

# The relation between depression, coping and health locus of control: differences between older and younger patients, with and without cancer

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## Abstract

**Objective:** Depression is an important health issue in cancer patients. People use different coping strategies and health locus of control to manage stressful situations, which relate to different risks of depression. Coping strategies and health locus of control can be changed by cognitive behavioral interventions.

**Methods:** In a cohort study, we investigated differences in coping strategy and health locus of control in older ( $\geq 70$  years) and middle-aged (50–69 years) cancer patients, and older patients without cancer ( $\geq 70$  years), and their association with presence of depression. We also investigated how these factors interact. We used the short version of the Utrecht Coping List, the Multidimensional Health Locus of Control scale, and the 15-item Geriatric Depression Scale.

**Results:** Data were available from 1317 participants. Overall prevalence of depression was 12%. Older cancer patients tended to use an avoiding coping strategy more frequently than middle-aged cancer patients. This was associated with higher risk of depression. Older cancer patients less often used an active coping strategy, in comparison with middle-aged cancer patients, which was associated with a lower risk of depression. Especially in women using a seeking social support strategy, there was a lower risk of depression. Overall, the internal health locus of control was associated with higher and the external ‘powerful others’ locus with lower risk of depression.

**Conclusions:** Older cancer patients strongly differ from middle-aged cancer patients, in particular with respect to coping. Interventions to prevent or alleviate depression should incorporate these differences.

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## Background

According to the Dutch Cancer Registration, the incidence of cancer will increase from 74,000 new cases in 2002 up to 101,000 new cases in 2015. At the time of diagnosis, about two-thirds of all patients is older than 60 years [1,2]. The prevalence of depression in older cancer patients is estimated between 17% and 25% [3]. Depressed cancer patients have a poorer quality of life, increased pain, less physical activity and decreased social functioning, in comparison with nondepressed patients [4]. Hence, depression is an important health issue in cancer patients.

Coping can be defined as thoughts and behaviors that people use to manage internal and external demands that are appraised as stressful [5]. A person may use different coping strategies over time, and the effectivity of a certain strategy depends on the situation. Several studies found that cancer patients using active, problem-focused coping

strategies were healthier both psychologically and physically [6,7]. Cancer patients using an avoiding coping strategy experienced more depressive symptoms and worse physical health, although, not all studies confirm this [7–9]. Cognitive-behavioral therapy proved to change coping strategies of cancer patients [10].

Another important predictor of depression could be health locus of control. Some people believe that their health status is controlled by themselves, they believe that they stay or become healthy as a result of their own behavior (called internal health locus of control) [11]. Others believe that their health status is controlled by powerful others or chance, so factors that determine their health are ones over which they have little control (called external and chance health locus of control, respectively) [11]. Perceived control might decline after cancer diagnosis and during the process of aging [12,13]. Still, the relationship between internal control and psychological adjustment to cancer remains largely unknown [8]. What

we do know is that to a large extent, perception of control can be taught [14].

Until now, associations between depression, coping strategy, and health locus of control among older cancer patients with different types of cancer are hardly studied. If there are differences between younger and older cancer patients and people without cancer, it may be possible to identify these particular groups. Thus, more knowledge in this field may have therapeutic implications, because it is possible to change both health locus of control and coping strategy, and new interventions could reduce depression among older cancer patients [10,14,15]. The objective of this study is to investigate the association between coping strategy, health locus of control and depression in older ( $\geq 70$  years) cancer patients. The impact of age and cancer will be evaluated by comparing the results of middle-aged (50–69 years) cancer patients and older patients ( $\geq 70$  years) without cancer. Our secondary aim is to investigate how these factors interact.

## Methods

### Study design

This study comprises cross-sectional analyses using baseline data of all the patients included in the KLIMOP-study (Dutch acronym for project on older cancer patients in Belgium and the Netherlands) between June 2010 and December 2013. The KLIMOP-study is a cohort study of older cancer patients in Belgium and the Netherlands [16].

### Setting and subjects

The study population consisted of patients living in the Netherlands or Belgium. Patients with cancer were recruited through hospitals; older patients without a previous diagnosis of cancer were recruited through general practitioners [16]. Inclusion criteria for older cancer patients were 70 years or older, with a first diagnosis of prostate, lung, gastrointestinal, or breast cancer. The two control groups consisted of older patients ( $\geq 70$  years) who have never been diagnosed with cancer, and middle-aged patients (50–69 years) diagnosed with one of the aforementioned cancer types. For more information on the KLIMOP-study, we refer to the study protocol [16].

