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ORIGINAL ARTICLE

Comparison between the first and second versions of the Copenhagen Psychosocial Questionnaire: psychosocial risk factors for a high need for recovery after work

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Abstract
Purpose The Copenhagen Psychosocial Questionnaire (COPSOQ I) was developed as a tool to assess a broad range of psychosocial work environment factors and was recently revised (COPSOQ II). The research question in this study was: Do COPSOQ II-scales predict a high need for recovery (NFR) after work better than COPSOQ I-scales?
Methods A cross-sectional questionnaire study was conducted in 990 subjects (84.5% response), employed in the public sector. Psychosocial factors were assessed by COPSOQ I and COPSOQ II. Multivariate logistic regression analysis was used to calculate the odds ratios for the presence of a high NFR, controlled for gender, age, physical workload and other relevant occupational and non-occupational factors. Analyses were performed for COPSOQ I and COPSOQ II separately.
Results In both COPSOQ versions, 'quantitative demands' ($p < 0.001$) and 'job insecurity' ($p < 0.005$) were significantly associated with a high NFR. Additionally, in the COPSOQ I model, 'demands for hiding emotions' ($p < 0.05$) and 'degrees of freedom' ($p < 0.05$), and in the COPSOQ II model 'emotional demands' ($p < 0.05$) and 'commitment to the workplace' ($p < 0.005$) were significant as well. 'Degrees of freedom' was omitted by the developers in the revised COPSOQ II. Reintroducing it into the COPSOQ II model did not alter the existing associations, but pointed out 'degrees of freedom' to be an additional important dimension ($p < 0.05$). The COPSOQ II model with 'degrees of freedom' included also had the best data fit.
Conclusions The results suggested the COPSOQ II to be better predictive than COPSOQ I for a high NFR, but also indicated that 'degrees of freedom' should be included into the COPSOQ II when studying the NFR as outcome parameter.

Keywords COPSOQ · Psychosocial work environment · Degrees of freedom

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Introduction

In industrialized countries, there is a shift in occupational exposures with an increasing importance of the psychosocial work environment. Reliable instruments to assess psychosocial work factors therefore become more important. Assessment of psychosocial work factors in epidemiologic studies is mainly focused on the components of the demand/control/support model and on the effort/reward imbalance model. However, these models do not include other psychosocial working conditions that have been suggested as health-hazardous factors, such as emotional demands, interpersonal conflicts, quality of leadership or predictability at work (Netterstrøm et al. 2008). These factors have rarely been investigated in epidemiologic studies.

The Copenhagen Psychosocial Questionnaire (COPSOQ I) was developed in 1997 as a tool to assess a broad range of psychosocial work environment factors (Kristensen et al. 2005). It was developed in three versions of different lengths: a long version for research use, a medium-length version for work environment professionals, and a short

version for the workplace. The questionnaire included most of the relevant dimensions according to a number of important theories on psychosocial factors at work, covering a large number of important aspects of the psychosocial work environment, stressors as well as resources (Kristensen et al. 2005). Although the COPSOQ I was theory based, it was not attached to one single theory, as no single theory or model covers all important aspects of the psychosocial work environment. However, the COPSOQ I lacked some important factors related to work: reward, justice, trust and discrimination (Kristensen et al. 2005; Siegrist 1996; Kivimäki et al. 2003).

In 2007, a revised version of the questionnaire (COPSOQ II) was developed (NRCWE 2007), rearranging or deleting some of the existing COPSOQ I dimensions and adding new and relevant psychosocial factors (Pejtersen et al. 2010). The scales 'degrees of freedom' and 'social relations' were deleted mainly because they measure features of the work environment which are well known in advance and are often not easy to change. 'Feedback at work' was deleted as a separate scale, and the items were included in two new scales on social support: 'social support from supervisor' and 'social support from colleagues', which replaced the 'social support' scale of COPSOQ I. The new scales 'work pace', 'variation of work', 'rewards', 'horizontal trust', 'vertical trust', 'justice and respect' were included in the questionnaire. The number of items in the scales 'quantitative demands', 'cognitive demands', 'possibilities for development', 'influence at work', 'job satisfaction' and 'role clarity' was reduced. The following COPSOQ I-scales were incorporated in COPSOQ II without any changes: 'meaning of work', 'predictability', 'role conflicts' and 'social community at work'. All in all, 57% of the items of COPSOQ I were retained (Pejtersen et al. 2010).

