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Extraversion in COVID-19 Coping

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Abstract: Extraversion, a Big Five personality trait, has been identified as a significant factor in COVID-19 positive coping—yet, relevant research is conflicting. Studies have not situated the influence of extraversion within a geographical and historical context. Thus, a sound base is lacking for assessing when opposing results regarding extraversion and COVID-19 positive coping are likely to result. Furthermore, extraversion with respect to COVID-19 coping has not been considered concerning other-directed learning in contrast to self-directed learning. To establish a sufficiently sound base, an examination of the range of high-ranking Google Scholar results on extraversion and COVID-19 coping from different countries during the pandemic's various waves—pre and post vaccine introduction—is undertaken. The same are then considered for insights into public opinion. Following, extraversion is compared with other-directed learning and differentiated from self-directed learning. An understanding is thus presented for assessing when extraversion will necessarily be an effective personality trait for COVID-19 positive coping and when it will not. Extraversion's effect will be found inherently inconsistent for identifying COVID-19 positive coping as a result, because of its dependence on other-directed learning. The conclusion: COVID-19 positive coping stability is contingent on personal values that guide self-directed learning, rather than other-directed extraversion.

Keywords: extraversion; Big Five; coping; COVID-19; other-directed learning; self-directed learning; Google Scholar; vaccine; public opinion; personal values

1. Introduction

The Big-Five Theory of personality traits identifies five broad dimensions: extraversion, agreeableness, conscientiousness, openness, and neuroticism [1] advocated for since the early 1990s [2]. The reliability of these five dimensions emerged over decades-long factor-analysis of participant descriptions in relation to ordinary language traits [2]. Extraversion, regarding the Big Five, has been defined as a predisposition to experience positive affect and usually has the highest correlations with measures of well-being [3]. The focus of extraversion is interpersonal skills as individuals characterized by this personality trait are friendly, social, outgoing, energetic, ambitious, confident, enthusiastic and seek stimulating conversation with others [4]. Extraversion has been specified as the Big Five personality trait socially relevant with respect to positive coping with the COVID-19 pandemic [5].

As a result of a new virus first reported by the World Health Organization (WHO) in December 2019, and declared a pandemic 11 March 2020 [6], various waves have been reported of COVID-19. In Iran, for example, five waves of the COVID-19 pandemic were identified between March 2020 and December 2021 [7], when COVID-19 became endemic throughout the world [8]. These five waves noted in Iran are in contrast to, for example, nine waves specified in the UK [9], and seven waves identified in Canada [10], among differences in waves reported around the world. Yet, to date, there has been no peer reviewed research documenting the total number of waves and their time periods internationally. As a result, the timeline created by the WHO represents the best estimation of COVID-19 waves [8]. What the WHO timeline shows in its breakdown by country is that what represents a wave and when it occurred is entirely country-dependent.

Coping is an individual's reaction to a perceived threat or uncertainty to alleviate their stress [11]. It can be adaptive (positive) or maladaptive (negative) dependent on the context in which the coping occurs [12]. Coping strategies are thus a progression with respect to people's reaction to stress [13]. When an event is perceived as a challenge (or, for that matter, an opportunity [14]) the response is adaptive; when it is perceived as a threat, a maladaptive response is the result [15]. Coping with challenges might lead variously to problem solving and information seeking in using self-reliance and/or support-seeking in either being assertive or accepting limitations based on identified priorities [15]. Coping with threats, on the other hand results in helplessness from feelings of being out of control and/or the need to escape, causing rumination, refusal to cooperate and social isolation resulting from a withdrawal from social interactions [15]. Accordingly, whether an individual perceives an occurrence as a challenge (or even an opportunity) or a threat will define their coping as either adaptive or maladaptive and is important to whether extraversion as a personality trait will determine the type of coping as positive or negative. What's more, the interpretation of an occurrence as a challenge, opportunity or threat may change in the course of an encounter with a conflicting situation like COVID-19 [16]. As such, personality traits like extraversion can be expected to have different effects in the various waves of the pandemic [17]) which may be further influenced by untrustworthy information based on conspiracy theories evident during COVID-19 [18]. In these circumstances, the intensity of the perceived danger is augmented, increasing the probability of personality traits, like extraversion, being expressed in coping [19].

Faced with increasing rates of infection producing uncertainty throughout the course of the pandemic, coping with COVID-19 thus became a long-term, but varying, effort [20]. When noting extraversion as the Big Five trait most likely to predict how people coped with COVID-19 [21], it is therefore important to consider how people differentially responded to the: (1) changing social climate, (2) consecutive waves of the pandemic, (3) their individual country's viewpoint, and (4) introduction of vaccines for COVID-19 December 2020 [22]. Consequently, it is important to situate research on extraversion geographically and historically so that changes in relation to how it permitted people to cope with COVID-19 are both recognized and understood within their context, rather than assuming that the role of extraversion has been consistent, though conflicting [23,24], throughout each of the various waves.

The purpose of this work will be to (1) understand the results of examples of studies on coping with COVID-19 both geographically and historically from the perspective of extraversion, (2) compare this with public opinion—specific to each country and with respect to the prominent societal issue particular to a country during each of the waves, most specifically in relation to vaccines—and (3) provide the context for understanding why there are varying results for these studies by comparing extraversion to other-directed learning and in contrast to self-directed learning. The significance of this undertaking is that it is the first such study of its kind. In understanding its context, through comparing extraversion with other-directed learning, it becomes clear that, in extraversion depending on other-directed learning, the ability of people to cope with COVID-19 who display the trait of extraversion is both internally unstable and may be expected to produce conflicting results comparatively. This work is undertaken to demonstrate that extraversion cannot be considered in itself when assessing COVID-19 coping. Rather, the particular wave in which extraversion is studied for an individual country must be taken into consideration as the effect of time, particularly regarding the introduction of vaccines, provides the social structure on which extraversion as a coping mechanism is dependent.

The principal conclusions are that caution should be used in identifying extraversion as socially effective in positive coping with COVID-19 since this type of coping is dependent on other-directed learning from what the extraverted individual considers trusted sources—sources that may or may not be available when information is sought. In contrast, coping dependent on self-directed learning, based on what an individual personally values with respect to learning—within a particular context after following a self-developed process [25,26]—can be expected to produce an individually lasting and satisfying ability to cope with COVID-19. Furthermore, the results of such a process are ones that

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can be identified by researchers through individual psychological testing focused on the important factors regarding self-directed learners [27].