### Data collection

Data were collected within 3 months of cancer diagnoses in older cancer patients and middle-aged cancer patients. Data were acquired by means of a personal interview or self-administered questionnaires.

### Measures

Depression was measured with the 15-item Geriatric Depression Scale (GDS-15), coping strategy with the

abbreviated version of the Utrecht Coping List (UCL), and health locus of control with the Multidimensional Health Locus of Control (MHLC) scale [11,17,18]. Furthermore, sex, age, level of education (age at which full-time education was finished), marital status, and living situation were assessed.

The GDS-15 is a scale for depression consisting of 15 yes–no questions [18]. This scale was validated in older primary care patients and in cancer patients treated with palliative intention [19,20]. All items are summed up to a total sum score, and a cutoff value of  $\geq 5$  for depression was used. Sensitivity and specificity of the GDS-15 were 67% and 73%, respectively, using a diagnostic interview as the gold standard [21,22]. Cronbach's alpha of the GDS-15 is 0.8 [23]. For patients who had less than five missing items on the GDS-15, the missing items were imputed if this would not change categorization. Because this study focuses on older cancer patients, we chose to apply a geriatric scale, which also may be used in younger patients, although it is known that presentation of depression differs from the younger population [24–26].

The short UCL covers four subscales: avoidance and awaiting (three questions), active coping (five questions), palliative reaction pattern (two questions), and seeking social support (five questions). Each question was answered on a four-point Likert scale. For each subscale, sum scores were divided by the number of questions, in order to present each subscale on a range from 1 to 4 [17,27]. A higher score indicates that a certain coping strategy is used more often. The internal consistencies (Cronbach's alpha) of the UCL were 0.64 (avoiding), 0.84 (active), 0.44 (palliative), and 0.82 (seeking social support) [28]. The UCL was validated in people aged 14 years and older [17].

The MHLC consists of three subscales: the internal scale, the external scale (also called 'powerful others'), and the 'chance' scale. Each subscale consists of three items on a five-point Likert scale. Sum scores are divided by the number of questions, in order to present each subscale on a range from 1 to 5. Higher scores represent more tendencies toward use of a certain locus of control [29]. Use of MHLC in older cancer patients has not been validated specifically, and validity of the MHLC is strongly dependent from the context in which it is used [30]. In a Dutch population, internal consistencies of the internal, external, and chance locus are reported to be 0.74, 0.81, and 0.67, respectively [28].

### Statistical analysis

All statistical analyses were carried out using SPSS 21. Sociodemographic and clinical characteristics of the study population are presented as means and standard deviations for continuous variables and as numbers and proportions for categorical variables. Chi-square tests were used to compare categorical variables between the different

patient groups; *t*-tests for independent samples were used to compare continuous variables.

The relationship between different variables and depression as the dependent variable was examined by means of logistic regression; odds ratios (OR) and corresponding 95% confidence intervals (CI) were calculated. Mean of sum scores of the four UCL categories and mean of sum scores of the MHLC subscales were used as independent variables. Sex and age were used as confounders. We built three models. In model 1, we only analyzed bivariate relations. In model 2, we adjusted for sex and age. In model 3, we adjusted for all variables, using the backward conditional method for logistic regression. In this method, the remove limit was set at  $\alpha < 0.10$  and the enter limit at  $\alpha < 0.05$ . For all other analyses, a significance level of  $\alpha < 0.05$  was used.

We tested for interactions between sex and the different UCL and MHLC subscales, age and the different UCL and MHLC subscales, presence of cancer and the different UCL and MHLC subscales, and level of education and the different UCL and MHLC subscales, by starting with a full model (all variables and the aforementioned interactions) and subsequently excluding the interaction term with the highest *p*-value, until the highest *p*-value was less than 0.05. Individual variables were excluded only if all the interactions containing this variable were already excluded. In order to interpret significant interactions, we stratified the results for sex, cancer, and level of education ( $\leq 14$  years, 15–18 years and  $\geq 19$  years).

