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The relationship between self-isolation during lockdown and individuals' depressive symptoms: Humor as a moderator

Ryota Tsukawaki[1], Tomoya Imura[2]

[1]Department of Social and Clinical Psychology, Hijiyama University, Japan
[2]Graduate School of Teacher Education, Saga University, Japan

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The isolation that people of many nations have experienced during lockdown periods to prevent the spread of COVID-19 may adversely affect their mental health. In this study we examined whether humor moderates the relationship between extent of self-isolation and the depressive symptoms that people experience when locked down. Participants were 400 Japanese adults aged between 21 and 69 years, who completed the Humor Styles Questionnaire and the Center for Epidemiologic Studies Depression Scale in addition to responding to a question to establish the extent of their self-isolation. Hierarchical multiple regression analysis results indicate that affiliative humor moderated the relationship between the degree of self-isolation and depression, and attenuated their association. In contrast, aggressive humor strengthened their association. Our study findings suggest that affiliative humor served to safeguard people from suffering from depression induced by self-isolation during lockdown, whereas aggressive humor increased the likelihood of people becoming depressed during lockdown.

Keywords
COVID-19; coronavirus; lockdown; self-isolation; humor styles; depression; depressive symptoms

The coronavirus commonly referred to as COVID-19 has resulted in hospitalizations and deaths worldwide (Wang et al., 2020). It has been posited that locking down regions to limit people's movement is one of the most effective strategies for reducing their exposure to the virus (Kim & Su, 2020). As at August 14, 2020, more than one third of the world's population had been placed under such a lockdown (Kaplan et al., 2020), as leaders of governments in nations around the world used these as a measure to contain the spread of COVID-19 (Aymerich-Franch, 2020).

Literature Review and Hypotheses

Lockdown and People's Mental Health

There are many reports that indicate being locked down affects several aspects of people's mental health. In a study conducted in Spain, Ozamiz-Etxebarria et al. (2020) found that spending a prolonged period under lockdown increased people's depression, anxiety, and stress. Participants in the Aymerich-Franch (2020) study, which was also conducted in Spain, and in which positive and negative affect were measured, reported a decrease in their psychological well-being during lockdown in comparison to the prelockdown period. Bignardi et al. (2020) conducted a study with primary school children in the United Kingdom and found that the participants experienced increased depression symptoms during the lockdown period. Results of surveys conducted in Nepal (Gupta et al., 2020) and Italy (Gualano et al., 2020) indicated that

CORRESPONDENCE Ryota Tsukawaki, Department of Social and Clinical Psychology, Hijiyama University, 4-1-1 Ushitashinmachi, Higashi-ku, Hiroshima 732-0068, Japan. Email: tsukaw@hijiyama-u.ac.jp

the prevalence of the symptoms of anxiety and depression was higher during, compared to before, the lockdown period. Thus, Gupta et al. (2020) concluded that the lockdown exacerbated the proliferation of anxiety and depression in the general population.

In contrast, in a study of adults in Britain, Fancourt et al. (2020) reported that lockdown hardly changed levels of anxiety and depression, and in a French study Recchi et al. (2020) showed that it improved people's subjective well-being. However, we hypothesized that—as has been reported in the majority of studies—there would be a negative relationship between being locked down and people's mental health, and we also examined if humor moderates this relationship.

Humor as a Protective Factor Against Stressors

Martin et al. (2003) conceptualized humor as having a multidimensional structure with both adaptive and maladaptive components. They distinguished between two adaptive forms of humor (affiliative and self-enhancing) and two maladaptive forms (aggressive and self-defeating) in their study. People with a high level of *affiliative humor* tend to joke to entertain others and to improve interpersonal relationships, and those with a high level of *self-enhancing humor* tend to have a humorous perspective even during adverse circumstances. People with a high level of *aggressive humor* frequently use sarcasm and tease others, and those with a high level of *self-defeating humor* generally seek approval by entertaining others at their own expense. Martin et al. developed the Humor Styles Questionnaire (HSQ) as an instrument for assessing each of these four types of humor separately. The HSQ is the most widely used instrument in studies of individual differences in humor (Martin, 2015).