2. Materials and Methods

The materials and methods of this study involve placing peer reviewed research regarding the effects of extraversion on COVID-19 coping within a geographical and historical context and then examining the results from the perspective of public opinion regarding the most salient COVID-19-related issue in each country during a COVID-19 wave, particularly in relation to vaccines.

2.1. Materials

The materials for this study were selected as representative research on the effect of extraversion with COVID-19 coping conducted over as many COVID-19 waves as have been studied by researchers from various countries. Google Scholar was chosen as the search engine for this investigation as a 2019 study of twelve academic search engines recognized it as the most comprehensive academic search engine [28]. That Google Scholar is the most comprehensive search engine for academics was additionally reconfirmed with 2023 research [29]. The examples of research to be highlighted were selected as the ones that received the highest relevant ranking in relation to each individual search performed. It may be argued that selecting studies in this manner is questionable as there are inaccuracies, duplications, omissions and misattributions of publications in Google Scholar [29]. Still, Google Scholar compares well with Scopus as a search engine, which has an estimated 12.6% duplicates to Google Scholar's 10% [28]. Furthermore, Google Scholar provides a multidisciplinary database found to outperform the coverage of either Web of Science or Scopus [28].

2.1.1. Wave 1

Regarding the results of a late February 2023 search of "COVID-19 coping extraversion first wave", a United States study of 2,066 adults in March 2020 found higher extraversion was associated with engaging in more preparations and was linked to more optimistic outcomes of the pandemic and shorter duration estimates until society goes back to normal and the United States economy recovers [30]. Also conducted March 2020, in a Slovakian study of 2,722 adults, extraversion was seen to present a predisposition to experience positive affect, bringing on the highest correlations with measures of well-being. In that extraversion promoted better access to social support, and openness through more flexible coping with the situation, these traits were anticipated to produce high resilience. However, extraversion was not found to be a predictor of resilience. Extraversion did predict stress from social distancing [3]. For Russian university students whose data were collected in March and April 2020, extraversion positively predicted a focus on: diet and nutrition, physical activity, stress management, and restorative sleep. Although it was negatively associated with substance abuse, it was also more likely to expose students to contracting COVID-19 [31]. In another study conducted during March and April of 2020, Greek research of university students found extraversion had little to no effect on student satisfaction with online learning [32]. In Germany, studies regarding extraversion (among the other Big Five personality traits) and COVID-19 coping were undertaken with the help of five separate surveys conducted between March 2020 and May 2020 (when the lockdown ended in that country) on initially 290 adults, decreasing steadily to a low of 199 adults by the fifth survey. What was found is that participants scoring higher on extraversion had a greater stress reduction in comparison with other personality traits during the lockdown but higher post-lockdown stress levels. Extraversion was not associated with loneliness during the pandemic. Yet, unexpectedly, the extraverted reacted strongly negatively during the lockdown, presumably because of the contact restrictions during that period. [33].

Among the search results for "COVID-19 coping extraversion first wave", two studies reported on extraversion and coping with COVID-19 without indicating the exact wave the studies took place—instead referring to "the early months" of COVID-19. In the online study of Italian adults, extraversion was found to protect against worry [34]. A sample of 625 Israeli-Palestinian college

students during the first three months of the pandemic found extraverts more likely to employ greater problem-focused methods of coping and fewer maladaptive emotion-focused strategies for coping [35]. For the purpose of this investigation, these studies are considered to be part of those conducted during Wave 1

Some studies returned in the search of "COVID-19 coping extraversion first wave" included or compared extraversion and coping during the first and one other wave of COVID-19. An Austrian study of 145 participants during the first and second wave of COVID-19 found that women were less resilient than men although they demonstrated greater extraversion. Those under 30 expressed more loneliness, yet their level of extraversion was comparable to others—with extraversion significantly mediating the relationship between participants' partnership situations and psychological distress [36]. In a German study of adults conducted between early April 2020 and early September 2020, extraversion was associated with increases (i.e., positive trajectories) in perceived stressfulness between early April 2020 and early July 2020 and decreases (i.e., negative trajectories) in perceived stressfulness thereafter [37]. In contrast to the research on adults, another study in Germany during both the first (mid-March 2020—early May 2020) and second waves (mid-May 2020—early July 2020) of 843 adolescents found that highly extraverted adolescents experienced higher rates of depression, with a third of this total effect mediated through increases in loneliness—results that contradict previous work evidencing lower depressiveness among extraverted youth and challenging the notion of extraversion as a protective factor. The overall rise in depressiveness was seen to result mainly from an increase of anhedonia rather than negative mood [38]. In Slovakia, April 2020, extraversion predicted positive purchasing and stockpiling as well as negative emotional response. Then, it was also only extraversion of the Big Five that predicted a decrease in purchasing and stockpiling once the socially perceived need for purchasing and stockpiling was reduced during the second wave, September 2020. This was seen to result from the ability of extraversion to increase reliance on interpersonal sources of information, facilitating feelings of threats. especially when this is the dominant emotion shared in the society [39]. A Norwegian study of 5,783 residents collected data April 2020 and December 2020 in which exhibiting anxious-depressive symptoms in the early phases of the pandemic was found the strongest predictor for similar symptoms 9 months after the outbreak with extraversion a pronounced protective factor for mental distress [40].

2.1.2. Wave 2

A subsequent Google Scholar search was then undertaken early March 2023 for "COVID-19 coping extraversion second wave". From this search, 1,096 Canadian adults were surveyed online between June and July 2020 finding that extraversion was positively and significantly related to emotional, psychological and social well-being [41]. A May 2020 study of 51 adults in Germany showed extraversion correlated with poorer coping during strict contact restrictions as well as an improvement as these restrictions were relaxed [42]. Regarding the second wave, a study of 34,629 individuals in relation to the Survey of Health, Aging, and Retirement in Europe of persons aged 50 and older from 27 European countries and Israel conducted from June to July 2020 did not observe associations between extraversion and COVID-19 precautionary behaviors (except for a weak association with using a disinfectant) [43]. A study of 123 participants undertaken in Xinjiang, China, during the second wave in that area found that extraversion was negatively identified with minority ethnicity, being worried about the pandemic, and spending more time on pandemic information [44].

This search also returned results on other studies of extraversion and coping with COVID-19 that either studied later waves or did not mention when the study was conducted, although the date of research can be surmised in relation to the publication date of the article. A study of United States adults mid-June 2020 found extraversion to be negatively correlated with the COVID-19 anxiety syndrome and being younger (that is, in one's thirties) and was associated with higher levels of COVID-19 anxiety and generalized anxiety and depression symptoms [45]. A further United States study of women found that higher extraversion was associated with greater video chat usage prior to and following the beginning of the pandemic [21]. Unfortunately, the date when the data were collected is not mentioned for this study nor for the larger study of which it was a part. However, as

the research on the larger study was published October 2020, the data collection occurred before this date [46].