All our models showed a good fit with the data according to the Hosmer–Lemeshow's test, with a significance level of 0.10.

### Ethics and informed consent

The study protocol was approved by the ethical review board of KU Leuven and UZ Leuven (S52097–ML6279) (Belgium) and by the ethical review board of the Maastricht University Medical Centre (NL.31414.068.10) (the Netherlands). All patients signed informed consent.

## Results

### Population characteristics

Full data were available for 1317 participants. Of these, 332 were older cancer patients, 452 were older patients without cancer and 533 were middle-aged cancer patients. In one hospital, data collection was integrated in a routine geriatric assessment; therefore, UCL and MHLC were not available for 71 older cancer patients.

As shown in Table 1, there were more female patients in all patient groups. The group of older cancer patients consisted of 76 (27%) men and 206 (73%) women. The mean age of the older cancer patients was 77.2 years (standard deviation (SD)=5.3).

Seventy-six patients had missing items for the GDS-15, 189 for the UCL and 153 for the MHLC. These patients were excluded in multiple logistic regression analysis. Hence, in the interaction analysis, 962 patients (73%) were analyzed. Among the older cancer patients, there were significantly more patients excluded from logistic regression analyses because of missing values (80 older cancer patients with missing values, 31%), compared with the control groups (113 middle-aged cancer patients, 21%,  $p < 0.01$  and 91 older patients without cancer, 20%,  $p < 0.01$ ).

### Depression

The overall prevalence of depression was 12%. There were no differences between the three patient groups (Table 1).

### Coping

The mean UCL scores are shown in Table 1. Older cancer patients scored significantly higher for the avoidance/awaiting coping strategy (2.05) than middle-aged cancer patients (1.94,  $p = 0.04$ ) and significantly lower for the active coping (2.70 and 2.88, respectively,  $p < 0.001$ ), palliative reaction pattern (2.11 and 2.29, respectively,  $p < 0.001$ ) and seeking social support strategies (2.08 and 2.26, respectively,  $p < 0.001$ ). Older patients without cancer scored even higher for the avoidance/awaiting strategy than the older cancer patients group (2.17,  $p = 0.02$ ).

### Health locus of control

Older cancer patients scored significantly lower for the 'chance' locus (2.46 and 2.73, respectively,  $p < 0.001$ ) and the internal locus (2.62 and 2.80, respectively,  $p = 0.004$ ) than middle-aged cancer patients (Table 1).

Older cancer patients scored significantly higher for internal locus compared with older patients without cancer (2.62 and 2.49, respectively,  $p = 0.02$ ).

### Relationship between depression and coping strategy and health locus of control

Table 2 shows the relationship of coping strategy and health locus of control with depression. An avoiding coping strategy is associated with a higher risk of depression (OR = 1.73; 95% CI = 1.31–2.29), also after adjusting using models 2 and 3. Active coping was associated with a lower risk of depression (OR = 0.60; 95% CI = 0.43–0.83), also after adjusting using models 2 and 3. Throughout all three models, there was a positive relationship between internal health locus of control and depression. After adjusting for all variables, the OR was 1.76 (95% CI = 1.35–2.29).

**Table 1.** Patient characteristics, *n* (%) and comparison of prevalence of depression between patient groups, presented as *n* (%), comparison of sum scores for UCL and MHLC between patient groups, presented as mean (range)

