

Developing a Scale for the New-Type Depression: Focusing on the Differences between Working Hours and Free Time

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Abstract

The new-type depression, in which depressive symptoms worsen during working hours and alleviate in free time, has been reported in Japan (especially among office workers) and other countries. The new-type depression, symptoms of which are different from those of the melancholic type, is difficult to cure using pharmacotherapy. The present study aims to develop the Distress Scale for On and Off Duty (DSOOD) to measure distress during working hours and free time separately. The new-type depression is often comorbid with anxiety and hypomania. Therefore, self-rating scales of depression, anxiety, hypomania, and a positive mental state were referred to while developing the DSOOD. The present study was conducted using the Internet. A total of 400 full-time non-managerial employees (200 male and 200 female) answered three questionnaires: DSOOD (37 items), the Patient Health Questionnaire-9 (PHQ-9), and the Generalized Anxiety Disorder-7 (GAD-7). The factor analysis indicated two factors of the DSOOD: "distress" (20 items) and "good condition" (12 items). The concurrent validity of DSOOD was high because 1) the distress scores of working hours and free time were highly correlated with PHQ-9 and GAD-7 and 2) the DSOOD distinguishably measured distress in working hours and free time, which was reflected in the answers to additional questions in the PHQ-9 and GAD-7.

Keywords

Distress, Occupational Stress, White Collar Workers, Measurement, Occupational Health Psychology

1. Introduction

In Japan, new types of depression have been reported since 2000. This typology characterizes the emergence of severe depressive symptoms during working hours that are relieved during free time. However, attempts to objectively measure this new-type depression (*Shin-gata utsu* in Japanese) have been limited. Therefore, the current study aims to develop a scale to measure physical and mental distress according to working hours (including commuting time and working hours from home) and free time (e.g., holidays) and examine its reliability and validity.

The new types of depression, such as *Mizyuku-gata utsu-byo* (immature type of depression) (Abe, 2011), *Gendai-gata utsu-byo* (modern type of depression) (Matsunami & Yamashita, 1991), *Dysthymia-gata utsu-byo* (dysthymic-type depression) (Tarumi, 2005), and modern-type depression (Kato et al., 2016), possess characteristics different from the melancholic type, which has traditionally been regarded as a typical example of depression in Japan. Although there are some unique features in each new type of depression, they all have some features in common; thus, an inclusive and undefined word *Shin-gata utsu* (new-type depression) has been used to refer to them in Japan. *Shin-gata utsu* (new-type depression) has been characterized by the following: 1) usually reported among office workers, 2) often mild and does not meet the diagnostic criteria for major depressive disorder (DSM-5), 3) usually includes both depressive and anxiety symptoms, 4) improves when good things happen (i.e., mood reactivity, typically, among office workers, depressive symptoms improve during their free time [e.g., holidays]) and 5) sometimes has an affinity with characteristics of bipolar II disorder (depressive symptoms of the new-type depression worsen during working hours and attenuate during free time). Considering that major depressive disorder continues for more than two weeks, the feature of improving depressive symptoms in free time, such as holidays, is noteworthy. In addition to these unique characteristics, the new-type depression is difficult to cure through pharmacotherapy (Tarumi & Kanba, 2005); as a result, it has been a problem in Japan. The new-type depression has been reported not only in Japan but also globally (Kato et al., 2011). Therefore, empirical studies on the new-type depression are required.

There have been some empirical studies on the new-type depression (Kato et al., 2019; Muranaka et al., 2017, 2019; Yamakawa et al., 2015); however, they have not investigated the important characteristics stated above. For example, Muranaka et al. (2017, 2019), who investigated the relationship between personality traits associated with the new-type depression and depressive symptoms, reported depressive symptoms using the Center for Epidemiologic Studies Depression Scale (Radloff, 1977) and the Global Scale for Depression (Fukunishi & Fukunishi, 2012), which do not separately measure depressive symptoms during working hours and free time. To the best of our knowledge, there is no self-administering scale that measures depressive symptoms according to working hours and free time. Thus, this study aims to bridge this research gap.

