

Research Article

Stress Mediates the Relationship between Personality and the Affordance of Socially Distanced Online Education

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The novel coronavirus pandemic has made life significantly more stressful for large populations of people. As one such demographic, university students worldwide have experienced a sudden shift toward the provision of socially distanced online education, often in the absence of a coherent institutional plan. The mechanisms of stress appraisal and response differ between individuals in part determined by personality. With a sample of 293 undergraduate students at a Japanese university operating under prohibitions relating to face-to-face education, this article examines the impact of personality on the affordance of socially distanced online education mediated through generalized life stress and online learning stress appraisal. A retrimmed structural model returned an acceptable goodness of fit accounting for 31.6% of the criterion variance. The model indicates that conscientiousness (positive) and neuroticism (negative) hold a significant mediated impact on the affordance of socially distanced online education through generalized life stress and online learning stress appraisal. Moreover, and in the absence of face-to-face social interaction, the model shows that extroverted students experience greater online learning stress appraisals than neurotic students. Neurotic students were, however, negatively impacted by appraisals of generalized life stress but not online learning stress. Informed by personality characteristics and stress appraisals, the outcomes are discussed in relation to educational improvements and appropriate pedagogies for the delivery of socially distanced online education.

1. Introduction

The novel coronavirus pandemic has exerted a profound impact on public mental health contributing to an increase in depression, anxiety, insomnia, and stress appraisal [1–5]. As a defensive physiological, psychological, and behavioral reaction, stress can be understood as the disruption arising from a perception that threat demands exceed one's adaptive mitigation capacity [6]. The transactional stress theory [7, 8] contends that stress as an objective variable is present neither within the individual nor the environment but rather is emergent via an abstract relationship wherein “the separate person and situation elements are joined together to form a new relational meaning” ([9]: 294). The mechanisms of stress appraisal and coping are known to differ significantly between individuals [10] and are at least partially determined by personality [11–13]. Personality “not only affects the appraisal of and coping with

stress, but it is also crucial with regard to the selection and shaping of stressful situations” ([14]: 335). Certain individuals are therefore more predetermined to experience and respond to stress based on personality characteristics [15, 16].

Prior to the novel coronavirus pandemic, a declassified Organization for Economic Co-operation and Development (OECD) report contextualized education within an emergent volatile, uncertain, complex, and ambiguous global environment [17]. The pandemic has exacerbated these concerns and situated education as a stressful domain for various stakeholders including students. In the context of Japanese society, a recent Japan Times (2021, February 28) [18] article entitled “COVID-19 pushes 1,300 Japanese university students to drop out” documents how many students have quit university due to an inability to pay tuition fees, loneliness and isolation, and an inability to make friends through online education, factors which also had a negative impact upon motivation to study. Beyond Japan, a plethora of recent studies have

highlighted increases in stress among students brought about by conditions surrounding the pandemic [13, 19–27]. These studies are important as mental health problems among students are associated with reduced academic performance, substance abuse, poor physical health, increased dropout rates, and avoidance-based coping strategies [28–33].

The pandemic has exposed inadequacies within many education systems around the world and drawn attention to the need for stakeholders to reassess established educational models, practices, and relationships. One of the most dramatic areas for reassessment concerns the unexpected demand for face-to-face courses to be delivered online [34], thus changing the ways in which educational communities interact, communicate, and learn. Throughout the pandemic, Japanese universities have remained operational although a lack of institutional readiness for online education has been exposed [35–37]. While a recent report from the Japanese Ministry of Education, Culture, Sports, Science, and Technology (MEXT) ([38]: 15) declares an additional \$95 million “for support in preparing an IT environment that will enable universities to set up a system and equipment for conducting distance learning classes and to provide advanced education using digital technology,” conceptualizations of successful online education in Japan are often limited to rhetoric and an overemphasis on technological infrastructure. There exists a marked absence of educational discourse pertaining to institutional culture reforms, teaching pedagogies, and professional development initiatives [39, 40]. If the new status quo is to be accepted as sufficient to support changing educational goals and learning needs, then it is important to consider the affordance of socially distanced online education as impacted by appraisals of stress surrounding the novel coronavirus pandemic.

Situated within a Japanese information systems university operating under prohibitions relating to face-to-face education, this article examines the impact of personality and stress appraisal on the affordance of socially distanced online education. As the transactional stress theory emphasizes the mediated relationship between individuals and their environment in stress appraisal and coping responses [7, 8], personality traits represent an appropriate focal point in the study of stress appraisal related to pandemic restrictions and the enforced provision of socially distanced online education. Moreover, various connections have been made between personality and technology use inclusive of learning management systems [41–45]. The primary hypothesis directing the current research is that stress appraisals mediate the relationship between personality and the affordance of socially distanced online education. Interdisciplinary research such as the current study is necessary if the widespread provision of online learning solutions is to be resilient to future stressors arising from within the volatile, uncertain, complex, and ambiguous global environment including those brought into focus by the novel coronavirus pandemic.

