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Original article

Working conditions, job strain and work engagement among Belgian radiation oncologists



Conditions de travail, stress et engagement professionnel des radiothérapeutes belges

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ABSTRACT

Purpose. – This national survey has measured the working conditions, work engagement, job strain, burn out, and the negative work–home interaction among Belgian radiation oncologists with validated questionnaires. In fact, previous studies had in general shown an interest to burn out and its association with working conditions among oncology workers, but not focused on radiation oncologists in particular. Moreover, few studies concerned work engagement and its association with working conditions although this could be important in preventing burn out.

Methods. – We used the Working Conditions and Control Questionnaire, the Positive and Negative Occupational States Inventory, the Maslach Burn out Inventory, and the negative work–home interaction subscale of the Survey Work–home Interaction Nijmegen. One open question asked about problematic job situations.

Results. – Sixty-six radiation oncologists participated (30% response rate). Median scores of most of working conditions corresponded to normal scores. Control over time management (45.8) was close to low score, while control over future (60.9) was high. Median score of job strain (48.9) was normal, whereas median score of work engagement (60) was high. Median score of burn out was low. The mean of negative work–home interactions (1.1) was higher than the mean of 0.84 in a reference sample ($t = 4.3$; $P < 0.001$). The most frequent problematic situations referred to work organization (e.g. time pressure) and specific resources (e.g. chief support).

Conclusions. – Radiation oncologists showed a very high level of work engagement and experienced several job resources. However, some resources (as supervisor support) were missing and needed to be developed. These results were discussed in the context of motivational process described in the Job Demands–Resources Model.

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R É S U M É

Mots clés :

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Objectifs de l'étude. – Cette étude nationale a mesuré les conditions de travail, l'engagement et le stress professionnel, le burn out et l'interaction négative travail–famille parmi les radiothérapeutes belges avec des questionnaires validés. En effet, les études précédentes se sont en général intéressées au burn out et à son association avec les conditions de travail parmi les travailleurs en oncologie, mais ne se sont pas focalisées sur les radiothérapeutes en particulier. De plus, très peu d'études ont concerné l'engagement professionnel et son association avec les conditions de travail alors que ce serait important dans la prévention du burn out.

Méthodes. – Nous avons utilisé le Working Conditions and Control Questionnaire, le Positive and Negative Occupational States Inventory, l'inventaire de burn out de Maslach, et la sous-échelle « interaction

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« négative travail-famille » de l'instrument « Work-home Interaction Nijmegen ». Une question ouverte concernait les situations professionnelles problématiques.

Résultats. – Soixante-six radiothérapeutes ont participé à l'étude (taux de réponse de 30%). Les médianes de la plupart des conditions de travail étaient normales. Le contrôle sur la gestion du temps (45,8) était proche d'un score faible, alors que le contrôle sur l'avenir (60,9) était élevé. La médiane du stress professionnel (48,9) était normale, alors que la médiane de l'engagement professionnel (60) était élevée. La médiane du *burn out* était faible. La moyenne du Negative Work-home interaction (NEGWHI) (1,1) était plus élevée que celle de 0,84 d'un échantillon de référence ($t=4,3$; $p<0,001$). Les situations problématiques les plus fréquentes se référaient à l'organisation professionnelle (par exemple pression du temps) et à certaines ressources spécifiques (par exemple soutien du superviseur).

Conclusion. – Les radiothérapeutes présentaient un engagement professionnel très élevé et avaient de nombreuses ressources professionnelles. Cependant, certaines ressources étaient manquantes et seraient à développer. Ces résultats sont discutés dans le contexte du processus motivationnel décrit dans le Job Demands-Resources Model.

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1. Introduction

Many researchers have studied job stress and burn out. Since the early 2000s, a new model of stress at work, the 'Job Demands-Resources Model' has appeared in the scientific literature [1]. Schaufeli and Bakker suggest that employee well-being is related to a wide range of workplace variables that can be conceptualized as either job demands or job resources [1]. These two sets of working conditions may each evoke a different process. First, job demands may exhaust employee's mental and physical resources and may therefore lead to the depletion of energy and to health problems (health impairment hypothesis). Second, the presence of adequate job resources reduces job demands, fosters goal accomplishment and stimulates personal growth, and may therefore lead to a stronger dedication to one's work (motivational hypothesis).

