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Research Article

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Media Exposure and Risk Perception as Predictors of Engagement in COVID-19 Preventive Behaviors: Extending the Theory of Planned Behavior Across Two Cultures

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Abstract

Purpose: This study examined the psychological and social factors that affect the performance of preventive behaviors toward COVID-19, by testing a model based on the theory of planned behavior (TPB). Our model featured media exposure and social networking site (SNS) involvement, and we tested it in two highly contrasted cultures regarding COVID-19 attitudes: U.S. and Japan.
Method: An online survey collected 300 samples for each culture. Participation was voluntary, for monetary compensation through crowd-sourcing platforms.
Findings: Overall, the results showed a good fit of our TPB model in each culture. Media exposure was a major predictor of risk perception in both cultures, while engagement in SNS predicted intention to perform preventive behavior for the Japanese only, and personal hygiene was found to be a significant predictor of protective behavior once again only for the Japanese.
Implications and Value: While there were differences in the variables affecting preventive behaviors, overall, our proposed model proved to be robust across both cultures. Implications were made on differences between tight and loose cultures, as represented by Japan and the US, regarding COVID-19 preventive attitudes.

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The reaction toward COVID-19 has varied greatly across the world, with some nations suffering intensely, while others have been successful in containing it. Aside from government control over people's behavior, culture has been a determinant of whether people heed measures toward preventing infection. In particular, two highly developed, democratic societies which have more or less left it up to the individual to abide by rules and guidelines over the disease's prevention, show an interesting contrast in the numbers of the infected. This study focused on two nations, Japan and the United States, to identify the influential factors behind an individual's decision to follow preventive behaviors or not. We adopted the theory of planned behavior (Azjen 1991; TPB), to come up with a predictive model for engagement in personal COVID-19 prevention. While the population of Japan is densely concentrated in a small geographical area, the whole country being less in area than just one state of California, the number of cases of COVID-19 is a fraction of that of the United States, recording, as of June 27, 2021, a total of 794,457 cases for Japan versus 34,490,134 cases for United States (Worldometer 2021). Granted, each government has reacted differently toward the pandemic, so it is difficult to determine how much of this difference is due to imposed public measures relative to the will of their citizens to comply, but both are democratic societies with some of the highest GDPs of the world. The countries differ substantially on cultural variability, in particular, individualism-collectivism (Triandis 1995), which may contribute to how much will the citizens are likely to have in abiding with public policy. While the collectivistic nature of Japan most likely contributed to their people cooperating with the government in refraining from engaging in spreader activities, and complying to preventive guidelines, the individualistic propensity of the American people was perhaps responsible for their resistance toward preventive behaviors infringing upon their personal convenience, such as mask wearing (Vargas and Sanchez 2020). In other words, the Japanese wear masks for the sake of public good, while Americans, if they choose to do so, as a personal decision on just how careful they want to be.

This contrast has recently been elaborated on by Gelfand et al. (2021), referencing their theory of cultural tightness/looseness. Tight cultures consist of people who strictly abide by social norms and rules. These societies are highly predictable and orderly, since their citizens follow the prescribed rules. In contrast, loose cultures are composed of people who are individualistic, and prefer to make decisions on their own free will, rather than adhering to given norms. Gelfand and associates found that a group of selected loose cultures had 4.99 times more COVID-19 cases than a counterpart of tight cultures, and 8.71

times more deaths. These figures attest to the fact that cultural tightness/looseness affects the acceptance or rejection of COVID-19 preventive behaviors. In Gelfand et al.'s (2011) study, the United States was identified to be a highly loose culture, while Japan was designated to be a highly tight one.

In conjunction with tightness and looseness, Hofstede's (2010) value dimensions of uncertainty avoidance and indulgence/restraint can also account for the difference between these two cultures. His uncertainty avoidance index shows the Japanese to be twice as aversive toward uncertainty than Americans (92 vs. 46), and the former is significantly lower on indulgence than the latter (42 vs. 68). The Japanese, then, prefer not to take any risks in getting sick, so they are more inclined to be careful and safe, showing great restraint in the exercise of personal freedom. On the other hand, media coverage of American college students partying during spring break amidst the pandemic, saying, "If I get corona, I get corona." had received worldwide attention (New York Times, March 24, 2020), and this could be representative of a carefree attitude toward uncertainty of contracting the disease, and reluctance to restraining their behavior.

Given the above arguments over cultural differences, our study proposes a TPB based model of the adoption of COVID-19 preventive behaviors, and we aim to test it in both a tight (Japan) and a loose (USA) culture. Our model is an attempt to delineate the factors that play a major role in people's decision to exercise spread preventing behaviors, and seek for differences in the weighting of factors by culture.

1 TPB in the Health Context

It is without doubt that daily practices of people impact their well-being at not only at the individual level, but societal levels as well. An individual's decision to conform to societal needs can impede upon their freedom, and warrant a certain degree of personal sacrifice, and this is acutely obvious in the case of COVID-19. One theoretical model that best fits an examination of this nature is TPB. This theory has been proven to be highly applicable to matters dealing with health (for a review, see Ritchie et al. 2021), although some have expressed doubts as to its validity. Nonetheless, TPB has been the theory of choice for a multitude of health behavior research (Noar and Zimmerman 2005; Sniehotta et al. 2014).

TPB has been applied to various health-related contexts worldwide including reducing heterosexual risk behaviors (Tyson et al. 2014), e-cigarette use (Hershberger et al. 2018) and HPV vaccination (Juraskova et al. 2012). Recently, it has been verified for explaining behaviors during the COVID-19 pandemic by Gibson et al. (2021), who observed the TPB framework to have robust explanatory power regarding social distancing behavior. Similar results were also attained in a UK population by Norman et al. (2020).

Despite its widespread use, some researchers have cast doubt as to TPB's explanatory power. For example, McEachan et al. (2011) conducted a meta-analysis of TPB health research and found that it can only explain 19.3% of the variance. Sniehotta et al. (2014) argued that variables over and beyond the basic TPB predictors are warranted to adequately account for people's behavior.

To this effect, Irfan et al. (2021) incorporated risk perception, availability and perceived benefits to the original TPB constructs in their probe into willingness toward wearing a mask during COVID-19, claiming that the model would not be robust without these additional variables. In fact, the original creator of TPB, Ajzen (2020), admits that there is much flexibility as to what measures are used in each of the component of the model, depending on the nature of the issue at hand. In line with this argument, validity of both direct and indirect measurement of TPB constructs have been tested and confirmed in previous studies (Nejad et al. 2005; Peters and Templin 2010).

