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COGNITIVE FLEXIBILITY AND FLEXIBILITY IN COPING IN NURSES – THE MODERATING ROLE OF AGE, SENIORITY AND THE SENSE OF STRESS

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Abstract
Objectives: The nursing profession entails many stressful situations and challenges, such as heavy workload, shift work, emotional demands and professional conflicts. In the light of the results of the research conducted so far, flexible coping has occurred to be highly adaptive, as its association with adaptive struggle with the disease, fewer depressive symptoms and both greater mental well-being and better health have been proven. In connection with the above, the aim of this study was to determine the nature of the relationship between cognitive flexibility and flexibility in coping in nurses, taking into account the moderating role of age of the respondents, seniority and the sense of stress. **Material and Methods:** The study sample consisted of 280 persons working as nurses (age range: 21–66). The number of women and men reflected their percentage distribution in this profession, as it is highly feminized. The following methods were used in the study: the *Cognitive Flexibility Inventory* (CFI) by Dennis and Vander Wal, the *Perceived Stress Scale* (PSS-10) by Cohen et al., the *Flexibility in Coping with Stress Questionnaire* (FCSQ-14) by Basińska et al., and a self-developed survey. **Results:** As the obtained research results show, cognitive flexibility in both the *Control* and *Alternatives* subscales was a predictor of flexible coping and their subscales. The analysis revealed that the model of the relationship between cognitive flexibility and flexibility in coping was moderated by age, seniority and the sense of stress. **Conclusions:** Coping skills and flexibility are positively correlated with the psychological adjustment of nurses. Int J Occup Med Environ Health. 2020;33(4):507–21

Key words:
general nurse, cognitive flexibility, moderation effect, flexibility in coping, *Flexibility in Coping with Stress Questionnaire,* sense of stress

INTRODUCTION

The daily work of nurses in the hospital setting, as viewed in the field literature, is difficult, inherently stressful, highly complex and of a multi-tasking nature [1]. Persons working in this profession experience work stress that derives from various sources, especially in hospital environments that change rapidly in response to the advances of medical technologies [2]. The nursing profession entails many stressful situations and challenges, such as heavy workload, shift work, emotional demands and professional conflicts [3].

Work stress can be perceived as a harmful emotional and somatic response of an individual which occurs when his/

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her skills and resources are insufficient to cope with work-related duties and responsibilities [4]. Prolonged individual activity in response to stress without periods of recovery may lead to irregularities and malfunctioning of all body organs [5]. The result of these experiences may be the deterioration of the individual's physical and mental health, leading, among others, to the development of cardiovascular and digestive system diseases, a decrease in immunity, chronic fatigue, burnout and depression. Indirect consequences include a reduced quality of care provided by nurses, a higher frequency of medical errors and, consequently, reduced patient satisfaction [6].

Work stress in nurses

One individual-level factor that was shown to increase the risk of stress-related ill health among new professional nurses is engagement in strategies to disengage from (i.e., avoid) stressful experiences [7]. It is believed that proactive engagement in stressful situations reduces stress because it facilitates effective problem-solving and development of skills [8]. The effectiveness of coping occurred to be significantly correlated with flexibility in coping [9].

Flexibility in coping

As claimed by Cheng [10], flexibility in coping refers to cognitive changeability in assessment and coping patterns in response to the emerging situation, as well as adjusting coping strategies to a given situation and assessing the effects of coping. The dual process theory by Kato [9] complements this approach to coping. The scholar treats flexibility in coping as the individual's ability to effectively modify coping strategies depending on the level of his/her effectiveness when dealing with a stressful situation [9].

In the research, the concept of flexibility in coping, in a broader sense, was adopted after Basińska et al. [9]. In this model, flexibility in coping should be understood by considering all the above aspects. First of all, flexibility in coping requires an individual to have a relatively wide repertoire of coping strategies. Secondly, it assumes changeability – defined after Lazarus and Folkman [10] as inter-situational changeability – i.e., the use of various coping strategies with relevance to changing situational conditions, and intra-situational changeability, which Kato [8] indicated (cf. Góralska et al. [9]) and which is connected with the selection of coping strategies depending on the change in the assessment of the stressful situation, i.e., also when, in objective terms, the circumstances have not changed. Thirdly, a manifestation of flexibility in coping is a reflective analysis of one's own behavior when striving to achieve a specific goal and potential improvement of one's own behavior (involving assimilation and accommodation processes), as postulated by Vriezekolk et al. [11]. It seems that only such a broad approach to flexibility in coping fully reflects the essence of this construct.

In the light of results of the research conducted so far, flexible coping has turned out to be highly adaptive, as its association with adaptive struggle with the disease [8], fewer depressive symptoms [8] and both mental well-being and better health [12] have been demonstrated.