2. Background Literature

2.1. Online Education and Affordances. The closure of universities and prohibitions on face-to-face contact have

impacted the mental health of students as evidenced in various multinational studies [46–48]. In a cross-sectional study, one-third of students experienced stress and anxiety relating to pandemic restrictions. The authors caution that it is vital for universities to establish and maintain connections with students during times of crisis to support psychological and social well-being [49]. In a study of university students in the United States, almost two-thirds of the sample reported increased stress and anxiety during the pandemic while less than half believed they were equipped to cope with the situation [5]. Similarly, in a study of students from three universities in China, over two-thirds of the population indicated moderate to high-stress levels during the pandemic [50].

Reasons for increases in stress among students include being distanced from the regular university life experience and social interaction with peers and teachers [51] and negative emotional responses such as anxiety, boredom, isolation, and frustration [52]. These negative responses have been exacerbated in courses delivered on-demand wherein direct social interaction with teachers and peers is absent or infrequent [53]. Questions have also been raised in relation to equality of access to digital technologies among students [54] in addition to the promotion of stress, anxiety, and other life disturbances through prolonged exposure to digital devices [55, 56]. Other studies have shown that restrictions surrounding the pandemic have impacted student motivation [57] and student satisfaction [58].

The acceptance and use of educational technologies including learning management systems have been studied in relation to a plethora of factors [59, 60]. Online ecosystems through which learning materials are delivered are informed by psychological principles of design pertaining to the speculated needs of an intended user. Such user needs can be framed as affordances or the motivational properties emergent between an object (i.e., a learning platform or technology such as Moodle) and an agent (i.e., a technology user such as a student). Gibson [61] argues that affordances resist the objective-subjective dichotomy as their realization is dependent upon an active agent being perceptually aware of contextual possibilities. Affordances have been used to structure and analyze technological design initiatives and evaluations across various domains [62, 63].

Effective affordances prompt individuals to engage in actions which satisfy needs resultant from an actual or imagined deprivation (e.g., the sudden absence of face-to-face learning opportunities). The affordance of online education concerns a complex mechanism of intertwined variables. While affordances may initially be drawn from the technological provisions of the experiences (e.g., the features of the learning management system used), there are many additional factors which shape the relationship between the system and the user. These include variability in individual teacher/student behaviors, competencies, and beliefs about learning and technology; the quality of learning materials and tasks given; the level of social interaction required, the forms of assessment used; and the self-regulatory abilities of students.

2.2. Personality and Stress. The five-factor model of personality remains a robust taxonomy of individual differences [64–67]. The role of personality in the appraisal of stress has been shown through various studies with findings indicating that neuroticism plays a dominant role [68]. As a maladaptive personality trait, neuroticism indicates a predisposition to stress in the form of negative emotions and the negative framing of experience [69, 70]. These negative emotions further promote irrational thought patterns and a decreased ability to control self-motivation. Neurotic individuals can be expected to interpret everyday situations as threatening and thus experience high levels of day-to-day hassle [71]. Neuroticism is linked to irrational thought processes and a sense of helplessness when confronted with problematic situations. Neurotic individuals are believed to be less able to control impulses even when the result of acting upon an impulse returns negative results in the form of increased stressors [72]. Neuroticism is also believed to be a reliable predictor of reduced life satisfaction [73]. An Iranian study into the predictive value of personality in diagnosing stress, anxiety, and depression found that neuroticism was the only significant predictor of all three mental health problems [74]. Similarly, a Finnish study that sought to ascertain university student interest in using a stress management app reported that extraversion, agreeableness, and conscientiousness were associated with lower self-reported stress whereas neuroticism was strongly associated with rumination, anxiety, and depression [75].

In contrast to neuroticism, individuals high in agreeableness, conscientiousness, and, to a lesser degree, extraversion can be expected to appraise everyday situations as less threatening and consequently experience lower degrees of day-to-day stress and hassle [76, 77]. Extraversion is a trait associated with an impulse toward sociability and assertiveness. Extroverted individuals are more likely to be self-assured and confident in their disposition. In addition to being outgoing and cheerful, extroverted individuals tend to appraise problems positively and engage in optimistic upbeat thinking [78]. Due to more expansive social support networks and interpersonal contacts, extroverted individuals are more likely to communicate feelings, thoughts, and experiences with others and engage in adaptive problem solving and planning. While exposed to a higher number of potential stressors, extroverted individuals deploy effective coping strategies and are therefore less prone to the negative impacts of stress and anxiety [79]. Connections have been made between extraversion and increased achievement on tasks inclusive of social interaction [80]. The trait of agreeableness reflects the regulation of interpersonal frustration and an orientation which seeks to avoid conflict and disagreement. From the perspective of task completion and achievement, agreeable individuals are thus best suited to social situations which require collaboration and cooperation. Agreeable individuals are considered flexible and accommodating of changes in circumstance, situation, and demand [81]. Agreeable individuals often demonstrate a desire to serve the needs of others through an inherently prosocial orientation which further includes expressions of altruism and sympathy [82].

