[Original]

Effect of Psychological Distress on the Association of Workplace Social Capital with Presenteeism and Sickness Absence

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Abstract : Greater workplace social capital (WSC) can be related to workers' health and productivity. We sought to clarify the association between horizontal WSC and presenteeism and sickness absence (SA) and to examine the effects of psychological distress on these associations among Japanese workers. A cross-sectional study was conducted in 2017 at seven large Japanese companies. Logistic regression analysis was performed with presenteeism and SA as the dependent variables, horizontal WSC as an independent variable, and sociodemographic characteristics and psychological distress as covariates. After adjustment for sociodemographic characteristics, the results showed that greater horizontal WSC was associated with lower presenteeism and SA. The odds ratios for the relationship between horizontal WSC and presenteeism and that between horizontal WSC and SA dropped moderately after adjustment for psychological distress but remained significant. Further exploration of the factors underlying the relationship between WSC and productivity is needed to confirm if WSC enhances workers' health and productivity and to inform the development of effective occupational health initiatives.

Keywords : workplace social capital, presenteeism, sickness absence, psychological distress.

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Introduction

Social capital is characterized by social organizations such as networks, norms, and trust that promote action and cooperation for mutual benefit [1]. The relationships between social capital and health-related outcomes, such as self-rated health, risk and symptoms of mental disorders, and mortality, have been studied in the field of public health for at least 20 years [2, 3]. The workplace is a community in which people spend

a substantial amount of time and interact with others through social networks [4]. In recent years, the workplace has been a target of social capital research, with several studies investigating the relationship between social capital and worker health and productivity [5–7]. Social capital in the workplace, termed workplace social capital (WSC), has been defined as “mutual trust, justice and collaboration in the workplace” and is associated with aspects of psychosocial relationships such as cooperation in the workplace [8–11].

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WSC is regarded as a resource for worker health and health-promoting activities, and previous studies indicate that it can determine worker health [12, 13]. Rich WSC is characterized by social support, mutual trust, and constructive cooperation between workers and between workers and their supervisors [11]. When workers in high WSC workplaces encounter stressful situations, for example, trust develops between workers and their superiors and colleagues, facilitating the utilization of resources such as support and mental health care [14]. This promotes the exchange of information and emotional support from colleagues, which can assist in health-related changes [15]. Workplaces with high WSC, such as those with well-established norms, are more likely to encourage desirable healthy behaviors [16, 17].

WSC is associated with several lifestyle diseases, including hypertension [6, 18, 19], obesity [18, 19] and diabetes [19], health-impairing habits such as smoking [20] and drinking [21], positive psychological states such as job satisfaction [22, 23] and work engagement [7, 23], and other health-related factors such as well-being [7] and self-rated health [5]. Lower WSC has adverse effects on workers' mental health, and is associated with mental health problems such as depression and psychological distress [17, 24, 25].

Workplaces are characterized by several relationship structures, including hierarchical relationships among management, supervisors, and colleagues, as well as relationships among colleagues in the same department and other departments. WSC can therefore be categorized in terms of horizontal and vertical indicators [26]. Horizontal WSC includes bonding, which involves social relationships between individuals with similar socioeconomic attributes (e.g., colleagues in the same department), and bridging, which represents relationships between persons with different attributes at the same hierarchical level (e.g., interdepartmental relationships); vertical WSC includes relationships between persons across hierarchical levels [26–28]. In a survey of 37 countries, the International Social Survey Program reported that Japan had the lowest percentage of people who thought that “in my workplace, the relationships between colleagues in the workplace are good,” which indicates that horizontal WSC in the Japanese workplace is poor [29]. There is also evi-

dence that relationships with colleagues affect health. For example, coworker support contributes to women's health [30], lack of coworker trust and assistance is associated with high systolic blood pressure [31], and poor coworker trust (i.e., poor horizontal WSC) is associated with worker health problems [32]. These findings suggest that horizontal WSC, which is characterized by relationships with colleagues in the workplace, has substantial effects on health.