As regards flexibility in coping, Cheng [13] noted that 1 of the components of flexibility in coping is cognitive flexibility. The respondents with a different level of flexibility in coping differed in the way they functioned at the behavioral level, which, as claimed by the author, resulted from their different cognitive interpretation of the situation. The effect was to seek components of coping and to isolate the construct of cognitive flexibility, which is subordinate to flexibility in coping [8,9,13].

Cognitive flexibility

According to Dennis and Vander Wal [14], cognitive flexibility is the ability of an individual to change his/her cognitive patterns in order to adapt to changing external

stimuli. They assumed that an adequate level of cognitive flexibility, which they characterized in 3 dimensions, is crucial for adaptive thinking and acting. The first dimension of cognitive flexibility included the individual's behaviors that tend to perceive difficult situations encountered as being controllable. The second dimension of cognitive flexibility was related to the individual's ability to identify many alternative explanations for human behaviors and life events. This means that a person manifesting cognitive flexibility was able to approach difficulties from different perspectives, which resulted in a more effective understanding of factors leading to the development and control of these difficulties. The third dimension of cognitive flexibility indicated that the individual was able to generate many alternative solutions when facing difficult situations. Statistical analyses, however, did not confirm this 3-dimensional structure of cognitive flexibility; the second and third dimensions merged into one [14]. Thus, an individual manifesting cognitive flexibility believes that he/she can solve difficulties in a variety of ways. This involves the ability to identify and ultimately choose a more adaptive solution to a given problem [14].

Flexibility in coping can be affected by sex, age, education and health. However, their role has not been fully recognized. Mental resilience, which is personality-dependent, also plays a key role in dealing with difficult situations [1,15]; considering cognitive flexibility, it decreases in late adulthood, which is expressed by, e.g., the weakening of cognitive processes and a greater rigidity of behaviors, and by reactions to new and unknown situations [15,16].

There is a feedback effect between cognitive flexibility and flexibility in coping, and experiencing stress. Stress can lead to difficulties in maintaining concentration [14,17], to changes in decision-making processes, and to more frequent failures of attention and memory [18]. As nursing is a dynamic and responsive occupation, reductions in the speed and accuracy with which information can be processed and evaluated would have clear implications for job performance. The present NHS24 study assessed the relationship between stress and cognitive function in a sample of nurses who were employed by the Scottish NHS24 service, which is a telephone helpline that members of the public can access around the clock seeking advice on symptoms [17,18].

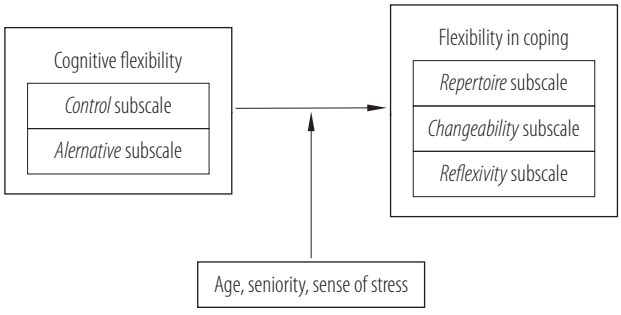

Figure 1. The conceptual model addressing relationships between cognitive flexibility and flexibility in coping with the moderating role of age, seniority and the sense of stress

In connection with the above, the aim of this study was to assess the nature of the relationship between cognitive flexibility and flexibility in coping in nurses, taking into account the moderating role of age of the respondents, seniority and the sense of stress. The conceptual model for these relationships is presented in Figure 1.

The following research questions, relevant to the research objective, were formulated:

- Is there a relationship between cognitive flexibility and flexibility in coping in the group of nurses?
- Does age modify the relationship between cognitive flexibility and flexibility in coping in the group of nurses?
- Does seniority modify the relationship between cognitive flexibility and flexibility in coping in the group of nurses?
- Does the sense of stress modify the relationship between cognitive flexibility and flexibility in coping in the group of nurses?

MATERIAL AND METHODS

Design

Prior to the study, all necessary permissions to conduct it were obtained from hospital management bodies. Subsequently, anonymous questionnaires were carried out in various hospital departments in January–March 2018.

Data collection

The selection of respondents was targeted: nurses working in various hospital departments were recruited. Questionnaire packages, whose order in the package was rotated, were used for the research. The study was individual-based.

Operationalization of variables

Three groups of variables occur in the analyzed model.

The explained variable is flexibility in coping measured by the *Flexibility in Coping with Stress Questionnaire* (KERS-14). Flexibility in coping is understood as a complex trait of dealing with stress, indicating the individual's ability to change their way of thinking and acting in a difficult situation according to the criterion of effectiveness. In the adult version, the operationalized variable consists of 3 dimensions:

- repertoire,
- changeability,
- reflexivity.

If the subject achieves a high score on the *Repertoire* subscale, he/she is convinced of having a wide repertoire of stress management methods, and the ability of finding appropriate or new countermeasures and applying them in the face of new difficulties. The individual perceives himself/herself as a competent person in the field of stress coping.