Given the above discussion, we proposed an original model, adding three variables on top of the traditional three predictors of the TPB (attitude, subjective norms, perceived behavioral control), which we also redefined to fit the context of our research. Figure 1 is the proposed model of COVID-19 preventive behavior, with the hypothesized paths to be described hereon. Personal hygiene is the attitude

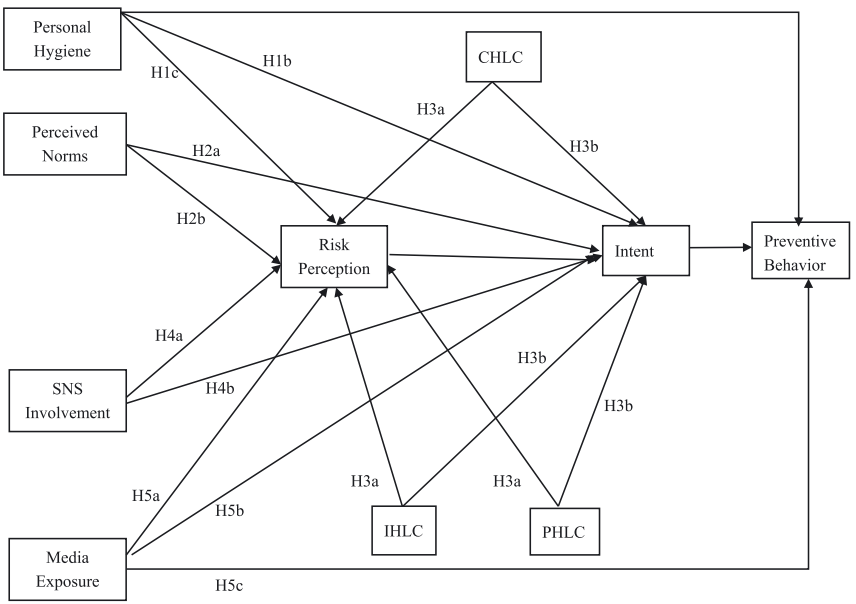

Figure 1: The proposed extended TPB model.

component, perceived norms is the subjective norms component, and health locus of control is the perceived behavioral control component. In addition to these predictors, we added Social Networking Site (SNS) involvement and media exposure, since we anticipate media engagement to influence the way people think about the disease, and risk perception, which may arise from people's media consumption.

Below, we shall describe the variables in our extended TPB model, and outline the hypotheses regarding their causal relationship with dependent variables.

1.1 The Attitude Component: Personal Hygiene

In the context of COVID-19 and its prevention, the relevant attitude naturally deals with one's beliefs about public health and personal hygiene. The prevention of COVID-19 entails people to isolate themselves from others, wearing facial masks, washing hands repeatedly, and refraining from activities part of the daily routine, like shopping and eating out. Such disruption of everyday lives surely would not be met with a warm welcome, but those who value personal hygiene would deem them necessary, and can be expected to be more amiable toward the idea of restraint. For example, studies have argued that personal hygiene practice, as a habit, will significantly influence people's self-efficacy on prevention of illness and health promotion behaviors (Stuckey et al. 2013; Yoo and Song 2021)

Rather than measuring attitudes toward the very behaviors we aim to target (e.g., wearing a mask), we avoided such tautology by applying attitudes toward personal hygiene, which are people's beliefs and habits dedicated to keeping themselves from being susceptible to disease.

Personal hygiene has been seen to differ with culture. For instance, people in Asian countries, including Japan, are used to wearing masks during flu season to avoid contracting a virus (Burgess and Horii 2012; Suppasri et al. 2021). In contrast, while Americans are careful about keeping their hands clean, their attitudes towards wearing a mask in public is highly controversial and politicized compared to most other countries.

From the above discussion, we will test the following hypotheses:

H1a: Personal hygiene will positively predict preventive behavior.

H1b: Personal hygiene will positively predict risk perception.

H1c: Personal hygiene will positively predict intent to adopt preventive behavior.

1.2 The Subjective Norms Component: Perceived Norms

The traditional TPB model specified subjective norm as beliefs people hold about their significant others' approval or disapproval of the target behaviors. However, Fishbein and Ajzen (2009) recently argued that aside from what important others think they ought/ought not to do (subjective norm), the fact that whether these others themselves are/aren't performing the behavior is also a sound predictor of intention (descriptive norm). Descriptive norms are the perception of behaviors seemingly adopted by the majority of others (Cialdini 2003). If the majority are engaging in a particular behavior, people feel social pressure to do likewise, and feel a need to conform. Therefore, in our study, we adopted both subjective and descriptive norms, and called this variable *perceived norms*.

The effect of norms on intent and behavior can differ across cultures. Cialdini et al. (1999), as well as Fischer and Mansell (2009), found that collectivists place greater value on normative information than on their own thinking and impulse, i.e., their attitude, when planning actions. Furthermore, compared to loose cultures, people in tight cultures are more likely to refrain from acting against a social norm, and have lower tolerance for people who disobey such norms (Gelfand et al. 2011). A recent study showed that in more collectivistic and tighter societies, the effects of norms on behavior and behavioral intentions were inclined to be stronger (Fischer et al. 2019). Therefore, in our study, we anticipate the Japanese to emphasize norms more than the Americans.

We formulated the following hypotheses in our TPB model regarding the paths of perceived norms

H2a: Perceived norms will affect intent to adopt preventive behavior positively.

H2b: Perceived norms will affect risk perception positively.

1.3 The Behavioral Control Component: Multidimensional Health Locus of Control

In the context of this study, we chose locus of control regarding one's health, in the form of Multidimensional Health Locus of Control (MHLC). MHLC was first developed by Wallston et al. (1978), with three variables: internal health locus of control (IHLC); powerful others health locus of control (PHLC) and chance health locus of control (CHLC). Individuals with IHLC believe that health outcomes depend on personal behavior and self-control; those with PHLC mainly

attribute external causes (such as other people) as determinants of their health; and those with CHLC believe fate, i.e., circumstantial/accidental factors are in effect.

In terms of culture, noted that individualists tend toward internal control over their behaviors, implying that their preventive behaviors are done on their own initiative, while collectivists emphasize external control, i.e. social pressure and collective action to keep safe. Likewise, Yamaguchi et al. (2005) found that Japanese believed that group efforts bring about better outcome than individual, while Americans believed the opposite. From these findings, in our health context, we expect Japanese to emphasize PHLC, while Americans would be influenced more by IHLC.

Furthermore, difference in religiosity could also play in on the Japan-US comparison. Olagoke et al. (2020) found that IHLC and PHLC mediated the negative relationship between religiosity and COVID-19 vaccination intent, suggesting the reluctance of Americans to get vaccinated. In fact, the International Social Survey Program (ISSP 1998) found that 62.5% of the Japanese surveyed had no religious faith, compared to 5.2% of Americans (ISSP 2004). CHLC, then, may show a difference between these cultures in the way it would affect preventive behaviors and their intent.

We proposed the following hypotheses regarding health locus of control:

H3a: Health locus of control will affect risk perception directly.

H3b: Health locus of control will affect intent to adopt preventive behavior directly.