While developing the scale, the authors paid attention to two other features of the new-type depression. First, because anxiety is usually observed in the new-type depression, the authors referred to anxiety scales. Second, the new-type depression sometimes has an affinity with characteristics of bipolar II—the condition in which depressive symptoms are attenuated in free time and is likely hypomanic. However, it is unknown if the good condition in free time is hypomania or simply a positive state under the threshold of hypomania. Thus, the authors referred to scales measuring hypomania, as well as positive conditions about the body and mind.

2. Method

2.1. Development of the Scale

Regarding the supposed symptoms of the new-type depression, it is important to consider symptoms other than depression, such as anxiety, hypomania, and positive affect. Thus, we developed items for depression scales (Kessler et al., 2002; Zung, 1965), anxiety scales (Liebowitz, 1987; Zung, 1971), the Hypomania Check List (Abe & Angst, 2014), the General Health Questionnaire (Goldberg & Hillier, 1979), and measurements regarding the positive mental state (Ito et al., 2003; Sato & Yasuda, 2001). Consequently, the Distress Scale for On and Off Duty (DSOOD) was created and included 37 items.

Regarding these items, the respondents looked back on the past month and answered the extent to which each item applied to them. The questions were divided into working hours and free time. The participants were given the following instructions: “How often did you have the following in the past month? Please consider distinguishing between working hours (including commuting time and working hours from home) and free time (e.g., holidays) and circle the numbers in the applicable columns.” The participants responded on a 5-point Likert scale (1 = none, 2 = a little, 3 = sometimes, 4 = usually, and 5 = always).

2.2. Participants

Participants were full-time non-managerial employees ($n = 400$, 22 - 59 years, $M = 41.8$ years, $SD = 9.9$ years) who were registered as monitors of an Internet research company (Cross Marketing Inc., Tokyo, Japan). Because the new-type depression is often found among white collar workers at large companies (Kameyama, Kashihara, Yamakawa, Muranaka, & Sakamoto, 2021), the authors limited participants to those who had graduated from a university or completed a master's degree and had worked for large companies (those with more than 300 employees). Of the total, 200 participants were male (24 - 59 years, $M = 46.1$ years, $SD = 9.1$ years) and 200 were female (22 - 58 years, $M = 37.4$ years, $SD = 8.8$ years), 205 were unmarried, and 263 had no children.

2.3. Procedures

The authors conducted a cross-sectional study via the internet. Participants

agreed to join the study after being informed that their anonymity would be maintained and that participation was voluntary. At first, a set of screening questions were asked concerning topics such as age, sex, employment, duty position, academic career, and the number of employees in their company. Then, for those who met the inclusion criteria stated above, the following questionnaires, along with the DSOOD, were administered.

2.4. Questionnaires

To test the validity of the DSOOD, the following scales were administered:

Patient Health Questionnaire-9 (PHQ-9). The Japanese version of the PHQ-9 (Kroenke et al., 2001) was used as the depression scale. The PHQ-9 addresses the nine symptoms of depression listed in DSM-5. The items are about situations during the past two weeks, and the respondents answered with four choices: “not at all,” “several days,” “more than half the days,” and “nearly every day.”

If any one of the nine items was checked for “several days” or more, two supplementary questions (dysfunction and differences between working hours and free time) were asked (the latter was added to the original in this survey). First, to measure the degree of dysfunction, the following question was asked, “How difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?” Respondents answered using four choices: “not difficult at all,” “somewhat difficult,” “very difficult,” and “extremely difficult.” Next, to measure the difference between working hours and free time, respondents were asked, “Did those problems occur more often during working hours or free time?” Respondents chose one from “the same between working hours and free time,” “more often during working hours,” and “more often during free time.” Hereinafter, they will be referred to as the “PHQ-equivalent group,” “PHQ-working hours group,” and “PHQ-free time group,” respectively. Respondents who proceeded to the supplementary question were classified into one of the three groups to test the validity of DSOOD, that is, to verify if the scale could discriminate between the responses during working hours and those during free time.

