Original Article

Developing a Scale for Workers' Psychological Burden from the Perspective of Occupational Safety and Health: The Basic Scale as the First Step

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ABSTRACT

Background: Organizations are pursuing complex and diverse aims to generate higher profits. Many workers experience high work intensity such as workload and work pressure in this organizational environment. Especially, psychological burden is a commonly used term in workplace of Republic of Korea. This study focused on defining the psychological burden from the perspective of occupational safety and health and tried to develop a scale for psychological burden.

Methods: The 48 preliminary questionnaire items for psychological burden were prepared by a focus group interview with 16 workers through the Copenhagen Psychosocial Questionnaire II and Mindful Awareness Attention Scale. The preliminary items were surveyed with 572 workers, and exploratory factor analysis, confirmatory factor analysis, and correlation analysis were conducted for a new scale.

Results: As a result of the exploratory factor analysis, five factors were extracted: organizational activity, human error, safety and health workload, work attitude, and negative self-management. These factors had significant correlations and reliability, and the stability of the model for validity was confirmed using confirmatory factor analysis.

Conclusion: The developed scale for psychological burden can measure workers’ psychological burden in relation to safety and health. Despite some limitations, this study has applicability in the workplace, given the relatively small-sized questionnaire.

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1. Introduction

Organizations today are pursuing complex and diverse aims to generate higher profits. They must constantly change to achieve these ends—namely, by organizing and managing products, work methods, technological innovations, human resource policies, forms of work organization, and so on. Such organizational changes lead to greater work intensity. The increased workload has negative effects on workers’ health and safety, including musculoskeletal disorders, psychological distress, fatigue, and accidents, and is a factor that increases absenteeism, presenteeism, staff turnover, and poor quality of work within an organization [11]. The factors giving rise to workers’ psychological burdens, described in various terms such as workload, work strain, and work pressure, are also known to impede the implementation of safety behaviors by depleting the resources needed for their implementation [2,3]. Volkoff et al [4] reported that the pressure resulting from work pace affected the health of workers in their 50s and above. Cantin et al [5] found that when driving work became complicated and the workload was high, drivers faced high mental...
load, resulting in poorer work performance including slower re-
action times with older drivers exhibiting a greater drop in per-
formance than younger drivers as their workload increased.

Organizations are looking for effective ways to evaluate work-
load, but many assessment tools are designed to measure only
essential features such as mental workload and, thus, provide a
divided understanding of the workplace. Moreover, there is a need
for a broad approach that goes beyond the traditional concept of
workload, distinguishes between physical and mental components,
and can encompass the complexity of work activities in diverse
environments [1]. According to Zhang and Luximon [6], workload is
affected by various psychological, physical, and environmental
factors and consists of mental demand, physical demand, temporal
demand, performance, effort, and frustration. Workload can also
refer to the amount of work that an individual has to perform, but
there is a difference between the actual amount of work and the
amount of work perceived by the individual. In other words, even if
the amount of work is the same, the perceived workload differs
among individuals, and the workload may be analyzed into quanti-
tative load (time and amount of work) and qualitative load (dif-
ficulty level) [7].

Workload is also treated as one of the stress factors in job stress
models, work overload, work complexity, work underload that
does not match the worker’s level, and other factors are considered
to be causes of job stress [8]. The Korean Occupational Stress Scale
also treats job demand as one of its subscales, including items such
as time pressure, work interruption, increased workload, respon-
sibility, excessive burden, work-home balance, and multitask-
ing [9]. Previous research has traditionally approached the
subject matter from a perspective that distinguishes between
physical and mental workloads [10]. Physical workload was
approached from an angle that deals with the limitations of physi-
ical work performance that could affect the health and safety of
workers [11,12]. In experimental psychology, mental workload was
approached from an angle that identifies cognitive or mental lim-
itations affecting human performance in information processing
[13]. Responsibility, uncertainty, time pressure, job interruption,
and other factors were added to the physical and mental workload
factors, and these factors again serve to increase physical and
mental workloads [1]. Physical scales focused on activities
responding to stress by assessing criteria such as heart rate and
blood pressure. Subjective scales, on the other hand, which pro-
vided relatively immediate data based on the assessment of
perceived workloads to workers, are considered to be convenient
and less expensive and, thus, are found to have higher validity than
physical scales [14]. Hart and Staveland [15] noted that such sub-
jective scales are among the most common methods of assessing
workloads. Representative scales include the National Aeronautics
and Space Administration Task Load Index [14,15], the Subjective
Workload Assessment Technique [16], the Workload Profile [16],
the Borg CR10 Scale [17], and the Multivariate Workload Index [18].