1.4 SNS Involvement

While mass media raise awareness of, and spread factual and timely information about the pandemic, people also engage in interpersonal communication to gain a sense of what others think (Neubaum and Krämer 2017). SNS allows users to exchange personal opinions and generate discussions amongst not only intimate others, but with the general public, both in and out of one's own national boundary (Mou et al. 2013; Santarossa and Woodruff 2018).

In contrast with consumption of mainstream media, engagement in SNS entails much greater cognitive effort and individual commitment. People seek out information more actively, and conversely, spread information across their network (Moorhead et al. 2013). As a real-time, highly interactive public sphere, SNS allows the rapid diffusion of information, relatively less-censored discussion

over social issues, and provides emotional support (Pittman 2018; Yoon and Tourassi 2014). Engagement in social media stimulates in-depth thinking process, fostering thinking about risk perception on threatening social issues (Yang et al. 2016). For instance, Jung et al. (2020) found that social media attention and posting behavior affected preventive intention toward the Zika virus, and more recently, Zhu and Liu (2021) noted an interaction effect between risk perception and social media posting on decision making during COVID-19. Discussion over the internet with similar lay people, then, is certainly necessary to gain information about one's susceptibility toward the disease, as well as instilling confidence in their beliefs about how to deal with it.

The COVID-19 pandemic, with its social distancing and quarantine measures cutting back the availability of offline face-to-face communication, have made people become compelled to use SNS more (Muñiz-Velázquez et al. 2021). In addition, people depend on opinion leaders within their SNS network to guide them through a threatening situation, as Yoon and Tourassi (2014) found regarding cancer. For these reasons, we chose to treat SNS separately from mainstream media, as a variable that would potentially affect the risk perception, and hence, intent to prevent contracting COVID.

In terms of cultural variability, while the usage of social media for people in individualistic cultures reflects their independence and personal autonomy, those in collectivistic cultures adopt it in order to avoid disapproval, and to conform to in-group norms (Alsaleh et al. 2019). Given this, we assume Americans would use SNS to express their own opinions and their individuality regarding the pandemic, while the Japanese would refer to it to gain perspective of what they ought to do, particularly to social norms over preventive behaviors.

From the above arguments, we added the variable of *media exposure* to the TPB model, as it would serve to mainly satisfy the cognitive need of people to make an informed decision about what to do in the pandemic. We also added a second media variable, that of *SNS involvement*, which serves the affective need of feeling confident about one's disposition toward the pandemic. Discussion over the internet with similar lay people is certainly necessary to gain information about one's susceptibility toward the disease, as well as instilling confidence in their beliefs about how to deal with it.

The following hypotheses have been formulated regarding SNS involvement:

H4a: SNS involvement will positively predict risk perception.

H4b: SNS involvement will positively predict intent to adopt preventive behavior.

1.5 Media Exposure

During any crisis, media plays a vital role in reducing one's uncertainty about the situation they are placed in, and a marked increase in information seeking is observed. People depend on multiple sources for information, not just mainstream media. For instance, Sugimoto et al. (2013) found that after the Fukushima nuclear plant disaster, local people turned to not only TV and newspapers, but toward the internet, where rumors and other informal information were abound, particularly on SNS. In the case of the pandemic, Mirbabaie et al. (2020) discovered people became more active on social media, seeking out information and opinions from grassroots sources. It would appear, then, when people are under great uncertainty, not only mainstream media is important, but SNS also becomes a significant source of information.

Media exposure has been implicated with risk perception formation and behavioral decisions in interaction with other psychological factors (Lee 2011; Russell and Buhrau 2015; Vyncke et al. 2017). An example with relevance to our purpose is Curşeu et al. (2021), who found that exposure to general information regarding COVID-19 significantly predicted *negative* attitudes and emotions towards it. Along with exposure, Li (2018) measured media exposure by using both exposure frequency and exposure extensity, the latter which he refers to as the extent of the range of information one seeks to obtain a broad perspective of an issue. He found that frequency made people feel more susceptible to a pandemic, while extensity urged people to think more thoroughly about the risk, resulting in perceiving a higher level of severity. Compared to just repetitive exposure to similar content, having access to a broader latitude of information would allow the audience to understand the current situation more thoroughly, hence, we included both the frequency and extensity to measure media exposure in the current study.

It is without doubt that media plays an important role in informing citizens about a pandemic, regardless of culture, but there are noticeable differences on media consumption behavior between Japan and the USA. While over 80% of Americans report that they get their news from digital device sources (Shearer 2021), a survey conducted in Japan (Japan Times 2018) found that 91.8 percent of the people relied on TV as their news source, while the internet was at 66.5%. In addition, Simon (2020) noted that, perhaps due to the aging population, social media penetration in Japan was conspicuously low (65%) compared to the rest of the world. These differences may contribute to how much effect media exposure may have on risk perception and preventive intent and behavior.

Given the above, we will test the following hypotheses:

H5a: Media exposure will affect risk perception positively.

H5b: Media exposure will directly and positively predict intent to adopt preventive behavior.

H5c: Media exposure will directly and positively predict preventive behavior.

1.6 Risk Perception

How people perceive the risk of being infected, and the threat to their health and welfare is certainly important to the COVID-19 context. Rogers' (1975) protection motivation theory elaborates on how people's motivation for a change in their usual behavior is induced when facing a threat, including those in health-related contexts (e.g., Floyd et al. 2000). According to this theory, coping appraisal, i.e. one's capacity to deal with a threat, and threat appraisal, the perceived severity and vulnerability, are key concerns of risk perception. Risk perception has been construed as consisting of perceived severity, susceptibility, and social risk

Culture seems to shape people's risk perception. Hofstede (1983) asserts that the degree of uncertainty avoidance determines how risk will be either welcomed or avoided, and in the disease scenario, Im and Chen (2020) found it to be positively associated with risk-aversion. According to a world survey measuring uncertainty across 70 countries, Japan ranked 10th, making it a high uncertainty avoidance country, while the U.S. ranked 58th, which is considered low avoidance country (Mockaitis 2002). When facing a pandemic, individuals in collectivistic societies perceive greater risk due to their cultural doctrine emphasizing greater concern for the collective well-being (Im and Chen 2020), motivating them to engage in prevention for the good of society, whereas individualists would do so if they thought it would be for their own good. Therefore, it is reasonable to assume that Japan might perceive greater risk, which might influence their preventive behavior more compared to the U.S.

We will test the following hypotheses regarding risk perception:

H6: Risk perception will positively predict intent to adopt preventive behavior.

H7: Intent will positively predict preventive behavior.

1.7 Research Question

Aside from testing the TPB model, the other focus of this study is to explore cultural differences in how the variables of the model will affect preventive intent and behavior. As has been discussed above, we chose to contrast Japan and the United States, two cultures which vary drastically along dimensions of cultural variability, as well as COVID-19 spread, and suggested how they may differ for each of the predictors of the TPB. We seek to determine if the two cultures differ in how strong each path of the TPB model is, such as to delineate which factors are conducive toward the performance of preventive behavior. For this purpose, we raise the following research question:

RQ1: How will the paths of our TPB model of COVID-19 prevention behavior differ between Americans and Japanese?