Generalized Anxiety Disorder-7 (GAD-7). As a measure of anxiety, the Japanese version of GAD-7 (Spitzer et al., 2006), a simple assessment tool for generalized anxiety disorder, was used. Respondents answered seven items about situations during the past two weeks, with four choices: “not at all,” “several days,” “more than half the days,” and “nearly every day.”

When one of the seven items was checked for “several days” or more, two supplementary questions (dysfunction and differences between working hours and free time) were asked, as in the case of PHQ-9. Then, regarding the difference between working hours and free time, in terms of anxiety symptoms, they were classified into the “GAD-equivalent group,” “GAD-working hours group,” or “GAD-free time group.” They were assigned to one of the three groups to test the validity of DSOOD.

2.5. Ethical Considerations

Those who agreed to the rules set by the survey company regarding the handling of response data and personal information were included in the study. Besides, at the beginning of the survey page, an outline of the research and information about handling data were presented, and it was explained that only those who agreed with it would participate. The study was approved by the institutional review board of the College of Humanities and Sciences, Nihon University (approval number 30 - 69).

3. Results

3.1. Factor Analysis

First, a factor analysis using the maximum likelihood method was performed on 37 items of working hours. The eigenvalues were attenuated to 14.743, 6.030, 1.841, 1.275, and .861, and two factors were judged to be valid as per the Scree plot. When the number of factors was specified as two, and the factor analysis was performed using the maximum likelihood method, the communality of items 24 to 28 was low, these five items were excluded from further analyses. Then, the factor analysis was performed again, with a Promax rotation, for the remaining 22 items using the maximum likelihood method with the number of factors set to two. The results are shown in the second column from the right of **Table 1**. The interfactor correlation was $-.49$. Additionally, when analyzed for gender, the items were divided into similar factors.

Similarly, a factor analysis using the maximum likelihood method was performed on 37 items of free time. The eigenvalues were attenuated to 14.637, 4.993, 1.326, .838, .714, and two factors were judged to be valid, as per the Scree plot. As a result of the factor analysis using the maximum likelihood method with the number of items specified as two, the communality of items 24 to 28 was also low. After these five items were excluded, the factor analysis was performed again using the maximum likelihood method with the number of factors set to two, and a Promax rotation was performed. The results are shown in the rightmost column of **Table 1**. The interfactor correlation was $-.50$. In addition, when analyzed for gender, the items were divided into similar factors.

As shown in the right half of **Table 1**, the items that made up the factors were the same for both working hours and free time. The first factor included items related to the psychological aspects of depression (e.g., items 1, 3, and 17), anxiety (e.g., items 10, 15, and 16), and anger (items 11 and 12). Moreover, items related to physical symptoms (e.g., items 19 and 21) were also included in the factor. Therefore, the first factor was named the “distress” factor. On the contrary, the second factor included positive content regarding cognition, behavior, and emotion (e.g., items 31, 34, and 37). Therefore, the second factor was named the “good condition” factor.

Table 1. Items of the Distress Scale for On and Off Duty (DSOOD), M (SD) of each item, and the results of factor analysis.