2.1.3. Waves 3 and 4

The second week of March 2023, two additional searches were done through Google Scholar—one with respect to the third wave, "COVID-19 coping extraversion third wave" and the other regarding the fourth wave, "COVID-19 coping extraversion fourth wave". The third wave of COVID-19 was studied with respect to 203 residents of Hong Kong and found that extraversion not only had significant correlations with mental health concerns but also served as a significant predictor of these difficulties. Additionally, individuals with high extraversion ratings tended to adopt active problem-focused coping and adaptive emotion-focused coping [47]. During the fourth wave of COVID-19 in Japan, 113 medical students were tested for pandemic coping with the finding that extraversion was a personality trait protective of depression [48]. An Iranian cross-sectional study was performed during the fourth wave of COVID-19 outbreak in April 2021 on 225 adults assessing personality traits and coping with COVID-19. The extraversion trait—related to overall energy, assertiveness, sociability, and positive insight about the future—was found to help extroverts deal with psychological consequences of the COVID-19 outbreak. Extroverts were found able to obtain more social support in this period by using their verbal abilities and by generating intimate relationships, resulting in their greater satisfaction and happiness [49].

2.1.4. Waves 5 and Higher Waves

A Google Scholar search also conducted the second week of March 2023 of "COVID-19 coping extraversion fifth wave" and one of "COVID-19 coping extraversion sixth wave" produced a result of research conducted between the fourth and fifth wave in Iran in which an online survey was conducted with 1,429 adult participants. In this study, extraversion was found to be a positive coping trait with respect to decreased depression and anxiety regarding COVID-19 in comparison with other personality types [50]. Also, between the fourth and fifth wave in Japan, 417 nurses were surveyed to assess their ability to cope with COVID-19. In this study, extraversion was found to play no role in protecting against depression or anxiety and did not predict better coping [51]. There were no studies found that concentrated on the sixth wave alone when this search was undertaken. However, a UK study of extraversion regarding 8,772 people in relation to coping with COVID-19 (among assessing the other four personality traits of the Big Five) is unique in combining seven different COVID-19 waves from April 2020 to January 2021 [9]. What was noted is that, in the initial period of COVID-19, extraversion caused negative coping. After this period, this was not seen to be the case. Yet, in the Black, Asian, and minority ethnic community, extraversion was found a stronger predictor of mental health deterioration than among White British. A November 2021 study of 616 third year Chinese medical students indicated that perceived stress was the strongest indicator of learning burnout and related negatively with extraversion [52].

2.2. Methods

The materials have been discovered in relation to the role of extraversion in COVID-19 coping as a result of the various Google Scholar searches that were performed during late February and the first two weeks of March 2023 in relation to the COVID-19 waves identified by the WHO timeline [6]. The method then employed involves the results being tabulated to present each country alphabetically with respect to every consecutive wave. For the one study comparing 27 European countries plus Israel, the 27 countries have been listed as if they were one country and the information regarding Israel appears on its own line. If a country had research conducted regarding extraversion in COVID-19 coping over more than one wave, the effects of extraversion with respect to COVID-19 coping have been listed separately under each of the appropriate waves. If a study was conducted over more than one wave consecutively then the columns listing the appropriate waves have been merged into one column. In other words, for any particular country, there may be differing

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information regarding extraversion listed separately under more than one wave as well as results covering a number of waves. Germany is the example of a country where each of these type of results is represented.

The WHO timeline [6] identifies six waves internationally; however, although there was one study of the seven different waves for a particular country (the UK), there were no studies of the sixth wave conducted by any countries returned during the relevant Google search conducted the second week of March 2023. Furthermore, the study of seven different waves is unique in studying a wave past the fifth and the WHO timeline itself notes only six distinct waves. Consequently, the method of organizing the various studies by country and by wave is extend to Wave 5 alone. As the purpose of this investigation's method is to demonstrate the range of COVID-19 coping with respect to extraversion over the course of the COVID-19 pandemic, especially in relation to vaccine introduction, restricting the number of waves examined to the first five is reasonable. It is notable that, by the fourth wave, all countries had COVID-19 vaccines available to their populations.

Based on these tabulated results, this method then has been extended to subsequently tabulate public sentiment with respect to the introduction of COVID-19 vaccines for each country identified as conducting research on COVID-19 coping in any of the five waves. The purpose will be to determine the societal views particular to each country regarding COVID-19 and then relate them to the type of COVID-19 coping demonstrated by those found to be extraverted in the studies that have been returned in the various Google searchers performed. This additional research has been undertaken to identify the relationship between public opinion and extraversion; it has also been tabulated.

3. Results

Table 1 represents the results of tabulating research returned from various Google Scholar searches conducted between late February and mid-March 2023 on the effect of extraversion in COVID-19 coping by country over each of the first five waves of the pandemic found during the searches conducted to establish the materials for this study.

Table 1. Effect of extraversion in COVID-19 coping research results for various countries returned on an early 2023 search of Google Scholar, in relation to the first five consecutive pandemic waves.*†.

Country	Wave 1	Wave 2	Wave 3	Wave 4‡	Wave 5
Austria	Women display more than men, but less resilient/those under 30 lonelier/Mediated partnerships and psychological distress.				
Canada		Higher emotional, psychological and social well-being/ Fewer mental health issues			
China		Negatively identified with: minorities, pandemic worries, spending time on pandemic information	Significant predictor of mental health concerns in Hong Kong/High levels adopt active problem-focused coping, adaptive emotion-focused coping		Related negatively to perceived stress and learning burnout

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Europe (27 countries)		No association with COVID-19 precautionary behaviors			
Germany	Increases in perceived stressfulness	Poorer coping during strict restrictions/ Improvement as restrictions were relaxed	Decreases in perceived stressfulness		
	High rates in adolescents, high depression resulting from anhedonia rather than negative mood, a third of these from loneliness				
Greece	No effect on student satisfaction with online learning				
Iran				Obtained more social support using verbal abilities and generating intimate relationships, resulting in greater satisfaction and happiness	Decreased depression and anxiety
Israel/Palestine	Employed greater problem-focused methods of coping and fewer maladaptive emotion-focused strategies for coping	No association with COVID-19 precautionary behaviors			
Italy	Protective against worry				
Japan				Protective of depression in medical students	Played no Protective role against depression or anxiety/ Did not predict better coping
Norway	Protective factor for depression and anxiety		If depressed and anxious in wave 1, more so in wave 3		
Russia	Predicted focus on: diet, nutrition,				