The HSQ has been used (Freeman & Ventis, 2010; Fritz et al., 2017) to examine whether the four types of humor serve as moderators in the relationship between stressors and mental health. In a study conducted with older adults, Freeman and Ventis (2010) found that as the respondents' self-enhancing humor and affiliative humor scores increased, the negative correlation between daily retirement stress and adjustment (i.e., better emotional well-being, social functioning, and general health) weakened. These results support the model devised by Martin et al. (2003) and indicate that the adaptive forms of humor—self-enhancing and affiliative humor—function as protective factors against stressors. However, Freeman and Ventis also showed the protective function of maladaptive humor, as the positive correlation between retirement stress and physical pain became weaker when self-defeating humor and aggressive humor scores increased. Further, Fritz et al. (2017) found that aggressive humor protected individuals from stressors, showing that as college students' aggressive humor scores increased, the positive correlation between the degree of disruption in their current life and psychological distress (mood disorders and depression) gradually weakened. However, Fritz et al. did not report protective functions of adaptive, self-enhancing humor, and affiliative humor.

Thus, studies of the function of these four types of humor as moderators have yielded inconsistent results. It has proven difficult to identify which types of humor are the best safeguards against stressors. As Freeman and Ventis (2010) noted, the type of stressor determines which type of humor can best combat or exacerbate it. It is now necessary to accumulate existing knowledge regarding various stressors and derive clear patterns from the prior findings, because research concerning the moderating function of humor is scarce. Therefore, in this study we investigated which kinds of humor function as moderators of the stressor of restricted movement resulting from being in lockdown.

The Current Study

In this study we investigated if the forms of humor measured by the HSQ (Martin et al., 2003) function as protective factors and/or risk factors with respect to the adverse effects on people's mental health when their movement is restricted because of being in lockdown. We adopted depressive symptoms as an index of mental health. This study was conducted in Japan. During the COVID-19 pandemic, prefectural leaders in

Japan have made the following requests (or instructions, in the case of noncompliance): (a) that residents refrain from going out unnecessarily; (b) that certain schools, orphanages, nursing homes for older adults, community centers, and stores and offices deemed unnecessary be closed; and (c) that events that will draw large crowds be postponed or canceled. However, no penalties for noncompliance have been imposed. Thus, the enforceable measures are limited in Japan and much less restrictive than the lockdowns enforced in, for example, some areas of Europe and the United States, and in Wuhan, China. Therefore, the cooperation of residents with the measures set in place by the leaders of the prefectural government is largely voluntary, and achieved, for example, by people taking time off from work or refraining from going out. This kind of lockdown is unique to Japan and has been called a "mild lockdown," in that it relies on people's voluntary cooperation (Yamamoto et al., 2020). The mild lockdown has resulted in individual differences among residents in terms of their degree of self-isolation. This variability provides a good framework for investigating the relationship between the degree of self-isolation and people's mental health.

As already outlined, in many studies a negative relationship has been found between being in lockdown and mental health. Humans are social beings; thus, when their movements are curtailed, their social interaction reduces and psychological distress ensues (Usher et al., 2020). Therefore, we formed the following hypothesis:
Hypothesis 1: The degree of lockdown-induced self-isolation will be positively associated with poor mental health in the form of depressive symptoms.

Affiliative humor has been found to be strongly associated with positive social relationships and social support (Cann et al., 2011; Kazarian et al., 2010; Rieger & McGrail, 2015). Self-enhancing humor also facilitates the humorous reframing of stress and difficulties that are regularly experienced (Martin et al., 2003). Therefore, we proposed the following hypotheses:
Hypothesis 2a: Affiliative humor will function as a protective factor by moderating the relationship between the extent of lockdown-induced self-isolation and mental health.
Hypothesis 2b: Self-enhancing humor will function as a protective factor by moderating the relationship between the extent of lockdown-induced self-isolation and mental health.

In contrast to affiliative humor, aggressive humor has been found to be associated with negative interactions and difficulties in relationships (Cann et al., 2011; Kazarian et al., 2010; Rieger & McGrail, 2015). Self-defeating humor has been found to be associated with cognitive distortions, such as making negative predictions about the future based on little or no evidence (Rnic et al., 2016). Although some studies have indicated certain types of maladaptive humor act as a protective factor against stressors (Freeman & Ventis, 2010; Fritz et al., 2017), we based our hypothesis on the theoretical model proposed by Martin et al. (2003). Therefore, we proposed the following hypotheses:
Hypothesis 3a: Aggressive humor will moderate the relationship between the extent of lockdown-induced self-isolation and mental health, and will function as a risk factor for depression.
Hypothesis 3b: Self-defeating humor will moderate the relationship between the extent of lockdown-induced self-isolation and mental health, and will function as a risk factor for depression.