No. Items	Working hours		Free time		Working hours		Free time	
	M	SD	M	SD	F1	F2	F1	F2
1 Have you ever thought that even if you do your best, nothing will improve?	2.67	1.29	2.36	1.17	.61	-.20	.62	-.20
2 Have you ever been restless and frustrated, or have you been impatient and uncomfortable?	2.41	1.22	2.07	1.11	.81	.06	.82	.01
3 Have you ever been depressed and never felt better?	2.41	1.27	2.16	1.14	.84	-.06	.80	-.08
4 Have you ever felt tired after completing the smallest task?	2.61	1.25	2.27	1.18	.79	-.04	.78	.01
5 Have you ever felt that you were worthless to the people around you?	2.06	1.32	1.79	1.13	.80	-.02	.79	-.02
6 Have you ever thought of yourself as a worthless person?	2.06	1.33	1.90	1.24	.75	-.05	.76	-.09
7 Have you ever been reluctant to do anything?	2.48	1.31	2.22	1.17	.80	-.11	.74	-.13
8 Have you ever felt happy?	2.20	1.08	2.82	1.13	.08	.80	.04	.75
9 Have you worried about something that did not matter to you?	2.30	1.21	1.93	1.01	.66	-.01	.66	.03
10 Have you ever been nervous or upset about something that you were interested in?	2.34	1.17	2.08	1.06	.78	.09	.79	.08
11 Have you ever become irritable?	2.66	1.26	2.31	1.14	.80	-.03	.82	-.01
12 Have you ever wanted to express your anger towards someone?	2.23	1.29	2.00	1.16	.73	.03	.71	.02
13 Have you had a fulfilling day?	2.42	1.11	2.88	1.11	-.01	.74	.05	.77
14 Have you not wanted to interact with strangers?	2.66	1.40	2.58	1.35	.51	-.10	.45	-.00
15 Have you been afraid that you make people around you feel uncomfortable?	2.11	1.08	1.90	1.00	.78	.13	.79	.11
16 Have you felt worried about what people around think about you?	2.20	1.18	1.97	1.07	.78	.14	.78	.14
17 Have you ever had difficulty focusing on something?	2.13	1.17	1.94	1.07	.78	.08	.82	.07
18 Have you ever felt like you were the only one left behind?	2.12	1.29	1.88	1.14	.78	.03	.82	.03
19 Have you suffered from stomach discomfort/pain or indigestion?	1.87	1.14	1.77	1.04	.61	.06	.60	.03
20 Have you ever felt stressed?	3.20	1.27	2.47	1.26	.66	-.20	.74	-.09
21 Have you ever felt heavy in your head?	2.20	1.26	1.91	1.09	.67	-.02	.72	.07
22 Have you ever felt pitiful that you were unhappy?	1.97	1.33	1.89	1.24	.81	.00	.75	-.08
23 Have you ever felt elated?	1.51	0.80	1.78	0.92				
24 Have you ever felt that you were capable of doing anything you wished to?	1.50	0.81	1.60	0.88				
25 Have you ever felt that you have a special talent or ability?	1.45	0.82	1.46	0.81				
26 Have you ever felt smart for no reason?	1.38	0.70	1.39	0.72				
27 Have you ever been tired of working or playing without sleeping?	1.28	0.66	1.34	0.73				
28 Have you ever found everyday life interesting?	1.89	0.96	2.39	1.08	.12	.86	.05	.84
29 Have you ever felt like you could do well in the future?	2.17	1.07	2.47	1.16	-.14	.74	-.10	.79
30 Have you ever had your own perspective on the future?	2.12	1.07	2.30	1.12	.01	.77	-.00	.78
31 Have you ever felt proud of yourself?	1.88	1.00	2.04	1.06	.11	.77	.12	.75
32 Have you ever felt good?	2.28	1.07	2.74	1.06	-.01	.88	.01	.87
33 Have you had issues with concentration?	2.52	1.12	2.67	1.09	-.04	.72	.05	.81
34 Have you been able to enjoy engaging in daily activities?	2.17	1.06	2.81	1.10	.05	.94	-.01	.86
35 Have you ever felt relaxed?	2.13	1.04	2.91	1.12	-.05	.75	-.07	.81
36 Have you ever felt that you were surrounded by good people?	2.56	1.16	2.97	1.17	-.02	.70	.04	.79
37 Have you ever felt refreshed?	2.26	1.06	2.75	1.12	-.06	.84	-.10	.81
Cumulative %					44.19	58.91	44.99	59.23
Interfactor correlation						-.49		-.50

3.2. Basic Statistics and Correlation Analyses

The total scores were calculated for each of the distress items (20 items), good condition items (12 items), and PHQ-9 and GAD-7. Correlation coefficients between each variable were calculated (Table 2).

The correlation between working hours and free time was high for both distress and good condition ($r(398) = .85, p < .001$; $r(398) = .74, p < .001$, respectively). Paired t -tests showed that while the distress score was significantly higher during working hours ($M = 46.6, SD = 18.9$) than during free time ($M = 41.4, SD = 17.2$), the good condition score was significantly higher during free time ($M = 31.8, SD = 10.9$) than during working hours ($M = 26.6, SD = 10.4$). However, the effect size was small ($t(399) = 10.36, p < .001$, Cohen's $d = .291$; $t(399) = 13.47, p < .001$, Cohen's $d = .488$).