When the examined person obtains a high result in the *Changeability* subscale, he/she is willing to use the kind of stress coping strategies that will provide him/her with an effective solution. When he/she notices that the applied method is ineffective, he/she changes it. An individual is prepared to look for an adequate coping method and use different psychological and behavioral coping strategies interchangeably.

A high result in the *Reflexivity* subscale shows that the individual is able to reflect on the strategies applied for dealing with stress in the aspect of accepted values, and also to accept the difficult situation in which he/she has found himself/herself [19–21].

The exploratory variables were variables that measure cognitive flexibility by the *Cognitive Flexibility Inventory* (CFI). The questionnaire measures 2 aspects of cognitive flexibility:

- the ability to perceive and generate many alternative solutions – the *Alternatives* subscale,
- a tendency to perceive difficult situations as controllable – the *Control* subscale [22].

Moderating variables:

- age (in years),
- seniority (in years),
- sense of stress measured by the *Perceived Stress Scale* (PSS-10), which makes it possible to measure the degree of stress perceived by an individual.

Methods

Three methods were used to measure variables.

Cognitive Flexibility Inventory

The CFI by Dennis and Vander Wal [14], in the Polish adaptation by Piórowski, Basińska, Piórowska and Grzankowska [22], was used to measure cognitive flexibility. The questionnaire measures 2 dimensions of cognitive flexibility:

- the tendency to see situations as controllable – the *Control* subscale,
- the perception and generation of many alternative solutions to difficult situations – the *Alternatives* subscale [14,22].

The questionnaire consists of 20 statements, which are assessed by respondents by way of selecting 1 of the possible

responses: from 1 – "definitely disagree" to 7 – "definitely agree." Both the original and Polish versions are characterized by satisfactory reliability, accuracy and stability over time [22]. In the research presented, measurement reliability assessed by Cronbach's α coefficient was:

– 0.89 for the *Control* subscale,
– 0.88 for the *Alternatives* subscale,
– 0.90 for the general result in cognitive flexibility.

Flexibility in Coping with Stress Questionnaire

Flexibility in coping was measured by the *Flexibility in Coping with Stress Questionnaire* (FCSQ-14) [9]. The questionnaire consists of 14 statements which are assessed by respondents by way of selecting 1 of the possible responses: 0 – "never," 1 – "sometimes," 2 – "often," or 3 – "always." The higher the score, the more flexible in coping the respondent was (Cronbach's $\alpha = 0.91$). The questionnaire consists of 3 subscales:

– *Repertoire* (in presented studies: Cronbach's $\alpha = 0.81$),
– *Changeability* (in presented studies: Cronbach's $\alpha = 0.88$),
– *Reflexivity* (in presented studies: Cronbach's $\alpha = 0.65$).

Perceived Stress Scale

The Perceived Stress Scale (PSS-10) by Cohen et al. [23], in the Polish adaptation by Juczyński and Ogińska-Bulik [24], was used to assess the extent to which the situations experienced by the individual are perceived as stressful. The scale consists of 10 questions about various subjective feelings related to problems, personal events, behavior and ways of coping. The questions address the assessment of the intensity of stress related to one's own life situation over the past month, but also the effectiveness of coping. The respondents answer by selecting 1 of the answers, where 0 stands for "never," 1 – "almost never," 2 – "sometimes," 3 – "quite often," 4 – "very often." The overall score of the scale is the sum of all points, which ranges 0–40. The higher the score, the greater the intensity of perceived stress [24]. In the presented studies, measurement reliability measured by Cronbach's α coefficient was 0.69.

A self-report structured questionnaire designed for this study was used to collect data on basic demographic characteristics and workplace conditions.

Data analysis

All analyses were performed using IBM SPSS Statistics software; SPSS PROCESS macros written by Andrew F. Hayes were used for moderation analysis. The statistical significance threshold was assumed to be $p < 0.05$. The normality of variable distributions was checked and adequate analyses were applied. All subscales had acceptable Cronbach's α coefficients.

The SPSS PROCESS macros (version 25) allowed the assessment of the occurrence of a single moderation (in Model 1) using bootstrapped confidence intervals (CI) (95% bias correlated). In the results presented, a number of random samples equal to 5000 was used. A significant interactive effect occurred when the confidence interval did not include 0. A bivariate correlation was deemed small, moderate or large when the respective r value was 0.30, 0.30–0.49, or 0.50.

The study sample is described in Table 1 and consisted of 280 persons working as nurses (age range: 21–66). The number of women and men reflected their percentage distribution in this profession, as it is highly feminized [1].

RESULTS

The relationship between cognitive flexibility and flexibility in coping in the group of nurses

The results obtained indicate the average intensity of flexibility in coping and all its dimensions (corresponding to a sten score of 6). Similarly, the average level of cognitive flexibility corresponded to the average level of its intensity (a sten score of 5). The stress experienced by the nurses also reached an average sten score of 6.