Job stress has been much studied in the medical profession. In particular, caring for patients with cancer can be one of the most demanding and stressful areas of medicine. Studies have mainly focused on medical oncologists and showed high prevalence rates of burn out from 25% to 62% in different countries (USA, Netherlands, UK, Canada, and Switzerland) (Table 1) [2–9]. There are few studies on job stress among radiation oncologists. However, radiotherapy is a profession that has seen major technological advances in recent years [10]. Radiation oncologists are therefore working in an environment where they are balancing complex technology with the emotional strain of working with cancer patients in a setting where there is no room for error, whilst still maintaining a high level of patient care and an empathetic demeanor [11–13]. Moreover, the demand for radiotherapy services is increasing [14]. All this could constitute job demands that could lead to a variety of problems for physicians including burn out without adequate job resources. Two studies in UK found that the prevalence of emotional exhaustion was at 38% among radiation oncologists and depersonalization prevalence was higher among radiation oncologists compared to medical oncologists and physicians involved in palliative care, 31%, 15% and 13%, respectively [5,6]. One study in Germany among eleven radiotherapy departments also showed that nurses and physicians had the highest level of job stress compared to radiographers and physicists [15].

In these studies, burn out among medical and radiation oncologists was associated with the stress of feeling overloaded or of working over 50 h/week, with treatment toxicity/errors, with deriving little satisfaction from professional status/esteem, with high stress and low satisfaction from dealing with patients, and with low satisfaction from having adequate resources [2,6,9]. In the same way, the specific study among radiotherapy departments showed that the greatest source of job stress originated from

structural conditions (e.g. underpayment) and from "stress by compassion" (e.g. "long suffering of patients") [15]. Moreover, being a young physician or being in the first few years of a consultant post appeared as a significant individual risk factor for burn out [5,6]. Only two studies have looked at sources of satisfaction among oncologists (e.g. having good relationships with patients, relatives and other staff; being held in esteem by colleagues) [5,6].

In summary, several studies have shown an interest to burn out and its association with working conditions among oncology workers in general, but have not focused on radiation oncologists in particular. On the other hand, very few studies have shown an interest to work engagement and its association with working conditions although this could be interesting in preventing burn out. So, we performed a national survey among Belgian radiation oncologists with validated questionnaires to measure working conditions, work engagement, job strain, burn out and the negative work-home interaction.

2. Methods

2.1. Questionnaires

In collaboration with the Belgian College of Radiotherapy, questionnaires were sent to 220 French and Dutch-speaking radiation oncologists in September 2011. We combined different instruments: the Working Conditions and Control Questionnaire (WOCCQ) [16], the Positive and Negative Occupational States Inventory (PNOSI) [17], the Maslach Burn out Inventory (MBI) [18], and the negative work-home interaction subscale of the Survey Work-home Interaction Nijmegen (NEGWHI) [19]. This was completed by an open question in which participants were asked to describe three problematic events encountered in their daily work activities.

2.1.1. Working conditions and control questionnaire

It is a multidimensional scale to measure the control that a worker has in his/her work situation [16], already used among anesthetists [20]. It encompasses six dimensions of control, allowing a more precise diagnosis about working conditions: control of resources, task management, risk, planning, time management and future. Each item refers to a job characteristic phrased in the first person, such as 'I believe in the future of my job'. The questionnaire response format is: 1 = rarely or never applicable to my job; 2 = sometimes applicable to my job; 3 = regularly applicable to my job; 4 = almost always or always applicable to my job. The valence of the items was balanced. Normative scores are available. A moderate level of control can vary from 40 to 60, with a mean equal to

Table 1

Samples and tools used in studies among oncology care providers.

Échantillons et outils utilisés dans les études parmi les professionnels de santé en oncologie.