The COPSOQ II was shown to be a reliable instrument (Thorsen and Bjorner 2010). Furthermore, it was shown that the COPSOQ II comprises a number of relevant psychosocial risk factors for mental health that are not included in the job strain model and the effort–reward imbalance model (Burr et al. 2010).

Both COPSOQ I (Kiss and De Meester 2009) and COPSOQ II (Burr et al. 2010; Rugulies et al. 2010; Clausen et al. 2012) have been used to evaluate the influence of psychosocial work factors on health outcomes. To our knowledge, up to now, no comparison between COPSOQ I and II concerning the influence of psychosocial factors on health outcomes has been made. So the question can be raised if the new COPSOQ version predicts health outcomes better than the first COPSOQ version.

For the comparison between the two versions of the COPSOQ, the need for recovery can be used as outcome parameter. Need for recovery is considered to be an early predictor and sensitive indicator of reduced well-being (Sonnentag and Zijlstra 2006). In an occupational setting, fatigue experienced during or after a day's work can lead to long-term adverse health effects, when there is insufficient time to recover from this fatigue in between two work periods (Sluiter et al. 1999). The subjective need for recovery is an indicator of fatigue at work and can be measured by 'The need for recovery scale'. This scale was proven to be a reliable instrument (van Veldhoven and Broersen 2003; de Croon et al. 2006). In prospective studies, an increased need for recovery was shown to be a predictor for psychosomatic complaints (Sluiter et al. 2003; de Croon et al. 2004), longer sickness absence (de Croon et al. 2003), cardiovascular diseases (van Amelsfoort et al. 2003) and occupational accidents (Swaen et al. 2003). As the need for recovery can be considered as an early indicator for the development of long-term adverse health effects, the need for recovery constitutes an important parameter in the preventive management of occupational exposures and therefore is very suitable as a health outcome parameter.

The research question in this study was: Do COPSOQ II-scales predict need for recovery better than COPSOQ I-scales?

Methods

This study has been approved by the Ethics Committee Progecov (Commissie voor Medische Ethiek OG 211, Ghent, Belgium).

Subjects and data collection

All employees ($n = 1172$) of two organizations in the public sector were asked to participate in a cross-sectional questionnaire study. One organization was a municipality with 704 employees, comprising administrative workers, library workers, professional fire fighters, teachers, technical and cleaning personnel. All subjects received a standardized self-completed questionnaire at their home addresses by mail. One month later, a second data collection was carried out amongst the non-responders. Eventually 543 subjects returned the questionnaire (77.1% response).

The second organization was a large public social institution, employing 468 subjects, comprising social service, administration, childcare, cleaning personnel, cleaning at home, nursing homes, home care, kitchen and technical personnel. At the occasion of information sessions organized by the employer, the employees had the opportunity to fill out the questionnaire. Eventually 458 employees filled out the questionnaire (97.9% response).

A total of 1001 subjects returned the questionnaire (85.4% response). Eleven of them (1.1%) did not fill out the

dependent outcome parameter, hereby reducing the study population to 990 subjects, which represented 84.5% of the target population.

Need for recovery

The dependent outcome variable was the experienced need for recovery, which was assessed by 'The Need for Recovery Scale' questionnaire. The 'Need for Recovery Scale' comprises 11 dichotomous (yes/no) items (e.g. 'I find it hard to relax at the end of a working day'; 'At the end of a working day, I am really feeling worn-out'; 'I have trouble concentrating in the hours off after my working day'; 'After a working day I am often too tired to start other activities'), which were coded '0' or '1' in such a way that higher scores are related to 'more complaints' (van Amelsfoort et al. 2003). The need for recovery scale was computed by summing up the scores of the 11 constituent items, resulting in a score ranging from 0 to 11, which was transformed to a 0–100 scale (de Croon et al. 2004, 2006). Higher scores indicate a higher degree of need for recovery after work. Cronbach's α of the scale was 0.85 (inter-item correlations, 0.14–0.68), which was comparable with the reliabilities reported earlier (Sluiter et al. 1999; van Veldhoven and Broersen 2003; Jansen et al. 2003, de Croon et al. 2003, Kiss et al. 2008). Receiver operating characteristic analyses showed that for long-term health effects (psychic and psychosomatic complaints), a cut-off point for a high need for recovery was determined at a score of 45 (Broersen et al. 2004). A need for recovery score higher than 45 was defined as a high need for recovery, while a score of 45 and lower was defined as a low need for recovery.