Table 1. Demographic characteristics in the study on the relationship between cognitive flexibility and flexibility in coping in nurses, northern Poland, 2018

Variable	Participants (N = 280) [n (%)]
Sex	
female	271 (96.79)
male	9 (3.21)
Relationship	
single	57 (20.36)
non-marital relationship	42 (15)
married	156 (55.71)
divorced	19 (6.79)
widowed	5 (1.79)
Education	
secondary	112 (40)
higher (university)	168 (60)
Place of residence	
village	71 (25.36)
town (≤25 000 residents)	54 (19.29)
city	
<100 000 residents	50 (17.86)
100 000–400 000 residents	71 (25.36)
>400 000 residents	34 (12.14)
Nursing experience	
≤10 years	102 (36.43)
11–20 years	80 (28.57)
>20 years	98 (35.00)

In the light of the conducted analyses, the model investigating the predictive role of cognitive flexibility (the *Alternatives* and *Control* subscales) for flexibility in coping in nurses proved to be statistically significant ($F = 26.66$, $p < 0.001$, R^2 adjusted = 0.16) and accounted for 16% of the changeability of flexibility in coping.

As the obtained research results show, cognitive flexibility in both the *Alternatives* and *Control* subscales was a predictor of flexible coping and the repertoire of coping strategies. The higher cognitive flexibility the nurses presented both in terms of the sense of control and the ability to look for alternative solutions, the more flexible they were in coping and the broader repertoire of coping strategies they had (Tables 2 and 3). It was noted that 1 dimension of cognitive flexibility, i.e., the ability to find alternative solutions, was a predictor of changeability and reflexivity in coping. The higher the number of solutions to a difficult situation the respondents generated, the more often they changed their coping strategies and reflected on them (Tables 2 and 3).

The moderating role of age

The analysis revealed that the model of the relationship between cognitive flexibility and flexibility in coping (the overall score), when taking into account the moderating role of age, was statistically significant and accounted for 19% of the changeability of flexibility in coping. A significant interactive effect of age was demonstrated for the relationship between cognitive flexibility and flexibility in coping. The Johnson-Neyman technique was applied to show that the positive relationship between cognitive flexibility and flexibility in coping was significant in nurses aged >29 years. In contrast, in younger persons this effect did not occur (Tables 3 and 4).

The analysis revealed that the model of the relationship between cognitive flexibility and flexibility in coping – the *Repertoire* subscale – when taking into account the moderating role of age, was statistically significant and accounted for 17% of the changeability of the repertoire of coping strategies. A significant interactive effect of age was demonstrated for the relationship between cognitive flexibility and the repertoire of coping strategies. The Johnson-Neyman technique was applied to show that the positive relationship between cognitive flexibility and repertoire was significant in nurses aged >21 years (Table 4).

Table 2. Correlations for the variables in the study on the relationship between cognitive flexibility (CF) and flexibility in coping (FC) in nurses (N = 280), northern Poland, 2018

Variable	M	SD	1	2	3	4	5	6	7	8	9
1. Age	39.52	10.61	–								
2. Seniority	16.55	11.51	0.93***	–							
3. Sense of stress	19.39	4.34	–0.11	–0.02	–						
4. CF	102.64	13.92	0.14*	0.09	–0.21**	–					
5. CF: control	39.99	7.29	0.07	0.03	–0.21**	0.78***	–				
6. CF: alternatives	62.65	9.46	0.16**	0.10	–0.15	0.87***	0.37***	–			
7. FC	25.70	6.64	0.03	0.02	–0.04	0.39***	0.25***	0.38***	–		
8. FC: repertoire	8.96	2.51	0.06	0.04	–0.04	0.40***	0.29***	0.36***	0.90***	–	
9. FC: changeability	11.24	3.24	0.03	0.02	–0.06	0.37***	0.24***	037***	0.95***	0.79***	–
10. FC: reflexivity	5.48	1.65	–0.03	–0.06	0.01	0.25***	0.11	0.29***	0.79***	0.57***	0.66***

* p < 0.05; ** p < 0.01; *** p < 0.001.

Table 3. Individual paths for the relationship between cognitive flexibility (CF) and flexibility in coping in nurses (N = 280), northern Poland, 2018

Variable	Coefficient				t	p	F
	β	SE	B	SE			
Flexibility in coping							26.66***
CF: control	0.13	0.059	0.12	0.054	2.176	0.030	
CF: alternatives	0.34	0.059	0.24	0.042	5.674	<0.001	
Repertoire							25.71***
CF: control	0.19	0.059	0.07	0.021	3.18	0.002	
CF: alternatives	0.29	0.059	0.08	0.016	4.80	<0.001	
Changeability							23.53***
CF: control	0.12	0.060	0.05	0.027	1.97	0.051	
CF: alternatives	0.32	0.060	0.11	0.021	5.38	<0.001	
Reflexivity							12.37***
CF: control	0.01	0.062	0.000	0.014	0.02	0.997	
CF: alternatives	0.29	0.062	0.050	0.011	4.62	<0.001	
$F = 26.66$, $p < 0.001$, $R^2 = 0.18$, R^2 adjusted = 0.16							

β – standardized regression coefficient, B – non-standardized regression coefficient, F – results of variance analysis, R^2 – coefficient of determination, R^2 adjusted – coefficient of determination adjusted, SE – standard error of the estimator, t – test t result.

