

A cross-sectional study of Health technology readiness of citizens referred to rehabilitation in the Copenhagen Centre for Cancer and Health

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Background

Globally, there is an increasing digitalization of both public and private services. The potential value of technology-based strategies utilizing digital tools and information systems has gained attention within the field of cancer rehabilitation [1]. Digital support of healthcare systems can support the patients' active participation in their own treatment. To achieve the potential benefits of digitalization, it is important to address the individuals' digital readiness. We developed the 'Readiness and enablement index for Health technology, READHY' to assess health technology readiness of potential users. The READHY instrument provides a comprehensive profile of health technology readiness by combining the theoretical framework of eHealth literacy [2] together with self-management elements and social context (see Figure 1). The aim of this study was to characterize citizens referred to cancer rehabilitation regarding to their health technology readiness and socio-demographic characteristics.

Results

Cluster analysis revealed four health technology readiness clusters (Table 2) that significantly differed regards to age, education, cohabitation status, number of additional chronic conditions, technology ownership and the purpose of using technology (Table 1).

Figure 1

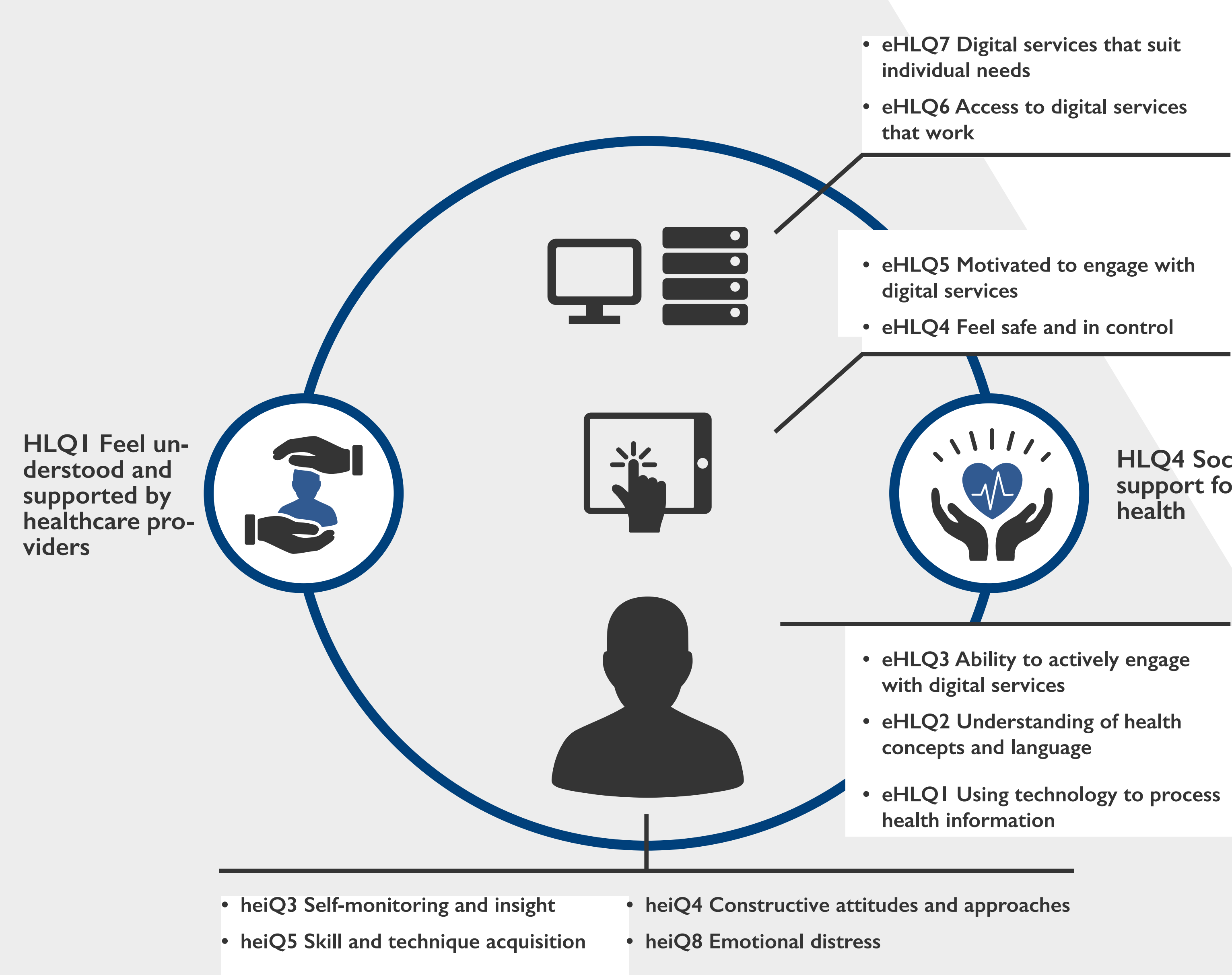


Figure 1. The 13 dimensions of the Readiness and enablement index for health technology, READHY (modified from [4]). The seven eHLQ dimensions describe: the attributes of the users (information and knowledge about their health and use of technology); the intersection between users and the technologies (their feeling of being safe and in control and their motivation); and users experience of systems (they work, are accessible, and suits users' needs). The four heiQ dimensions add knowledge about the individuals' capabilities to handle their condition and emotional response. The two HLQ dimensions add knowledge about the individuals' social context (represented by the circle encompassing the individual and the individual's attributes).

Table 1

Four health technology readiness clusters based on cluster analysis of questionnaires administered to 305 people with a recent diagnosis of cancer.