2 Method

2.1 Participants and Sampling

A web-based cross-sectional survey was conducted in Japan and the United States to test the model. Sampling was targeted for American/Japanese citizens of adult age (>18 in USA, >20 in Japan), following the guidelines for the ethics review of the university of the principle investigator. Sampling was conducted via recruitment on crowdsourcing websites: *Mturk* in the United States, and *Lancers* in Japan. Stewart et al. (2017) reviewed sampling on crowdsourcing sites, and concluded that they were legitimate sources for data, and while having some limitations, provide a promising method of sampling in social scientific research. Likewise, Korovina et al. (2019) tested the reliability of crowdsourcing in an experiment involving emotion labeling, and concluded that the results were robust.

Taking account the typical sample size of a previous TPB study (Hagger and Chatzisarantis 2009), a total of 600 completed questionnaires were collected (Japan N = 303, USA N = 297), with a monetary award offered for participation (Japan = ￥50; USA = $.50). Our sample indicated that 63.3% of the American participants were male, with an average age at 38.11 (SD = 11.89), while 55.8% of the Japanese were male, the average age at 41.45 (SD = 9.84). Descriptive data of demographics for profession, income and education were also asked, but no significant discrepancies in their composition across samples were detected.

2.2 Measurement

The measurements utilized in this study consisted mainly of existing scales. The wording of each scale item was scrutinized as necessary and modified to fit the COVID-19 context. Where translation was necessary, a back-translation procedure by three bilingual researchers was conducted to assure equivalence. A filter question ("please choose 1 for this item") was also added to exclude random answers. Table 1 denotes the means, standard deviations, and Cronbach alpha values for each scale, broken down by culture.

2.2.1 Media Exposure

The Media Exposure Scale (Li 2018) consisted of two factors: exposure frequency, and exposure extensity. Exposure frequency was measured by asking how often a respondent accessed news about COVID-19 from: (1) print media, (2) television, (3) radio, (4) news website, and (5) online media. Exposure extensity was measured by asking respondent's views regarding: (1) the extent of influence; (2) its threat to health; (3) measures taken to solve it; (4) social impact of it; and (5) long-term solution to COVID-19. Both exposure frequency (M = 3.31, SD = 0.80, α = 0.70) and exposure extensity (M = 3.71, SD = 0.70, α = 0.82) were measured with a 5-point verbal frequency scale ranging from "1 = never" to "5 = frequently." The items of exposure frequency and exposure extensity were added up and averaged to compute the score of media exposure (M = 3.51, SD = 0.66, α = 0.83).

2.2.2 Social Media Involvement

The Social Media Involvement Scale (Boyd and Ellison 2007) was adapted to ask how often respondents communicate with others through online methods regarding COVID-19, on a 5-point, four-item frequency scale. The items included: (1) talking to other users; (2) paying attention to posted messages; (3) posting messages; and (4) relaying messages. The items were averaged for scores (M = 2.74, SD = 1.19, α = 0.90).

2.2.3 Risk Perception

For our purposes, risk perception pertained to the perceived relevance and seriousness of the risk on self and society in general, and was comprised of three dimensions: (1) perceived susceptibility on self (e.g., "It is possible that I will contract COVID-19"); (2) perceived severity on self (e.g., "I believe that COVID-19 is

Table 1: Means, SDs and correlations (n = 600).

	Means and SD				*t*-test	Pearson correlations								
	Japanese		Americans		*t* (598)	2	3	4	5	6	7	8	9	10
1. Media exposure	3.23	*0.64*	3.80	*0.57*	11.39*	0.62**	−0.29**	0.47**	0.43**	0.55**	0.33**	0.42**	0.56**	0.52**
Frequency	2.87	*0.69*	3.78	*0.64*	16.72	0.71**	−0.39**	0.34**	0.46**	0.51**	0.35**	0.26**	0.50**	0.43**
Extensity	3.60	*0.77*	3.82	*0.61*	3.90***	0.36**	−0.10*	0.51**	0.30**	0.48**	0.24**	0.49**	0.48**	0.50**
2. SNS involvement	1.77	*0.66*	3.72	*0.73*	34.39	–	−0.62**	0.16**	0.47**	0.45**	0.33**	0.10*	0.44**	0.32**
3. Personal hygiene	4.27	*0.65*	2.22	*1.04*	−29.10***	–	–	−0.03	−0.39**	−0.18**	−0.06	0.11**	−0.26**	−0.14**
4. Perceived norm	3.93	*0.61*	3.96	*0.6*	0.59	–	–	–	0.35**	0.42**	0.20**	0.61**	0.64**	0.64**
5. IHLC	3.21	*0.61*	3.80	*0.57*	12.23	–	–	–	–	0.49**	0.22**	0.21**	0.49**	0.41**
6. PHLC	3.39	*0.53*	3.73	*0.63*	7.26**	–	–	–	–	–	0.52**	0.46**	0.53**	0.47**
7. CHLC	3.41	*0.59*	3.62	*0.75*	3.76***	–	–	–	–	–	–	0.39**	0.26**	0.19**
8. Risk perception	3.89	*0.53*	3.79	*0.59*	−2.13	–	–	–	–	–	–	–	0.56**	0.54**
9. Intention	3.50	*0.68*	3.94	*0.59*	8.42	–	–	–	–	–	–	–	–	0.86**
10. Behavior	3.61	*0.72*	3.88	*0.62*	4.79	–	–	–	–	–	–	–	–	–

*p < 0.05, **p < 0.01, ***p < 0.001

severe"); and (3) perceived risk at societal level (e.g., "COVID-19 will lower the standard of living of the people"). Perceived susceptibility and perceived severity were originally developed by Witte et al. (1996), and were measured by three items, on 5-point Likert scales. The measurement of perceived risk at societal level was adapted from studies on social and personal risk perception (Brewer et al. 2007; Wu and Li 2017), from which we gathered four items, on a 5-point Likert scale ranging from "1 = strongly disagree" to "5 = strongly agree." While risk perception consisted of three facets, in order to simplify the model, we combined the three scores into one variable (M = 3.84, SD = 0.56, α = 0.82).

2.2.4 Personal Hygiene

We adopted items from a scale originally designed to probe into preventive behaviors toward influenza (Liao et al. 2011), which probed into hygiene practices in daily life. The scale consisted of four items on a 5-point Likert scale, ranging from "1 = strongly disagree" to "5 = strongly agree". An example item was "It is important to cover the mouth when sneezing or coughing," and the scale's metrics were M = 3.26, SD = 1.33, α = 0.93.