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	physical activity, stress management, restorative sleep/Negatively associated with substance abuse/More likely to be exposed to COVID-19	
Slovakia	Not predictive of resilience/Better access to social support, openness through more flexible coping/ Predictive of positive purchasing and stockpiling and negative emotional response	Predictive of decrease in purchasing and stockpiling once socially-perceived need for purchasing and stockpiling was reduced
United Kingdom	Negative coping	Negative coping not found in White majority / Black, Asian, and minority ethnic community a stronger predictor of mental health deterioration
United States	Associated with more preparations, more optimistic outcomes, shorter pandemic duration and US economy recovery estimates	Negatively correlated with COVID-19 anxiety in general/In young adults, associated with higher levels of COVID-19 anxiety and generalized anxiety and depression symptoms
	Greater video chat usage in women	

* The time period defining a wave differs for each country. †Any research conducted sequentially over more than one wave is noted by the data being entered in the relevant number of merged cells. ‡ By Wave 4, vaccines for COVID-19 were available in all countries.

3.1. Extravrsion and Geographical Differences

In relation to the searches done on Google Scholar to identify articles on extraversion and COVID-19 coping, there were 14 countries in which research was conducted on their populations as well as one research article that compared 27 European countries and Israel for which information could be gleaned regarding extraversion and COVID-19 coping. Generally, the publications were concerned with all the Big Five personality traits in this regard. Therefore, it was necessary to extract the information particular to extraversion from most these articles. Only four of the publications were specifically focused on extraversion, and two of these compared extraversion with neuroticism. The

four countries that directly investigated extraversion were Austria, Germany, Canada, and China (Hong Kong). It cannot be known what difference it made to the results to investigate extraversion as one of the Big Five personality traits or to consider it separately.

It is hypothesized that dividing the different countries into three geographic areas of the world—Europe (plus Israel), Asia, and North America is relevant in making geographical and historical comparisons. Europe and Israel share a common history through religion, and their economic development is interconnected [53]. Asia has separate, though country-specific, traditions from the rest of the world [54] and North America is unique in having a historical development with an aim to free immigrant individuals from ancestral constraints yet doing so by gaining title to aboriginal land [55].

3.1.1. Europe and Israel

The European countries individually represented in the research regarding extraversion and COVID-19 coping include Austria [36], Germany [37,38,42], Greece [32], Italy [34], Norway [40], Slovakia [3,39] and the United Kingdom [9]. As well, 27 European countries were studied together along with Israel [43], for which an independent study was also conducted including Palestinians [35]. Although it is possible to divide Europe into four diverse regions [56], European countries generally are divided into Northern Europe and Southern Europe as the former are bound by Protestant traditions and early industrialization [57] while the latter are connected by Catholic/Orthodox traditions and later industrialization [58]. In this respect, the Northern European countries are Austria, Germany, Norway and the United Kingdom while the Southern European countries are Greece, Italy and Slovakia. Although Israel is not a Southern European country, it has been included in recent research on Southern Europe because of its geography [59]. If geography, religious traditions and industrialization matter to what differentiates Northern from Southern Europe, then contrasts between how extraversion relates to COVID-19 coping are hypothesized to also be evident.

The results from Northern Europe, in comparing those of Austria, Germany, Norway and the United Kingdom show, that during Wave 1, extraversion led to negative coping as a result of less resilience, depression and anxiety with respect to COVID-19. This negative coping; however, decreased either in Wave 2 (UK) or Wave 3 (Germany). From that point on, extraversion was correlated with a decrease in stress associated with COVID-19, that is, except for minority ethnic communities expressing extraversion, where it was a strong predictor of mental health deterioration; true for each of these European countries.

These findings contrast as expected with those of Southern Europe and Israel where extraversion was found to be protective against worry even in Wave 1. Nevertheless, this protective quality did not improve resilience, as people were dependent on their social connections to mitigate their negative emotions. In Slovakia, in particular, this extended to stockpiling behavior in Wave 1. Yet, by the time of Wave 2, extraversion coincided with there no longer being precautionary behaviors undertaken.

Given this support demonstrated for the hypothesis, it can therefore be considered that the findings of the 27 countries in Europe, plus Israel [43], were skewed towards the effect of extraversion found in the Southern European countries since the results were similar to those of these countries. However, this cannot be tested as the authors of the article in question did not break down their results by individual country.

3.1.2. Asia

The Asian countries for which results were available regarding extraversion and COVID-19 coping with respect to the Google Scholar searches undertaken March 2023 include China (three waves), Iran (the last two waves), Japan (the last two waves) and Russia (Wave 1). The most salient feature of Asian countries is the division between those countries that have historically been democracies and those that have been managed by dictatorships. Although Hong Kong has been grouped with China since its return to China in 1997 [60], traditionally, it has been a democracy [61],

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unlike the rest of China that has been ruled by dictatorship. In this respect, then, Hong Kong economically still compares more with Japan than the rest of China [62]. Furthermore, although China, Russia and Iran differ in many respects, each is, and has been, a dictatorship [63].

Comparing the areas that are democracies: in Hong Kong during Wave 3, extraversion was significant predictor of mental health concerns in Hong Kong. Although in Wave 4, extraversion was seen to be protective of depression in medical doctors, by Wave 5 in Japan—once vaccines were readily available for COVID-19—extraversion was seen to have no protective value against depression, anxiety, or better coping. These results are in contrast to those found for the dictatorships. In China, except for minorities, extraversion was seen to correlate with fewer pandemic worries and spending less time on pandemic information during Wave 2. By Wave 3, those who were highly extraverted adopted active problem-focused coping and adaptive emotion-focused coping. After vaccines became available, extraversion related negatively to both perceived stress and learning burnout. Although the data from Iran is only from after vaccines were introduced, those displaying extraversion were better able to maintain their social connections including intimate relationships and, as a result, sustained their happiness. By Wave 5, extraversion in Iran was found to decrease depression and anxiety. In Russia, the extraverted exhibited proactive behavior in relation to maintaining their health during the pandemic, including that they were less likely to abuse substances. However, extraversion meant that they were more likely to contract COVID-19. The result: the hypothesis is supported that whether an Asian country has historically been a democracy or dictatorship is relevant to COVID-19 coping regarding extraversion.