Conscientiousness reflects a desire to accept responsibility and adhere to strict principles of conduct. Conscientious individuals are often purposeful, disciplined, and organized, particularly when focused on task achievement due to their intrinsic achievement motive [83]. The achievement-focused regulation of behavior among conscientious individuals also means that fluctuations in circumstance and external environment changes are likely to be successfully negotiated as the task competition and achievement motive are dominant. Furthermore, conscientious individuals are often rational decision makers [84] and deploy problem-focused and adaptive emotion-focused coping such as positive reframing and humor [85]. Conscientious individuals may experience fewer disruptions and less stress within their daily lives on account of having stable personalities [86]. Conscientiousness has also been linked to greater academic achievement outcomes [87, 88] as it encompasses organization, self-discipline, and determination.

Intellect (more commonly termed as openness) is associated with being imaginative, creative, and original [89] and having a preference for divergent thinking [90]. It has been defined as a trait which “reflects individual differences in the ability and tendency to seek, detect, comprehend, utilize, and appreciate complex patterns of information, both sensory and abstract” ([91]: 369). Several studies have made connections between intellect, critical thinking, and academic achievement outcomes [92, 93]. Individuals high in intellect tend to be open to fluctuations in circumstance and external environment changes, and due to broad learning experiences [94], such individuals can cope with stress through deployment of various adaptive strategies.

3. Aims and Hypotheses

Referenced within the specific context of the novel coronavirus pandemic and prohibitions on face-to-face contact within a Japanese university situation, the current research tests the hypothesis that (H1) stress appraisals mediate the relationship between personality and the affordance of socially distanced online education. It is hypothesized that (H2) as adaptive personality traits, extraversion, agreeableness, conscientiousness, and intellect predict reduced generalized life stress appraisals; (H3) as a maladaptive personality trait, neuroticism predicts increased generalized life stress appraisals; (H4) generalized life stress appraisals predict increased online learning stress appraisals; and (H5) online learning stress appraisals predict a decrease in the affordance of socially distanced online education.

4. Methods

4.1. Participants and Context. The context of the current study is an information systems university in northern Japan. The university has approximately 1200 full-time undergraduate students. During the first semester of 2020, all lectures and classes were moved to an online only format with students prohibited from attending the university. All students therefore became socially distanced online learners located around Japan. While many students subsequently

experienced an undergraduate education delivered through the Moodle learning management system, in the absence of internal quality assurances, individual teachers were permitted to implement methods and materials of their own choosing. The undergraduate student populations were therefore exposed to a broad range of delivery methods and materials dependent upon individual course teacher. After 30 weeks of learning under such conditions, all first- and second-year students were contacted by the author, and voluntary participation in the current study was invited. Students were given a brief overview of the study, and consenting students were directed to an online Japanese instrument comprising of the measures outlined below. After a period of one month, a total of 293 complete responses were gathered. The sample included 58 female students and 235 male students with a mean age of 19.6 years old ($SD = 0.72$).

4.2. Measures

4.2.1. Personality. The lexical tradition of personality trait assessment utilizes adjectives to represent behavioral tendencies, either as standalone descriptors or as pairs of behavioral opposites. These measures have been critiqued for the influence of temporal mood states on lexical choice in addition to ignoring the meaning of those adjectives not selected. Complete sentences have the advantage of being semantically and context-specific although measures such as the NEO-PI-R require a significant level of literacy and are thus at risk from introducing response error [95]. The current study used a Japanese translation of the 50-item IPIP representation of the Goldberg [96] markers for the five-factor structure (IPIP-BFM-50). The IPIP-BFM-50 retains a focus on assessment in the lexical tradition while overcoming the limitations of binary adjectives and elaborate sentences. The measure is inclusive of ten indicators on each personality trait including extroversion, agreeableness, conscientiousness, neuroticism, and intellect. Items are assessed on a five-point scale ranging from “very accurate” (5) to “very inaccurate” (1) and are distributed in nonconsecutive order. An initial confirmatory factor analysis (CFA) of the five-factor personality model returned a poor fit ($\chi^2 = 3074.567$ ($df = 1165$), $p \leq 0.001$, $NC = 2.639$, $TLI = 0.619$, $CFI = 0.638$, and $RMSEA = 0.075$). Several of the indicators on each of the five personality traits returned standardized loadings below the recommended cut-off of 0.60 [97]. These indicators were removed leaving a total of 17 reliable indicators across the five personality traits. The retested measurement model returned an improved goodness of fit ($\chi^2 = 214.253$ ($df = 109$), $p \leq 0.001$, $NC = 1.966$, $TLI = 0.932$, $CFI = 0.945$, and $RMSEA = 0.058$).