Authors	Samples	Tools
Whippen and Cannelos (1991) [3]	1000 oncologists	12 items about burn out
Ramirez et al. (1995) [6]	60 medical oncologists 207 clinical oncologists 126 palliative care specialists	General Health Questionnaire-12 items Maslach Burn out Inventory Sources of stress and satisfaction
Ramirez et al. (1996) [5]	Gastroenterologists, surgeons, radiologists, and oncologists	General Health Questionnaire-12 items Maslach Burnout Inventory Sources of stress and satisfaction
Le Blanc et al. (2003) [4]	227 cancer radiation assistants 179 cancer physicians 410 cancer nurses	Maslach Burn out Inventory Sources of stress and satisfaction
Catt et al. (2005) [7]	Members of 10 multidisciplinary cancer teams	General Health Questionnaire-12 items Maslach Burn out Inventory
Grunfeld et al. (2005) [8]	131 cancer physicians	General Health Questionnaire-12 items Maslach Burn out Inventory Job satisfaction and stress
Allegra et al. (2005) [2]	1740 oncologists	Causes and potential solutions to their signs of burn out
Arigoni et al. (2009) [9]	113 cancer clinicians 117 paediatricians 141 general practitioners	General Health Questionnaire-12 items Maslach Burn out Inventory
Sehlen et al. (2009) [15]	Radiotherapy department 82 physicians 113 nurses 128 radiographers 39 physicists	Stress Questionnaire of physicians and nurses

50. Values higher than 60 characterize high control. Values lower than 40 characterize very low control.

2.1.2. Positive and Negative Occupational States Inventory

Eight items assess the positive occupational state 'work engagement' and 11 items assess the negative occupational state 'job strain', on a four-level scale from one ("never" or "rarely") to four ("almost always" or "always"). Eight items assess the positive occupational state 'work engagement' and 11 items assess the negative occupational state 'job strain', on a four-level scale from one ("never" or "rarely") to four ("almost always" or "always"). The positive occupation state has been demonstrated in Barbier et al. to be an alternative measurement for engagement at work defined by Schaufeli et al. as a combination of vigour (a high level of energy and concentration while working), dedication (a feeling of meaning, enthusiasm, pride and challenge towards work) and absorption (being completely involved in one's work so that time passes quickly and one has difficulty detaching from it) [17,21]. Normative scores are available. A moderate level of job strain/work engagement can vary from 40 to 60, with a mean equal to 50. Values higher than 60 characterize severe job strain. Values lower than 40 characterize very low work engagement.

2.1.3. Maslach Burn out Inventory

It provides a measure of burn out consisting of three dimensions: emotional exhaustion (nine items), depersonalization (five items) and lack of personal accomplishment (eight items). The subject is asked to answer each item on a scale from one ("never") to seven ("every day"). The level of emotional exhaustion can vary between 0 and 54 and is characterized as low (values lower than 19), moderate (values from 19 to 26) or severe (values higher than 26). The level of depersonalization can vary between 0 and 30 and is characterized as low (values lower than six), moderate (values from six to nine) or severe (values higher than nine). The level of lack of personal accomplishment can vary between 0 and 48 is characterized as low

(values lower than 34), moderate (values from 34 to 39) or high (values higher than 39) [18].

2.1.4. Negative Work–Home Interaction

The Survey Work–Home Interaction Nijmegen (SWING, 27 items) is used to measure four types of work–home interaction including negative, referring to a situation in which negative load effects built up at work hampering functioning at home (nine items) (e.g. How often does it happen that you are irritable at home because your work is demanding?). There are four response categories: "never" (0), "sometimes" (1), "often" (2) and "always" (3).

2.2. Statistical analysis

Descriptive statistics including medians and range are presented for working conditions, job strain, work engagement, burn out and negative work–home interactions. Pearson's correlation coefficient was performed between these outcome variables. According to standardized scores, the four first outcome variables are categorized in small, medium or high level of score [17,22]. The norms of Maslach and Jackson are used for burn out [23,24]. As regards negative work–home interactions, a *t*-test was used to compare Belgian radiation oncologists to a sample of 254 workers from different sectors [19]. The problematic situations are classified in taxonomy. Comparisons of all these variables, according to age categories (under 30, 30–35, older than 35) and level of training (residents vs. senior staff members), were performed using Kruskal-Wallis and Mann-Whitney U non-parametric tests, respectively. Significance was assumed for a *P*-value < 0.05. Multiple linear regression analyses were also used to explain job strain, work engagement and emotional exhaustion by working conditions and negative work–home interactions.