Method

Participants

We surveyed 400 Japanese individuals (246 men and 154 women) ranging in age from 21 to 69 years (M = 49.90, SD = 10.83). Regarding profession, 49.50% of the participants were office workers, 15.75% were self-employed, 10.50% were part-time workers, 9.75% were unemployed, 9.50% were housewives, 2.00% were civil servants, 0.25% were students, and 2.75% had other professions. Regarding household annual income, 18.5% of the participants earned less than 3 million yen, 20.5% earned between 3 and 5 million yen, 17.75% earned between 5 and 7 million yen, 15.5% earned between 7 and 9 million yen, 14% earned between 9 and 12 million yen, and 13.75% earned over 12 million yen. (CNY 100 = approximately USD 1.00.)

Procedure

The participants were recruited via Freeasy, a leading online research service in Japan that is run by iBRIDGE Inc. Potential participants residing in Tokyo received an email notification from Freeasy with an overview of the survey, and those who provided informed consent responded to the survey online in their own time. The participants were paid about JPY 70 (approx. USD 0.70) worth of points as compensation for taking part in the study. (These points can be used in place of money at certain stores.) The Tokyo lockdown commenced on April 10, 2020, and was lifted on June 19, 2020. The survey was conducted on May 16, 2020, during the lockdown period.

Measures

Extent of Self-Isolation During Lockdown

The extent to which participants self-isolated during the lockdown period was measured through one item: "How many days did you go out in the last week?" The item was evaluated on a 5-point Likert scale: 1 (*I haven't been out in the last week*), 2 (*I went out on 1 or 2 days*), 3 (*I went out on 3 or 4 days*), 4 (*I went out on 5 or 6 days*), and 5 (*I went out every day*).

Humor Styles Questionnaire

The HSQ (Martin et al., 2003), which consists of 32 items, was used to assess the four different types of humor: affiliative, self-enhancing, aggressive, and self-defeating. The Japanese version was compiled by Yoshida (2012). Sample items include "I enjoy making people laugh" (affiliative), "My humorous outlook on life keeps me from getting overly upset or depressed about things" (self-enhancing), "If I don't like someone, I often use humor or teasing to humiliate them" (aggressive), and "I let people laugh at me or make fun at my expense more than I should" (self-defeating). Each subscale consists of eight items evaluated using a 7-point Likert scale ranging from 1 (*totally disagree*) to 7 (*totally agree*). Cronbach's alpha in this study ranged from .80 to .90.

Center for Epidemiologic Studies Depression Scale

Depressive symptoms were assessed using the Center for Epidemiologic Studies Depression Scale (Radloff, 1977). The Japanese version was produced by Shima et al. (1985). It is a 20-item scale designed to assess depressive symptoms that are experienced over the course of a week (e.g., "I thought my life had been a failure"). The items are evaluated on a 4-point Likert scale ranging from 1 (*rarely or not at all*) to 4 (*mostly or almost all the time*). Cronbach's alpha in this study was .89.

Data Analysis

First, we conducted descriptive and bivariate analyses of the study variables. Next, a hierarchical multiple regression analysis was performed to test if humor moderated the association between the extent of self-isolation and depression. We included interaction terms in our model, and standardized the explanatory and moderator variables to reduce multicollinearity (Aiken & West, 1991). The variables were entered into the regression equation in three steps: Control variables (gender and age) were inputted in the first step, humor and the extent of self-isolation were added in the second step, and the extent of self-isolation × humor interaction term was added in the third step. For the significant interaction terms, according to the recommendation of Aiken and West (1991), humor was set at $M - 1\,SD$ and $M + 1\,SD$, and a simple slope test was performed. We used HAD, a statistical software package running on Microsoft Excel (Shimizu, 2016), to analyze our data.