2.2.5 Perceived Norm

We adopted items from Ajzen's (2002) scale for subjective norms and descriptive norms. Five items on a 5-point Likert scale, ranging from "1 = strongly disagree" to "5 = strongly agree" (M = 3.95, SD = 0.60, α = 0.75) measured how they perceived of the attitudes toward preventive behaviors of significant others and the general public (e.g., "Many people like me to wear a mask when I'm out") and actual prevention behaviors of significant others (e.g., "Most people who are important to me frequently wash their hands").

2.2.6 Multidimensional Health Locus of Control

The scale of the same name questioned the agency of health outcomes that individuals tend to believe are responsible. Items from the MHLC (multidimensional health locus of control) scale (Kuwahara et al. 2004; Wallston et al. 1978) were adopted. This construct contained three variables: internal health locus of control (IHLC), powerful others health locus of control (PHLC), and chance health locus of control (CHLC), each subscale contained six items evaluated on 5-point Likert scales of agreement, ranging from "1 = strongly disagree" to "5 = strongly agree" (IHLC: M = 3.50, SD = 0.65, α = 0.77; PHLC: M = 3.56, SD = 0.60, α = 0.70; CHLC: M = 3.51, SD = 0.68, α = 0.78).

2.2.7 Intent

The intent to perform preventive behavior toward COVID-19 was adopted from Ajzen (2002) (e.g., "I should stay indoor until the situation is better"). Nine items, on a 5-point Likert scale of agreement ranging from "1 = strongly disagree" to "5 = strongly agree" were used (M = 3.73, SD = 0.67, α = 0.86).

2.2.8 Behavior

Preventive behavior toward COVID-19 was modified from Ajzen (2002), consisting of nine items, such as "I refrain from engaging in social activities". Items were assessed on a 5-point Likert scale of agreement ranging from "1 = strongly disagree" to "5 = strongly agree" (M = 3.74, SD = 0.68, α = 0.85).

The English version questionnaire (used to collect U.S. samples) is also attached at the end of this study.

3 Results

Table 1 depicts the descriptive information for all variables, calculated for two countries, along with Pearson's coefficients of correlations between variables. Differences in the means of each variable were probed by t-tests. Results show that Americans had greater overall media exposure, and media exposure extensity than Japanese, while there was no difference in the amount of SNS involvement. For personal hygiene, Japanese scored significantly higher than Americans, as expected. For health locus of control, Americans scored higher than Japanese for both PHLC and CHLC, which we also expected. However, there were no differences between cultures for perceived norm and risk perception, where we anticipated there would be some discrepancy. Finally, no differences for intent to perform preventive behavior, nor actual behavior were found.

We used structural equation modelling to evaluate the contributions of media exposure, SNS involvement, personal hygiene, MHLC, perceived norms on the intermediary variable of risk perception, and then sought for its effect on behavioral intent and preventive behavior. Sex, age, family income and education level were controlled for in the model as covariates on risk perception, intent and behavior. After testing the path coefficients of control variables, paths from age, family income, sex and education level on risk perception and intent, and paths from age and family income to protective behavior were removed, because they were not significant among the groups. We conducted a multiple group simultaneous analysis to test the general model fit and model invariance over the two

cultures. The fit indices of the fully unconstrained model suggested a good fit ($\chi 2$ = 37.445 (20, n = 600), p = 0.021; GFI = 0.990; AGFI = 0.922; CFI = 0.992; RMSEA = 0.068). The overall TPB model is presented in Figure 2.

We then looked at the model for each culture. Fit indices were good for Americans ($\chi 2$ = 21.098 (10, n = 297), p = 0.002; GFI = 0.989; AGFI = 0.91; CFI = 0.995; RMSEA = 0.061), as well as for Japanese ($\chi 2$ = 13.819 (10, n = 303), p = 0.181; GFI = 0.993; AGFI = 0.942; CFI = 0.997; RMSEA = 0.036).

In the Japanese sample, the model explained 74.6% of the variance for protective behavior, 47% of the variance for intent and 46.6% of the variance for risk perception. For Americans, the model accounted for 79.7% of the variance for protective behavior, 74.9% of the variance for intention and 59.5% of the variance for risk perception. Standardized path coefficients separately for the two groups are reported in Figure 3a and b.

From these Figures, the path coefficients show that media exposure significantly predicted risk perception in both Americans (β = 0.133, p < 0.05) and Japanese (β = 0.195, p < 0.01), but predicted preventive behavior for the Americans (β = 0.144, p < 0.01) only. SNS involvement significantly and negatively predicted risk perception only for Americans (β = −0.135, p < 0.05), while significantly and positively predicting intent solely for Japanese (β = 0.089, p < 0.05). Thus, H5a was supported, while H4a, H4b, H5c were partially supported, and H5b was not supported.

Perceived norms significantly predicted risk perception for Americans (β = 0.425, p < 0.01) and for Japanese (β = 0.342, p < 0.01). It also significantly

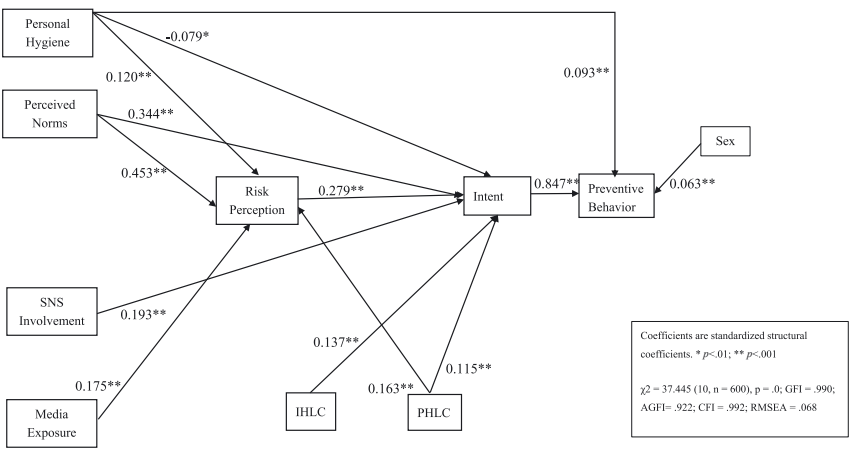

Figure 2: TPB model for Japanese and Americans (n = 600).

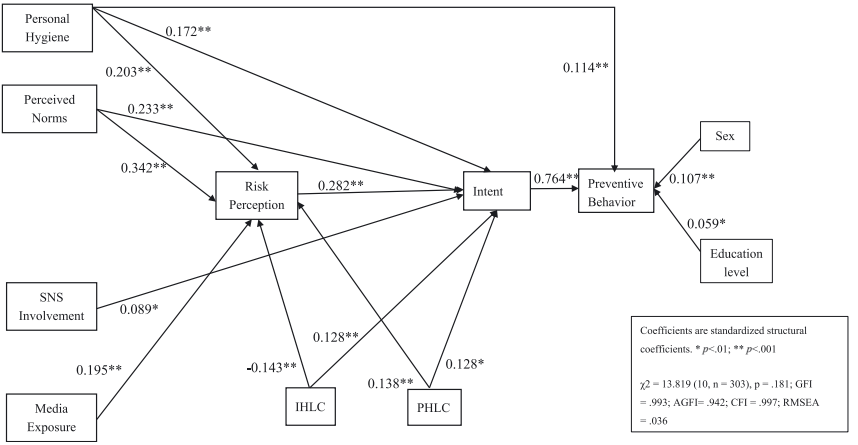

Figure 3a: TPB model for Japanese (n = 303).

