The Association of Sense of Coherence and Coping Profile with Stress among Research Park City Workers in Japan

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Abstract: Via a large scale cross-sectional study among Japanese white color workers, the authors aimed to elucidate: (1) the distributions of Sense of Coherence (SOC), which reflect stress coping abilities, (2) the distributions of the Brief Scale for Coping Profile (BSCP) which reflect coping profiles for stressors; (3) and the association between SOC and BSCP. Anonymous self-administered questionnaires were sent to 20,742 employees at educational and research institutions in Tsukuba Research Park City. A total of 12,009 (57.9%) workers completed and returned the questionnaire; 10,317 workers without missing data were analyzed. SOC scale scores and BSCP subscale scores differed by gender, age, and other demographic features. Among the BSCP subscales, workers whose SOC scale scores were higher tended to adopt a problem-focused coping profile, whereas workers whose SOC scale scores were lower adopted an emotion-focused coping profile. The coping profile that workers adopted depended on their background and demographic characteristics. Stronger SOC allowed one to adopt a problem-focused coping profile that allows for better coping with work-related stressors.

Key words: Field study, Mental health, Coping profile, SOC, BSCP

Introduction

In Japan, more than 60% of workers have anxiety, and more than half of all corporations have workers on leave because of mental problems1). The annual number of suicides in Japan has exceeded 30,000 for 11 consecutive years, a quarter of which have been workers2). Work stress in Japan has been thought to increase since the 1990s because of changes brought by the revolution in information technology, diversification of employment status, and new personnel evaluation systems3). As a result, stress-related mental disorders among Japanese workers have become an important social issue.

Most studies on occupational mental health have focused on workers’ mental health state and external factors, such as occupational stressors, job control, social support system, and rewards. These studies are usually conducted to develop measures to “reduce quantity and quality of work stress”, or to “improve accomplishment by work”, although there are usually limitations to adopting the suggested corrective measures in the workplace. Therefore it is also important to focus on internal factors of workers, such as recognizing one’s style of dealing with occupational stress4). Among internal factors that may affect worker’s men-
mental health, a sense of coherence (SOC) is an important concept from the view of the salutogenic theory and stress recognition style. The salutogenic theory, as discussed by Antonovsky, determines “By what methods can we maintain our health?” Antonovsky proposed that the SOC would be strengthened by cumulative life experiences that provide a person with sets of meaningful experiences and coherent life experiences. He called these experiences generalized resistance resources (GRRs) and indicated that they are characterized by “participation in shaping the outcome”, “underload-overload balance”. According to this theory, SOC is comprised of three inter-related components: meaningfulness, comprehensibility, and manageability. Meaningfulness is the feeling that there is a meaning for life. Comprehensibility is the feeling that one can recognize stress as understandable. Manageability is the feeling that one has enough resources to deal with the stress.

The SOC is associated with physical and mental well-being. It also reflects stress-coping abilities in relation to stress recognition. For example, a stronger SOC allows one to cope with life stressors more proactively. Furthermore, an inverse correlation of supervisors’ SOC with subordinates’ stress reaction has been reported. Among 2,999 Finnish subjects aged 18–64 yr, a weak SOC as well as presence of a chronic illness and experiencing little or no concern from friends is predictive of a depressive episode. SOC and severity of depression are inversely related. A weak SOC during early training among military conscripts predicts suicidal ideation and death. A study of Finnish outpatients with psychiatric disorders showed that SOC can be a good indicator of how people are coping with stress when doing well.

The above results of previous research lead us to question which factors help develop or strengthen SOC. In Japan, however, little is known about workers’ SOC. The authors thus decided to determine an SOC scale score by gender and age groups and investigate the association of SOC scale scores and the coping profile with stressful experiences in the workplace to determine ways to manage mental health among workers in Japan. For this purpose, the authors conducted a large-scale survey among employees at Tsukuba Research Park City (TRPC). TRPC is the largest research park city in Japan where many educational and scientific research institutions are concentrated according to the policy of the Japanese government.