Results

Descriptive and Bivariate Analyses

Means, standard deviations, and intercorrelations for the study variables are presented in Table 1. The extent of self-isolation was not significantly correlated with depression; thus, Hypothesis 1 was not supported. Both affiliative and self-enhancing humor (adaptive types) showed a significant negative correlation with depression, and aggressive and self-defeating humor (maladaptive types) showed a significant positive correlation with depression.

Table 1. *Means, Standard Deviations, and Intercorrelations for Study Variables*

	M	*SD*	1	2	3	4	5	6
1. Extent of self-isolation	2.96	1.26	—					
2. Affiliative humor	4.36	1.06	.02	—				
3. Self-enhancing humor	3.71	0.88	.03	.35**	—			
4. Aggressive humor	3.27	0.91	−.08	.02	.13*	—		
5. Self-defeating humor	3.13	1.07	−.07	.09	.39**	.55**	—	
6. Depression	1.75	0.51	−.01	−.33**	−.20**	.13**	.27**	—

Note. $N = 400$.
* $p < .05$. ** $p < .01$.

Hierarchical Multiple Regression Analysis

The results of hierarchical multiple regression analysis with depression as the objective variable are shown in Table 2. Affiliative and self-enhancing humor were significant negative predictors of depression, and self-defeating humor was a significant positive predictor of depression. Further, the interaction between the extent of self-isolation and affiliative humor was significant (see Figure 1). When a simple slope test was performed, the association between the extent of self-isolation and depression was positive and significant in the group with a low level of affiliative humor, $b = 0.06$, $SE = 0.02$, $\beta = .14$, $t(388) = 2.37$, $p < .05$, but not in the group with a high level of affiliative humor, $b = -0.03$, $SE = 0.03$, $\beta = .08$, $t(388) = -1.23$, $p = .220$. In addition, because the interaction of the extent of self-isolation and aggressive humor was also significant, a simple slope test was performed (Figure 2). The results indicate there was a significant positive association between the extent of self-isolation and depression in the group with a high level of aggressive humor, $b = 0.06$, $SE = 0.03$, $\beta = .15$, $t(388) = 2.23$, $p < .05$, but not in the group with a low level of aggressive humor, $b = -0.04$, $SE = 0.03$, $\beta = -.09$, $t(388) = -1.33$, $p = .185$.

Table 2. *Results of Hierarchical Regression Analysis*

					95% CI	
	ΔR^2	*b*	*SE*	β	*LL*	*UL*
Step 1	.08**					
Age		−0.01	0.00	−.27**	−0.37	−0.17
Gender[a]		0.02	0.05	.02	−0.08	0.12
Step 2	.24**					
Age		−0.01	0.00	−.21**	−0.29	−0.12
Gender		0.08	0.05	.07	−0.01	0.16
Extent of self-isolation		0.01	0.02	.04	−0.05	0.12
Affiliative humor		−0.13	0.02	−.27**	−0.36	−0.19
Self-enhancing humor		−0.15	0.03	−.25**	−0.35	−0.16
Aggressive humor		−0.02	0.03	−.04	−0.14	0.06
Self-defeating humor		0.20	0.03	.41**	0.30	0.52
Step 3	.02*					
Age		−0.01	0.00	−.20**	−0.29	−0.12
Gender		0.07	0.05	.07	−0.02	0.16
A: Extent of self-isolation		0.01	0.02	.03	−0.05	0.11
B: Affiliative humor		−0.13	0.02	−.26**	−0.35	−0.18
C: Self-enhancing humor		−0.16	0.03	−.27**	−0.37	−0.17
D: Aggressive humor		−0.03	0.03	−.05	−0.15	0.06
E: Self-defeating humor		0.20	0.03	.41**	0.30	0.52
A × B		−0.04	0.02	−.11*	−0.20	−0.02
A × C		0.02	0.02	.05	−0.06	0.15
A × D		0.05	0.02	.13*	0.02	0.23
A × E		−0.02	0.02	−.06	−0.18	0.07

Note. $N = 400$. [a] man = 0; woman = 1.
* $p < .05$. ** $p < .01$.