Psychosocial work factors

To explore the impact of psychosocial work factors on the need for recovery, both versions of the COPSOQ were used separately.

In the first model (COPSOQ I), psychosocial work environment was assessed by 18 dimensions of the first version of the COPSOQ (long research version) (Kristensen et al. 2005). Except for job insecurity (4 dichotomous yes/no questions), all questions had five response options: 'always, often, sometimes, seldom, never/hardly ever' or 'to a very large extent, to a large extent, somewhat, to a small extent, to a very small extent'. Each dimension was transformed to a 0–10 scale. High scores corresponded to high values on the respective dimensions. The considered dimensions of the COPSOQ I and their respective number of constituting items and reliability figures are summarized in Table 1. The reliability figures were comparable with those found in the original study, where the detailed composition of the different scales was described (Kristensen et al. 2005).

Table 1 Dimensions and their respective number of items and reliability figures (Cronbach's α and inter-item correlations) of the first version of the COPSOQ

Dimension	Number of items	Cronbach's α	Inter-item correlation(s)
Quantitative demands	7	0.84	0.18–0.70
Emotional demands	3	0.82	0.52–0.69
Demands for hiding emotions	2	0.26	0.15
Cognitive demands	8	0.90	0.41–0.74
Influence at work	10	0.73	0.01–0.53
Possibilities for development	7	0.85	0.21–0.73
Degrees of freedom	4	0.66	0.18–0.43
Meaning of work	3	0.83	0.51–0.72
Commitment to the workplace	4	0.68	0.22–0.49
Social support	4	0.76	0.26–0.59
Social relations	3	0.58	0.27–0.40
Job insecurity	4	0.62	0.18–0.40
Role clarity	4	0.77	0.33–0.67
Role conflicts	4	0.77	0.37–0.54
Predictability	2	0.75	0.60
Feedback	2	0.52	0.36
Sense of community	3	0.78	0.47–0.72
Quality of leadership	8	0.94	0.52–0.85

In the second model (COPSOQ II), psychosocial work environment was assessed by 22 dimensions of the second version of the COPSOQ (long research version) (Pejtersen et al. 2010). All questions had the five following response options: 'always, often, sometimes, seldom, never/hardly ever' or 'to a very large extent, to a large extent, somewhat, to a small extent, to a very small extent'. Each dimension was transformed to a 0–10 scale. The considered dimensions of the COPSOQ II and their respective number of constituting items and reliability figures are summarized in Table 2. The reliability figures were compatible with those found earlier (Pejtersen et al. 2010; Burr et al. 2010).

Control variables

Earlier studies showed a significant impact of physical workload on the need for recovery (Sluiter et al. 2003; Kiss et al. 2008; Kiss and De Meester 2009), stressing the importance of taking into account physical workload when studying the effects of occupational factors on the need for recovery. Physical workload was therefore included as control variable in this study. Physical work characteristics were assessed using a four-item physical workload scale, comprising sustained physical efforts ('my job requires fast and sustained physical efforts'), repetitive work ('my job

Table 2 Dimensions and their respective number of items and reliability figures (Cronbach's α and inter-item correlations) of the second version of the COPSOQ

Dimension	Number of items	Cronbach's α	Inter-item correlation(s)
Quantitative demands	4	0.86	0.54–0.70
Work pace	3	0.75	0.45–0.57
Cognitive demands	4	0.83	0.52–0.61
Emotional demands	4	0.85	0.49–0.69
Demands for hiding emotions	3	0.40	0.14–0.28
Influence at work	4	0.56	0.16–0.37
Possibilities for development	4	0.84	0.42–0.73
Variation of work	2	0.68	0.52
Meaning of work	3	0.83	0.51–0.72
Commitment to the workplace	4	0.65	0.25–0.39
Predictability	2	0.74	0.60
Rewards	3	0.83	0.53–0.73
Role clarity	3	0.80	0.50–0.67
Role conflicts	4	0.77	0.37–0.54
Quality of leadership	4	0.89	0.60–0.74
Social support from supervisor	3	0.82	0.53–0.70
Social support from colleagues	3	0.69	0.32–0.59
Social community at work	3	0.78	0.47–0.73
Job insecurity	4	0.58	0.18–0.40
Vertical trust	4	0.72	0.27–0.51
Horizontal trust	3	0.71	0.28–0.71
Justice and respect	4	0.80	0.38–0.66

involves repetitive movements'), lifting heavy weights ('during my work I have to move or lift very heavy loads') and working in awkward positions ('I have to work for long periods in awkward postures'). For each separate item, a frequency-based answer could be given (four possibilities: never, sometimes, often and always), resulting in a score from 0 to 3 per item. The physical workload scale was computed by summing up the scores of the four constituent items, resulting in a score ranging from 0 to 12, where the highest score was concordant with the highest physical workload. Cronbach's α of the scale was 0.84, with inter-item correlations ranging from 0.52 to 0.65.