The WSC factor of workplace collaboration can affect worker health and the efficiency of production processes [7]. The loss of productivity from health problems is often assessed in terms of presenteeism and sickness absenteeism [33–35]. The term presenteeism is commonly used to describe two different concepts: going to work despite feeling unhealthy, and productivity loss at work owing to health problems [36, 37]. Studies in both the United States and Japan have reported substantial productivity loss from presenteeism [35, 38]. Presenteeism related to productivity loss includes lifestyle diseases and physical symptoms [35, 39–43], but the most important health issues are mental health-related problems in the workplace, such as stress, psychological distress, and depression [43–46]. Studies in Japan have indicated that mental and behavioral disorders are the most common causes of presenteeism [35]. In contrast to presenteeism, sickness absence (SA) describes absence from work caused by sickness and can be either short term or long term [47]. The main causes of SA are mental health problems, such as depression, and musculoskeletal disorders [48, 49].

The deterioration of worker physical and mental health increases presenteeism and SA, and reduces the productivity of companies. The improvement of WSC could possibly reduce presenteeism and SA, but few studies have examined the relationships between WSC and presenteeism and SA, and whether health factors affect these relationships. To the best of our knowledge, only two previous studies have examined the relationship between WSC and presenteeism, and a negative dose–response relationship was observed [50, 51]. Several previous studies have examined the relationship between WSC and SA, but the results are inconsistent; although multiple studies have found an association between higher WSC and lower SA [52–

54], another study reported a non-significant relationship between WSC and SA [55]. Although Japanese workers are presumed to have poor horizontal WSC, the relationship between horizontal WSC and presenteeism (which may affect health) and between horizontal WSC and SA in Japanese workers remains to be clarified.

As mentioned above, a significant relationship between horizontal WSC and health status has been established, and health status has been shown to affect presenteeism and SA. Thus, it is necessary to investigate whether health status affects the relationship between horizontal WSC and presenteeism, and that between horizontal WSC and SA. Previous studies have shown that subjective health and job stress influence the relationship between WSC and presenteeism [50, 51], but the effects of mental health on the relationship between WSC and presenteeism, and on that between WSC and SA, have not been examined. As WSC is an important resource for the promotion of mental health and can reduce stress [55], high WSC might be expected to reduce presenteeism and SA that result from mental health problems. Among indicators of mental health, Kessler's six-item psychological distress scale (K6) is a reliable and valid measure of mental health status [56].

This study aimed to 1) elucidate the relationship between horizontal WSC and presenteeism and the relationship between horizontal WSC and SA among Japanese employees, and 2) determine the effects of psychological distress on these relationships.

Methods

Study population and data collection

This was a cross-sectional study. Participants were workers older than 20 years of age from seven large Japanese companies: five manufacturing companies and two service companies. Two of the companies were listed in the First Section of the Tokyo Stock Exchange. A self-administered website survey was administered to 33,980 workers between July 2017 and October 2017. The number of participants in the seven companies were as follows: A: $n = 897$; B: $n = 2,287$; C: $n = 3,116$; D: $n = 5,475$; E: $n = 6,066$; F: $n = 7,040$; G: $n = 9,099$.

Workplace social capital (explanatory variable)

Previous studies have assessed WSC in different ways, but WSC measures are typically based on self-administered questionnaires, and various indicators have been developed [27]. Items from different scales have been used in combination to measure the multifaceted elements of WSC, or authors have added new items to existing WSC measures [23]. In the present study, we used the Japanese version of the WSC scale, which is based on a scale by Kouvonen *et al* [27, 57], and the WSC scale developed by Tsuboya *et al* for Japanese workers [25], to evaluate horizontal WSC. The Kouvonen *et al* WSC scale comprises eight items, three of which are vertical items and five of which are horizontal items [27, 28]. In the present study, we used the following five horizontal items: (1) We have a "we are together" attitude; (2) People keep each other informed about work-related issues in the work unit; (3) People feel understood and accepted by each other; (4) Members of the work unit build on each other's ideas to achieve the best possible outcome; (5) People in the work unit cooperate to help develop and apply new ideas. We added to that the two horizontal questions from the six WSC scale items developed by Tsuboya *et al* [25]; (6) In our workplace, we trust each other; (7) Our workplace is a place of laughter and smiles. These seven questions had four response options and were scored: 1) strongly agree (4 points), 2) agree (3 points), 3) disagree (2 points), and 4) strongly disagree (1 point).