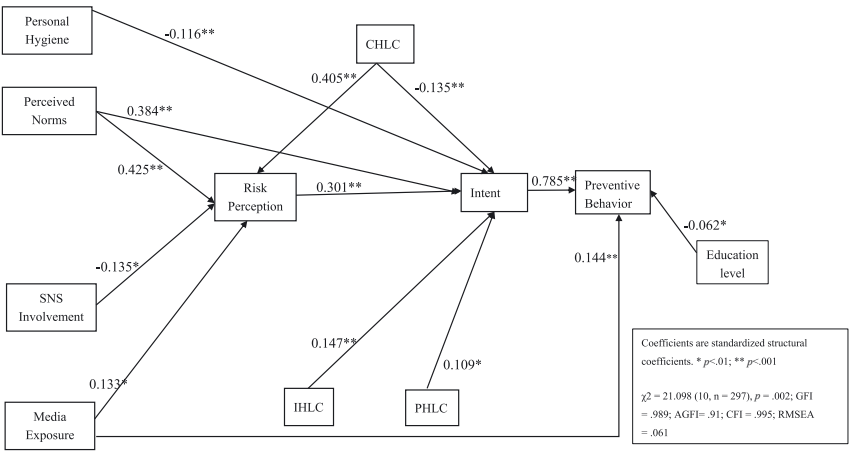

Figure 3b: TPB model for Americans (n = 297).

predicted people's intention of performing a preventive behavior in both Japan (β = 0.233, p < 0.01) and the United States (β = 0.384, p < 0.01). Personal hygiene failed to significantly predict American's risk perception and protective behavior towards COVID-19 but positively predicted risk perception, protective behavior and intent for Japanese. Hence, H2a, H2b were supported. H1a, b, c were partially supported.

As for health locus of control, both IHLC and PHLC did not significantly affect risk perception for Americans, but significantly predicted risk perception for Japanese, as well as intent for both cultures. CHLC significantly influenced risk perception and intent for Americans only. Risk perception was found to be a strong predictor of intent for both Americans ($\beta = 0.301$, $p < 0.01$) and Japanese ($\beta = 0.282$, $p < 0.01$). Similarly, intent was a strong predictor of preventive behavior in both cultures (USA $\beta = 0.785$, $p < 0.01$; Japan $\beta = 0.764$, $p < 0.01$). Therefore, H3 was partially supported while H6, H7 were fully supported.

4 Discussion

By investigating social and psychological factors, including media exposure, risk perception and personal hygiene, the purpose of the current study was to extend upon the theory of planned behavior to determine what factors affect one's engagement in preventive behaviors in the COVID-19 context. This study also aimed to explore if the variables have adequate explanatory power across two cultures that are contrasted on the tightness and looseness dimension. Our findings appear to add more credibility to TPB as an explanatory framework for health-related issues.

The findings overall showed a good fit of the extended model in both cultures, and hence, confirmed the viability of the extended TPB model. However, the paths of the predictors differed across cultures, therefore, the factors that ultimately influence whether one engages in preventive behavior were specific to each culture.

Our TPB model added the predictors of SNS involvement, media exposure, and risk perception, to the traditional variables of attitude (personal hygiene), subjective norms (perceived norms), and behavioral control (MHLC). We positioned risk perception as an intermediary variable, one that the predictors might influence before it affected intent. While the traditional TPB predictors of intent, by and large, were influential across both cultures, the added variable of SNS involvement was effective on intent for Japanese only, while neither culture had a direct path to intent from media exposure. This is in line with Ajzen and Fishbein (2005), who claimed that media exposure is likely to influence people's intent indirectly by cultivating one's beliefs, which in our case was that of risk perception. Indeed, across both cultures, the media variables affected risk perception, which predicted intent. For the Americans, both activity on SNS and media usage affected their perception of the risks of COVID-19, while only media exposure did so for the Japanese, suggesting that the latter rely more on traditional media sources for the assessment of risk.

That being said, SNS involvement did affect intent directly for the Japanese, entailing that they perhaps adopt intent more passively, from word of mouth of others, rather than forming their own perception of the risks involved. Of more interest was the finding for Americans, in that SNS involvement negatively predicted risk perception, implying that the more SNS activity they engage in, the more emboldened they become toward COVID. One explanation for this difference can be offered by regulatory focus theory. Higgins (2012) distinguishes between promotion and prevention foci, the former being the tendency to seek pleasure, while the latter to seek avoiding pain. Americans may implement SNS to brag about how bold they are in defying COVID, or about how they are actively engaging in protective behaviors, both of which would reduce perception of risk. Conversely, Japanese may use SNS to share opinions about the dangers of the pandemic, not on how great they are in dealing with it, thus their risk perception is heightened.

Looking at the traditional TPB variables, we employed MHLC for perceived behavioral control. For Americans, chance or fate (CHLC) was a significant predictor for risk perception and intention, while it affected neither for Japanese. This pattern may be illustrated by the infamous statement made by an American student during spring break, which coincided with the initial spread of COVID-19, "If I get Corona, I get Corona" New York 2021. Perhaps this difference can be attributed to how religious people are. Tanaka (2010) noted a huge difference in religiosity between Japanese and Americans, the latter being strong believers of the Christian faith, while the former are practically atheist. During times of uncertainty, such as the COVID-19 pandemic, people are inclined to perceive themselves as having low personal control, and according to Compensatory Control Theory, they leave their course of life to God (Kay et al. 2008). The Japanese, in contrast, have the second highest percentage of atheists in the world, next to China, so they are less fatalistic (World Population Review 2021).

The perception of preventive behavior as being dependent on one's own initiative, IHLC, affected intent in both cultures, but interestingly, it only had a negative effect on risk perception (decreased risk) for Japanese, but not Americans. It would stand to reason that if one believed that s/he was able to exercise preventive behavior on his/her own will, i.e., have essential control over contracting the disease, risk perception will be discounted, but this did not happen for Americans.

The reason that Japanese have higher IHLC may be due to it being a tight culture. People of tight cultures have higher control over impulse, and greater self-monitoring since they must regulate their behavior in order to avoid being ostracized for not complying to norms (Baumeister and Heatherton 1996; Snyder 1974).