	Older, without cancer	<i>p</i> -value	Older, with cancer	<i>p</i> -value	Middle-aged, with cancer
Sex	<i>n</i> = 452		<i>n</i> = 332		<i>n</i> = 533
Male	175 (38.7%)	<b>0.002</b> <sup>†</sup>	94 (28.3%)	0.86 <sup>†</sup>	148 (27.8%)
Female	277 (61.3%)		238 (71.7%)		385 (72.2%)
Age mean in years (SD)	<i>n</i> = 452 78.22 (5.63)	<b>0.001</b> <sup>‡</sup>	<i>n</i> = 331 76.86 (5.31)	<b>&lt;0.001</b> <sup>‡</sup>	<i>n</i> = 533 59.86 (5.39)
Country of origin	<i>n</i> = 443		<i>n</i> = 255		<i>n</i> = 519
Belgium	329 (74.3%)	<b>0.01</b> <sup>†</sup>	168 (65.9%)	<b>&lt;0.001</b> <sup>†</sup>	329 (63.4%)
the Netherlands	103 (23.3%)		85 (33.3%)		164 (31.6%)
Other	11 (2.5%)		2 (0.8%)		26 (5.0%)
Level of education mean in years (SD)	<i>n</i> = 442 17.1 (3.72)	0.25 <sup>‡</sup>	<i>n</i> = 315 16.8 (3.33)	<b>&lt;0.001</b> <sup>‡</sup>	<i>n</i> = 513 18.6 (3.83)
Marital status	<i>n</i> = 447		<i>n</i> = 323		<i>n</i> = 524
Married/living together	279 (62.4%)	0.44 <sup>†</sup>	187 (57.9%)	<b>&lt;0.001</b> <sup>†</sup>	417 (79.6%)
Unmarried/widow/divorced	167 (37.4%)		135 (41.8%)		104 (19.8%)
Other	1 (0.2%)		1 (0.3%)		3 (0.6%)
Living situation	<i>n</i> = 447		<i>n</i> = 322		<i>n</i> = 520
Alone	139 (31.1%)	0.03 <sup>†</sup>	101 (31.4%)	<b>&lt;0.001</b> <sup>†</sup>	74 (14.2%)
Living together	294 (65.8%)		198 (61.5%)		438 (84.2%)
Other	14 (3.1%)		23 (7.1%)		8 (1.5%)
GDS-15					
Depressed	52 (11.9%)	0.40 <sup>†</sup>	42 (14.0%)	0.67 <sup>†</sup>	64 (12.9%)
Not depressed	385 (88.1%)		258 (86.0%)		431 (87.1%)
UCL					
Avoidance/awaiting	2.17 (1.0–4.0)	<b>0.02</b> <sup>‡</sup>	2.05 (1.0–4.0)	<b>0.04</b> <sup>‡</sup>	1.94 (1.0–4.0)
Active coping	2.69 (1.0–4.0)	0.84 <sup>‡</sup>	2.70 (1.2–4.0)	<b>&lt;0.001</b> <sup>‡</sup>	2.88 (1.0–4.0)
Palliative reaction pattern	2.00 (1.0–4.0)	0.08 <sup>‡</sup>	2.11 (1.0–4.0)	<b>0.001</b> <sup>‡</sup>	2.29 (1.0–4.0)
Seeking social support	2.09 (1.0–4.0)	0.92 <sup>‡</sup>	2.08 (1.0–3.6)	<b>0.001</b> <sup>‡</sup>	2.26 (1.0–4.0)
MHLC					
‘Chance’ locus	2.50 (1.0–4.0)	0.43 <sup>‡</sup>	2.46 (1.0–5.0)	<b>&lt;0.001</b> <sup>‡</sup>	2.73 (1.0–5.0)
External locus – ‘powerful others’	2.37 (1.0–5.0)	0.30 <sup>‡</sup>	2.31 (1.0–4.3)	0.08 <sup>‡</sup>	2.41 (1.0–4.67)
Internal locus	2.49 (1.0–4.7)	<b>0.02</b> <sup>‡</sup>	2.62 (1.0–5.0)	<b>0.004</b> <sup>‡</sup>	2.80 (1.0–5.0)

UCL, Utrecht Coping List; MHLC, Multidimensional Health Locus of Control; GDS-15, 15-item Geriatric Depression Scale; SD, standard deviation. Number of patients may differ per variable. For exact number of missing patients for the main variables, we refer to the text. Bold values indicate significant *p*-values. <sup>†</sup>Chi-square test. <sup>‡</sup>*t*-test for independent samples.