READHY dimension	Cluster 1 Mean	Cluster 2 Mean	Cluster 3 Mean	Cluster 4 Mean
heiQ3 Self-monitoring and insight	2.74	2.83	3.15	3.21
heiQ4 Constructive attitudes and approaches	2.85	2.88	3.51	3.39
heiQ5 Skill and technique acquisition	2.65	2.79	3.25	3.32
heiQ8 Emotional distress	2.60	2.62	3.18	2.98
HLQ1 Feeling understood and supported by healthcare providers	3.01	2.94	3.50	3.46
HLQ4 Social support for health	3.01	3.19	3.74	3.68
eHLQ1 Using technology to process health information	1.53	2.75	2.31	3.52
eHLQ2 Understanding of health concepts and language	2.68	2.91	3.18	3.61
eHLQ3 Ability to actively engage with digital services	1.70	3.00	2.89	3.64
eHLQ4 Feel safe and in control	2.88	2.90	3.21	3.56
eHLQ5 Motivated to engage with digital services	1.81	2.65	2.35	3.42
eHLQ6 Access to digital services that work	2.09	2.74	2.77	3.36
eHLQ7 Digital services that suit individual needs	1.74	2.60	2.42	3.29

HeiQ8 was reverse scored so that a high score means low level of distress. The READHY dimensions are rated on a 4-point scale ranging from 1= strongly disagree to 4= strongly agree. heiQ=Health education impact Questionnaire, HLQ=Health Literacy Questionnaire, eHLQ=eHealth Literacy Questionnaire.

Methods

305 citizens were enrolled among citizens referred to cancer rehabilitation in the Copenhagen Centre for Cancer and Health. Participants answered the READHY instrument and questions on socio-demographic variables. Cluster analysis was performed to segment the citizens according to their READHY scores. The resulting segments were presented to a focus group of health care professionals to ensure rigor. Sociodemographic and disease specific differences between the clusters were tested using the non-parametric Kruskal-Wallis H test or the Pearson χ^2 test.

Perspectives

Failure to acknowledge individuals wishes and/or limitations in the use of technology introduces risk of neglecting or excluding low-resource individuals, thus adding to an already existing inequality within cancer management [3]. With the development of READHY we provide an instrument to characterize potential users' readiness for and enablement by health technology. This information could be used to address the different types of users according to their competences and needs.

Table 2

Sociodemographic characteristics of the four READHY profiles based on cluster analysis.