The analysis revealed that the model of the relationship between cognitive flexibility and flexibility in coping – the *Strategy changeability* subscale – when taking into account the moderating role of age, was statistically significant and accounted for 17% of the changeability dimension in coping strategies. A significant interactive effect of age

Table 4. The moderating role of age for the relationship between cognitive flexibility (CF) and flexibility in coping in nurses (N = 280), northern Poland, 2018

Effect	B	SE	t	p	95% CI
Flexibility in coping (total)					
CF: *Control* subscale	–0.07	0.225	–0.31	0.754	–0.513–0.372
age	–0.32	0.71	–1.47	0.001	–0.746–0.109
interaction	0.008	0.005	1.54	0.126	–0.002–0.019
			$F = 7.78, p < 0.001, R^2 = 0.07$		
CF: *Alternatives* subscale	–0.16	0.158	–0.99	0.321	–0.469–0.154
age	–0.74	0.238	–3.13	0.002	–1.213–(–0.276)
interaction	0.01	0.004	3.08	0.002	0.004–0.019
			$F = 21.19, p < 0.001, R^2 = 0.19, \Delta R^2 = 0.03, p < 0.002$		
Repertoire					
CF: *Control* subscale	0.02	0.074	0.26	0.796	–0.126–0.164
age	–0.10	0.071	–1.47	0.142	–0.244–0.035
interaction	0.003	0.002	1.56	0.120	–0.001–0.006
			$F = 16.47, p < 0.001, R^2 = 0.15$		
CF: *Alternatives* subscale	–0.06	0.055	–1.06	0.291	–0.166–0.050
age	–0.25	0.082	–2.98	0.003	–0.407–(–0.083)
interaction	0.004	0.001	2.98	0.001	0.001–0.007
			$F = 18.33, p < 0.001, R^2 = 0.17, \Delta R^2 = 0.03, p < 0.003$		
Changeability					
CF: *Control* subscale	0.03	0.114	0.25	0.801	–0.195–0.253
age	–0.09	0.110	–0.79	0.431	–0.303–0.130
interaction	0.002	0.003	0.83	0.405	–0.003–0.008
			$F = 5.85, p = 0.001, R^2 = 0.06$		
CF: *Alternatives* subscale	–0.06	0.080	–0.69	0.492	–0.213–0.106
age	–0.33	0.120	–2.75	0.006	–0.569–(–0.095)
interaction	0.005	0.002	2.69	0.008	0.001–0.009
			$F = 19.23, p < 0.001, R^2 = 0.17, \Delta R^2 = 0.02, p = 0.007$		
Reflexivity					
CF: *Control* subscale	–0.04	0.052	–0.67	0.503	–0.138–0.068
age	–0.07	0.050	–1.31	0.193	–0.165–0.034
interaction	0.001	0.001	1.22	0.225	–0.009–0.004
			$F = 1.82, p = 0.144, R^2 = 0.02$		
CF: *Alternatives* subscale	–0.04	0.037	–1.01	0.314	–0.111–0.036
age	–0.15	0.056	–2.69	0.008	–0.262–(–0.040)
interaction	0.002	0.0009	2.51	0.013	0.00005–0.004
			$F = 11.36, p < 0.001, R^2 = 0.11, \Delta R^2 = 0.02, p = 0.013$		

was demonstrated for the relationship between cognitive flexibility and changeability of coping strategies. The Johnson-Neyman technique was applied to show that a positive relationship between cognitive flexibility and changeability was significant in nurses aged >21 years (Table 4).

The analysis revealed that the model of the relationship between cognitive flexibility and flexibility in coping – the *Reflexivity* subscale, when taking into account the moderating role of age, was statistically significant and accounted for 11% of the changeability of the reflexivity dimension. A significant interactive effect of age was demonstrated for the relationship between cognitive flexibility and reflexivity. The Johnson-Neyman technique was applied to show that the positive relationship between cognitive flexibility and reflexivity was significant in nurses aged >31 years. However, in younger persons (aged 21–30 years) this effect did not occur (Table 4).

The moderating role of seniority

The analysis revealed that the model of the relationship between cognitive flexibility and flexibility in coping, when taking into account the moderating role of seniority, was statistically significant and accounted for 16% of the changeability of flexibility in coping. A significant interactive effect of seniority was demonstrated for the relationship between cognitive flexibility and flexibility in coping. The results of the Johnson-Neyman technique applied were to demonstrate that the positive relationship between cognitive flexibility and flexibility in coping was significant in nurses with both shorter (0.1–5 years) and longer (>28) seniority (Table 5).