**Table 2.** Coping strategy, health locus of control, sex, and age and their relationship with depression, odds ratio (95% CI)

	Model 1	Model 2	Model 3
Coping strategy (UCL)			
Avoidance/awaiting	1.73 (1.31–2.29)	1.76 (1.32–2.35)	1.43 (1.05–1.95)
Active coping	<b>0.60 (0.43–0.83)</b>	<b>0.59 (0.42–0.82)</b>	<b>0.67 (0.46–0.96)</b>
Palliative reaction pattern	0.92 (0.71–1.20)	0.90 (0.69–1.17)	—
Seeking social support	0.85 (0.63–1.14)	0.83 (0.61–1.12)	—
Health locus of control (MHLC)			
‘Chance’ locus	1.01 (0.78–1.30)	1.01 (0.78–1.31)	—
External locus – ‘powerful others’	<b>0.74 (0.56–0.97)</b>	<b>0.73 (0.55–0.96)</b>	0.77 (0.56–1.05)
Internal locus	<b>1.65 (1.29–2.11)</b>	<b>1.65 (1.29–2.13)</b>	<b>1.76 (1.35–2.29)</b>
Sex			
Men (reference: women)	0.87 (0.60–1.25)	—	—
Age	1.00 (0.98–1.02)	—	—

UCL, Utrecht Coping List; MHLC, Multidimensional Health Locus of Control. Results based on logistic regression analysis. Bold values indicate significant *p*-values. Model 1: unadjusted. Model 2: adjusted for sex and age. Model 3: adjusted for all variables.

Interaction analysis

The results of our logistic regression analysis for interactions are presented in Table 3. We found significant interactions with sex, presence/absence of cancer, and level of education, when analyzing all patients. In order to interpret the direction of these interactions, the analysis was stratified for these variables.

A social support coping strategy is significantly associated with less depression in women (OR=0.60; 95% CI=0.39–0.91) but not in men (OR=1.85; 95% CI=0.92–3.72). There also seems to be an interaction between an active coping strategy and level of education. The most educated patients (≥19 years) had a significantly lower risk of depression (OR=0.41; 95% CI=0.18–0.96). For the interactions with presence of cancer, the degree of interaction was not that clear after stratification.

A summary of our main results is presented in Figure 1.

Conclusions

Main findings

The overall prevalence of depression was 12%. Older cancer patients used an avoiding coping strategy more frequently, which was associated with a higher prevalence of depression. They used an active coping strategy less often, which was associated with a lower prevalence of depression, in particular among more educated patients.

There were no important differences between older cancer patients and older patients without cancer, except for the internal locus of control and the avoiding coping strategy.

Especially in women using a seeking social support coping strategy, we found an association with a lower prevalence of depression. Overall, the internal health locus of control is associated with more depression, and the external locus seemed to be associated with a lower prevalence of depression.

Comparison with literature and discussion of findings

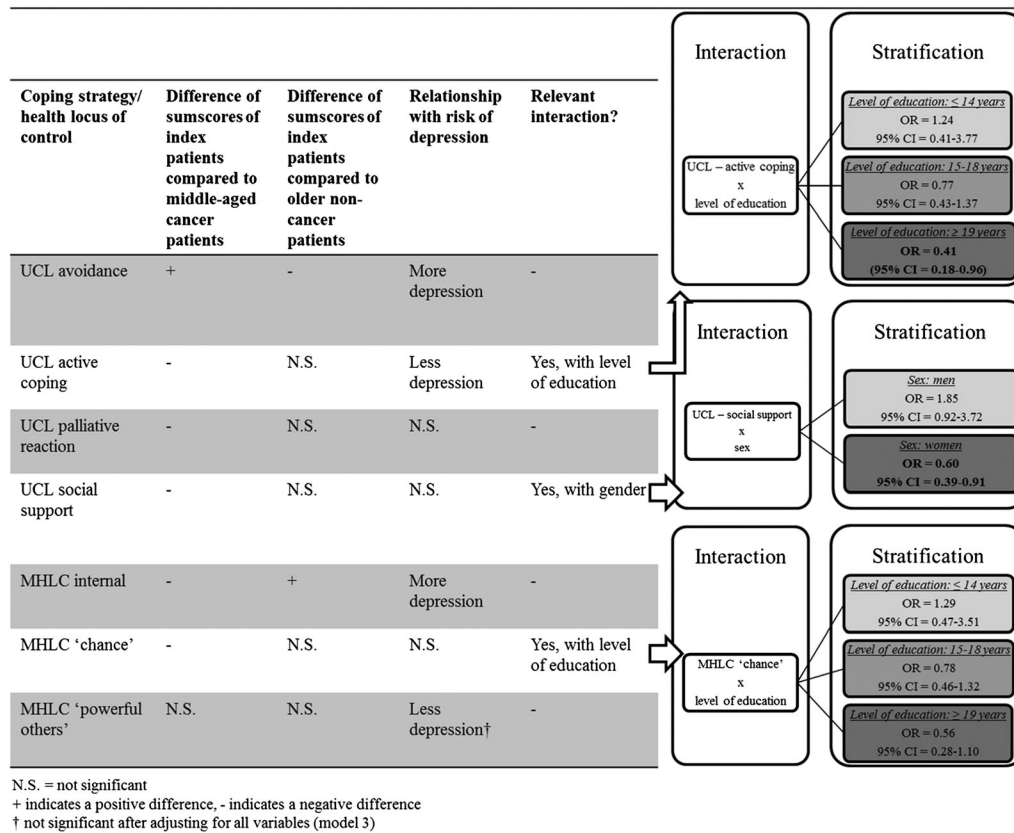
The prevalence of depression in cancer patients is estimated between 17% and 21%, in our study, this was slightly lower [3,31,32]. This may be a consequence of selection bias, moderate sensitivity of the GDS-15, or the fact that cancer patients had to be diagnosed within the last 3 months while development of depression takes longer.