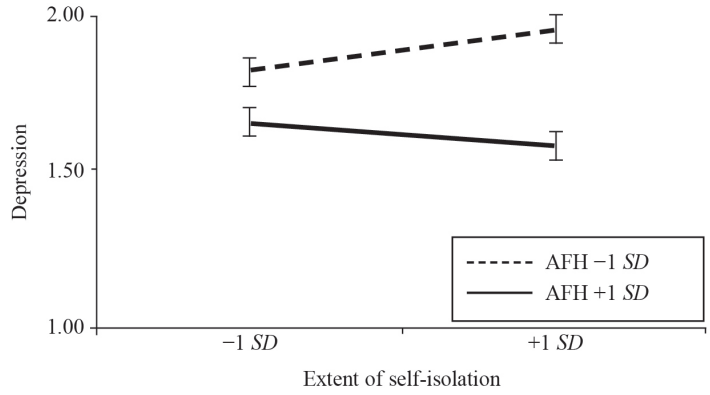

Figure 1. *Affiliative Humor as a Moderator of the Relationship Between the Extent of Self-Isolation and Depression*
Note. AFH = affiliative humor. Error bars represent standard errors.

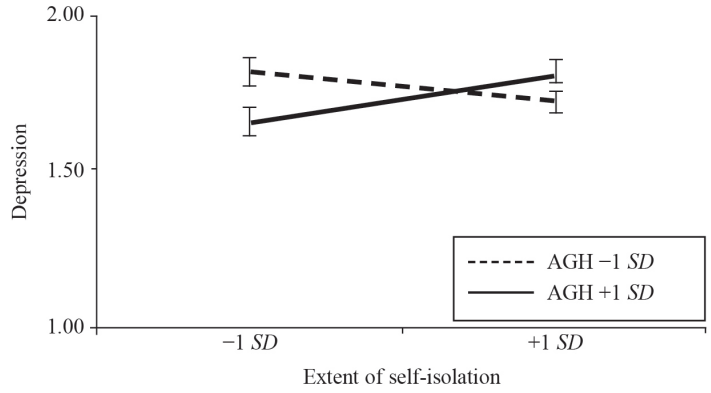

Figure 2. *Aggressive Humor as a Moderator of the Relationship Between the Extent of Self-Isolation and Depression*

Note. AGH = aggressive humor. Error bars represent standard errors.

We posited that affiliative (Hypothesis 2a) and self-enhancing (Hypothesis 2b) humor (adaptive types) would moderate the relationship between the extent of self-isolation and depression, and would function as a protective factor. The results support the hypothesis for affiliative humor, but not for self-enhancing humor. We also posited that aggressive (Hypothesis 3a) and self-defeating (Hypothesis 3b) humor (maladaptive types) would moderate the relationship between the extent of self-isolation and depression, and would function as a risk factor. The results support the hypothesis for aggressive humor, but not for self-defeating humor.

Discussion

In this study we examined the relationship between the extent of self-isolation during lockdown and depressive symptoms, and investigated which kinds of humor moderate this relationship.

Relationship Between Extent of Self-Isolation and Depression

We found that the relationship of extent of self-isolation with depression was nonsignificant. Our study finding supports Fancourt et al.'s (2020) inference that being locked down caused a negligible change in people's levels of anxiety and depression. Therefore, being locked down may have little effect on depression overall. Alternatively, its impact on the mental health of students (who tend to be younger than our participants) may be more severe than that on the general adult population (including our participants). Gualano et al. (2020) found that those with depressive symptoms were significantly younger than those who did not demonstrate such symptoms. Students' lives were changed dramatically when many educational institutions worldwide suspended classroom education and switched to online classes (Elmer et al., 2020). Students already experienced pressure in carrying out their studies when they were being taught in the normal classroom situation. When they were confined to their homes for long periods of time they faced this pressure while simultaneously adapting to an unfamiliar style of learning. In our study the impact of the lockdown on the overall sample may have been small because the sample included only a few students. Additionally, our study was conducted in Japan, where the lockdown might not have significantly threatened people's mental health owing to its weak enforcement. It is necessary to pursue this point further in future research.