The WSC scale developed by Tsuboya *et al* is based on the WSC scale developed by Kouvonen *et al*, and items (6) and (7) above are newly created items that were added to the present survey because they reflect the characteristics of Japanese companies. The horizontal WSC score comprises the total score across the seven items, with a score range from 7 to 28; higher scores indicated greater horizontal WSC. Because there is no standard WSC cutoff point, the distribution of scores was divided into three quartile categories: low (7–19 points), moderate (20–22 points), and high (23–28 points). Cronbach's alpha for horizontal WSC scores was 0.93 in this study.

WSC has been measured at both the individual level and the workplace level, but the best measurement method remains to be determined; in this study, hori-

zontal WSC was measured at the individual level for the following reason. WSC is a characteristic of individuals, and the association between WSC and health has been clarified by individual-level analysis. A group-level analysis can be conducted using the average value of social capital in the workplace, but group-level WSC is generally weakly related to or unrelated to health, so individual-level analysis is recommended for health-based WSC studies [55].

Outcomes

The outcomes were that a higher score indicates moderate or greater work function impairment (presenteeism) and SA. Presenteeism was measured by the Work Functioning Impairment Scale (WFun) [58], which was developed to measure the level of work impairment in workers based on the Rasch model. It is a self-assessment scale comprising seven items: (1) I haven't been able to behave socially; (2) I haven't been able to maintain the quality of my work; (3) I have had trouble thinking clearly; (4) I have taken more breaks during my work; (5) I have felt that my work isn't going well; (6) I haven't been able to make rational decisions; and (7) I haven't been proactive about my work. Each item has five response options: 1) not at all, 2) at least 1 day a month, 3) about 1 day a week, 4) at least 2 days a week, and 5) almost every day. The WFun score comprises the total score across seven items, with a score range of 7 to 35. Higher scores indicate greater impairment in work functioning. A score of 21 or more indicates moderate or greater work function impairment. In terms of validity, previous studies have reported that moderate or greater work impairment on this scale is strongly associated with independent assessments conducted by an occupational health nurse regarding the extent to which health problems affect work [58]. We defined a high WFun score as 21 points or more, and a low score as below 21 points.

SA was measured using the following question: "Please indicate the number of days you have missed work due to your own medical treatment in the past year." The number of days off was a continuous response variable. Human resource data kept by employers is the most accurate measure of SA [59], but previous research has also used self-report measures, which indicates that alternative SA measures are fea-

sible [60]. As there is no standard cutoff point for annual absences, we calculated the mean number of days of sick leave of subjects with SA (mean 5.1, standard deviation [SD] 14.2, median 2.4) and used 5 days as the cutoff point.

Covariates

Sociodemographic characteristics (sex, age category, company, occupation, and employment position) and psychological distress were included as covariates.

Personnel data from each company were used for sex and age. For age, continuous variable data were categorized into 20–29 years, 30–39 years, 40–49 years, 50–59 years, and 60 years and above. Respondents were asked to choose from the following occupational categories: office/staff, sales, customer service, research, development, technical/skilled worker, factory production line, production technician, and other. Psychological distress was evaluated using the Japanese version of the K6, which comprises six items that measure the degree of psychological distress [56]. Total scores range from 0 to 24; higher scores indicate more psychological distress. Scores of 5 or more are considered to indicate mild or greater psychological distress. A cutoff score of 5 or more points was considered an appropriate indicator of mild or greater psychological distress for our survey of Japanese respondents [61, 62].

Statistical analysis

First, a chi-square test was used to compare the ratios of horizontal WSC high, intermediate, and low groups. Next, using horizontal WSC as the explanatory variable and presenteeism and SA as the dependent variables, a multiple logistic regression analysis was performed to identify the relationship between horizontal WSC and presenteeism, the relationship between horizontal WSC and SA, and odds ratios (OR) and 95% confidence intervals (CI) for both relationships. We adjusted for sex and age categories (Model 1), then added company, occupation, and job position (Model 2). Finally, we adjusted for K6 score (Model 3). The significance level was set at two-sided $P < 0.05$, and SPSS version 25.0 (IBM Corp., Armonk, NY) was used for statistical analysis.