It has been shown that full-time work, as compared to part-time work (<38 h a week), was significantly associated with a high need for recovery (Kiss et al. 2008). This was asked for as well.

Since working hours and schedules were found to be associated with need for recovery from work (Jansen et al. 2003), more than one employment and shift work were considered as well, using the same questions used in earlier research (Kiss et al. 2008; Kiss and De Meester 2009).

In recent research, it has been shown that women tend to have a higher need for recovery than men (Kiss et al. 2008; Verdonk et al. 2010). Therefore, gender was taken into account.

Earlier research pointed out existing significant associations between age and need for recovery (Kiss et al. 2008; Mohren et al. 2010); therefore, age was taken into account. Age was asked for as a continuous variable.

Family and social life factors outside work were also included in the study, because it was shown that family and social life stressors could influence psychosocial health leading to fatigue (Moos et al. 2005; Bernert et al. 2007; Siltaloppi et al. 2011). Questions used in earlier research on need for recovery were used (Kiss et al. 2008; Kiss and De Meester 2009): number of children at home, taking care of disabled or elderly people, degree of satisfaction ('very satisfied', 'fairly satisfied' and 'not very satisfied') on relationships with close relatives and friends and on social contacts (contacts with people in leisure activities, neighbours, hobby clubs, associations, etc.).

As it could be argued that differences in data collection methods could bias response behaviour, the analyses were controlled for subpopulation as well.

Statistical analyses

All data analyses were performed using SPSS, version 19.0 for Windows (SPSS 2010). Multivariate logistic regression analysis was used to calculate the odds ratios and their 95% confidence interval for the presence of a high need for recovery. Analyses were performed for COPSOQ I and COPSOQ II separately, including all COPSOQ psychosocial dimensions of the considered COPSOQ version and all control variables.

Because earlier research showed a specific nonlinear age-related pattern in the need for recovery (Kiss et al. 2008; Mohren et al. 2010), the age variable was not entered as a continuous variable, but divided into eight age groups (<25, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54 and >54 years) and treated as a categorical variable in the regression analyses.

Stepwise forward conditional multiple logistic regression analysis was used to calculate the odds ratio and their 95% confidence intervals for the presence of a high need for recovery. For the stepping method criteria, the p value for including a variable was set at .05 and the p value for excluding a variable at .10. For each multivariate model, 2 Log likelihood and the correctly predicted percentage were computed. The Nagelkerke R-squared statistic was used to compare the competing models.

Correlations between all exposure variables were checked beforehand to prevent the occurrence of multicollinearity, and no correlation was found higher than 0.80 (Checkoway et al. 2004). Between the COPSOQ I variables, the lowest correlation (0.002) was found between 'emotional demands' and 'quality of leadership'. Only one correlation above 0.60 was found between 'cognitive demands' and 'possibilities for development' (0.63). Between the COPSOQ II variables, the lowest correlation (0.004) was found between 'predictability' and 'degrees of freedom'. The highest correlations (above 0.60) were found between 'justice and respect' and 'predictability' (0.61), 'reward' (0.73), quality of leadership' (0.71), 'support from superiors' (0.60), 'vertical trust' (0.78); between quality of leadership' and 'reward' (0.61), 'social support from superiors' (0.68), 'vertical trust' (0.66); and between 'vertical trust' and 'reward' (0.70).

An exploratory factor analysis was performed on all of the measurement items to assess the degree of common method variance (Podsakoff et al. 2003).

Results

Table 3 summarizes the main characteristics of the study population. The high proportion of women in the study population was characteristic for the considered study population.

The mean need for recovery for the total study population was 28.9, ranging from 0 to 100; 241 subjects (24.3%) had a high need for recovery.

The final multivariate logistic regression models for the presence of a high need for recovery are shown in Table 4.