4.2.2. Stress. The Perceived Stress Scale (PSS) is a short measure which assesses the degree to which certain life situations are appraised as stressful [98]. The original measure uses 14 questions and asks participants to consider their thoughts and feelings in relation to how often certain feelings have arisen during a specific period. Using the PSS as a start point, a two-factor ten-item Japanese measure was devised which assessed generalized life stress and online learning

stress referenced to the prior few months of daily life and study during the novel coronavirus pandemic. Items were presented to participants as questions answerable on a five-point frequency scale ranging from “very often” (5) to “never” (1). On the generalized life stress factor, three items referred to how often participants had felt unable to control important things in their life were frustrated by problems in their life and unable to overcome difficulties in their life while two further items referred to how often participants had felt alone and angry about their current life situation. For the online learning stress factor, the five items referred to how often participants had felt upset, stressed, confused, demotivated, and alone because of something that had happened on one of their socially distanced online courses at the university. An initial CFA of the two-factor stress model returned a poor fit ($\chi^2 = 231.488$ ($df = 34$), $p \leq 0.001$, $NC = 6.808$, $TLI = 0.818$, $CFI = 0.863$, and $RMSEA = 0.141$). One indicator from each of the two-factors returned a standardized loading below the recommended cut-off of 0.60 [97] and was therefore removed. The retested model returned an acceptable goodness of fit ($\chi^2 = 63.581$ ($df = 19$), $p \leq 0.001$, $NC = 3.346$, $TLI = 0.942$, $CFI = 0.960$, and $RMSEA = 0.090$).

4.2.3. Affordance of Socially Distanced Online Education. From an information communication technology perspective, Zhang [63] proposes a motivational affordance framework inclusive of principles such as autonomy and the self (supporting autonomy and opportunities for the representation of self-identity), competence and achievement (design for optimal challenge and the provision of positive and timely feedback), relatedness (facilitate interpersonal interaction and represent human social bonds), leadership and followership (facilitate a desire to influence others and a desire to be influenced by others), and affect and emotion (induce emotions via short- and long-term exposure to the technology). From an educational perspective, several affordances have been proposed as applicable to learning online such as the need to provide maximum flexibility to technology users [99], the need to provide opportunities for interactive dialogues between students and teachers relative to the teaching materials [100], and the need to provide opportunities for students to progress from the level of novice to expert [101]. In the current study, seven Japanese statements were presented to participants on a five-point scale ranging from “strongly agree” (5) to “strongly disagree” (1). The statements asked participants to appraise their experience of socially distanced online education over the past 30 weeks relative to encouraging personal learning responsibility, as helping develop time management skills, as promoting active participation and successful communication, as satisfying educational needs, as offering flexibility, and as promoting a positive educational experience. An initial CFA of the single-factor online learning affordance model returned a poor fit ($\chi^2 = 89.264$ ($df = 14$), $p \leq 0.001$, $NC = 6.376$, $TLI = 0.837$, $CFI = 0.891$, and $RMSEA = 0.136$). Three indicators returned standardized loadings below the recommended cut-off of 0.60 [97]. These indicators were therefore removed. The retested measurement model

returned an improved goodness of fit ($\chi^2 = 2.331$ ($df = 2$), $p \geq 0.05$, $NC = 1.166$, $TLI = 0.998$, $CFI = 0.999$, and $RMSEA = 0.024$).

5. Analysis and Results

The descriptive statistics drawn from the retained indicators are shown in Table 1.

Table 2 shows the reliability and validity attributes in addition to bivariate correlations. Cronbach's alpha values for the six constructs were either good (>0.80) or acceptable (>0.70) [102]. Construct validity was affirmed through average variance extracted (AVE) values of >0.50 combined with composite reliability values >0.70 [103]. The discriminant validity of the data was confirmed through assessing whether the square root of the AVE was greater than the off-diagonal correlations. The absence of significant correlations between the five-factor personality traits and the affordance of socially distanced online education suggests that a mediated relationship through the two-factor stress component can be tested.

The most prevalent personality traits in the current sample were neuroticism ($M = 3.45$, $SD = 0.99$) and agreeableness ($M = 3.28$, $SD = 0.88$) although no significant correlation was found between them suggesting that they exert influence in isolation. The other most dominant personality traits were extroversion ($M = 2.86$, $SD = 0.89$), conscientiousness ($M = 2.76$, $SD = 0.99$), and intellect ($M = 2.76$, $SD = 0.90$). Extroversion had significant positive correlations with agreeableness and intellect in addition to a significant negative correlation with neuroticism. Agreeableness had a significant positive correlation with intellect. Conscientiousness had a significant negative correlation with neuroticism. Neuroticism also had a significant negative correlation with extroversion and intellect. Although gender differences were not a focal point in the current study, a one-way analysis of variance (ANOVA) found significant personality trait differences on neuroticism ($F(1, 291) = 15.816$, $p \leq 0.001$) and generalized life stress ($F(1, 291) = 9.526$, $p \leq 0.01$) with female students having significantly higher values on both measures. No significant differences were found relative to age.