Ethics

The purpose of the study was explained to the participants, and their consent to participate was obtained before the survey was conducted. Workers were free to choose whether to participate in the study. The results from the self-administered questionnaires completed by workers were not made available to the companies. The research protocol was approved by the medical research ethics committee of the University of Occupational and Environmental Health, Japan (H26-026).

Results

There were 17,532 respondents; the response rate per company ranged from 12% to 81%. After excluding 3,376 individuals for whom data were missing, the data of 14,156 individuals were analyzed.

The characteristics of the 14,156 subjects are shown in Table 1, in which 77% ($n = 10,852$) were men. The mean (SD) age was 43.9 years (9.86) (data not shown in table). In terms of occupation, 64% of the subjects were sales and office/staff, and 22% had the job position of manager. A total of 30% ($n=4,261$) had high K6 scores, 32% ($n=4,569$) were in the low horizontal WSC group, 38% ($n=5,428$) were in the intermediate horizontal WSC group, and 30% ($n=4,159$) were in the high horizontal WSC group. The mean K6 score was 3.52 (SD=4.38) and the mean horizontal WSC score was 21.3 (SD=3.95) (data not shown in table). Fourteen percent ($n=1,922$) of the subjects had presenteeism and 14% ($n=1,977$) had SA of 5 days or more. Significant differences in the proportion of horizontal WSC degree were found by sex. Similar significant differences were also found for factors such as age categories, occupation, job position, K6 score, presenteeism and SA ($P < 0.001$).

Table 2 shows the results of multiple logistic regression analysis of the relationship between horizontal WSC and presenteeism. In Model 2, which was adjusted for sex, age categories, company, occupation, and job position, lower presenteeism was associated with greater horizontal WSC (adjusted OR: 0.48 [CI: 0.43–0.54] for intermediate horizontal WSC; adjusted OR 0.27 [CI: 0.24–0.31] for high horizontal WSC). In Model 3, this relationship remained significant when the K6 score was included in Model 2 as a covariate

(adjusted OR: 0.66 [CI: 0.58–0.74] for intermediate horizontal WSC; adjusted OR 0.47 [CI: 0.41–0.55] for high horizontal WSC). The P value of the linear tendency was statistically significant in Model 1 to Model 3. Table 3 shows the results of multiple logistic regression analysis of the relationship between horizontal WSC and SA. In Model 2, which was adjusted for sex, age categories, company, occupation, and job position, lower SA was associated with greater horizontal WSC (adjusted OR: 0.76 [CI: 0.68–0.84] for intermediate horizontal WSC; adjusted OR: 0.65 [CI: 0.58–0.74] for high horizontal WSC). In Model 3, this relationship remained significant when the K6 score was included in Model 2 as a covariate (adjusted OR: 0.82 [CI: 0.73–0.92] for intermediate horizontal WSC; adjusted OR: 0.74 [CI: 0.65–0.85] for high horizontal WSC). The P value of the linear tendency was statistically significant in Model 1 to Model 3.

Discussion

The present findings showed that, in Japanese companies, greater horizontal WSC, analyzed at the individual-level after adjusting for sociodemographic characteristics, was associated with lower presenteeism (measured as work functional impairment) and lower SA. The present finding that a lower risk of presenteeism was associated with greater WSC is consistent with a previous study by van Scheppingen *et al*, which found that horizontal WSC (bonding WSC) was significantly negatively associated with presenteeism in a cross-sectional study of Dutch workers [51]. Zhu *et al* also conducted a cross-sectional study of workers in 38 different Chinese factories and reported that WSC, assessed by a combination of horizontal and vertical factors after adjusting for socioeconomic characteristics, was negatively associated with presenteeism at both the individual and workplace levels [50]. The present results also showed that greater horizontal WSC was associated with lower SA, in accord with previous studies in the Netherlands by van Scheppingen *et al* [51]. Van Scheppingen *et al* found a negative relationship between horizontal WSC (bonding WSC) and absenteeism, and Török *et al* found that higher levels of a combination of horizontal and vertical WSC factors in work units were associated with

Table 1. Subject characteristics and descriptive data according to horizontal workplace social capital category