3.1.3. North America

The North American results are those from Canada and the United States. Although, in many respects, these countries are similar in their fundamental concerns with freedom and their views of aboriginal rights [64], Canada has a greater law-abiding, socialist tendency than the United States, which is more individualist and achievement-oriented in nature [65]. As a result of these differences, the expectation would be that extraversion regarding COVID-19 would differ for the two in a similar manner to what differentiates the two countries. Examining the results, even in Wave 2—before vaccines—extraversion in Canadians led to positive coping with higher emotional, psychological and social well-being and fewer mental health issues. On the other hand, in the United States, where there has been less trust in social institutions regarding COVID-19 [66], it was found that extraverted individuals were trusting of their own ability to recover from COVID-19 and that of the economy in Wave 1. On the other hand, by Wave 2, although extraversion provided positive coping against anxiety in general, it was associated with higher levels of COVID-19 anxiety and generalized anxiety and depression symptoms in young people. Over both of these two waves in the United States, an increase in the use women made of online chatting wasn't clearly a positive or negative result of extraversion. Thus, the hypothesis was supported that slight differences in these countries fundamental concerns mattered to their COVID-19 coping with respect to extraversion.

3.2. Extraversion and Wave-Related Comparison

What is most important in comparing the material of various waves of COVID-19 is the relationship between the time of the wave and the introduction of vaccines for COVID-19 for all countries. At Wave 1, there is little understanding of the virus that caused COVID-19 and, as a result, interventions were non-pharmaceutical in nature [67] and the public concern was mortality rates [68],[69]. By Wave 2, there was a better understanding of the cause of COVID-19, but intensive global research had yet to produce a vaccine [70]. During Wave 3, there was initially information that a vaccine would be soon introduced and then, with its introduction, people were beginning to be vaccinated [71]. By Wave 4, vaccines were available after a wait period [72]. By Wave 5, a percentage of the populations reported in Table 1 had been vaccinated; however, it also became known that vaccines lost their effectiveness after three months and booster shots were required to maintain immunity against COVID-19 [73].

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To understand the context of Table 1, Table 2 represents the research regarding countries reported in Table 1 with respect to the changing nature of country-specific public concerns in each of the five waves—initially with respect to mortality regarding COVID-19 and then, from the second wave onwards, concerning the introduction of vaccines.

Table 2. Research results regarding countries reported in Table 1 with respect to the changing nature of public concerns in each country with respect to each of the five waves as searched March 2023.*.

Country	Wave 1	Wave 2	Wave 3	Wave 4‡	Wave 5
Austria	Noted hospital admissions decrease may accompany a substantial increase in mortality	Feeling of vulnerability regarding COVID-19 was not decreased regarding anticipated development of vaccines			
Canada		Almost 60% had no degree of hesitancy related to COVID-19 vaccines			
China		Proud of China's involvement in developing vaccines but believed possibly too expensive for use by their entire families	76% of youths surveyed from November 2020 to March 2021 indicated their acceptance of a future COVID-19 vaccine		Only older individuals in mainland China and Hong Kong were reluctant to receive vaccine once they were available
Europe (27 countries)		Conspiracy theories regarding vaccines and an international Judeo–Bolshevik conspiracy became popular			
Germany	Increased cancer rates in children (possibly reflecting enhanced parental and pediatricians' attention to early symptoms) and coronary patients avoiding hospitals likely due to fear of COVID-19	67% of the population were hesitant to receive the vaccine because of possible side effects with almost 20% stating they would not receive the vaccine at all	Self-assignment to a risk group was in most cases not associated with an increased willingness to be vaccinated		

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	mortality rates				
Greece	Experiencing "cultural trauma" from increased mortality				
Iran				Vaccine acceptance rate was 70% in conjunction with a high death rate from COVID-19 although progress in vaccination was slow	Only 17% of Iran's population of 85 million received their first dose of a COVID-19 vaccine because country living under United States sanctions
Israel/Palestine	COVID-19 weight gain in girls and women considered acceptable — likely reason for increases in type I diabetes which is found to result in increased mortality	Familial Mediterranean Fever-associated genetic mutations may confer milder COVID-19 irrespective of vaccines			
Italy	Older patients may be more likely to die of COVID-19 because age-related changes in immunological functions				
Japan				Relatively late in beginning vaccination campaign, hindered by supply and bureaucratic problems resulting in challenges with procurement and distribution/No vaccine hesitancy	Negative sentiment toward vaccines dominated where concerns about side effects from AstraZeneca in particular outweighed fears of infection
Norway	Higher levels of "trained immunity" and serum "vitamin D" levels may have protected		Vaccine hesitancy based on political values and ideology even when controlling for trust		

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	from high mortality rates				
Russia	Larger households of extended families generally considered a health-protective behavior; might have contributed to higher social exposure producing greater mortality				
Slovakia	Increase vitamin D supplementation thought to correspond to decreased mortality	Various theories were spread about the detrimental effects of disposable face masks and respirators on the human body and political plans for using the pandemic and vaccines against ordinary people			
United Kingdom	High mortality considered to relate to previous cardiovascular disease, diabetes and low vitamin D particularly in the Black, Asian and minority ethnic group	Among the adult population, 16.6% were very unsure about vaccination, and 11.7% were strongly hesitant resulting from negative perceptions of vaccine developers, health services and conspiracy beliefs	Significant decrease in vaccine acceptance in comparison with Wave 2	For most citizens there was a significant decrease in vaccine acceptance in comparison with Wave 3 with speed, safety, efficacy, and quality control as key reasons for concern about receiving a vaccine	92% of people were vaccinated or intended to be, although vaccine confidence varied by age and ethnicity, with lowest confidence in young people and those of Black ethnicity
United States	Increased mortality associated with belief in conspiracy theories generated from social media and disbelief of information	Those who felt powerless were more susceptible to conspiracy theories with vaccine hesitancy increasing overall in comparison with Wave 1			

	provided by mainstream broadcast media

* The time period defining a wave differs for each country. ‡ By Wave 4, vaccines for COVID-19 were available in all countries.