Structural equation modeling with IBM SPSS AMOS 27 was used to devise and test the hypotheses. The χ^2 (chi-square), NC (normed chi-square), TLI (Tucker-Lewis index), CFI (comparative fit index), and RMSEA (root mean square error of approximation) were selected as the fit criteria. A preliminary model assessing the relationship between personality and the criterion variable revealed no significant direct effects, thus indicating that it was appropriate to further test for mediation through the two-factor stress variable. The two-factor stress variable was modelled as a serial interaction with generalized life stress (superordinate category) believed to be predictive of online learning stress (subordinate category). Subsequent models therefore used bootstrapping (2000 samples, 95% CI) (bias-corrected confidence estimates) [104] to test for mediation. The initially tested full structural model returned an acceptable goodness of fit ($\chi^2 = 653.665$ ($df = 360$), $p \leq 0.001$, $NC =$

1.824, $TLI = 0.911$, $CFI = 0.921$, and $RMSEA = 0.053$) which accounted for 31.3% of the variance in the criterion variable (Table 3).

As part of the retrimming process, insignificant paths and variables were removed, and a direct path was inserted between extroversion and online learning stress and between neuroticism and online learning stress. The retrimmed full structural model returned a slightly improved fit ($\chi^2 = 421.021$ ($df = 221$), $p \leq 0.001$, $NC = 1.905$, $TLI = 0.923$, $CFI = 0.933$, and $RMSEA = 0.056$). This retested model accounted for 31.6% of the variance in the criterion variable (Table 4).

The retrimmed structural model is shown in Figure 1.

6. Discussion

Referenced within the specific context of the novel coronavirus pandemic and prohibitions on face-to-face contact within a Japanese university situation, the current research tested the primary hypothesis that (H1) stress appraisals mediate the relationship between personality and the affordance of socially distanced online education. The hypothesis has been partially accepted in relation to the functioning of conscientiousness and neuroticism. The retrimmed structural model indicates that conscientiousness had a positive impact on the affordance of socially distanced online education when mediated through generalized life stress and online learning stress. This outcome supports the promotion of thoughts and behaviors underpinned by aspects of conscientiousness for two reasons. First, conscientiousness provides a channel through which online education can be appraised in a more positive manner; however, this would appear conditional on the opportunities afforded within a particular online experience for students to express conscientiousness as reward bearing (e.g., time management in meeting an assignment deadline, in being required to create and execute a plan of study). This draws attention to the issue of quality assurance, standardization, and the need for institutions to have a coherent plan of action and accountability. Second, thoughts and behaviors underpinned by aspects of conscientiousness provide a means to mitigate stress appraisals within daily life (partial acceptance of H2) and within the online learning environment.

Within the context of education, conscientious thoughts and behaviors can be conceptualized through reference to self-regulation as a "constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behaviour, guided and constrained by their goals and the contextual features in the environment" ([105]: 453). Conscientiousness is therefore a personality trait which lends itself to the main principles of self-regulation. Self-regulation can provide teachers and students with an achievement-focused framework to mitigate stress appraisals and promote the affordance of socially distanced online education. A recent study into online education provides support for this proposition in detailing how the level of self-regulation within a learning initiative determines stress, meaning that students who are poor self-regulators also

TABLE 1: Descriptive statistics of retained indicators.