Variable	READHY profiles				P
	1	2	3	4	
Supplement training with technology ^a , n (%)					<0.001
Yes	9 (23.7)	98 (83.1)	42 (63.6)	64 (84.2)	
No	29 (76.3)	20 (16.9)	24 (36.4)	12 (15.8)	
Sociodemographic characteristics					
n (%)	38 (12.5)	119 (39.0)	66 (21.6)	76 (24.9)	
Sex					0.898
Female, n (%)	25 (65.8)	86 (72.3)	47 (71.2)	54 (71.1)	
Male, n (%)	13 (34.2)	33 (27.7)	19 (28.8)	22 (28.9)	
Age, median [IQR]	69.0 [58.5-77.5]	59.0 [50.8-68.3]	63.5 [51.0-69.0]	56.5 [43.0-66.0]	<0.001
Highest attained level of education ^b , n (%)					0.021
Comprehensive school	9 (23.7)	11 (9.2)	6 (9.1)	5 (6.6)	
Short education	18 (47.4)	44 (37.0)	22 (33.3)	23 (30.3)	
Medium education	8 (21.1)	38 (31.9)	18 (27.3)	22 (28.9)	
Long education	3 (7.9)	26 (21.8)	20 (30.3)	26 (34.2)	
Cohabitation status, n (%)					0.004
Alone	25 (65.8)	42 (35.3)	22 (33.3)	27 (35.5)	
With spouse and/or children	13 (34.2)	77 (64.7)	44 (66.7)	49 (64.5)	
Disease characteristics					
Additional chronic conditions, n (%)					0.003
no additional conditions	8 (21.1)	58 (48.7)	34 (53.1)	46 (60.5)	
1 additional condition	15 (39.5)	39 (32.8)	21 (32.8)	18 (23.7)	
2+ additional conditions	15 (39.5)	22 (18.5)	9 (14.1)	12 (15.8)	
Distress thermometer ^c , median [IQR]	5.0 [4.0-7.0]	5.0 [3.0-7.0]	3.0 [1.8-5.0]	4.0 [2.0-6.0]	0.002
Behavioral characteristics					
Daily physical activity, n (%)					0.047
<30 min a day	4 (10.5)	19 (16.0)	16 (22.1)	7 (9.2)	
30-60 min a day	19 (50.0)	65 (54.6)	22 (24.2)	38 (50.0)	
>60 min a day	15 (39.5)	35 (29.4)	28 (42.4)	31 (40.8)	
Wish to be more active, n (%)					
Yes	29 (76.3)	100 (84.0)	55 (83.3)	63 (82.9)	
No	5 (13.2)	7 (5.9)	6 (9.1)	8 (10.5)	
Maybe	4 (10.5)	12 (10.1)	5 (7.6)	5 (6.6)	
Smoking habits, n (%)					<0.001
Current	8 (21.1)	5 (4.2)	8 (12.1)	3 (3.9)	
Never	11 (28.9)	29 (24.4)	27 (40.9)	32 (42.1)	
Earlier	19 (50.0)	85 (71.4)	31 (47.0)	41 (53.9)	
Owens no cell phone or ordinary cellphone (not smartphone), n (%)	22 (57.9)	6 (7.9)	13 (19.7)	14 (11.9)	<0.001
Purpose of using technology^d, n(%)					
Exercise	0 (0.0)	19 (16.0)	12 (18.2)	28 (36.8)	<0.001
Work	4 (10.5)	59 (49.6)	30 (45.5)	42 (55.3)	<0.001
Information seeking	16 (42.1)	115 (96.6)	62 (93.9)	72 (94.7)	<0.001
Communicating with family/friends	18 (47.4)	108 (90.8)	54 (81.8)	74 (97.4)	<0.001
Entertainment	17 (44.7)	95 (79.8)	48 (73.8)	61 (80.3)	<0.001

^ap value from Kruskal-Wallis H test (continuous variables) or Pearson χ^2 test (frequencies) between the four profiles.

^b comprehensive school equivalent to International Standard Classification of Education 2011 (ISCED-2011) levels 1 and 2, or European Qualifications Framework (EQF) level 2; short education equivalent to ISCED-2011 and EQF levels 3, 4 and 5; medium education equivalent to ISCED-2011 and EQF level 6 and; long education equivalent to ISCED-2011 and EQF levels 7 and 8.

^cScale 0=no distress-10=extreme distress

^dMultiple answers allowed.

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