**Subjects and Methods**

*Study design and participants*

The present study was conducted in November 2006. Eighty-three educational and scientific research institutions in Tsukuba Research Park City agreed to participate. A self-administered and anonymous questionnaire was distributed to 20,742 employees working at these institutions. The authors asked each institution to designate an in-house research liaison to distribute and collect the questionnaires. Participants were instructed to seal the completed questionnaire in the provided envelope and submit it in person to the research liaison.

Of the participants, 12,009 (57.9%) returned the questionnaire. The authors examined responses from subjects aged 20 to 60 yr. Responses that had data missing were excluded from the analysis. As a result, data from 10,317 participants were analyzed. Subjects included 6,840 men and 3,477 women (Table 1) with a mean ± SD age of 40.4 ± 9.6 yr.

Other demographic characteristics of participants are shown in Table 2. Jobs were classified into researchers, technicians, or administrative clerks. Many participants had master’s or doctorate degrees. The level of income was also high compared with that of general workers in Japan.

**Ethical considerations**

The purpose of the study, the voluntary nature of participation, the anonymity and confidentiality of respons-

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**Table 1. Distribution of participants by gender, age and SOC scale score**

<table>
<thead>
<tr>
<th></th>
<th>Number (%)</th>
<th>Age (yr) (mean ± SD)</th>
<th>SOC scale score (mean ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>10,317</td>
<td>40.4 ± 9.6</td>
<td>125.6 ± 21.7</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>6,840 (66.3)</td>
<td>41.5 ± 9.5</td>
<td>126.1 ± 21.8</td>
</tr>
<tr>
<td>Women</td>
<td>3,477 (33.7)</td>
<td>38.3 ± 9.5</td>
<td>124.7 ± 21.5</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20s</td>
<td>1,461 (14.2)</td>
<td>-</td>
<td>123.2 ± 21.5</td>
</tr>
<tr>
<td>30s</td>
<td>3,626 (35.1)</td>
<td>-</td>
<td>124.2 ± 22.3</td>
</tr>
<tr>
<td>40s</td>
<td>3,054 (29.6)</td>
<td>-</td>
<td>126.0 ± 21.4</td>
</tr>
<tr>
<td>50s</td>
<td>2,176 (21.1)</td>
<td>-</td>
<td>129.1 ± 20.7</td>
</tr>
</tbody>
</table>

*: p<0.01 (t-test).
+: p<0.05 (one-way ANOVA post test), ++: p<0.01 (one-way ANOVA post test).
es, and secure data management were clearly stated at the beginning of the questionnaire. The protocol of the study was approved in the General Meeting of the Tsukuba Research Park City Network to which participating institutions belong.

**Questionnaire**

The variables analyzed in this study were age, gender, the Japanese version of the SOC Scale, and the Brief Scales for Coping Profile (BSCP).

The Japanese version of the SOC Scale consists of 29 items rated on a 7-point scale. The sum of these scores (SOC scale score) range from 29 to 203, with higher scores indicating a stronger SOC7). The reliability and validity of this scale have been confirmed22, 23). The Cronbach’s alpha coefficient in the present study was 0.91, which is comparable with that reported in previous studies (range, 0.70 to 0.95)24).

The BSCP consists of 18 items rated on a 4-point scale. It assesses workers’ tendency to choose coping profile using six subscales, “Active solution for problems”, “Avoidance and suppression”, “Changing mood”, “Changing a point of view”, “Seeking help for solution”, and “Emotional expression involving others” in stressful daily situations25, 26). If a respondent shows a high score for a subscale, this means he/she frequently chooses that kind of coping method. The Cronbach’s alpha coefficients in the present study ranged from 0.72 to 0.86 (0.86 for “Active solution for problems”, 0.76 for “Avoidance and Suppression”, 0.78 for “Changing mood”, 0.72 for “Changing a point of view”, 0.80 for “Seeking help for solution”, and 0.76 for “Emotional expression involving others”).

**Statistical analysis**

SOC scale scores and BSCP subscale scores were compared by gender, age group, and job type, using the t-test and one-way analysis of variance, followed by Tukey’s test for multiple comparisons.