There was a moderate negative correlation between distress and good condition in both working hours and free time conditions ($r(398) = -.48, p < .001$; $r(398) = -.49, p < .001$, respectively). Gender differences were found only in the distress score in the free time condition; female employees ($n = 200, M = 43.3, SD = 17.6$) experienced significantly higher distress than male counterparts ($n = 200, M = 39.5, SD = 16.6$). However, the effect size was small ($t(398) = 2.18, p = .030$, Cohen's $d = .218$).

The correlation between distress and PHQ-9 and GAD-7 was high not only for working hours ($r(398) = .77, p < .001$; $r(398) = .74, p < .001$) but also for free time ($r(398) = .79, p < .001$; $r(398) = .76, p < .001$). Thus, it can be indicated that the validity of the distress scale was confirmed because it showed a high correlation with the existing scales of depression and anxiety.

3.3. Scatter Plot

Scatter plots were drawn between working hours and free time for each measure of distress and good condition (Figure 1 and Figure 2). As indicated by the high

Table 2. Correlation between distress score, good condition score, PHQ9 and GAD7, and their mean (SD).

	Distress (free time)	Good condition (working hours)	Good condition (free time)	PHQ9	GAD7	M	SD
Distress (working hours)	.85**	-.48**	-.35**	.77**	.74**	46.6	18.9
Distress (free time)		-.35**	-.49**	.79**	.76**	41.4	17.2
Good condition (working hours)			.74**	-.44**	-.35**	26.6	10.4
Good condition (free time)				-.44**	-.37**	31.8	10.9
PHQ9					.88**	5.8	6.5
GAD7						3.8	5.0

Note. ** $p < .001$. PHQ9: Patient Health Questionnaire-9; GAD7: Generalized Anxiety Disorder-7.

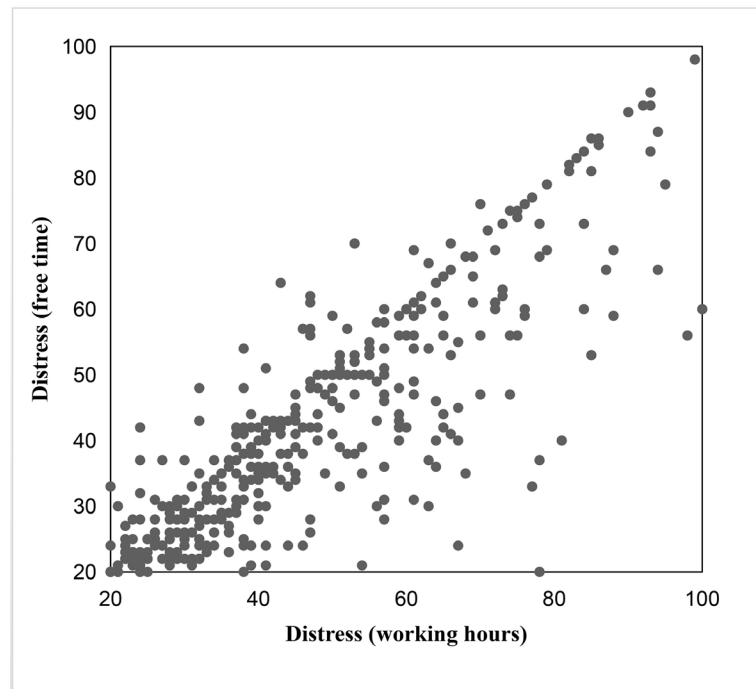


Figure 1. The scatter plots of the distress score.