Humor as a Moderator

We found that affiliative humor moderated the relationship between the extent of self-isolation and depression and functioned as a protective factor, but self-enhancing humor did not play such a moderating role. In a survey conducted in the United Kingdom, White and Van Der Boor (2020) found that participants who reported feeling more (vs. less) isolated during lockdown had higher levels of anxiety and depression, and lower levels of subjective well-being and quality of life. Furthermore, we found that those who felt more (vs. less) connected to their community showed lower levels of depressive symptoms, and greater subjective well-being and quality of life during lockdown. These results suggest that having positive relationships may p rotect people from experiencing adverse effects of a lockdown on their mental health. Affiliative humor is use d to strengthen social relationships (Martin et al., 2003) and, among the four types of humor, is the one m ost strongly associated with good-quality relationships, such as positive interactions and high-quality fa mily relationships (Cann et al., 2011; Kazarian et al., 2010; Rieger & McGrail, 2015). Thus, people with a high level of affiliative humor may have shared a lot of lighthearted moments with their families and strengthened their ties with family members during the lockdown period. Such social connections may have helped protect them from depression.

We found that self-enhancing humor did not moderate the association between the extent of self-isolation and depression. However, it was a significant negative predictor of depression. Thus, regardless of the extent of self-isolation, self-enhancing humor was negatively associated with depression. Martin et al. (2003) conceptualized self-enhancing humor as a tendency to maintain a humorous outlook in life. Such a humorous worldview may help individuals to not only reframe stressors but also respond with humor to the various events in daily life. As a result, regardless of the size of the stressor, people with self-enhancing humor are more likely than are their peers to experience stable positive emotions (Cann & Collette, 2014) and their likelihood of depression is, thus, lowered.

There are two main reasons that humor serves to protect against stressors. First, humor can effectively reframe potentially stressful events as less threatening (Lefcourt, 2001). Humor enables individuals to experience lightheartedness rather than feeling threatened when faced with potential stressors. Second, humor creates positive social relationships, which, in turn, induce significant social support from those around a person and enable them to deal effectively with stressors (Martin, 2007). The results of this study suggest that affiliative and aggressive humor, which are both more strongly related to interpersonal relationships than are self-enhancing and self-defeating humor, function as moderators of the stress experienced in a lockdown. It is appropriate to assume that affiliative and aggressive humor act as an interpersonal relationship mechanism, although the function of humor as a moderator is limited to the stressor of lockdown.

We found that aggressive humor moderated the relationship between the extent of self-isolation and depression and functioned as a risk factor, but self-defeating humor did not act as a moderator in this relationship. Again, these results are evidence of a strong relationship between mental health and social relationships during a lockdown period (White & Van Der Boor, 2020). Therefore, considering that aggressive humor is associated with negative interactions and difficulties in relationships (Cann et al., 2011; Kazarian et al., 2010; Rieger & McGrail, 2015), our finding that using aggressive humor increased the psychological damage of self-isolation was unsurprising for us. On the other hand, we found that self-defeating humor was a significant positive predictor of depression. Previous studies have indicated that self-defeating humor is consistently associated with higher levels of depression and negative affect, and with lower self-esteem and less positive affect (Martin, 2007; Schneider et al., 2018). Thus, according to our results, self-defeating humor had a direct negative association with people's depression, regardless of the extent of self-isolation being practiced during the lockdown.

Limitations and Future Research Directions

Our study has some limitations. The cross-sectional and correlational methodology that we used did not allow us to infer the direction of causality between constructs. Level of depression was predicted by the

degree of self-isolation and the use of humor, but this did not include an estimation of causality. Alternative methodological approaches, such as longitudinal and experimental designs, could be implemented to clarify the potential causality between these factors. In addition, although we identified and measured the type of humor used by individuals via self-reported data, it would be useful to assign a numerical score for humor type to individuals using peer evaluations and observation to confirm whether the results of this study can be reproduced. Furthermore, it should be noted that our sample was composed exclusively of Japanese individuals; thus, the results may not be generalizable to other cultural contexts.

Conclusion

Our findings demonstrate that affiliative and aggressive humor acted as moderators of the relationship between extent of self-isolation during lockdown and depressive symptoms. However, these two types of humor have opposite functions. Affiliative humor weakened the relationship between the extent of self-isolation and depression and functioned as a protective factor, whereas aggressive humor strengthened this relationship and functioned as a risk factor. Therefore, we have demonstrated that affiliative humor is important to protect people from the adverse effects of self-isolation during lockdown on their mental health. Researchers can help protect people from the effects of lockdowns by developing programs designed to reduce individuals' use of aggressive humor and increase their use of affiliative humor.

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