Psychological burdens such as workload not only impede work
performance but also can have a direct impact on the safety of
workers through accidents and so forth. Despite this, however,
there have not been many attempts to develop an assessment tool
for measuring the psychological burdens related to the occupa-
tional safety and health of workers. In particular, although “psy-
chological burden” is a commonly used term in the workplace in
Republic of Korea, it does not have much currency in the academic
field relative to other terms such as workload. Job stress and
workload can be interrelated, and there is also a corresponding
conceptual overlap between them [19]. However, the present
study defines “psychological burden” using a more fine-grained
concept than job stress and attempts to develop a scale that can
measure it.

According to the Cambridge Dictionary [20], “burden” is defined
as “a heavy load that you carry” or “something difficult or un-
pleasant that you have to deal with or worry about.” Because the
aim of this study is to develop a scale for psychological burdens
affecting occupational safety and health through work accidents
and so on, psychological burdens here may be regarded as burdens
pertaining to the work directly performed by workers or to other
related work. More specifically, excessive work amount, work pace,
safety and health conditions related to work, and so on can be
deemed determinants of psychological burden. Thus, the present
study defines the psychological burden of workers in terms of
emotions such as concern, anxiety, uneasiness, and depression felt
by workers due to their concerns about the success or failure of
their work and their safety, which are affected mainly by the
workload and work conditions. This conceptual definition serves as
the point of departure for our study.

To develop our psychological burden scale, we reviewed the
Copenhagen Psychosocial Questionnaire II (COPSOQ II) [21—
23] developed by the National Institute of Occupational Health in
Denmark to assess the health effects of the psychosocial environ-
ment of workers in diverse occupations—and the Korean version
of the Mindful Awareness Attention Scale (K-MAAS) [22]. Using
these scales as the basis, we revisited the questionnaire items to suit
our research aims through a focus group interview (FGI) and composed
preliminary questionnaire items. The COPSOQ II can be used to
carry out a comprehensive assessment of the psychosocial work
environment. Therefore, it has recently been widely used in Asian
countries, and in Republic of Korea, June and Choi [23] conducted a
study on its validity. In particular, the COPSOQ II deals with
workload-related questions and psychosocial questions in various
industrial fields, including job demands, organizational structure,
work—individual interface, health and well-being, and offensive
behaviors mentioned in the previous studies. As previously
mentioned by Fournier [1], it was judged to be suitable as a basic
tool.

In addition, as Kim and Ahn [24] mentioned in their previous
study, the ability of workers to concentrate in given work situations
is one of the important factors for the prevention of safety acci-
dents. One of the concepts associated with consciousness and
attention is the concept of mindfulness. Ludwig and Kabat-Zinn
[25] emphasized mindfulness as a critical way to pay attention to
what is happening now and turned out that mindfulness training
has been shown to help emotional stability and has a positive effect
on stress reduction and psychological well-being. And recently, the
mindfulness concept helps workers to perform effective actions
that are appropriate to their situation in the workplace. Because
this can lead to the prevention of work accidents [26], we used the
K-MAAS along with the COPSOQ II to prepare preliminary ques-
tionnaires to use in the present study. In addition to the exploratory
study for the development of the scale, the confirmatory factor
analysis tried to confirm the validity of the developed scale.

2. Materials and methods

2.1. Measurement

The version of the COPSOQ II designed for professional use
consists of a total of 127 questionnaire items with subscales per-
taining to “demands at work,” “work organization and job con-
tents,” “interpersonal relations and leadership,” “work—individual
interface,” “health and well-being,” and “offensive behavior” [21].

The Mindful Awareness Awareness Scale (MAAS), as developed
by Brown and Ryan [27], is a representative questionnaire for assess-
ing mindfulness, and the version used in Republic of Korea is the K-
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