3. Results

A total of 66/220 (30%) radiation oncologists completed the questionnaires (M/F ratio 25:41). The mean age was 39-years-old

(SD = 11.1). There were 36 French-speaking and 30 Dutch-speaking participants. There were 16 residents and 50 senior staff members. Twenty-four percent were aged between 30 and 35, while 59% were aged more than 35.

Concerning working conditions, the median standardized scores of control over resources, task management, risks and planning in radiation oncologists measured with WOCQC corresponded to normal scores (Table 2). For these scores, majority of radiation oncologists were in the moderate to high level groups. Control over time management (45.8) was close to low score and 30% were in the low level group. On the contrary, control over future (60.9) corresponded to a high score: 42% and 55% of the radiation oncologists were in the medium and high level groups, respectively. There were no significant differences for working conditions according to age categories or level of training. The median job strain standardized score measured with the PNOI was 48.9, corresponding to normal score (Table 3). The interindividual variability of scores was high: 15% of the radiation oncologists were in the low level group class, 77% in the medium level group and 8% in the high level group, which is low as expected in the normal distribution of standardized scores. There was no significant difference according to the age variable [$\chi^2(2) = 1.894$, NS] or level of training ($U = 423$; NS). The median work engagement standardized score was 60,

corresponding to high score. The interindividual variability of scores was high: no radiation oncologist was in the low level group class, 68% and 32%, respectively in the medium and high level groups. The age variable was significant [$\chi^2(2) = 7.787$, NS]: work engagement increases with age. In the same way, a statistical marginal effect analysis showed that senior staff members showed a higher work engagement than residents ($U = 528.50$, NS).

Concerning burn out, the median standardized score for emotional exhaustion was 16, which corresponds to a low score (Table 4). The interindividual variability of scores was high: 59% were in the low level group class, 21% and 20% respectively in the medium and high level groups. The median standardized score for depersonalization was five, corresponding to a low score. The interindividual variability of scores was high: 64% were in the low level group class, 18% and 18%, respectively in the medium and high level groups. The median standardized score for lack of personal accomplishment was 41, corresponding to a high score. The interindividual variability of scores was high: 7% were in the low level group class, 32% and 61%, respectively in the medium and high level groups. The age variable was only significant with respect to personal accomplishment [$\chi^2(2) = 10.092$, $P < 0.01$], which increases with age (Table 2). There was no significant difference between residents and senior staff members. As regards

Table 2
Working condition levels measured with the Working Conditions and Control Questionnaire (WOCQC) in radiation oncologists according to age and level of training ($n = 66$).
Conditions de travail des radiothérapeutes mesurées avec le Working Conditions and Control Questionnaire (WOCQC) selon l'âge et le niveau de formation ($n = 66$).

WOCQC dimensions	Median (range)	Level of scores n (%)			Age categories Median (range)			Level of training Median (range)	
		Low n (%)	Medium n (%)	High n (%)	< 30	30–35	> 35	Residents	Senior
Resources control	50.8 (33.2–74.9)	4 (6)	46 (70)	16 (24)	50.8 (33.2–68.2)	54.9 (42.8–68.2)	50.8 (35.6–74.9)	49.4 (33.2–68.2)	52.2 (35.6–74.9)
Task management control	52.6 (31.8–76.4)	6 (9)	48 (73)	12 (18)	49.2 (33.0–64.9)	57.1 (44.2–66.9)	50.5 (31.8–76.4)	51.9 (33.0–66.9)	52.6 (31.8–76.4)
Risks control	51.6 (33.6–71.2)	3 (4)	56 (85)	7 (11)	53.2 (41.3–68.9)	52.4 (33.6–66.6)	48.5 (36–71.2)	50 (41.3–68.9)	51.6 (33.6–71.2)
Planning control	52.6 (34.1–76.5)	3 (4)	54 (82)	9 (14)	52.6 (34.1–58.4)	56.4 (43.1–73.9)	50.6 (35.8–76.5)	52.6 (34.1–58.4)	52.6 (35.8–76.5)
Time management control	45.8 (24.2–75.9)	20 (30)	40 (61)	6 (9)	46.6 (37.7–64.5)	53.7 (28.9–64.5)	43.5 (24.2–75.9)	48.9 (37.7–64.5)	44.3 (24.2–75.9)
Future control	60.9 (39.2–77.1)	2 (3)	28 (42)	36 (55)	62.7 (51–67)	64.8 (52.6–74.2)	60.9 (39.2–77.1)	62.7 (51–74.2)	60.9 (39.2–77.1)

According to standardized scores, WOCQC data are categorized in small, medium or high level of score [17,22]: values lower than 40 characterize very low control, a medium level of control can vary from 40 to 60, with a mean equal to 50, and values higher than 60 characterize high control. Scores were compared according to age categories (< 30, 30–35, > 35) and level of training (residents vs. senior staff members).