Indicators	Frequencies of responses n (%)					M (SD)
	5	4	3	2	1	
EXT1	9 (3.1)	65 (22.2)	93 (31.7)	73 (24.9)	53 (18.1)	2.67 (1.10)
EXT2	29 (9.9)	65 (22.2)	73 (24.9)	87 (29.7)	39 (13.3)	2.85 (1.19)
EXT3	20 (6.8)	67 (22.9)	76 (25.9)	89 (30.4)	41 (14.0)	2.78 (1.14)
EXT4*	43 (14.7)	84 (28.7)	82 (28)	63 (21.5)	21 (7.2)	3.22 (1.15)
AGR1	31 (10.6)	98 (39.2)	71 (24.2)	68 (23.2)	25 (8.5)	3.14 (1.14)
AGR2	23 (7.8)	115 (39.2)	77 (26.3)	66 (22.5)	12 (4.1)	3.24 (1.02)
AGR3*	48 (16.4)	110 (37.5)	80 (27.3)	40 (13.7)	15 (5.1)	3.46 (1.07)
CON1	31 (10.6)	67 (22.9)	62 (21.2)	94 (32.1)	39 (13.3)	2.85 (1.22)
CON2	21 (7.2)	49 (16.7)	53 (18.1)	103 (35.2)	67 (22.9)	2.50 (1.21)
CON3*	27 (9.2)	64 (21.8)	97 (33.1)	70 (23.9)	35 (11.9)	2.92 (1.14)
NEU1*	45 (15.4)	92 (31.4)	71 (24.2)	64 (21.8)	21 (7.2)	3.25 (1.17)
NEU2	82 (28)	112 (38.2)	43 (14.7)	40 (13.7)	16 (5.5)	3.69 (1.17)
NEU3	53 (18.1)	103 (35.2)	69 (23.5)	46 (15.7)	22 (7.5)	3.40 (1.17)
INT1	14 (4.8)	38 (13)	112 (38.2)	86 (29.4)	43 (14.7)	2.63 (1.03)
INT2	19 (6.5)	60 (20.5)	96 (32.8)	87 (29.7)	31 (10.6)	2.82 (1.07)
INT3*	14 (4.8)	55 (18.8)	115 (39.2)	84 (28.7)	25 (8.5)	2.82 (.98)
GLS1	47 (16)	68 (23.2)	81 (27.6)	71 (24.2)	26 (8.9)	3.13 (1.20)
GLS2	23 (7.8)	69 (23.5)	101 (34.5)	75 (25.6)	25 (8.5)	2.96 (1.07)
GLS3	32 (10.9)	67 (22.9)	105 (35.8)	68 (23.2)	21 (7.2)	3.07 (1.08)
GLS4	17 (5.8)	43 (14.7)	85 (29)	93 (31.7)	55 (18.8)	2.57 (1.12)
OLS1	23 (7.8)	59 (20.1)	105 (35.8)	81 (27.6)	25 (8.5)	2.91 (1.06)
OLS2	50 (17.1)	62 (21.2)	93 (31.7)	61 (20.8)	27 (9.2)	3.16 (1.20)
OLS3	35 (11.9)	80 (27.3)	106 (36.2)	53 (18.1)	19 (6.5)	3.20 (1.07)
OLS4	53 (18.1)	82 (28)	68 (23.2)	63 (21.5)	27 (9.2)	3.24 (1.23)
AOL1	33 (11.3)	99 (33.8)	68 (23.2)	63 (21.5)	30 (10.2)	3.14 (1.18)
AOL2	27 (9.2)	81 (27.6)	102 (34.8)	65 (22.2)	18 (6.1)	3.11 (1.05)
AOL3	38 (13)	86 (29.4)	93 (31.7)	53 (18.1)	23 (7.8)	3.21 (1.12)
AOL4	44 (15)	105 (35.8)	69 (23.5)	52 (17.7)	23 (7.8)	3.32 (1.16)

Note: EXT: extroversion; AGR: agreeableness; CON: conscientiousness; NEU: neuroticism; INT: intellect; GLS: generalized life stress; OLS: online learning stress; AOL: affordance of socially distanced online education. * denotes reversed indicator.

TABLE 2: Overview of the variables.

	M (SD)	CA	AVE	CR	DV	Pearson's correlation							
						EXT	AGR	CON	NEU	INT	GLS	OLS	AOL
EXT	2.86 (0.89)	0.83	0.50	0.83	0.70	—	—	—	—	—	—	—	—
AGR	3.28 (0.88)	0.75	0.54	0.77	0.73	0.29*	—	—	—	—	—	—	—
CON	2.76 (0.99)	0.78	0.57	0.79	0.75	0.09	0.01	—	—	—	—	—	—
NEU	3.45 (0.99)	0.83	0.59	0.81	0.76	-0.29**	0.05	-0.20**	—	—	—	—	—
INT	2.76 (0.90)	0.85	0.66	0.85	0.81	0.31**	0.14*	0.08	-0.20**	—	—	—	—
GLS	2.93 (0.88)	0.78	0.52	0.81	0.72	-0.13*	0.05	-0.25**	0.42**	-0.07	—	—	—
OLS	3.12 (0.98)	0.88	0.66	0.88	0.81	0.07	0.01	-0.10	0.14**	-0.02	0.53**	—	—
AOL	3.19 (0.91)	0.82	0.55	0.82	0.74	-0.00	0.03	0.11	-0.07	0.04	-0.40**	-0.50**	—

Note: EXT: extroversion; AGR: agreeableness; CON: conscientiousness; NEU: neuroticism; INT: intellect; GLS: generalized life stress; OLS: online learning stress; AOL: affordance of socially distanced online education; M : mean; SD : standard deviation; CA: Cronbach's alpha; AVE: average variance extracted; CR: composite reliability; DV: discriminant validity. * $p \leq 0.05$; ** $p \leq 0.01$.

TABLE 3: Initially tested direct and indirect effects.