The analysis revealed that the model of the relationship between cognitive flexibility and flexibility in coping – the *Repertoire* subscale – when taking into account the moderating role of seniority, was statistically significant and accounted for 15% of the changeability of the repertoire of coping strategies. A significant interactive effect of seniority was demonstrated for the relationship between cognitive flexibility and the repertoire of strategies. The results of the Johnson-Neyman technique applied allowed to show that it is not possible to isolate statistically significant cut-off points for seniority, as a result of which the direction of correlation would change from positive to negative (Table 5).

The analysis revealed that the model of the relationship between cognitive flexibility and flexibility in coping – the *Changeability* subscale – when taking into account the moderating role of seniority, was statistically significant and accounted for 15% of the changeability dimension of coping strategies. However, no interactive effect of seniority was demonstrated for the relationship between cognitive flexibility and changeability of coping strategies (Table 5).

The analysis revealed that the model of the relationship between the *Cognitive flexibility* and *Reflexivity* subscales, when taking into account the moderating role of seniority, was statistically significant and accounted for 9% of the changeability of reflexivity. A significant interactive effect of seniority was demonstrated for the relationship between cognitive flexibility and reflexivity. The results of the Johnson-Neyman technique applied allowed to show that the positive relationship between cognitive flexibility and reflexivity was significant in nurses with both shorter (0.1–5 years) and longer (>28 years) seniority in the profession (Table 5).

The moderating role of stress

The analysis revealed that the model of the relationship between cognitive flexibility and flexibility in coping, when taking into account the moderating role of the sense of stress, was statistically significant and accounted for 13% of the changeability of flexibility in coping. However, no significant interactive effect of stress was demonstrated for the relationship between cognitive flexibility and flexibility in coping (Table 6).

The analysis revealed that the model of the relationship between cognitive flexibility and the repertoire dimension,

Table 5. The moderating role of seniority for the relationship between cognitive flexibility (CF) and flexibility in coping in nurses (N = 280), northern Poland, 2018

Effect	B	SE	t	p	95% CI
Flexibility in coping (total)					
CF: *Control* subscale	0.14	0.105	1.34	0.182	–0.066–0.346
seniority	–0.23	0.208	–1.09	0.277	–0.635–0.183
interaction	0.006	0.005	1.14	0.255	–0.004–0.016
		$F = 5.76, p = 0.001, R^2 = 0.07, \Delta R^2 = 0.005, p = 0.255$			
CF: *Alternatives* subscale	0.16	0.079	2.07	0.040	0.008–0.320
seniority	–0.46	0.223	–2.08	0.039	–0.904–(–0.024)
interaction	0.007	0.004	2.04	0.042	0.0003–0.104
		$F = 17.33, p < 0{,}001, R^2 = 0.16, \Delta R^2 = 0.01, p = 0.042$			
Repertoire					
CF: *Control* subscale	0.09	0.034	2.51	0.013	0.019–0.153
seniority	–0.08	0.068	–1.14	0.257	–0.211–0.057
interaction	0.002	0.002	1.25	0.212	–0.001–0.005
		$F = 13.54, p < 0.001, R^2 = 0.13, \Delta R^2 = 0.005, p = 0.212$			
CF: *Alternatives* subscale	0.05	0.027	1.72	0.087	–0.007–0.100
seniority	–0.16	0.077	–2.09	0.037	–0.312–(–0.010)
interaction	0.003	0.001	2.14	0.034	0.0002–0.005
		$F = 15.39, p < 0.001, R^2 = 0.15, \Delta R^2 = 0.01, p = 0.034$			
Changeability					
CF: *Control* subscale	0.09	0.053	1.68	0.094	–0.015–0.193
seniority	–0.04	0.105	–0.41	0.689	–0.249–0.165
interaction	0.001	0.003	0.44	0.663	–0.004–0.006
		$F = 12.86, p = 0.005, R^2 = 0.05, \Delta R^2 = 0.0007, p = 0.663$			
CF: *Alternatives* subscale	0.09	0.040	2.23	0.027	0.010–0.168
seniority	–0.20	0.113	–1.75	0.081	–0.420–0.025
interaction	0.003	0.002	1.71	0.088	–0.0005–0.007
		$F = 15.94, p < 0.001, R^2 = 0.15, \Delta R^2 = 0.009, p = 0.088$			
Reflexivity					
CF: *Control* subscale	0.0006	0.024	0.02	0.981	–0.047–0.048
seniority	–0.06	0.048	–1.23	0.219	–0.154–0.035
interaction	0.001	0.001	1.10	0.271	–0.001–0.004
			$F = 1.49, p = 0.218, R^2 = 0.02$		
CF: *Alternatives* subscale	0.02	0.018	1.24	0.218	–0.014–0.060
seniority	–0.98	0.053	–1.85	0.065	–0.201–0.006
interaction	0.001	0.0008	1.67	0.096	–0.0002–0.003
		$F = 8.88, p < 0.001, R^2 = 0.09, \Delta R^2 = 0.009, p = 0.096$			