Both in the first and second versions of the COPSOQ, 'quantitative demands' and 'job insecurity' showed a significant association with a high need for recovery.

In the COPSOQ I model, 'demands for hiding emotions' and 'degrees of freedom' were also significantly associated with a high need for recovery.

In the COPSOQ II model, 'demands for hiding emotions' was replaced by 'emotional demands', and 'commitment to the workplace' became significantly associated with a high need for recovery as well.

Using the COPSOQ I questionnaire, 'degrees of freedom' was significantly associated with a high need for recovery. This dimension is no more included in the COPSOQ II. Therefore, it seemed justifiable to reintroduce this dimension into the COPSOQ II. Introducing 'degrees of freedom' into the COPSOQ II model did not alter the existing associations of the final regression model, but pointed out 'degrees of freedom' to be an additional dimension significantly associated with the presence of a high need for recovery.

Table 3 Characteristics of the study population

Variable	*N*	%	Mean (SD)
Age (years)	990		41.6 (10.3)
<25	66	6.7	
25–29	95	9.6	
30–34	109	11.0	
35–39	111	11.2	
40–44	161	16.3	
45–49	192	19.4	
50–54	164	16.6	
>54	92	9.3	
Gender			
Men	283	28.6	
Women	707	71.4	
Work activity			
Part time	479	49.6	
Full time	487	50.4	
Shift work			
No	736	75.8	
Yes	235	24.2	
More than one employment			
No	913	92.7	
Yes	72	7.3	
Physical workload scale	984		4.5 (2.9)
Number of children at home			
0	363	37.0	
1	231	23.5	
2	280	28.5	
≥3	108	11.0	
Taking care of ill or old people			
No	801	81.3	
Yes	184	18.7	
Contacts with close relatives			
Very satisfactory	687	69.5	
Fairly satisfactory	282	28.5	
Not very satisfactory	19	1.9	
Contacts with friends			
Very satisfactory	595	60.3	
Fairly satisfactory	375	38.0	
Not very satisfactory	17	1.7	
Social contacts			
Very satisfactory	503	51.2	
Fairly satisfactory	456	46.4	
Not very satisfactory	24	2.4	

According to the R^2 statistic, the COPSOQ II model was better compared to the COPSOQ I model, and the COPSOQ II with the 'degrees of freedom' was even better.

The exploratory factor analysis performed on all of the measurement items revealed the presence of 39 distinct

Table 4 Final multivariate logistic regression models for the presence of a high need for recovery for COPSOQ I, COPSOQ II and COPSOQ II with 'degrees of freedom' included, controlled for subpopulation, physical workload, full/part-time work, shift work, gender, age, number of children at home, taking care of disabled or elderly people, degree of satisfaction on relationships with close relatives and friends and on social contacts

* $p < 0.05$; ** $p < 0.005$; *** $p < 0.001$

Variable	COPSOQ I ($n = 901$)	COPSOQ II ($n = 890$)	COPSOQ II + 'degrees of freedom' ($n = 890$)
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Quantitative demands	1.50 (1.34–1.68)***	1.38 (1.25–1.52)***	1.38 (1.25–1.52)***
Demands for hiding emotions	1.10 (1.01–1.20)*		
Emotional demands		1.11 (1.02–1.20)*	1.09 (1.00–1.19)*
Degrees of freedom	0.89 (0.82–0.98)*		0.90 (0.83–0.99)*
Job insecurity	1.12 (1.06–1.20)**	1.14 (1.07–1.22)***	1.14 (1.07–1.22)***
Commitment to workplace		0.85 (0.77–0.94)**	0.86 (0.77–0.94)**
Correctly predicted percentage	78.7	78.6	78.9
−2 Log likelihood	840.83	826.48	821.63
Nagelkerke R^2	0.246	0.266	0.273

factors with eigenvalue greater than 1.0. The 39 factors together accounted for 65.5% of the total variance. The largest factor did not account for a majority of the variance (12.7%).

Discussion

The persistence of 'quantitative demands' and 'job insecurity' as significant factors associated with a high need for recovery throughout the three regression models, indicated the existence of a stable relationship between those factors and the need for recovery. The association of increasing 'quantitative demands' with an increased risk of a high need for recovery was demonstrated earlier (Kiss and De Meester 2009) and was compatible with the findings of earlier research, where high work pressure was found to be a predictor for a high need for recovery (Sluiter et al. 2001, 2003). The findings on 'job insecurity' were also a confirmation of earlier research (Sluiter et al. 2003; Kinnunen et al. 2010).