Direct and indirect effects		Std. β	SE	95% CI	
				Lower	Upper
EXT→	GLS	0.04	0.08	-0.12	0.20
AGR→	GLS	-0.02	0.06	-0.17	0.12
CON→	GLS	-0.17**	0.05	-0.33	-0.02
NEU→	GLS	0.48***	0.08	0.32	0.64
INT→	GLS	0.03	0.06	-0.11	0.18
	GLS→ OLS	0.59***	0.08	0.46	0.71
	OLS→ AOL	-0.55***	0.06	-0.65	-0.44
EXT→	GLS→ OLS→ AOL	-0.01	0.02	-0.07	0.03
AGR→	GLS→ OLS→ AOL	0.00	0.02	-0.04	0.06
CON→	GLS→ OLS→ AOL	0.05*	0.02	0.00	0.12
NEU→	GLS→ OLS→ AOL	-0.16**	0.03	-0.24	-0.09
INT→	GLS→ OLS→ AOL	-0.01	0.02	-0.06	0.03
	GLS→ OLS→ AOL	-0.33**	0.05	-0.45	-0.23

Note: EXT: extroversion; AGR: agreeableness; CON: conscientiousness; NEU: neuroticism; INT: intellect; GLS: generalized life stress; OLS: online learning stress; AOL: affordance of socially distanced online education. * $p \leq 0.05$, ** $p \leq 0.01$, and *** $p \leq 0.001$.

TABLE 4: Retrimmed direct and indirect effects.

Direct and indirect effects		Std. β	SE	95% CI	
				Lower	Upper
EXT→	OLS	0.15*	0.07	0.01	0.29
CON→	GLS	-0.16**	0.05	-0.32	-0.01
NEU→	GLS	0.49***	0.07	0.35	0.61
	OLS	-0.17*	0.08	-0.35	0.01
	GLS→ OLS	0.74***	0.11	0.57	0.88
	OLS→ AOL	-0.56***	0.06	-0.66	-0.45
EXT→	OLS→ AOL	-0.08*	0.04	-0.16	-0.00
CON→	GLS→ OLS→ AOL	0.07*	0.03	0.00	0.14
	OLS→ AOL	-0.10*	0.04	-0.20	-0.01
NEU→	GLS→ OLS→ AOL	-0.41**	0.06	-0.56	-0.29

Note: EXT: extroversion; AGR: agreeableness; CON: conscientiousness; NEU: neuroticism; INT: intellect; GLS: generalized life stress; OLS: online learning stress; AOL: affordance of socially distanced online education. * $p \leq 0.05$, ** $p \leq 0.01$, and *** $p \leq 0.001$.

experience higher degrees of stress associated with the demands of learning [106]. As shown within the current study, heightened stress appraisals connected to learning are likely to have a negative impact on the affordance of socially distanced online education. Moreover, conscientiousness and self-regulated learning have been linked to greater academic achievement outcomes with more successful students having higher levels of conscientiousness and a more expansive repertoire of regulation strategies [87, 88, 107, 108].

Concerning the finding that neuroticism had a significant negative impact on the affordance of socially distanced

online learning when mediated through generalized life stress and online learning stress appraisals, such a finding echoes much of what has been documented regarding the negative role of neuroticism. Neuroticism is known to promote the negative framing of experience [69, 70], the increased appraisal of stress within daily situations [71], and greater impulsivity and lack of control [72]. Reflecting a preference for avoidance-based coping strategies, neuroticism has further been linked to reduced test performance [109], reduced motivation to study [110], and increased absenteeism [111]. However, while conscientiousness and neuroticism are commonly understood as promoting contrary outcomes (i.e., one positive and one negative), beneficial instances of high conscientiousness and high neuroticism have been identified in relation to health behaviors [112]. Although neuroticism had an expected significant impact on generalized life stress (acceptance of H3) within the current study, there is partial evidence for a positive function of neuroticism in relation to its negative significant impact on online learning stress appraisal.

To understand this relationship, it is useful to also consider the relationship between extroversion and online learning stress appraisal in contrast. Extroverted individuals are typically energetic, sociable, lively, and assertive whereas neurotic individuals tend to be withdrawn, irritable, anxiety, moody, and self-conscious. The characteristics of online learning within the current study appear to lend themselves more toward neurotic students than toward extroverted students. As mentioned, previous studies have found that online learning causes stress and anxiety in some students due to a lack of direct social interaction with peers and teachers [51, 53]. The outcome of the current study indicates that while there was no significant relationship between extroversion and generalized life stress appraisal, there was a significant direct relationship between extroversion and online learning stress appraisal with extroverted students having higher online learning stress appraisals than neurotic students. Within the current research context, online learning therefore offers some benefits to neurotic students such as a reduction in stress caused by the challenges of direct social interaction.

In contrast, the removal of direct social interaction opportunities in favor of a more solitary online learning experience creates stress for extroverted students. This finding should be of concern as the current study also found a strong negative relationship between online learning stress appraisal and the affordance of socially distanced online education (acceptance of H5). To better satisfy extroverted students, online learning initiatives are therefore encouraged to provide direct social interaction opportunities while also retaining opportunities—but not rewards—for more isolated activities which favor more neurotic students. Finally, the appraisal of generalized life stress functioned as a positive indicator of the appraisal of online learning stress (acceptance of H4) which provides evidence to support the idea that the stressors of daily life relating to the pandemic influence stress appraisals within an online learning situation.