Table 6. The moderating role of the sense of stress for the relationship between cognitive flexibility (CF) and flexibility in coping in nurses (N = 280), northern Poland, 2018

Effect	B	SE	t	p	95% CI
Flexibility in coping (total)					
CF: *Control* subscale	0.22	0.326	0.69	0.492	–0.419–0.868
sense of stress	–0.01	0.677	–0.02	0.985	–1.349–1.324
interaction	–0.002	0.017	–0.14	0.889	–0.035–0.031
			$F = 2.10$, $p = 0.102$, $R^2 = 0.04$		
CF: *Alternatives* subscale	0.32	0.293	1.11	0.271	–0.255–0.903
sense of stress	0.07	0.903	0.08	0.936	–1.712–1.857
interaction	–0.002	0.014	–0.17	0.866	–0.030–0.026
			$F = 7.28$, $p = 0.001$, $R^2 = 0.13$, $\Delta R^2 = 0.002$, $p = 0.866$		
Repertoire					
CF: *Control* subscale	0.09	0.100	0.94	0.346	–0.103–0.292
sense of stress	–0.02	0.208	–0.12	0.905	–0.436–0.386
interaction	0.0003	0.005	0.06	0.952	–0.010–0.010
			$F = 5.71$, $p = 0.001$, $R^2 = 0.10$		
CF: *Alternatives* subscale	0.15	0.094	1.60	0.111	–0.035–0.337
sense of stress	0.20	0.290	0.70	0.487	–0.371–0.776
interaction	–0.004	0.005	–0.79	0.433	–0.013–0.005
			$F = 5.96$, $p = 0.001$, $R^2 = 0.11$, $\Delta R^2 = 0.004$, $p = 0.433$		
Changeability					
CF: *Control* subscale	0.06	0.153	0.39	0.695	–0.243–0.363
sense of stress	–0.08	0.319	–0.26	0.797	–0.711–0.548
interaction	0.002	0.008	0.20	0.850	–0.014–0.017
			$F = 1.99$, $p = 0.119$, $R^2 = 0.04$		
CF: *Alternatives* subscale	0.12	0.135	0.91	0.365	–0.903–0.751
sense of stress	–0.08	0.419	–0.18	0.856	–0.145–0.392
interaction	0.001	0.007	0.17	0.867	–0.012–0.014
			$F = 9.05$, $p < 0.001$, $R^2 = 0.15$		
Reflexivity					
CF: *Control* subscale	–0.03	0.074	–0.46	0.646	–0.181–0.113
sense of stress	–0.12	0.154	–0.79	0.432	–0.427–0.184
interaction	0.003	0.004	0.87	0.377	–0.004–0.011
			$F = 0.79$, $p = 0.377$, $R^2 = 0.005$		
CF: *Alternatives* subscale	0.06	0.068	0.88	0.380	–0.075–0.196
sense of stress	0.06	0.211	0.28	0.777	–0.358–0.478
interaction	–0.0007	0.003	–0.205	0.838	–0.007–0.006
			$F = 3.53$, $p = 0.016$, $R^2 = 0.06$, $\Delta R^2 = 0.003$, $p = 0.838$		

when taking into account the moderating role of the sense of stress, occurred to be statistically significant and accounted for 11% of the repertoire changeability (Table 6). There was no significant interactive effect of the sense of stress for the relationship between cognitive flexibility and the repertoire of strategies (Table 6).

The analysis revealed that the model of the relationship between cognitive flexibility and changeability of coping strategies, when taking into account the moderating role of the sense of stress, was statistically significant and accounted for 15% of the changeability dimension of coping strategies (Table 6). There was no significant effect of the interactive sense of stress for the relationship between cognitive flexibility and changeability of coping strategies (Table 6).

The analysis revealed that the model of the relationship between cognitive flexibility and reflexivity, when taking into account the moderating role of the sense of stress, was statistically significant and accounted for 6% of the changeability of the reflexivity dimension (Table 6).

DISCUSSION

The obtained research results demonstrate that nurses working in hospital departments were characterized by medium intensity of cognitive flexibility and its dimensions, as well as flexibility in coping and its dimensions. The results obtained by nurses were slightly lower (especially in terms of the dimension of variability in the use of strategies and cognitive control) than the results obtained by fire department officers [25]. The cited studies conducted in professional groups did not take into account the gender role for the variable in question. A new light on the issue could be cast by studies of flexibility in coping with stress in occupations where the number of women and men is similar.

The results of subsequent studies showed that the surveyed nurses obtained similar results in flexibility in coping with stress as a group of patients with cancer [26]. The results obtained by nurses were slightly higher than those among teenagers [27]. This situation was further confirmed by the results of research conducted by Basińska et al. [9], which showed that younger individuals differed significantly from older individuals (aged >35 years) in terms of flexibility in coping at the general level and in all its dimensions. Consequently, older persons exhibited a broader repertoire of coping strategies and their changeability, which can be explained by their longer life experience as well as a higher level of reflexivity.