Switching from the COPSOQ I to the COPSOQ II model induced a shift from 'demands for hiding emotions' to 'emotional demands'. This was completely compatible with changes in the content of the respective COPSOQ dimensions, where constituting questions of the 'demands for hiding emotions' and 'emotional demands' dimensions of the COPSOQ II questionnaire were rearrangements of the COPSOQ I dimensions. Furthermore, the persistence of emotional demands in the final COPSOQ II models was completely in accordance with earlier findings in studies using need for recovery as endpoint (Sluiter et al. 2003; Kiss and De Meester 2009). It was also compatible with the finding of a recent study that showed 'emotional demands', as assessed by the COPSOQ II, to be negatively associated with mental health (Burr et al. 2010).

Switching from the COPSOQ I to the COPSOQ II model also induced the appearance of an additional factor in the final regression model: 'commitment to the workplace'. Although this variable was also taken into account in the COPSOQ I model, it did not reach any significant level of association in the COPSOQ I analysis. The significant relationship between 'commitment to the workplace' and need for recovery has not been studied before. A high commitment was associated with a decreased need for recovery.

The 'degrees of freedom' dimension comprises four questions about following items: ability for deciding when one can take a break, ability for taking holidays more or less when one wishes, ability for leaving work to have a chat with a colleague and ability to leave the place of work for half an hour without special permission if one has some private business. After reintroduction of the 'degrees of freedom' in the COPSOQ II model, this dimension turned out to be a significant factor in the regression model as well. This result was consistent with earlier findings of a study where it was shown that increasing lack of recovery opportunities was associated with increasing need for recovery (van Veldhoven and Sluiter 2009). The recovery opportunities scale comprises nine questions, two of which are almost identical to two questions of the 'degrees of freedom' scale of the COPSOQ. The scale on 'degrees of freedom' has been dropped in COPSOQ II, primarily because this scale often 'revealed' conditions which were already very well known by the workplaces and which are not always easy to change. This is indeed true for certain specific jobs (e.g. teachers), but to our opinion, there are other jobs for which there are possibilities to change the 'degrees of freedom'. In these cases, interventions on 'degrees of freedom' could prove to be useful in reducing the need for recovery. Moreover, recent research has pointed out that psychological detachment from work during after-work hours reduced fatigue and increased vigour at work

(Kinnunen et al. 2010). It is very plausible that increasing 'degrees of freedom' will facilitate the possibilities for psychological detachment from work during after-work hours. The findings in the current study stress the importance of 'degrees of freedom' in the context of need for recovery.

Furthermore, the statistical tests suggested that the COPSOQ II with the 'degrees of freedom' dimension included was more predictive for a high need for recovery than COPSOQ I and COPSOQ II without 'degrees of freedom'. This provides an additional argument for the inclusion of this dimension in the COPSOQ II questionnaire when studying the effects on need for recovery.

The current study has some limitations. First, this study has a cross-sectional design, not allowing to draw reliable conclusions on causal relationships between predictors and outcome. As the predictor measures do not necessarily reflect the actual psychosocial work environment of respondents, but factors of the work environment as they are being perceived by the participants, it cannot be excluded that people with a high need for recovery might perceive certain psychosocial work factors as more demanding than people with a low need for recovery. The direction of the causal relationship cannot be determined with the current study design; a longitudinal study is needed to allow causal interpretations.

Second, data were self-reported and collected through the same questionnaire during the same period of time. Measures could be subject to common method variance (Podsakoff et al. 2003), which may increase the risk of inflated relationships. Common method variance may be a problem if the variables all load on one factor or if there is one factor that explains the majority of the variance. The findings of the exploratory factor analysis (39 distinct factors accounting for 65.5% of the total variance, the largest factor of which accounted for 12.7% variance) suggested that the data were not explained by a single common method factor and that common method variance was not of great concern.

Conclusion

This study compared the two versions of the COPSOQ and their relationship with an early adverse health effect indicator, the need for recovery. The results suggested the second version of the COPSOQ to be more predictive than the first version, but also indicated that 'degrees of freedom' should be included into the COPSOQ II questionnaire when studying the need for recovery as outcome parameter.

Conflict of interest The authors declare that they have no conflict of interest.

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