	Total		Horizontal workplace social capital						
	n=14,156		Low n=4,569 (32%)		Intermediate n=5,428 (38%)		High n=4,159 (30%)		
	n	%	n	%	n	%	n	%	<i>P</i> value
Sex									<0.001
Men	10,852	77	3,373	74	4,191	77	3,288	79	
Women	3,304	23	1,196	26	1,237	23	871	21	
Age (years)									<0.001
20–29	1,471	10	417	9	502	9	552	13	
30–39	3,092	22	1,036	23	1,143	21	913	22	
40–49	5,088	36	1,698	37	2,002	37	1,388	34	
50–59	3,963	28	1,236	27	1,561	29	1,166	28	
≥ 60	542	4	182	4	220	4	140	3	
Occupation									<0.001
Office/staff	4,523	32	1,667	36	1,638	30	1,218	29	
Sales	4,620	32	1,034	23	1,914	35	1,672	40	
Customer service	394	3	100	2	133	2	161	4	
Research	1,266	9	367	8	494	9	405	10	
Development	771	5	261	6	296	6	214	5	
Technical/skilled worker	114	1	60	1	33	1	21	0	
Factory production line	1,096	8	403	9	461	8	232	6	
Production technician	1,090	8	553	12	369	7	168	4	
Others	282	2	124	3	90	2	68	2	
Job position									<0.001
Manager	3,093	22	753	16	1,181	22	1,159	28	
Rank-and-file employee	11,063	78	3,816	84	4,247	78	3,000	72	
K6 score									<0.001
<5 points	9,895	70	2,515	55	3,955	73	3,425	82	
≥ 5 points	4,261	30	2,054	45	1,473	27	734	18	
Presenteeism (WFun)									<0.001
Low	12,234	86	3,576	78	4,794	88	3,864	93	
High	1,922	14	993	22	634	12	295	7	
Sickness absence									<0.001
Low	12,179	86	3,782	83	4,707	87	3,690	89	
High	1,977	14	787	17	721	13	469	11	

Presenteeism (WFun): Work Functioning Impairment Scale, sickness absence: number of days missed from work owing to medical treatment in the past year.

Table 2. Odds ratios and 95% confidence intervals of multivariable logistic regression analysis of horizontal workplace social capital and presenteeism

	Model 1			Model 2			Model 3		
	aOR	95% CI	P value	aOR	95% CI	P value	aOR	95% CI	P value
Horizontal workplace social capital									
Low	reference			reference			reference		
Intermediate	0.47	0.43–0.53	<0.001	0.48	0.43–0.54	<0.001	0.66	0.58–0.74	<0.001
High	0.27	0.23–0.31	<0.001	0.27	0.24–0.31	<0.001	0.47	0.41–0.55	<0.001

aOR: adjusted odds ratio, CI: confidence interval, presenteeism (WFun): Work Functioning Impairment Scale. Model 1: Adjusted for sex, age category. Model 2: Adjusted for model 1 + company, occupation, and job position. Model 3: Adjusted for model 2 + K6 score.

Table 3. Odds ratios and 95% confidence intervals of multivariable logistic regression analysis of horizontal workplace social capital and sickness absence

	Model 1			Model 2			Model 3		
	aOR	95% CI	P value	aOR	95% CI	P value	aOR	95% CI	P value
Horizontal workplace social capital									
Low	reference			reference			reference		
Intermediate	0.74	0.67–0.83	<0.001	0.76	0.68–0.84	<0.001	0.82	0.73–0.92	<0.001
High	0.62	0.55–0.71	<0.001	0.65	0.58–0.74	<0.001	0.74	0.65–0.85	<0.001

aOR: adjusted odds ratio, CI: confidence interval, sickness absence: number of days missed from work owing to medical treatment in the past year. Model 1: Adjusted for sex, age category. Model 2: Adjusted for model 1 + company, occupation, and job position. Model 3: Adjusted for model 2 + K6 score.

lower long-term SA [52].

Rich WSC may help to develop a healthy code of conduct in the workplace and to promote the rapid dissemination of useful health information [52]. Health behavior is better in workplaces in which health norms are high and information about health is actively exchanged, which is likely to improve worker performance and reduce presenteeism. High WSC workplaces have established norms and trust, so physical work tasks can be distributed more efficiently and the health status of individual workers can be addressed [52]. Workplaces with high WSC can therefore be characterized by low SA. These previous studies suggest that WSC is an important resource that affects worker productivity, and the present findings indicate a relationship between rich WSC and lower presenteeism and SA.