Pearson’s product-moment correlation coefficients of age with SOC scale scores and BSCP subscale scores were calculated. Considering the gender differences, the same analyses were conducted in men and women, respectively. Pearson’s product-moment correlation coefficients between SOC scale scores and BSCP subscale scores were also determined.

Two groups were extracted from the participants according to SOC scale scores. The participants with SOC scale scores lower than 103 (mean minus SD) were defined as the weak SOC group, whereas those with SOC scale scores higher than 146 (mean plus SD) were defined as the strong SOC group. Age, gender, job type, experience working as a manager, educational background, annual income, and BSCP subscale scores were compared between these two groups.

Finally, a stepwise multiple regression analysis for SOC scale scores was conducted, using BSCP subscale scores as independent variables. Age and gender were included as covariates.

The significant level of statistics was set at p<0.05. All statistical analyses were performed on SPSS 15.0 for Windows.


Results

SOC scale scores

As shown in Table 3, the mean SOC scale score of participants was 125.6 ± 21.7. The score in men was significantly higher than that in women (126.1 ± 21.8 vs. 124.7 ± 21.5; p<0.01). A weak but significant positive correlation was observed between SOC scale score and age. The comparisons between the age groups revealed a significant difference between the 30s and 40s groups (p<0.05) and the 40s and 50s groups (p<0.01).

BSCP subscale scores

The scores for “Changing mood”, “Changing a point of view”, “Seeking help for solution”, and “Emotional expression involving others” were significantly higher in women than in men (p<0.01 for all comparisons). All of the BSCP subscale scores were inversely correlated with age. Significant differences were found between the 20s and 30s groups in the scores for “Changing mood”, “Seeking help for solution”, and “Emotional expression involving others” (p<0.01 for all comparisons). Scores for “Active solution for problems” (p<0.01), “Changing mood” (p<0.01), “Seeking help for solution” (p<0.01), and “Emotional expression involving others” (p<0.05) were significantly different between the 30s and 40s groups. Significant differences (p<0.05) were found in all BSCP subscale scores between the 40s and 50s groups except for “Changing a point of view”.

Comparisons between weak and strong SOC groups

Comparisons between weak and strong SOC groups are shown in Table 4. The strong SOC group exhibited significantly higher, a higher percentage of men, larger income, a higher percentage of researchers, a higher percentage of having the experience of being managers, and higher educational background (p<0.01 for all comparisons).

SOC Scale score and BSCP subscale scores among men

SOC scale score and BSCP subscale scores among men are shown in Table 5. The mean SOC scale score was 126.1 ± 21.8. A weak but significant positive correlation was observed between SOC scale score and age. The comparisons between the 40s and 50s groups revealed a significant difference in the SOC scale score (p<0.01). As regard to BSCP subscale scores, significant differences were found between the 20s and 30s groups for “Active solution for problems” (p<0.05), “Changing mood” (p<0.01), “Changing a point of view” (p<0.05), “Seeking help for solution” (p<0.01), and “Emotional expression involving others” (p<0.05). Between the 30s and 40s groups, “Active solution for problems”, “Changing mood”, and “Seeking help for solution” were significantly different (p<0.01 for all comparisons). Between the 40s and 50s groups, “Active solution for problems”, “Avoidance and suppression”, “Seeking help for solution”, and “Emotional expression involving others” were significantly different (p<0.01 for all comparisons). All BSCP subscale scores were inversely correlated with age. There were significant differences in all BSCP subscale scores between the strong and weak SOC groups.