The impact of influential others on their perception of behavioral control, PHLC, proved to influence intent in both cultures. However, for risk perception, PHLC had an effect only for Japanese. The Japanese, as collectivists, value their connectedness with significant others. Germani et al. (2020) suggest that for collectivists, one's susceptibility to COVID-19 is dependent on relatives and close others. On the other hand, individualists value their own views and opinions, hence Americans may have been influenced less by others in their perceiving the risk of contagion.

Our TPB subjective norms component, perceived norms, had a significant positive impact on risk perception and intent in both countries. It seems that when it comes to the pandemic, what others say and do about it, and how they see people reacting to it, perhaps on TV and other media, affects what people think about it, and whether they want to protect themselves from it or not, regardless of culture. Even the individualistic Americans seem to be swayed by the popular opinions of those who they identify strongly with, as evidenced by the predominant refusal to wear masks and get vaccinated of Republican voters.

Finally, the attitude component of personal hygiene was the element that showed the greatest cultural variation. While this variable positively predicted risk perception, intent and preventive behavior for the Japanese, it only affected intent for Americans, and in a negative direction. This implies that Americans who are concerned about their hygiene are confident about not getting infected due to their daily habits, to the point that they may not see the need to go beyond them. Indeed, even simple preventive measures such as mask wearing is being politicized, therefore they may choose not to engage in such preventive behaviors even if they have high regard for personal hygiene. For example, in 2020, the protesters of mask mandates had President Donald Trump as an ally, who had ignored the CDC's urging of the use of facemasks and stated "You don't have to do it. They suggested for a period of time, but this is voluntary. I don't think I'm going to be doing it." (Victor et al. 2020). Kahane (2021) found that the tendency to wear a mask in public is significantly lower in counties where then-candidate Donald Trump found strong support during the 2016 presidential election. In addition, people in states with mask-wearing mandates tend to have stronger mask-wearing behavior. Japanese, on the other hand, by virtue of them being part of a tight culture, may think that one can never be too careful, and that it is the responsibility of each citizen to contribute to society's battle against the pandemic. Japanese had always valued personal hygiene, and high standards of public health (Burgess and Horii 2012), along with their responsibility toward society (Germani et al. 2020).

4.1 Theoretical and Practical Contributions

Perhaps the biggest theoretical contribution of this study was that we were able to predict preventive behaviors toward COVID-19 via the TPB, demonstrating adequate fit over both Japan and U.S. In Hofstede's (1980) study, Japan scored 46 on the individualism index, and were subsequently characterized as a collectivistic culture, whereas the U.S. scored 91 which was the highest among all countries in individualism. In addition, in Gelfand's et al. (2011) study, Japan scored 8.6 on tightness while the United States scored 5.1 with a mean of 6.5 amongst 33 countries. These rankings ascertain Japan's character as a collectivistic and tight culture, and the American propensity to be an individualistic and loose culture. Loose and individualistic culture have fared much worse through the pandemic, with people who are less likely to engage in prescribed behaviors aimed at controlling the spread of the disease (Gelfand et al. 2021; Vargas and Sanchez 2020), unlike those of tight and collectivistic. From our results, it appears that the model follows the logic of TPB better for the Japanese, whereas there were more unexpected patterns with the American. This can be implied that loose and individualistic cultures are less likely to follow a rational reasoning for people's behavior.

Reading beyond the lines from our results, we can perhaps identify how Americans can be persuaded to engage in preventive behaviors. They appear to be affected strongly by media, as can be seen in the current political divide either created or exacerbated by the right-wing versus left-wing media. Media does not necessarily persuade Americans with an appeal to logic (risk perception), but can tell them what to do, as seen by the direct route from media exposure to preventive behavior. When it comes to a pandemic, they are more chance-oriented, less trusting of their own ability to change their course of life. The appropriate strategy to appeal to such people maybe the strength and consistency of media messages toward engaging in behaviors facilitative of disease prevention.

Another contribution to TPB on our part was the introduction of the intermediary variable of risk perception. In dealing with a public health issue, we cannot overlook the importance of how people view the risks to themselves and to society. Our choice to treat this not as a predictor variable as the other TPB components, but one which stands between them and intent, proved to be effective.

4.2 Limitations and Future Directions

Several limitations of this study need to be mentioned. First, we only conducted a cross-sectional survey of the pandemic, taking just a slice of the ongoing dynamics

of a pandemic. The data collection, incidentally, occurred before vaccines were made available, at one of the peak threat periods. Had we gathered samples in the initial scare stage, or the herd-immunity approaching stage, the proposed model may go through transitions that would provide important information on the nature of people to protect themselves and society. Longitudinal data collection, then, would have had a much stronger scientific impact.

Another shortcoming is that the sampling involved internet crowdsourcing sites. People who register on such sites are naturally those with not only access to the internet, but likely to be very active on the net as well. Heavy media and internet users may have biased our results, compared to what we may have obtained should we have opted to conduct a more traditional sampling method. Also, the gender ratio was skewed in this sample (63.3% participants were male for the U.S., and 55.8% for Japan) while in reality only 49.48% of the population in the U.S. were male, and 48.82% for Japan ("World Population Prospects – Population Division – United Nations" 2021). Furthermore, 94.3% of the our American participants, and 60.7% of Japanese had bachelor degrees and above, which is not representative of that of the population in each country (37.5% USA and 52.8% Japan; Duffin 2021; MEXT 2019). Women have been identified to have stronger concern for COVID-19 (Otterbring and Festila 2021), and those with higher educational background tend to be more informed about health risks (Alizadeh et al. 2021). We did, however, control for these demographic variables in our analysis. Nonetheless, more representative sampling would have provided better accuracy in the portrayal of people's actual awareness and behavior regarding the pandemic.

Finally, while we conducted a cross-cultural comparison based on tight and loose cultures, only one representative culture each was sampled, so our claims to the pattern of results may not be substantial. Also, at the time of sampling, each respective culture was in a different phase of the pandemic, so it is difficult to say if the samples were taken under the same conditions. In short, a true test of cultural differences requires more cultures to be sampled, and the timing of the sample should be controlled for.

Appendix

The appendix includes only the English version of the questionnaire items, and not the Japanese. Income brackets were adjusted for in each culture according to the median annual salary. Some demographic information categories differed, to reflect the particular characteristics of each society, for instance, ethnic/racial composition.

Media exposure

1. When COVID-19 appears in media recently, how often do you access news about it from the following channels?

	Exposure frequency	Never	Seldom	Sometimes	Often	Frequently
1-1	Print media (newspapers and magazines)	1	2	3	4	5
1-2	Television	1	2	3	4	5
1-3	Radio	1	2	3	4	5
1-4	News websites, e.g. Portal websites, online news websites.	1	2	3	4	5
1-5	Online media, e.g. Facebook, Twitter, etc.	1	2	3	4	5
	Exposure frequency	**Never**	**Seldom**	**Sometimes**	**Often**	**Frequently**
2-1	The extent of influence of it	1	2	3	4	5
2-2	COVID-19's threat to health	1	2	3	4	5
2-3	Measures taken to solve it	1	2	3	4	5
2-4	Social impact of it	1	2	3	4	5
2-5	Long-term solution to it	1	2	3	4	5

Social media involvement

3. Thinking about the past few months, how often do you participate in the following activities **related to COVID-19** in social media (e.g. Facebook, Twitter, and Whatsapp)?