3.2.1. Pre-vaccine

Wave 1 was the period for each country when the least was known about COVID-19, producing the greatest amount of speculation regarding mortality rates in relation to the pandemic. For those countries represented in Table 1, the public speculations regarding mortality associated with Wave 1 of COVID-19 are represented in Table 2. This research regarding public sentiment represents those articles with the highest rank on a Google search performed mid-March, 2023, of "Wave 1 [country name] COVID-19 speculation mortality rates". These are the results: Austria, the decrease in hospital admissions noted may accompany a substantial increase in mortality [74]; Germany, increased cancer rates in children may reflect enhanced parental and pediatricians' attention to children's early symptoms due to the fear of COVID-19 mortality rates [75], in contrast, coronary patients avoided seeking hospital care because of a fear of COVID-19 infections that could lead to death or to avoid burdening the overwhelmed healthcare system [76]; Greece, as a result of COVID-19, is experiencing "cultural trauma" from increased mortality [77]; Israel, weight gain in girls and women during COVID-19—considered acceptable—was found to be the reason for increases in type I diabetes, a leading cause of COVID-19-related death [78]; Italy, older patients may be more likely to die of COVID-19 because of age-related changes in immunological functions [79]; Norway, higher levels of "trained immunity" and serum "vitamin D" levels may have protected the population from high mortality rates [80]; Russia, larger households of extended families were generally considered a health-protective behavior; however the tradition might have contributed to higher social exposure and, hence, higher losses [81]; Slovakia, an increase vitamin D supplementation was thought to correspond to decreased mortality [82]; United Kingdom, high mortality considered to relate to previous cardiovascular disease, diabetes and low vitamin D particularly in the Black, Asian and minority ethnic group [83]; and in the United States, increased mortality was associated with a belief in conspiracy theories generated from social media and disbelief of information provided by mainstream broadcast media [84]. Particularly in the United States, but also noted in the United Kingdom, Wave 1 brought "fake news", producing and encouraging a lack of trust among these populations [85].

By Wave 2, what was speculated upon regarding COVID-19 specifically related to the development of vaccines. These results are with respect to those countries for which research data is reported in Table 1 and tabulated in Table 2. This research regarding public sentiment represents those articles with the highest rank on a Google search performed mid-March, 2023, of "Wave 2 [country name] COVID-19 speculation vaccines". The results are: Austria, the feeling of vulnerability regarding COVID-19 was not decreased as a result of the anticipated development of vaccines [86]; Canada, more than 40% of respondents reported some degree of vaccine hesitancy with respect to the development of COVID-19 vaccines—particularly poorer, less educated, non-white mothers of young children who were essential healthcare workers. In other words, almost 60% had no degree of hesitancy related to COVID-19 vaccines [87]; China, citizens were proud of China's involvement in developing vaccines but believed they may be too expensive to afford for their entire families [88]; in Europe as a whole, conspiracy theories regarding vaccines and an international Judeo–Bolshevik conspiracy became popular [89]; Germany, at this time, 67% of the population were hesitant to receive the vaccine because of possible side effects with almost 20% stating they would not receive the vaccine at all [90]; in Israel, it was speculated that Familial Mediterranean fever (FMF)-associated genetic mutations may confer milder disease course of COVID-19 irrespective of vaccines [91]; Slovakia, various theories were spread regarding the detrimental effects of disposable face masks and respirators on the human body and regarding political plans for using the pandemic against ordinary people, including plans for vaccines [92]; United Kingdom, among the adult population, 16.6% were

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very unsure about vaccination, and 11.7% were strongly hesitant resulting from negative perceptions of vaccine developers, health services and conspiracy beliefs. This means that the majority of the population were not vaccine hesitant. [93]; for the United States, those who felt powerless were more susceptible to conspiracy theories with vaccine hesitancy increasing overall in relation to Wave 1 [94]. Fake news during Wave 2 continued to influence the views of Americans, British and Canadians with little evidence that repeated fact-checks have enduring effects on beliefs about COVID-19 vaccination in these populations [95].

During Wave 3, the COVID-19 vaccine was introduced. As such, this was a transition period in which individuals were required to decide if they would be vaccinated or not. How populations reacted to this necessary decision is compared in relation to the countries examined with respect to extraversion in Table 1 as can be found in Table 2. This research regarding public sentiment represents those articles with the highest rank on a Google search performed the third week of March, 2023, of "Wave 3 [country name] COVID-19 decision vaccine 2020". The year 2020 was added to the search to ensure that the Wave 3 that was identified was within the period during which vaccines were introduced. This was necessary because not all countries had the same timeline for each of the waves they reported of COVID-19. The following represent the results: China, 76% of youths surveyed from November 2020 to March 2021 indicated their acceptance of a future COVID-19 vaccine [71]; Germany, self-assignment to a risk group was in most cases was not associated with an increased willingness to be vaccinated [96]; Norway, there was vaccine hesitancy based on political values and ideology even when controlling for trust [97]; United Kingdom, there was a significant decrease in vaccine acceptance in comparison with vaccine receptiveness in Wave 2 [98].

3.2.2. Post-vaccine

Wave 4 and Wave 5 were both periods during which COVID-19 vaccines were available. During Wave 4, vaccination required a wait period with the those in country-defined high risk groups being first to receive the vaccine [99,100]. Wave 5, in contrast, was a period when the vaccine was readily available in high income countries as a result of vaccine hoarding in these countries, meaning that many low income countries were still inadequately provided with vaccines by Wave 5 [101].

Three countries had Wave 4 results with respect to extraversion as indicated in Table 1—Iran, Japan and the United Kingdom. Therefore, it was these countries that were searched on Google Scholar using the following parameters in late March: "Wave 4 [country name] COVID-19 vaccine perceived limitation". The results of that search are provided in Table 2: Iran, vaccine acceptance rate was 70% in conjunction with a high death rate from COVID-19 although progress in vaccination was slow [102]; Japan was relatively late in beginning its vaccination campaign, hindered by supply and bureaucratic problems resulting in challenges with procurement and distribution, but not by vaccines hesitancy [103]; in the United Kingdom, there was a significant decrease in vaccine acceptance in comparison with Wave 3 with speed, safety, efficacy, and quality control as key reasons for concern about receiving a vaccine [98].

In relation to Wave 5, the Google Scholar search conducted in late March of the countries identified in Table 1 with research studies on extraversion included the parameters of "Wave 5 [country name] COVID-19 vaccination". The results are presented in Table 2: in China, after vaccines became freely available, a substantial proportion of older individuals in mainland China and Hong Kong were reluctant to receive them [104]; Iran, only 17% of Iran's population of 85 million had received their first dose of a COVID-19 vaccine as a consequence of living under United States sanctions [105].; Japan, the negative sentiments toward vaccines that dominated where concerns about side effects from Astra-Zeneca in particular and these outweighed fears of infection [106]; United Kingdom, 92% of people were vaccinated or intended to be, although vaccine confidence varied by age and ethnicity, with lowest confidence in young people and those of Black ethnicity [107].