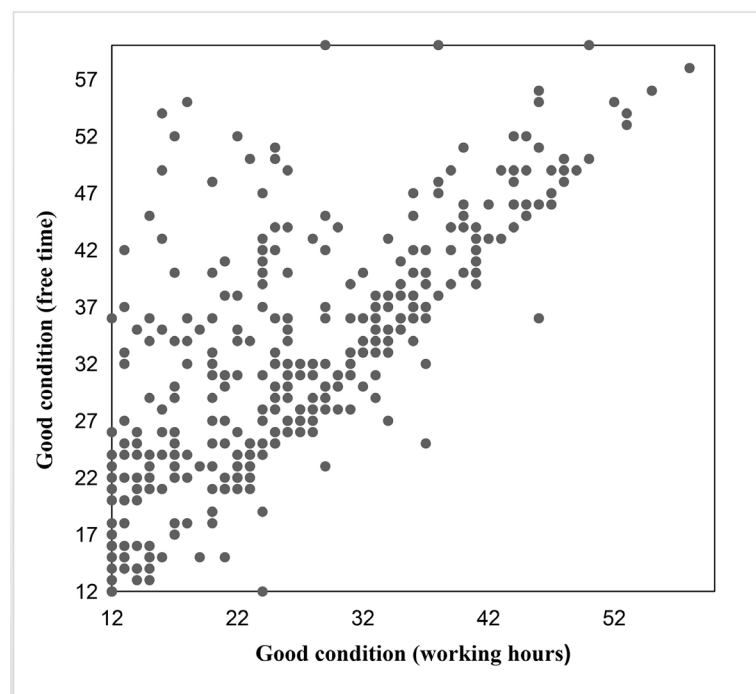


Figure 2. The scatter plots of the good condition score.

correlation between working hours and free time (distress: $r = .85$; good condition: $r = .74$), most of the cases were plotted around the diagonal line. However, the plotted location was significantly different between distress and good condition; many cases (63.8%) were plotted under the diagonal line in distress score, and many cases (69.5%) were plotted above the line in good condition score.

3.4. Discrimination between Working Hours and Free Time

As mentioned in the method, participants who endorsed “several days” or more in at least one of the nine items of PHQ-9 answered the supplementary question (differences between working hours and free time) and were divided into three groups: PHQ-equivalent group, PHQ-working hours group, and PHQ-free time group. If the DSOOD distinguishes distress in working hours and free time, the following results are expected: 1) in the PHQ-equivalent group, no significant difference will be found in distress scores between working hours and free time, 2) in the PHQ-working hours group, the distress score of working hours will be significantly higher than that of free time, and 3) in the PHQ-free time group, the distress score of free time will be significantly higher than that of working hours. Thus, the authors performed paired *t*-tests for the three groups (Table 3).

In the PHQ-equivalent and PHQ-working groups, the distress score of working hours was significantly higher than that of free time ($t(102) = 3.82, p < .001$; $t(156) = 12.18, p < .001$) but the effect size showed that the difference was small in the PHQ-equivalent group (Cohen's $d = .134$) and moderate in the PHQ-working group (Cohen's $d = .647$). In the PHQ-free time group, no significant difference was found between distress scores in working hours and free time ($t(52) = 1.37, p = .18$, Cohen's $d = .116$).

The same analysis was performed on the three groups in GAD: the GAD-equivalent group, the GAD-working hours group, and the GAD-free time group (Table 4). In the GAD-equivalent and GAD-working groups, the distress score of working hours was significantly higher than that of free time ($t(88) = 3.91, p < .001$; $t(126) = 10.59, p < .001$), but the effect size showed that the difference was small in the GAD-equivalent group (Cohen's $d = .197$) and moderate in the GAD-working group (Cohen's $d = .678$). In the GAD-free time group, the distress score in free time was significantly higher than that in working hours ($t(33) = 4.00, p < .001$), and the effect size was small (Cohen's $d = .241$).

Table 3. Distress scores of PHQ-equivalent, working hours, and free time groups.

	<i>n</i>	Working hours			Free time		
		<i>M</i>	<i>SD</i>	<i>SE</i>	<i>M</i>	<i>SD</i>	<i>SE</i>
PHQ-equivalent group	103	50.9	19.7	1.6	48.2	19.4	1.5
PHQ-working hours group	157	53.8	17.8	1.3	42.8	16.2	1.3
PHQ-free time group	53	43.3	15.7	2.3	45.1	14.3	2.2

PHQ: Patient Health Questionnaire.