Table 3
Positive and Negative Occupational States (PNOI) and Negative Work–Home Interaction (NEGWHI) measured in radiation oncologists according to age and level of training ($n = 66$).

Résultats des questionnaires Positive and Negative Occupational States Inventory (PNOI) et Negative Work–home interaction (NEGWHI) utilisés auprès des radiothérapeutes, selon l'âge et le niveau de formation ($n = 66$).

PNOI dimensions and NEGWHI	Median (range)	Level of scores n (%)			Age categories Median (range)			Level of training Median (range)	
		Low	Medium	High	< 30	30–35	> 35	Residents	Senior
PNOI									
Job strain	48.9 (28.2–67.3)	10 (15)	51 (77)	5 (8)	50.7 (28.2–66.2)	44.9 (28.2–58.3)	48.9 (33.5–67.3)	48.9 (28.2–66.2)	48 (33.5–67.3)
Work engagement	60.0 (43.2–75.0)	0	45 (68)	21 (32)	53.7 (43.2–64.4)	59 (47.2–67.2)	60 (43.2–75)	53.7 (43.2–70.4)	60.0 (43.2–75)
NEGWHI	1.2 (0–2)	–	–	–	1.2 (0–2)	0.9 (0–2)	1.2 (0–2)	1.1 (0–2)	1.2 (0–2)

According to standardized scores, PNOI data are categorized in small, medium or high level of score [17,22]: values lower than 40 characterize very low levels, a medium level can vary from 40 to 60, with a mean equal to 50, and values higher than 60 characterize high levels. PNOI and NEGWHI scores were compared according to age categories (< 30, 30–35, > 35) and level of training (residents vs. senior staff members).

Table 4

Burn out measured with the Maslach Burn out Inventory (MBI) in radiation oncologists according to age and level of training ($n=66$).
Burn out mesuré avec le Maslach Burn out Inventory (MBI) parmi les radiothérapeutes selon l'âge et le niveau de formation ($n=66$).

MBI dimensions	Median (range)	Level of scores n (%)			Age categories Median (range)			Level of training Median (range)	
		Low	Medium	High	< 30	30–35	> 35	Residents	Senior
Emotional exhaustion	16 (2–46)	39 (59)	14 (21)	13 (20)	17 (2–28)	12.5 (2–38)	17 (2–46)	15.5 (2–38)	16 (2–46)
Depersonalization	5 (0–16)	42 (64)	12 (18)	12 (18)	4 (0–16)	3 (1–13)	5 (0–14)	3.5 (0–16)	5 (0–14)
Personal accomplishment	41 (20–48)	5 (7)	21 (32)	40 (61)	38 (29–42)	40 (33–46)	42 (20–48)	39.5 (25–48)	41 (20–48)

The norms of Maslach and Jackson were used for burn out [23,24]. For emotional exhaustion, values lower than 19 characterize a low level, a medium level can vary from 19 to 26 and values higher than 26 characterize high level. For depersonalization, values lower than 6 characterize low level, a medium level can vary from 6 to 9 and values higher than 9 characterize high level. For personal accomplishment, values lower than 34 characterize low level, a medium level can vary from 34 to 39 and values higher than 39 characterize high level. MBI scores were compared according to age categories (< 30, 30–35, > 35) and level of training (residents vs. senior staff members).

Table 5

Intercorrelations between variables.
Intercorrélations entre les variables.

