model of seven domains of core competence in EoLC.

Furthermore, compared with the majority of previous studies that have been designed and validated for nurses or care assistants (Mason and Ellershaw, 2004; Phillips et al., 2011; Nguyen et al., 2014), our results suggest that the newly developed CECCS has adequate internal consistency and reliability for wide use with health and social care professionals from different settings, including hospitals, hospices, long-term care institutions, private clinics, and community-based social services. Therefore, the current assessment tool should be valid for assessing self-confidence in the skills, knowledge, and competences to provide a primary level of EoLC. Notably, training and developing professionals' perceived competences are important, because the current study found that the levels of perceived competence were associated with professionals' job-related well-being. However, the overall results of the three years of data show that the mean scores of the majority of perceived competences, with the exception of self-care and self-reflection, were at a medium level. This suggests a compelling need to strengthen the core competences of EoLC for health and social care professionals in Hong Kong. In particular, the mean scores of competences related to *psychosocial and community care* and to *EoLC decision-making* were relatively lower than other domains and thus may merit particular attention. Social workers may play an important role in promoting psychosocial care in different communities and implementing advance care planning through various activities (Wang et al., 2018). Additionally, talking about death in advance is a taboo associated with misfortune in Chinese culture, and most older patients die in hospitals, as they are rarely referred to community or home-based EoLC services (Luk et al., 2011). Professionals thus need capacity training working on cultural competence. Moreover, understanding factors associated with greater perceived competence among health professionals can help identify who would benefit from additional training and support. First, age and the level of involvement in EoLC work were positively correlated with perceived competences in all domains of EoLC, and years working in EoLC were positively associated with competence in most domains. These findings are consistent with previous studies that age and career experience were each statistically significant predictors of death competence (Miller-Lewis et al., 2019) and self-competence in death work for professionals (Cheung et al., 2018). This may suggest that personal resources and skills are acquired through personal experience. Professional training provided should strengthen participants' first-hand experiences, and can include role-playing exercises putting them into real-life situations (e.g., bereavement) and allowing self-reflection on their personal needs.

Second, this study also demonstrates variation across different professional groups and work settings. Specifically, social workers and counselors showed lower levels in symptom management competence than health-care professionals; this is likely the result of physicians and nurses receiving more discipline-specific training and having more relevant clinical experience. Professionals working in the hospices showed a higher level in symptom management, psychosocial and community care, and EoLC decision-making competences, whereas professionals working in private clinics showed lower competence in EoLC decision-making than other professionals working in hospitals. Private doctors have a role to play in promoting advanced directives and advance care planning in the community. Trainings on EoLC decision making are need to well prepare them to support the growing needs since advance directives have been legislated in Hong Kong. The new competence framework emphasizes cross-disciplinary

competences that need to be improved irrespective of clinical settings. This highlights the need for integrated professional training that covers multiple domains of competence and involves knowledge learning, practical training, and self-reflection to improve interdisciplinary competence for professionals in different settings in Hong Kong, particularly for professionals working in hospitals, elderly long-term care services, and private clinics. The need for improvement initiatives may vary among different institutions or settings since they have different service demands and staff cultures. The latter factor needs to be taken into account in any strategies for professional training. Also, social workers and counselors may need basic training in physical care. Although basic knowledge is necessary to enable them to communicate better with other health-care professionals in interdisciplinary settings, they showed the lowest perceived competences in symptom management.

This study has some limitations. First, the validation of the CECCS was based on data from Hong Kong-wide surveys and thus lacked test-retest reliability. This is particularly important since this type of questionnaire is supposed to be used before and after training to test potential change. Further research is needed considering its sensitivity to change over time. Second, self-reported assessment of competence or confidence may not accurately reflect actual performance. Participants might give desirable answers as they are expected to be "competent professionals". Therefore, where resources allow, multiple assessments, including actual workplace performance and patient outcomes, are needed. Third, the risk associated with developing a short instrument covering all the important end of life areas is that it is difficult to deepen each area and therefore they focus only on a very broad level. Group discussions were held in an attempt to retain some necessary items in order to guarantee content reliability. Since our framework focused on basic core competence for all, it is in nature basic and general, we did suggest developing items for intermediate skills, but it would better be done based on the same competence framework while developing discipline-specific items for different disciplines (Chan and Chow, 2019). Additionally, although this study provided a reference for studies in Hong Kong, future studies can apply CECCS in other sociocultural contexts.

Conclusion

This study developed a new questionnaire assessing professionals' perceived competence covering seven domains of EoLC for wide use with health and social care professionals from different settings. The content and construct of this questionnaire were validated. Due to the lack of test-retest, future research should examine its application in training programs. Moreover, this study suggests that professional training that covers comprehensive competences for core EoLC knowledge and skills needs to be provided for health and social care professionals in Hong Kong, particularly for younger staff, social workers, and professionals working in hospitals, elderly long-term care services, and private clinics.

Disclosure

The authors declare no conflict of interest.

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Conflict of interest

The authors declare no conflict of interest.

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