Table 4. Distress scores of GAD-equivalent, working hours, and free time groups.

	<i>n</i>	Working hours			Free time		
		<i>M</i>	<i>SD</i>	<i>SE</i>	<i>M</i>	<i>SD</i>	<i>SE</i>
GAD-equivalent group	89	55.7	18.9	1.7	52.1	17.8	1.6
GAD-working hours group	127	55.4	17.3	1.4	44.2	16.0	1.3
GAD-free time group	34	46.2	17.8	2.7	50.4	17.1	2.5

GAD: Generalized Anxiety Disorder.

4. Discussion

4.1. Summary of Results

To understand the characteristics of the new-type depression, we developed the DSOOD to measure distress separately during working hours and free time and verified its reliability and validity. The factor analysis indicated two factors of the scale, distress (20 items) and good condition (12 items).

Since this scale has a high correlation with the PHQ and GAD, the concurrent validity of the DSOOD was confirmed. We also confirmed the validity of DSOOD, that is, DSOOD distinguishably measured distress during working hours and free time (Table 3 and Table 4).

4.2. About Factor Analysis

The hypomanic items (Items 24 - 28) were dropped in the factor analysis because the frequency of appearance in these samples was low (see the left half of Table 1) and the correlation with other items was weak. Thus, the DSOOD can be administered to subclinical samples without hypomanic items.

As a result of the factor analysis, the DSOOD was divided into two parts: negative content (i.e., distress) and positive content (i.e., good condition). This is consistent with the fact that emotions can be broadly divided into negative and positive emotions (Watson et al., 1988). Items related to depression, anxiety, anger, and physical symptoms were combined into one to form the negative content (i.e., distress factor). This is consistent with the high correlation between depression and anxiety scales in a previously studied subclinical sample (Knowles & Olatunji, 2020). The positive content did not include items related to hypomania, and the good condition factor reflected the good state of mind and body.

4.3. Limitations of This Research and Practical Implications

This study was conducted with office workers and not with clinical patients. Therefore, it is not possible to set a cutoff point that indicates a suspicion of depression. This needs to be clarified in future studies.

Despite these shortcomings, developing a scale that measures distress and good conditions during both working hours and one's free time is meaningful. It is clear that office workers live in different environments during working hours and in their free time, but so far, no scale has focused on this difference. Therefore, the DSOOD, which measures distress and good conditions separately during working hours and free time, has originality. This scale can be used for at least three practical purposes.

First, it may be used to detect melancholic depression. In melancholic depression, anhedonia causes a marked loss of interest. Therefore, if the distress scores in both working hours and free time are high (e.g., $M + SD$), and the good conditions score in working hours and in free time is low (e.g., $M - SD$), the worker may be suffering from melancholic depression. If the DSOOD is used longitudinally,

nally (e.g., administered twice throughout three months), it is more likely that melancholic depression can be detected. That is, if the distress scores in both working hours and free time are high, and the score of good conditions is lowered remarkably from the last administration, the worker is likely suffering from melancholic depression.

Second, the DSOOD may be used for early detection of new-type depression. Unlike melancholic depression, this condition is difficult to cure via pharmacotherapy (Tarumi & Kanba, 2005). Therefore, it is important to distinguish between the new-type depression and melancholic depression. One of the most remarkable features of new-type depression is the changes in physical and mental conditions between working hours and free time. That is, while working, the mental and physical conditions are bad; during one's free time, conditions improve significantly. Therefore, if the distress scores in working hours is high (e.g., $M + SD$) but becomes low in free time (e.g., $M - SD$), the worker may suffer from new-type depression.

Finally, the DSOOD can be a means to identify occupational stress in a workplace. If most office workers' distress scores during working hours are equivalent to, or lower than, those in their free time, the occupational stress of the workplace is thought to be low. On the contrary, if most office workers' distress scores during working hours are markedly higher than those in their free time, the occupational stress of the workplace is thought to be high.

Thus, the DSOOD has some practical implications and is considered useful in the study of occupational health psychology.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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