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Resources control	–											
2. Task management control	0.67 ^b	–										
3. Risks control	0.37 ^b	0.55 ^b	–									
4. Planning control	0.47 ^b	0.57 ^b	0.61 ^b	–								
5. Time management control	0.53 ^b	0.59 ^b	0.48 ^b	0.60 ^b	–							
6. Future control	0.29 ^a	0.36 ^b	0.43 ^b	0.53 ^b	0.26 ^a	–						
7. Job strain	–0.35 ^b	–0.45 ^b	–0.37 ^b	–0.59 ^b	–0.52 ^b	–0.47 ^b	–					
8. Work engagement	0.24 ^a	0.19 ^a	0.18	0.21 ^a	–0.09	0.38 ^b	–0.09	–				
9. Negative work–home interaction	–0.38 ^b	–0.47 ^b	–0.52 ^b	–0.51 ^b	–0.66 ^b	–0.36 ^b	0.61 ^b	0.08	–			
10. Emotional exhaustion	–0.49 ^b	–0.54 ^b	–0.43 ^b	–0.57 ^b	–0.53 ^b	–0.48 ^b	0.76 ^b	–0.16	0.62 ^b	–		
11. Depersonalization	–0.11	–0.12	–0.20	–0.07	–0.03	–0.25 ^a	0.25 ^a	0.26 ^a	0.22	0.34 ^b	–	
12. Personal accomplishment	–0.08	0.05	–0.04	–0.03	–0.22	0.20	–0.01	0.45 ^b	0.23	0.14	–0.19	–

^a $P < 0.05$.

^b $P < 0.01$.

negative work–home interactions, the median score was 1.2 and the mean was 1.1, which is higher than the mean of 0.84 in the reference sample ($t=4.26$; $P < 0.001$) (Table 3) [19]. The age variable was significant [$\text{Chi}^2(2)=6.208$, $P < 0.05$]: negative work–home interactions was higher for radiation oncologists younger than 30 and older than 35 years, comparing to those between 30–35. There was no significant difference for negative work–home interactions according to level of training ($U=510.5$, NS).

As expected, there was a negative correlation between working conditions and, job strain ($P < 0.01$), emotional exhaustion ($P < 0.01$), negative work–home interactions ($P < 0.01$) (Table 5). Linear regression analyses showed that 52% of our variance of job strain was explained by working conditions and negative work–home interactions [$F(7,58)=9.04$, $P < 0.001$]: job strain was explained positively by negative work–home interactions ($\beta=0.40$; $P < 0.001$) and negatively by control over planning ($\beta=-0.32$; $P < 0.05$). Then, 30% of our variance of work engagement was explained by working conditions and negative work–home interactions [$F(7,58)=3.547$, $P < 0.01$]: work engagement was explained positively by control over future ($\beta=.33$; $P < 0.05$). Moreover, almost 55% of our variance of emotional exhaustion was explained by working conditions and negative work–home interactions [$F(7,58)=9.951$, $P < 0.001$]: emotional exhaustion was explained positively by negative work–home interactions ($\beta=.39$; $P < .001$).

We collected 124 problematic situations, which were categorized into six groups (Table 6). The most frequent referred to four subcategories: simultaneity of the tasks-multi-tasking (12%) and time pressure–work overload–delays (14%) included in the ‘work organization’ category; chief/supervisor support (8%) included in the ‘resources’ category; and relations with co-workers (doctors, nurses) (8%) included in the ‘work relationship’ category. The ‘work organization’ and ‘resources’ categories were the most cited problematic situations.

4. Discussion

The aim of this study was to identify working conditions among Belgian radiation oncologists and to measure their levels of work engagement, job strain, burn out and negative work–home interaction with validated questionnaires.

There were three key findings. First, the study revealed generally adequate working conditions, very high work engagement, medium job strain and high negative work–home interactions. However, some problems appeared in the control over time management and in the social support for which organizational solutions and Balint groups [25,26] could be proposed. Third, the regression analyses suggested that job resources could play a moderating role between work

Table 6
Problematic situations (total $n = 124$) encountered by radiation oncologists.
Situations problématiques (n total = 124) rencontrés par les radiothérapeutes.