	Social media involvement-specific	Never	Seldom	Sometimes	Often	Frequently
3-1	Talk to other users	1	2	3	4	5
3-2	Pay attention to posted messages (pictures/videos/texts)	1	2	3	4	5
3-3	Post messages (pictures/videos/texts)	1	2	3	4	5
3-4	Relay messages (pictures/videos/texts)	1	2	3	4	5

Personal hygiene

4. Please indicate your belief to the following statements.

		Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
4-1	It's important to cover mouth when sneezing or coughing	1	2	3	4	5
4-2	Use liquid soap when washing hands is important to me	1	2	3	4	5
4-3	It's necessary to use serving utensils when dining with others	1	2	3	4	5
4-4	Washing hands before touching face or food is important to me	1	2	3	4	5

Risk Perception

5. Based on what you learned about COVID-19, to what degree do you agree with the following statements?

	Personal impact	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5-1	I am at risk for getting COVID-19	1	2	3	4	5
5-2	It is possible that I will contract COVID-19	1	2	3	4	5
5-3	It is likely that I will contract COVID-19	1	2	3	4	5
5-4	I believe that COVID-19 is severe	1	2	3	4	5
5-5	I believe that COVID-19 is serious	1	2	3	4	5
5-6	I believe that COVID-19 is significant	1	2	3	4	5
	Social impact	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
5-7	COVID-19 will lower the living standard of people.	1	2	3	4	5
5-8	COVID-19 will affect the stability of people's life.	1	2	3	4	5
5-9	COVID-19 will increase the cost of the societal operation.	1	2	3	4	5
5-10	COVID-19 will negatively affect the economy.	1	2	3	4	5

Perceived norm

6. Based on what you learned about COVID-19, to what degree do you agree with the following statements?

		Never	Seldom	Sometimes	Often	Always
6-1	Most people who are important to me frequently wash their hands	1	2	3	4	5
6-2	Many people like me to wear a mask when I'm out	1	2	3	4	5
6-3	The people in my life whose opinions I value already minimize their social activities	1	2	3	4	5
6-4	Most people who are important to me are taking extra efforts to prevent themselves from COVID-19	1	2	3	4	5
6-5	Most people who are important to me would like me to keep social distancing when I'm with others	1	2	3	4	5

Health locus of control

7. Please indicate to what extent you agree with the following statements.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7-1	If I get sick, it is my own behavior which determines how soon I get well again.	1	2	3	4	5
7-2	No matter what I do, if I am going to get sick, I will get sick.	1	2	3	4	5
7-3	Having regular contact with my physician is the best way for me to avoid illness.	1	2	3	4	5
7-4	Most things that affect my health happen to me by accident.	1	2	3	4	5
7-5	Whenever I don't feel well, I should consult a medically trained professional.	1	2	3	4	5
7-6	I am in control of my health.	1	2	3	4	5
7-7	My family has a lot to do with my becoming sick or staying healthy.	1	2	3	4	5

(continued)

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7-8	When I get sick I am to blame	1	2	3	4	5
7-9	Luck plays a big part in determining how soon I will recover from an illness.	1	2	3	4	5
7-10	Health professionals control my health	1	2	3	4	5
7-11	My good health is largely a matter of good fortune.	1	2	3	4	5
7-12	The main thing which affects my health is what I myself do	1	2	3	4	5
7-13	If I take care of myself, I can avoid illness.	1	2	3	4	5
7-14	When I recover from an illness, it's usually because other people (for example, doctors, nurses, family, friends) have been taking good care of me.	1	2	3	4	5
7-15	No matter what I do, I'm likely to get sick.	1	2	3	4	5
7-16	If it's meant to be, I will stay healthy.	1	2	3	4	5
7-17	If I take the right actions, I can stay healthy.	1	2	3	4	5
7-18	Regarding my health, I can only do what my doctor tells me to do.	1	2	3	4	5

Filter question

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7-19	Please choose 1 (strongly disagree) for this question	1	2	3	4	5

Intention

8. Please indicate to what extent you agree with the following statements.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
8-1	I should wash(sanitize) my hand more often.	1	2	3	4	5
8-2	I should stay indoor until the situation is better	1	2	3	4	5
8-3	I should clean frequently touched surfaces and objects	1	2	3	4	5
8-4	I should practice physical distancing and wear a mask when I'm with others	1	2	3	4	5
8-5	I should refrain from engaging in social activities	1	2	3	4	5
8-6	I tend to cancel my offline trips/dates with others	1	2	3	4	5
8-7	I tend to change my daily routine	1	2	3	4	5
8-8	I should not go out unless it's necessary	1	2	3	4	5
8-9	I should avoid using public transportations	1	2	3	4	5

Behavior

9. Please indicate the frequency you conducted the following behaviors.

		Never	Seldom	Sometimes	Often	Always
9-1	I wash(sanitize) my hand more often.	1	2	3	4	5
9-2	I stay indoor until the situation is better	1	2	3	4	5
9-3	I clean frequently touched surfaces and objects	1	2	3	4	5
9-4	I practice physical distancing and wear a mask when I'm with others	1	2	3	4	5
9-5	I refrain from engaging in social activities	1	2	3	4	5
9-6	I cancel my offline trips/dates with others	1	2	3	4	5
9-7	I change my daily routine	1	2	3	4	5
9-8	I don't go out unless it's necessary	1	2	3	4	5
9-9	I don't take public transportations unless I have to	1	2	3	4	5

Demographics

1 Your age: _____

2 You are:

1. ❑Male 2. ❑Female

3 Your highest educational level (Select one of the following categories):

1. ❑Primary school or under
2. ❑Middle school
3. ❑High school
4. ❑Technical secondary school
5. ❑Diploma
6. ❑Bachelor degree
7. ❑Master degree or higher
8. ❑Others

4 Your profession (Select one of the following categories):

1. ❑Civil Servants
2. ❑Private entrepreneurs
3. ❑Management
4. ❑General staff
5. ❑Experts (Lawyer, Teacher)
6. ❑ Laborer (Worker, Attendant, Driver)
7. ❑Student
8. ❑Freelancer
9. ❑Farmer
10. ❑Unemployed
12. Medical experts
11. ❑Other

5 Your family monthly income (Select one of the following categories):

1. ❑No income
2. ❑Below $10000
3. ❑$10000 - $29999
4. ❑$30000 - $49999
5. ❑$50000 - $79999
6. ❑$80000 - $99999
7. ❑$100000 - $149999
8. ❑$150000 - $199999
9. ❑More than $200000
10. ❑No answer

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