3.3. Comparing COVID-19 coping and public opinion

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The results of Table 1 and Table 2 can be compared with respect to whether the coping demonstrated by the population of a particular country during a specific wave was either positive, negative or neutral and if public sentiment was positive, negative or neutral. Table 3 presents this comparison. With respect to each country and every applicable wave for that country there are two entries. The topmost indicates whether overall the COVID-19 coping as a result of extraversion was positive (+), negative (-) or neutral (o). The bottom entry specifies whether public opinion was for the most part positive (+), negative (-) or neutral (o) related the particular concern highlighted during the wave in question.

Table 3. COVID-19 coping as a result of extraversion described by research presented in Table 1 as predominantly positive (+), negative (-), or neutral (o) followed by whether public opinion in relation to the primary issue for a particular country during each wave found in Table 2 was positive (+), negative (-), or neutral (o).*.

Country	Wave 1	Wave 2	Wave 3	Wave 4‡	Wave 5
Austria	o	o			
	o	o			
Canada		+			
		+			
China		+	+		+
		+	+		+
Europe		o			
(27 countries)		-			
Germany	-	o	+		
	-	-	-		
Greece	o				
	-				
Iran				+	+
				+	o
Israel/Palestine	+	o			
	+	o			
Italy	+				
	o				
Japan				+	-
				+	-
Norway	+		-		
	+		-		
Russia	o				
	o				
Slovakia	o	+			
	+	-			
United	-	+	+	+	+
Kingdom	+	+	o	-	+
United States	+	o			
	-	o			

* The time period defining a wave differs for each country. ‡ By Wave 4, vaccines for COVID-19 were available in all countries.

In the 30 paired entries of Table 3, examining the top pair of the entry, there are 17 instances where extraversion was seen to provide positive COVID-19 coping; in 9 occurrences, the COVID-19 coping was found to be predominately neutral, and, in 4 cases, the COVID-19 coping was identified as negative as a result of extraversion. Thus, although extraversion has been cited as being the most protective of the Big Five personality traits with respect the COVID-19 coping [5], it is found to

provide positive coping only in just over 50% of situations worldwide when the searches were conducted. Confirming what has been judged by other researchers [23,24], this result supports that extraversion provides conflicting results regarding COVID-19 coping.

Of the pairs, 18 had the same results for both top and bottom, 12 did not. This means that almost 60% of the time the coping ability of extraversion is evidently similar to the nature of public opinion. In 5 of the situations where these two entries differed, one of them was neutral while the other was either positive or negative. Yet, in 4 of the cases COVID-19 coping was determined to be opposite to public sentiment, representing just over 13% of the cases. The reason in these 4 situations the entries of the two pairs were in opposition is the most important point to consider, given that this author's claim is that there is a correspondence between COVID-19 coping with respect to extraversion and public opinion. As such, the four instances to be discussed in relation to Table 3 are Germany during Wave 3, Slovakia for Wave 2, the United Kingdom in Wave 4, and the United States during Wave 1.

4. Discussion

This discussion will investigate the major discrepancies noted between the effect of extraversion on COVID-19 coping in comparison to public opinion for the particular countries in which this was noted during the specific wave period searched during March 2023. From this investigation, a discussion of the difference between the other-directed learning found with extraversion and self-directed learning will be considered. Finally, the limitations of the method employed will be stated.

4.1. Discrepancies between extraversion's effect on COVID-19 coping and public opinion

To examine why in some instances the effect of extraversion on COVID-19 coping differed from public opinion, the relevant data from each of Table 1 and Table 2 as represented in Table 3 will be examined, including additional research to clarify the reason for the discrepancy noted.

During Wave 3, in Germany, extraversion was found to decrease the perceived stressfulness of the pandemic. Yet, at the same time, there was a mistrust of public information regarding vaccines to the point that those self-assigning themselves to a risk group in relation to COVID-19 did not increase their willingness to be vaccinated. There is another study done during Wave 3 in Germany regarding the first large-scale uses of an app for digital contact tracing to track a chain of infection and contain the spread of a virus that corroborates this feeling of distrust for those who did not download the app. On the other hand, for those who did download the app, their trust in the app's perceived security and belief in its effectiveness were cited as psychological factors playing a key role in its adoption [108]. What this indicates, and is highlighted by those who conducted this app-related research, is that there were marked differences between the attitudes of the population and these were entirely dependent on trust in relevant authorities as the key factor of people's attitudes towards novel interventions. That the research represented in Table 1 and that of Table 2 for Germany during this wave depended on populations with different levels of trust thus represents the likely reason for the conflicting results regarding extraversion and COVID-19 coping and public sentiment with respect to vaccines.

In Slovakia, during Wave 2, those demonstrating the personality trait of extraversion decreased their purchasing and stockpiling of consumer goods once this was the socially expected response, yet, there was mistrust of information about COVID-19 protection as various theories were spread about the detrimental effects of disposable face masks and respirators and about politicians using the pandemic and vaccination for political gains against ordinary people. Further research into this discrepancy reveals that after the Slovakian government was seen by the population to handle Wave 1 of COVID-19 well, the government was considered by its citizens to have improperly handled the second wave by trying to assure people that everything was fine, relaxing rules, while at the same time blaming citizens for having limited discipline in responding to the pandemic [109]. This additional information—that the rules were relaxed and that the government was blaming the people for COVID-19 continuing to be present—represents why those who were extraverted would now no longer stockpile (there was no need as rules were relaxed) and at the same time there was distrust in the government.

For the United Kingdom, during Wave 4, there was a strong differentiation between the positive coping of the extraverted White majority and the negative coping of the extraverted Black, Asian, and minority ethnic community for which extraversion became a stronger predictor of mental health deterioration in this minority ethnic community than in previous waves. Yet, at the same time, the White majority displayed a significant decrease in vaccine acceptance in comparison with Wave 3. The problems identified with vaccines for this majority were the speed at which the vaccine was introduced, as well as its safety, efficacy, and quality control. Additional information regarding the United Kingdom with respect to Wave 4 identifies an important aspect to this change in the sentiment of the White majority, that is, most people had already received a booster of the vaccine and common reasons for additional booster refusal included the belief that the second vaccine was enough to keep them safe (59%) or that the booster will not offer any additional protection (49%). Furthermore, concerns were expressed about long-term effects on health (33%) and about whether the booster should be offered to others rather than themselves (22%) [110]. As such, this change in public opinion regarding vaccines wasn't with respect to them in general. Rather, it was about the number of boosters that were necessary to be protective. In this way, it is evident that there was no actual discrepancy between positive coping as a result of extraversion and public opinion regarding the COVID-19 vaccines in general.