SOC scale score and BSCP subscale scores among women

SOC scale scores and BSCP subscale scores among women are shown in Table 6. The mean SOC scale score was 124.7 ± 21.5. A weak but significant positive correlation was observed between SOC scale score and age. The comparisons between the 30s and 40s, and the 40s

Table 3. Comparisons of Sense of Coherence (SOC) scale score and Brief Scales for Coping Profile (BSCP) subscale scores

<table>
<thead>
<tr>
<th>Category (number)</th>
<th>SOC scale score (mean ± SD)</th>
<th>BSCP subscale scores (mean ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Active solution for problems</td>
<td>Avoidance and suppression</td>
</tr>
<tr>
<td></td>
<td>Changing mood</td>
<td>Changing a point of view</td>
</tr>
<tr>
<td></td>
<td>Seeking help for solution</td>
<td>Emotional expression involving others</td>
</tr>
<tr>
<td>All (10,317)</td>
<td>125.6 ± 21.7</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men (6,840)</td>
<td>126.1 ± 21.8</td>
<td></td>
</tr>
<tr>
<td>Women (3,477)</td>
<td>124.7 ± 21.5</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20s (1,461)</td>
<td>123.2 ± 21.5</td>
<td></td>
</tr>
<tr>
<td>30s (3,626)</td>
<td>124.2 ± 22.3</td>
<td></td>
</tr>
<tr>
<td>40s (3,054)</td>
<td>126.0 ± 21.4</td>
<td></td>
</tr>
<tr>
<td>50s (2,176)</td>
<td>129.1 ± 20.7</td>
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<tr>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOC scale score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (1,296)</td>
<td>89.2 ± 13.3</td>
<td></td>
</tr>
<tr>
<td>High (1,585)</td>
<td>159.2 ± 9.9</td>
<td></td>
</tr>
</tbody>
</table>

* p<0.01 (t-test), ** p<0.001 (t-test), + p<0.05 (one-way ANOVA post test), ++ p<0.01 (one-way ANOVA post test), +++ p<0.001 (r: Pearson’s product-moment correlation coefficient).
and 50s groups revealed a significant difference in the SOC scale scores (p<0.01 for both comparisons). In terms of BSCP subscale scores, significant differences were found between the 20s and 30s groups for “Changing mood” (p<0.05) and “Seeking help for solution” (p<0.01). Between the 30s and 40s groups, “Active solution for problems” (p<0.05), “Changing mood” (p<0.01), and “Seeking help for solution” were significantly different. Between the 40s and 50s groups, “Active solution for problems” (p<0.01), “Avoidance and suppression” (p<0.05), and “Seeking help for solution” (p<0.01) were significantly different. All of BSCP subscale scores were inversely correlated with age. There were significant differences in all BSCP subscale scores between the strong and weak SOC scale scores.

Correlation between SOC scale scores and BSCP subscale scores

Among BSCP subscale scores “Active solution for problems”, “Changing mood”, “Changing a point of view”, and “Seeking help for solution” were significantly higher in the strong SOC group (p<0.01 for all comparisons). “Avoidance and suppression” and “Emotional expression involving others” were significantly higher in the weak SOC group (p<0.01 for all comparisons). These findings were observed both in men and women (Table 5).

Table 7 shows the correlation of SOC scale scores to each BSCP subscale score. Significant (p<0.01) positive correlations were found between SOC scale score and “Active solution for problems” (r=0.18), “Changing mood” (r=0.16), “Changing a point of view” (r=0.16), “Seeking help for solution” (r=0.16), and “Emotional expression involving others” (r=0.16).
Changing a point of view (r=0.24), and Seeking help for solution (r=0.21). Significant (p<0.01) inverse correlations were observed between SOC scale score and Avoidance and suppression (r=–0.34) and Emotional expression involving others (r=–0.26).

Multiple regression between SOC scale score and BSCP subscale scores

Table 8 shows the results of stepwise multiple regression analysis for SOC scale score. Age and gender were included as covariates. All BSCP subscale scores were independently associated with SOC scale scores, taking the association of age and gender into account. The model’s coefficient of multiple determination (R²) was 0.27.

Discussion

This study demonstrated the distribution and characteristics of SOC scale scores among workers in Tsukuba Research Park City. The mean SOC scale scores among participants didn’t differ so much from those reported by Ogawa et al. They reported that the mean (± SD) SOC score among clerical workers was 126.0 ± 26.9 in 289 men (mean age 39.7 ± 11.8 yr) and 128.9 ± 21.0 in 80 women. The mean SOC scale score among participants in this study was 122.9 ± 21.1. The results of our study suggest that SOC scale scores among workers in Tsukuba Research Park City are comparable to those reported in previous studies.