The findings that the active coping strategy is used less frequently in older cancer patients and is associated with a lower risk of depression, that use of an avoiding strategy is associated with a higher risk of depression and that older cancer patients use the internal locus of control less often are in line with previous research [7,9,33,34].

**Table 3.** Logistic regression with interactions between sex and the different UCL and MHLC subscales, age groups (50–69 years or >70 years) and the different UCL and MHLC subscales, and level of education and the different UCL and MHLC subscales, and their relationship with depression, stratified for sex, age, level of education, and cancer (yes/no), odds ratio (95% CI)

	All patients		Stratified for sex		Stratified for cancer				Stratified for level of education			
		Men	Women		Cancer	No cancer		≤14 years	15–18 years	≥19 years		
			Men	Women		Cancer	No cancer					
UCL avoidance	1.07 (0.71–1.60)	1.58 (0.73–3.42)	0.90 (0.55–1.47)	1.04 (0.69–1.57)	1.33 (0.96–1.84)	1.39 (0.50–3.88)	0.79 (0.44–1.42)	1.53 (0.75–3.13)				
UCL active coping	<b>13.22 (1.17–149.01)</b>	11.13 (0.18–683.99)	10.86 (0.40–292.00)	13.96 (0.70–278.54)	<b>16.68 (1.58–175.91)</b>	1.24 (0.41–3.77)	0.77 (0.43–1.37)	<b>0.41 (0.18–0.96)</b>				
UCL social support	<b>1.94 (1.02–3.67)</b>	1.85 (0.92–3.72)	<b>0.60 (0.39–0.91)</b>	<b>2.32 (1.04–5.16)</b>	<b>1.95 (1.03–3.70)</b>	3.27 (0.85–12.58)	1.54 (0.58–4.10)	1.31 (0.42–4.10)				
MHLC external – ‘chance’	4.86 (0.86–27.61)	4.27 (0.22–84.41)	6.27 (0.68–57.86)	3.88 (0.54–27.74)	<b>9.29 (1.70–50.65)</b>	1.29 (0.47–3.51)	0.78 (0.46–1.32)	0.56 (0.28–1.10)				
MHLC internal	<b>2.00 (1.39–2.89)</b>	<b>2.16 (1.10–4.23)</b>	<b>1.95 (1.25–3.06)</b>	<b>2.02 (1.39–2.92)</b>	<b>1.67 (1.25–2.24)</b>	<b>3.70 (1.42–9.66)</b>	1.62 (0.99–2.64)	<b>2.58 (1.30–5.12)</b>				
Level of education	<b>2.08 (1.37–3.15)</b>	<b>1.86 (1.01–3.45)</b>	<b>2.19 (1.19–4.04)</b>	<b>2.09 (1.29–3.39)</b>	<b>2.28 (1.51–3.42)</b>	0.10 (0.00–15.119)	0.01 (0.00–0.41)	0.57 (0.00–2.69.54)				
Cancer (reference: no cancer)	<b>0.04 (0.002–0.93)</b>	0.07 (0.00–1.6.53)	0.05 (0.001–2.15)	—	<b>0.34 (0.16–0.71)</b>	0.27 (0.05–1.43)	0.34 (0.11–1.05)	0.44 (0.11–1.73)				
UCL social support × sex	<b>0.32 (0.15–0.67)</b>	—	—	<b>0.26 (0.10–0.64)</b>	<b>0.83 (0.73–0.95)</b>	—	—	—				
UCL active coping × level of education	<b>0.84 (0.74–0.97)</b>	0.84 (0.67–1.05)	0.86 (0.71–1.04)	<b>0.83 (0.70–0.98)</b>	<b>0.88 (0.81–0.97)</b>	—	—	—				
MHLC external – ‘chance’ × level of education	<b>0.90 (0.82–0.99)</b>	0.92 (0.79–1.08)	<b>0.88 (0.78–0.997)</b>	0.91 (0.82–1.02)	—	—	—	—				
UCL avoidance × cancer	<b>2.11 (1.02–4.37)</b>	2.36 (0.66–8.45)	1.83 (0.74–4.51)	—	—	—	—	—				
MHLC external – ‘chance’ × cancer	<b>3.45 (1.63–7.29)</b>	2.86 (0.77–10.63)	<b>3.70 (1.45–9.41)</b>	—	—	—	—	—				
MHLC internal × cancer	<b>0.47 (0.24–0.93)</b>	0.43 (0.14–1.30)	0.47 (0.20–1.13)	—	—	—	—	—				