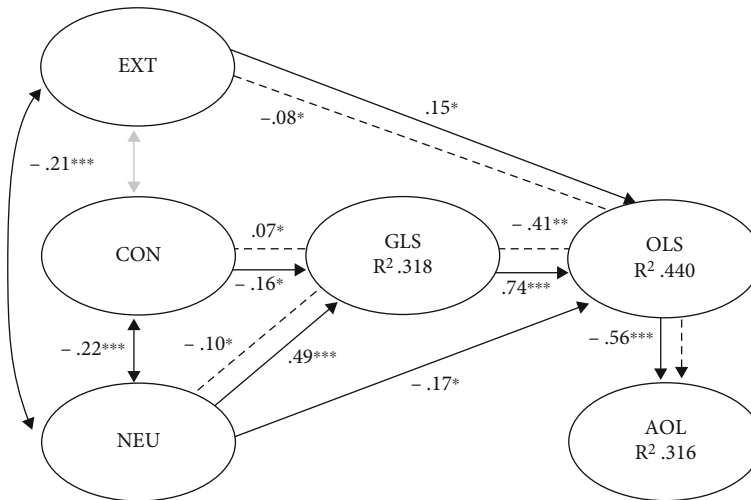


FIGURE 1: The retrimmed structural model ($\chi^2 = 421.021$ (df = 221), $p \leq 0.001$, NC = 1.905, TLI = 0.923, CFI = 0.933, and RMSEA = 0.056). Full lines denote direct paths while broken lines indicate indirect paths. * $p \leq 0.05$, ** $p \leq 0.01$, and *** $p \leq 0.001$.

7. Conclusion

As a proactive teacher-researcher response to the dramatic changes experienced surrounding the novel coronavirus pandemic, the current study has focused on the shift toward the provision of socially distanced online education within the context of a Japanese information systems university. Attention has been given to the impact of personality traits on the affordance of socially distanced online education mediated through generalized life stress and online learning stress appraisal. While personality traits are relatively stable across the lifespan, the current study suggests that teachers should make structured efforts to promote the principles of conscientiousness through self-regulation. Conscientiousness within the current student sample promoted positive outcomes although, and perhaps reflecting the fact that the research context is a nonelite university, conscientiousness was found to be the equal weakest personality trait alongside intellect. Moreover and of concern is the fact that neuroticism and agreeableness were found to be the most prevalent traits within the sample population. Therefore, the author amplifies the view that “university students must be trained in self-regulated learning behaviours and made aware of the pitfalls of a lack of regulation or dysregulation in one’s learning” ([106]: 11). This guidance is given further significance through research highlighting links between self-regulation and academic achievement in online environments [113, 114]. If a socially distanced student population is low in conscientiousness and intellect (and high in neuroticism and agreeableness), then it is imperative for teachers to promote conscientious behaviors through a framework of self-regulation. It is further necessary to structure online educational provisions in a manner which rewards conscientious actions as dictated via the principles of positive self-regulation (e.g., time management, strategic planning, goal setting, and help seeking).

While the model tested in the current study has produced several outcomes which can be used to better inform suitable teaching pedagogies, within the boundaries of Jap-

nese higher education, these have little chance of implementation beyond the initiatives of individual teachers due to institutional and academic inertia. It has been documented how Japanese universities were poorly prepared for the switch to the provision of online education at such short notice [35–37]. Although restrictions surrounding the pandemic caught many nations off-guard, the nature of Japan’s lack of preparedness reflects characteristics innate to the education system itself. These include an absence of quality assurances relating to faculty competencies and qualifications, an absence of accountability for poor teaching materials and syllabus designs, and a lack of direction concerning standardization and assessment practices. Relative to these concerns, a recent exploration of online self-regulation within context cautions how “the re-designing of face-to-face course materials within the current landscape requires conceptual and philosophical reflection about the nature of teaching and learning, stakeholder roles and the relationship between teachers, learners and teaching materials within digital learning communities” [115]. In a landscape of diminished academic accountability, normalized via a cultural imperative for conflict avoidance, such information is easily dismissed. In times of socially distanced online education, possessing academic knowledge relevant to the needs of students alongside the professional competencies required to deliver effective teaching solutions is paramount to a generation of students who have missed out on a traditional university experience.

Data Availability

The quantitative data used to support the findings of this study have not been made available due to the nature of participant consent.

Ethical Approval

Ethical approval was not required by the research institution due to the nature of the research.

Consent

All participants were informed about the content of the research and that their participation was voluntary and subject to no conditions or agreements. Participants were further informed that individual data would not be disclosed while cumulative data would be used for the purpose of research and publication.

Conflicts of Interest

The author declares no conflict of interest.

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