Categories	n (%)
Work organization	56 (45)
Simultaneity of the tasks and multitasking	15 (12)
Time pressure–work overload–delays	17 (13)
Unforeseen–interruptions–breakdowns	8 (7)
Administrative workload–heaviness of the procedures	5 (4)
Diffuse responsibilities–several hierarchical levels	4 (3)
General organization of the department	5 (4)
General organization of the hospital	2 (2)
Staff management	9 (7)
Absence management	4 (3)
Lack of staff	2 (2)
Staff management	3 (2)
Resources	21 (17)
Acknowledgment and appreciation	2 (2)
Difficulties related to decision making	3 (2)
Theoretical training	1 (1)
Chief/supervisor support	10 (8)
Budgetary difficulties	2 (2)
Ergonomy–equipment	3 (2)
Work relationship	19 (15)
Relations with co-workers (doctors, nurses)	10 (8)
Relations with the direction	3 (2)
Lack of motivation/training of others	4 (3)
Relationships within institution and between institutions	2 (2)
Work content	13 (11)
Difficult behaviors of patients	3 (2)
Ineffective treatment	2 (2)
Incident/error	4 (3)
Taking care of patients	4 (3)
Work–home interaction	6 (5)

conditions and job strain, despite these specific negative aspects.

In fact, the majority of radiation oncologists were in the moderate level group for the control over resources, task management, risks, and planning. Moreover, more than a half were in the high level group for control over future (i.e. successful career). This could be explained by increasing demand for radiotherapy services and technical progress, partly due to an ageing population and greater utilization of radiotherapy for certain cancers [14]. Nevertheless, control over time management was close to low score and one third of radiation oncologists were in the low level group. This dimension was confirmed in open questions: the subcategories of ‘simultaneity of the tasks–multitasking’ and ‘time pressure–work overload–delays’ were the most frequently problematic events cited. These results confirmed other previous studies [2,6] and referred to two major problems: the difficulty to do simultaneously research, clinical, teaching and administrative work in a university hospital; the waiting list before access to treatment, which can have deleterious effects on patients’ recovery. Moreover, some specific resources as chief/supervisor support and relations with co-workers were also cited as missing. Then, negative work–home interactions score was high, confirming results found in other studies about the impact of work on home life among oncologists [5]. Increasing productivity requirements and the need to complete administrative tasks after the end of the workday may create tension between personal and professional life.

Despite these specific negative aspects, working conditions and job resources seemed to be adequate. This could explain their medium job strain and very high work engagement. In fact, 52% of the variance of job strain and 30% of the variance of work engagement was explained by working conditions and negative work–home interactions. It could be hypothesized that these job resources play a moderating role between work conditions and job

strain. This underscores the hypothesized motivating potential of job resources suggested in the Job Demands–Resources model [1]. It could be interesting to have a better knowledge of other predictors of work engagement. Besides job and personal resources assessed in our study, one study has showed that changes in one particular personal demand, namely the expectations employees place on themselves regarding their own performance (called performance expectations) also predicted work engagement [27]. Concerning burn out, emotional exhaustion and depersonalization were low and lack of personal accomplishment was high. Their level of burn out was lower than the one of medical or radiation oncologists in other studies (e.g. [5]). No differences were found between residents and senior staff members. Once again, it could be hypothesized that adequate working conditions prevent from development of burn out.

Practical implications based on these results could be proposed. As regard control over time management and organizational problems, it could be proposed to offer more structure to the department, to improve division of work, or to allocate more job resources (i.e. relevant information available or administrative support). Concerning missing resources, it could be proposed to improve multidisciplinary team management with training sessions to help managers to stimulate their collaborators in an efficient professional development, to be supportive with his/her collaborators, etc. Effective multidisciplinary team working could provide benefits to patients and healthcare professionals working in cancer teams [7]. Support groups made up of peers could also be proposed to analyze difficult job situations together, to express problems, to break out of isolation and abandon guilty feelings (e.g. Balint groups [25,26]). As regards the negative work–home interactions, some ideas could be explored on the side of home working (i.e. for research work).

This present study had some limitations. The response rate in our study was small. The authors could argue that only radiation oncologists having more time to answer (and thus a lower workload) have participated in the survey. However, the size of the sample was acceptable for the statistical analyses performed on the data and studies carried out in American departments of radiotherapy showed weaker rates of participation, 6% and 4%, respectively [28].

5. Conclusion

This study has identified Belgian radiation oncologists working conditions and has measured their levels of burn out, job strain, work engagement and negative work–home interaction with validated questionnaires. They had several adequate job resources and experienced a very high work engagement. However, some problems appeared in the control over time management and in the social support for which organizational solutions and Balint groups could be proposed.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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