Table 8. Multiple regression between SOC scale score and BSCP subscale scores

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Independent variables</th>
<th>All (n=10,317)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOC scale score</td>
<td></td>
<td>0.27</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>0.11 &lt;0.001</td>
</tr>
<tr>
<td>Men (compared with women)</td>
<td></td>
<td>0.03 &lt;0.001</td>
</tr>
<tr>
<td>Active solution for problems</td>
<td></td>
<td>0.03 &lt;0.005</td>
</tr>
<tr>
<td>Avoidance and suppression</td>
<td></td>
<td>–0.34 &lt;0.001</td>
</tr>
<tr>
<td>Changing mood</td>
<td></td>
<td>0.08 &lt;0.001</td>
</tr>
<tr>
<td>Changing a point of view</td>
<td></td>
<td>0.28 &lt;0.001</td>
</tr>
<tr>
<td>Seeking help for solution</td>
<td></td>
<td>0.13 &lt;0.001</td>
</tr>
<tr>
<td>Emotional expression involving others</td>
<td></td>
<td>–0.17 &lt;0.001</td>
</tr>
</tbody>
</table>

R²: coefficient of correlation.
β: standardized partial regression coefficient.
women (mean age 32.8 ± 10.4 yr). But their result was only for clerical workers.

In the present study, SOC scale scores were significantly higher in men than in women, and age was positively correlated with SOC scale scores. These results agree with the results of Anttovisky5,28 and Matsui et al.29. On the other hand, inconsistent results have been reported in other studies. Takayama et al.23) found no significant correlation of SOC scale scores with age, gender, occupation, marital status, or parental status among 410 community-dwelling persons in Tokyo. Bengtsson-Tops and Hansson30) also found no significant correlation of SOC scale scores with age among patients with schizophrenia. Ogawa et al.27) reported that there was no gender differences in SOC scale scores, and that an inverse correlation between SOC scale scores and age was found only in women. In the present study, the gender difference was less than 2 points and the correlation coefficient between SOC scale scores and age was only 0.10. It is possible that these values were statistically significant because of our large sample size. Thus, the association of SOC scale scores with gender and age found in our study should not be over-emphasized.

Results of comparisons between the strong and weak SOC scale scores groups indicated that socioeconomic status is important in relation to SOC. This finding is inconsistent with the report by Takayama et al.23). In our sample, job type (researchers), the experience of being a manager, higher educational background, and high income were correlated with SOC scale scores. There are several possible reasons for these correlations. Researchers aim to reveal something unknown, in general, and tend to experience much success. Experience working as a manager would also give workers various experiences. It is probable that socioeconomic status, which influences life experience in the long term, also affects the development of SOC. Our results are partially consistent with previous reports that showed that the influence of socioeconomic status on SOC was important31, 32).

This study also examined the distribution of coping profiles among workers and the association of SOC scale scores with coping profiles. It was interesting to see that coping profile scores were lower among older workers. This finding means that young workers are more flexible and challenging to choose various coping profile for stressors. This finding agrees with the report by Lazarus33), which suggested that young workers are more flexible and challenging for stress. The reason women were more likely to choose various coping profiles for different stressors remains unclear in the present study.

In terms of coping profiles, “Active solution for problems”, “Changing mood”, “Changing a point of view”, and “Seeking help for solution” were positively correlated with SOC, whereas “Avoidance and suppression” and “Emotional expression involving others” were inversely correlated with SOC. These results were observed in both men and women and confirmed by multivariate analysis. These results suggest that a problem-focused coping profile33–37), such as “Active solution for problems” and “Seeking help for solution”, are positively correlated with SOC. On the other hand, “Avoidance and suppression” and “Emotional expression involving others” are categorized into emotion-focused coping profiles, which aim to reduce mental distress by controlling one’s own recognition style33, 38, 39). It is important to remember that SOC does not represent a specific coping profile but rather an ability to choose an appropriate coping profile for each stressor faced in life5, 28). Thus it is reasonable that SOC was positively correlated with many types of coping profiles. According to a previous report, “Active solution for problems” was inversely correlated with depressive symptoms, while “Avoidance and suppression” was positively correlated with depressive symptoms among Japanese workers29). Taking this into consideration, the results in the present study appear to explain why strong SOC helps reduce strain among workers. Namely, a stronger SOC allows one to cope with life stressors more appropriately14–16).