UCL, Utrecht Coping List; MHLC, Multidimensional Health Locus of Control. Bold values indicate significant p-values.



**Figure 1.** Summary figure of the main results. Only interactions considered relevant are presented. UCL, Utrecht Coping List; MHLC, Multidimensional Health Locus of Control; OR, odds ratio

An unexpected finding was the association between use of an internal health locus of control and a higher risk of depression [35].

Our interaction analysis showed that the relation between a seeking social support coping strategy and depression was moderated by sex. The positive effect of seeking social support on the risk of depression in women in particular has been described and can be explained by both innate and socialization hypotheses [36,37]. Women more frequently express their emotions and seek for social support than men. A possible important innate difference is the fact that women possess higher levels of oxytocin than men, which upregulates the parasympathetic nervous system, and thereby leads to a more ‘tend-and-befriend’ pattern, involving seeking social support [38,39]. Next to this innate hypothesis, socialization might explain the male–female difference, as people provide more social support to women than men; it is easier for women to seek for support [39].

The most important differences in health locus of control and coping style appear to depend on age and not on being diagnosed with cancer. Differences in external factors between the older and younger patient groups are importance of religion, changing society, and being used to a more

paternal role of government and physicians. There could also be an effect of aging itself.

**Strengths and limitations**

This study is one of the first that specifically examined the relation between health locus of control, coping strategy and the risk of depression among older cancer patients, with different types of cancer. Two control groups were used; therefore, we could discriminate the effect of age and the effect of being recently diagnosed with cancer. Important limitations of our study are the cross-sectional design and insufficient power of our interaction after stratification. The MHLC has not been validated in older cancer patients, and there were relatively many missing items for UCL, MHLC and GDS-15.

Follow-up of patients from the KLIMOP-study is ongoing, and we expect to present longitudinal data within a few years. It is interesting to evaluate if the results within this cohort change when assessed later after cancer diagnosis. The amount of patients in the KLIMOP-study is still increasing, so in the future, the power for subgroup analyses will also increase. We do not have specific information regarding the participation rate of this study;

therefore, prudence is called for the generalization of results.

### Consequences

Although many studies have studied the concept of coping, there remains a relative absence of psychosocial interventions. Some studies, however, show promising results regarding coping interventions. Effective interventions teach patients how to use knowledge about coping styles in daily practice and improve their functioning. Almost all studied interventions are using a cognitive-behavioral approach.

In clinical practice, healthcare workers should be aware of the fact that older cancer patients differ from middle-aged cancer patients.

### Future research

Future research should focus on the change of coping strategies and health locus of control especially in older cancer patients, using a longitudinal study design. Additionally,

we still have to learn if screening for particular coping strategies and use of a particular health locus of control in the elderly will be effective and to what extent we can influence the coping strategy or locus of control of the older cancer patient and prevent depression.

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### Conflict of interest

The authors declare that they have no competing interests.

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