It has been suggested that rich WSC is characterized by higher health norms, that good workplace cohesiveness promotes healthy behavior, and that a sense of trust reduces stress [16, 17]. Thus, high WSC may lower presenteeism and SA. The present findings

showed that after adjustment for psychological distress, the ORs for the relationship between horizontal WSC and presenteeism, and for that between horizontal WSC and SA, dropped moderately but remained significant. As mentioned above, previous study findings differ regarding the effects of health on presenteeism and SA.

To the best of our knowledge, only one previous study has adjusted for health indicators in the relationship between WSC and presenteeism and SA: a study of workers in the Netherlands by van Scheppingen *et al* [51]. In the study, the negative relationships of presenteeism and absenteeism with a combination of horizontal and vertical factors WSC, respectively, were no longer significant when self-rated health and emotional exhaustion were included in the regression model.

Thus, although we used different health indicators, it is clear that the one previous study mentioned above and the present study yielded different results regarding the effects of health conditions. There are several possible reasons for these contrasting results. First, differences in WSC measures may have contributed to

the discrepancies. Whereas the study by van Schepingen *et al* measured a combination of horizontal and vertical factors of WSC in the workplace [51], the present study examined only horizontal WSC. Vertical WSC is characterized by the formation of reliable and respectful relationships, and reduces stress related to a lack of power and control over the job [63], but this aspect was not included in the present study. The second possible reason is related to differences in the health indicators used. Van Scheppingen *et al* examined self-rated health and emotional fatigue, which is a subscale on the Utrecht Burnout Scale [51]. In the present study, however, K6 was used as a health indicator. Third, differences in the target population may also have affected the results. However, the present findings suggest that factors other than psychological distress affected the relationship between horizontal WSC and presenteeism, and that between horizontal WSC and SA.

Limitations

The present study had several limitations that should be considered. First, as the data were cross-sectional, it is not possible to draw firm conclusions about the causal relationships between horizontal WSC and presenteeism and SA. Longitudinal studies are needed to determine any causal relationships.

Second, there were several limitations regarding the measurement of WSC. We used individual-level WSC because organizational information about each company was not available, but Clausen *et al* reported that higher levels of uniformity were found between the results of individual- and team-level analyses [7]. In contrast, Meng *et al* reported that WSC is measured most appropriately at the level of work teams in the workplace because work teams are the social units that are most accessible for cooperation and social support [16]. Another limitation is that the present study only measured horizontal WSC and so was unable to assess the effect of WSC at the vertical level. Although some previous studies have measured horizontal WSC and vertical WSC separately, it cannot be assumed that they provide a coherent measure of horizontal and vertical WSC aspects.

Third, there were several limitations regarding data quality. The data were self-reported and vulnerable to

response and recall bias. In addition to that, we recorded the number of days of absence owing to illness in the past year, which resulted in temporal discrepancies with variables such as horizontal WSC at the time of the survey. Although previous SA is associated with current social support [64], the possibility that the time gap had an effect cannot be ruled out.

Fourth, SA was calculated using the average number of absence days per year, which may not differentiate between short-term and long-term SA, potentially making the results vulnerable to bias toward long-term absence.

Fifth, the questionnaire response rate varied between companies because the methods used to request survey cooperation differed between them. We conducted an analysis that included companies as covariates, but could not completely rule out that effect.

Sixth, participants were workers in the manufacturing and service sectors of large companies, and the findings may not be generalizable to workers in small and medium companies and other industries.

Despite these limitations, the strengths of the study are the large sample size and the robust results for the relationship between horizontal WSC and presenteeism and SA.

Conclusion

This study showed that greater horizontal WSC was associated with lower risk of presenteeism and SA in Japanese companies. These findings suggest that horizontal WSC may promote workers' health and productivity, and that efforts to improve WSC should be undertaken. However, many of these factors and mechanisms remain unclear. Further exploration of the factors underlying the association between WSC and productivity is needed, including intervention studies. Such work could inform approaches for enhancing WSC by developing occupational health activities that contribute to workers' health and productivity.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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