The theory of social problem-solving shows how human cognitive and behavioral processes are involved, owing to which individuals are able to define ways of solving difficult situations and face them. The individual achieves the intended goal by using a problem-oriented style (which refers to their cognitive patterns concerning the problem and the possibilities of solving it) and the very style of problem-solving (which is a set of skills aimed to solve a stressful situation) [8,9,28].

In the light of the presented research results, it can be stated that when nurses manifested higher cognitive flexibility both in terms of perceiving situations as controllable, and perceiving and generating many alternative solutions to difficult situations, they were more flexible in coping, and they had a broader repertoire of coping strategies. They were more likely to change these strategies when they proved ineffective, and were more reflexive. Therefore, it can be postulated that cognitive flexibility was associated with a higher level of creativity and imagination, thus helping the individual perform many tasks concurrently and find solutions to difficult situations [29]. The obtained results, and in particular the percentage in which cognitive flexibility accounted for the changeability of flexibility in coping, corroborate theoretical assumptions underlying the analyzed constructs [13]. First of all, they are separate constructs, and secondly, flexibility in coping is a broader construct than its component – cognitive flexibility.

As far as the characteristics of the relationship between cognitive flexibility and flexibility in coping is concerned, it

is worth addressing theoretical assumptions of the acceptance and commitment-based therapy. They give a broader understanding of the onset as well as the reduction of symptoms of diseases associated with the experience of stress by specialists and, therefore, by the medical staff. The emphasis here is on increasing psychological flexibility, because as it increases, the experience of stress will decrease due to its more effective management [30]. A similar relationship was presented in the results obtained, in the light of which, when nurses generated a higher number of solutions to a difficult situation and had a sense of control, they managed flexibly more frequently in stressful situations by choosing relevant strategies, changing them depending on their effectiveness and more often reflecting on them.

Moreover, the relationship between cognitive flexibility and flexible coping and its dimensions turned out to be significant in older nurses:

- in the research subjects aged >29 years – for the relationship between cognitive flexibility and flexibility in coping,
- in the research subjects aged >21 years – for the relationship between cognitive flexibility and the repertoire of coping strategies and their changeability,
- in the research subjects aged >31 years – for the relationship between cognitive flexibility and reflexivity.

Research results have shown that younger nurses used the emotion-oriented style more often than the older ones [31,33]. Flexibility includes readiness to reflect and think, and these properties do not characterize the emotion-oriented style of action, which is more characteristic of younger people.

Seniority also proved to be a moderating factor for the positive relationship between cognitive flexibility and flexibility in coping. However, this relationship was significant in nurses with both shorter (0.1–5 years) and longer (>28 years) seniority in the profession. In the field literature, both age and seniority were associated with the way of coping [32,33]. Higher seniority in the nursing profession was associated with the use of a more active attitude in the case of difficulties. Persons with bigger professional experience acquire the skills to adjust remedial actions to a specific problem situation [31,33]. Adjusting remedial actions is a manifestation of flexibility of their application. The significance of seniority for work-related functioning is not so explicit in the study group. It did not support this relationship among those nurses who had already gained experience, but were still at full strength. Probably the role of seniority is important for those nurses who are starting their work and then, when their health deteriorates with age, their fatigue increases and physical fitness is reduced [1]. Similar results were obtained by nurses in Shanghai. Those with 10–20 years of professional experience reported a higher level of job satisfaction than their younger and older colleagues [34].

There was no significant interactive effect of the sense of stress for the relationship between cognitive flexibility and flexibility in coping and its dimensions. Similar results were obtained in a group of firemen [25]. Presumably, other psychological variables play an important role here. Perhaps flexibility in both thinking and acting is a property less dependent on situational variables, and more on relatively persistent personality traits [9,27] and temperament [27], but this requires further research in this field.

Coping skills and flexibility are positively associated with psychological adjustment [23]. Flexibility in the choice of emotion regulation strategies supports adaptive coping in response to various types of microaggressions [28,30,31]. A higher level of psychological flexibility allows to predict fewer psychopathological symptoms [16,22,25], which is why developing it is so important, especially in the professions requiring rapid response, with the profession of a nurse being one of them.

CONCLUSIONS

In the light of the obtained research results, nurses working in hospital departments were characterized by medium intensity of cognitive flexibility and its dimensions, as well as flexibility in coping and its dimensions. The surveyed nurses who presented higher cognitive flexibility both in terms of perceiving situations as controllable, and in terms

of perceiving and generating many alternative solutions to difficult situations, were more flexible in coping.

Age was a moderating factor for the relationship between cognitive flexibility and flexibility in coping and its dimensions. Seniority was a moderating factor for the relationship between cognitive flexibility and flexibility in coping stress in a group of young nurses with ≤5 years of seniority, and among older nurses – with >28 years of seniority. There was no significant interactive effect of the sense of stress on the relationship between cognitive flexibility and flexibility in coping and its dimensions.

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