However, it also should be noted that the correlations of SOC scale scores with BSCP scores were weak. In multiple regression analysis, the model’s coefficient of multiple determination (R2) was relatively low (0.27). This is reasonable because factors other than coping profile, such as income, educational background, and experiences in work, would influence the development of SOC. On the other hand, another relationship should be considered. It is probable that SOC influences how one copes with stressors. Because SOC represents not a specific coping profile but the ability to choose an appropriate coping profile in each stressful situation5, 28), the coping profile chosen in a particular situation probably depends not only on SOC but also on situation itself as well as the person’s mental health status and various other factors34). It is difficult to determine which factor influences coping profiles more because this study was based on the cross-sectional data. It is possible that multiple factors are involved and that SOC and coping profile of a worker develop interactively.

The above discussion may be important for the so-called secondary appraisal in stress process model33). It is also possible that SOC can be a great resource for primary appraisal whether a worker perceives a situation as stressful33). This hypothesis should also be examined in future studies.

Controlling their workload, giving workers a sense of fulfillment, and providing a feeling of job-control are
important to improve workers’ mental health, in general. However, it is difficult to attain the above goals using external resources because human resources are limited and work/employment status is changing in Japan. However, SOC can be a great internal resource to modify stress recognition and to an adequate way of coping with stress. Considering not only external resources but also SOC as an internal resource is important in the field of occupational health. Based on the results of the present study, the background and experiences that influence SOC should be clarified and examined in more detail, particularly by longitudinal studies.

The limitations of the present study also should be considered. This study was conducted in Tsukuba Research Park City in Japan, where educational and research institutions are concentrated at a particularly high rate. Thus, there is sampling bias compared with subjects working on other environments in Japan. In particular, participants in this study were more likely to work as researchers and have masters or doctorate degrees. As a result, they would be better educated and earn a higher income. Furthermore, there is a discrepancy of the number of participants between genders (6,840 men and 3,477 women). These biases may limit the ability to generalize our results to all workers in Japan. Although the authors might have been able to weight our results to counter the differences in gender, the authors did not perform this type of analysis. However, the association between SOC and BSCP subscales did not differ between men and women. Thus, it is possible that the difference in sample sizes between genders did not affect the power of the study. Because the present study was an ecologic study in Tsukuba Research Park City and had a large sample size, the authors avoided including missing samples and were thus able to describe participants’ backgrounds precisely. In terms of SOC and BSCP, the authors analyzed men and women separately. These analyses would be very useful. Finally, because this survey was conducted as a part of mental health research in Tsukuba Research Park City, the authors cannot rule out the possibility of sampling bias, as workers who are interested in mental health are more likely to respond to a survey.

The characteristics of SOC and BSCP among Japanese workers in Tsukuba Research Park City were examined. SOC was stronger in men than in women, and increased with age, although these correlations were not strong. Participants who were researchers, had a higher income, had a higher educational background, and had experience working as a manager tended to be among group with strong SOC scale scores. In terms of the association between SOC and BSCP, participants with strong SOC scale scores exhibited high scores for “Active solution for problems”, “Changing a point of view”, “Seeking help for solution”, and “Changing mood”. It suggested that they adopted a “problem-focused coping style” more often. Participants whose SOC scale scores were weaker adopted “Avoidance and suppression” and “Emotional expression involving others” coping skills more often. Although it is difficult to determine the causal relationship between SOC and coping profile, it is possible that SOC and coping profile develop interactively. These results may partially explain why a strong SOC contributes to reduced strain among workers.

It seems important to consider SOC as an internal resource for managing job stress in the field of occupational health. The background and experiences that influence SOC should be examined in more detail.

Acknowledgements

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