Extraversion was associated with more preparations, more optimistic outcomes, shorter pandemic duration estimates and the thought that United States economy would recover during Wave 1. However, at the same time, increased mortality was associated with United States citizen's belief in conspiracy theories generated from social media and their disbelief of information provided by mainstream broadcast media. Why these differences were noted between the effect of extraversion on COVID-19 positive coping and public sentiment was that, although there were partisan differences in the perception of the health threat posed by COVID-19, the majority believed, along with the country's president, that the United States would recover from COVID-19 during the first wave. However, at the same time there was also a significant distrust of public health institutions in their focus on measures considered a threat to the economy and to personal liberties [111]. It was because these public health institutions were presenting information in opposition to the view of the president (supported by most United States citizens at that time) that the majority found these views of the public health institutions untrustworthy [112].

It has been noted that those who display the personality trait of extraversion will cope with COVID-19 differently dependent on (1) in what country people reside, (2) during which wave it occurred, (3) the status of vaccine introduction, and (4) whether the information is considered trustworthy by the extraverted individual. It can therefore be concluded that if extraverts have what they consider sufficient access to positive social interaction, they evaluate their sources as knowledgeable, and with providing the information they seek when they want it (resulting in the belief that they can trust their sources [113]) then extraverts will have positive coping with COVID-19. To the other extreme, it can also be concluded that if those displaying personality traits of extraversion have (in their view) insufficient contact with adequate sources, those they do have contact with are negative, lack knowledge or are unable to express what they know so it is comprehensible and, consequently, the information they provide is untrustworthy, then extraverts will have negative coping with COVID-19. Coping somewhere in between these extremes then will depend on contacts demonstrating some, but not all, of the variables for trustworthiness.

4.2. Other -directed versus self-directed learning in extraversion regarding COVID-19 coping

Given that the ability of extraversion to permit positive coping with COVID-19 depends on the appropriate nature of the aforementioned variables, it is not a stable measure of coping for COVID-19. This is because these variables relate to the information that extraverts gather based on other-directed learning. Other-directed learning has been defined as a process in which someone other than the learner controls the learning including the requirements, objectives, resources, activities and evaluations [114]. Under other-directed conditions, learning occurs as a result of guidance and direction of an "other," such as family, friend, colleague, broadcaster, teacher or researcher [115]. In

this regard, examples of pursuits promoting other-directed learning concern media employed by these "others" and may include listening to a phone conversation, reading message boards, following an online a group chat, watching telecasts, studying podcasts, completing courses, attending lectures, taking part in conferences, and participating in workshops. In each of these cases, the learner accepts the predesigned curriculum of the learning process without question [116] as the point of the learning is to incorporate a way of interpreting information about COVID-19 from a perspective developed externally from the extraverted person.

In contrast to the other-directed learning that is the focus of extraversion, self-directed learning—identified as the most appropriate form of learning for adults [117] and a form of learning from which potentially anyone can benefit [118]—is demonstrated when learners take responsibility for organizing and managing their own learning based on what they personally value [116]. They do this through: identifying personal knowledge gaps [119]; critically considering information that they seek out on their own [120]; diagnosing their requirements, identifying their goals, selecting strategies, and designing their evaluations for performances and outcomes [121]. Unlike other-directed learners, self-directed learners demonstrate intrinsic motivation, integrity, agency, diligence, perseverance and grit towards their learning [122] while being continuously engaged in acquiring, applying and creating knowledge and skills in the context of their unique needs [123]. Adults are found to have a deep need to self-direct their learning [26]. This indispensable need for learners to self-direct grew exponentially overnight as a result of the imposed COVID-19 lockdown for academic institutions on 12 March 2020 [124]. Yet, however necessary and in accordance with a deep need, the adoption of self-directed learning continues to pose a challenge in education and engagement, particularly with respect to medical professionals [125] as other-directed learning has been the accepted norm for empathetic response during COVID-19 [126].

The Big Five personality traits related to self-directed learning primarily involve conscientiousness and openness [118]. If self-directed individuals display extraversion, it is a factor related to agreeableness within a particular working environment [127], rather than a function of self-directed learning per se. The personality traits of conscientiousness and openness have also been found highest in those who were most satisfied with online learning during the COVID-19 lockdown periods [128] when self-directed learning was required [124]. How self-directed learners can be identified is by using particular psychological tests developed specifically for this purpose [27]. Self-directed learning can be encouraged in individuals within a context through following a self-developed process [25,26] and has been found most successful in relation to student-led activity structures during COVID-19 restrictions [129]. The importance of COVID-19-related self-directed learning has been supported by educators in various countries during the pandemic [130–132].

Self-directed learning has been recognized as significantly important during times of crisis as the self-directed learner: (1) is not constrained to maintain a particular way of interpreting a situation; (2) is willing and able to upgrade their skills to match their situation; (3) feels empowered to challenge oppressive situations; (4) focuses their learning progress on self-actualization, and (5) has their vision for learning related to long-term career success [133]. Factors that that have been identified as leading to successful personal change with self-directed learning include: freedom to learn, an abundance of resources, choice, control, and perceived enjoyment [114]. The key obstacles to self-directed learning have been reported as a lack of time, lack of high-quality available resources, and the cost of education [114]. Importantly, unlike with extraversion when it is maladaptive, with self-directed learning, stresses are viewed as challenges or opportunities rather than threats [134–136].

Extraversion has been found important to consider in motivating a learner's willingness to self-initiate information-seeking behavior in adult populations [114]. Yet, self-initiating information-seeking behavior is not equivalent to being self-directed with respect to assessing information once it is accessed. Rather, the focus of the extraverted individual when turning to others as potential sources of information is maintaining a pleasurable interaction [137] not determining if the information provided corresponds with what they personally value given the situation [138]. In contrast, the key feature of self-directed learners is adaptability [139] based on personal values and although the individual displaying extraversion is readily adaptable to others and their points of

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view, this person is not adaptable to challenging others in a crisis situation, such as COVID-19 has been, because they are not guided by what they personally value [140].

4.3. Limitations

The limitations of this study are with respect to three aspects. The first is that the studies selected for comparison were based on using particular keywords at a certain time on one search engine. Reasons have been provided for why this was done; however, that these were constraints is a limitation. The second limitation concerns the lack of comparability among how the various studies tested for extraversion, how they defined a COVID-19 wave, and whether the study was looking to support or question the current public opinion. Each of these aspects inserted a level of ambiguity into the results of the comparison. A further limitation was the author's reading of the various studies. It is the author's interpretation regarding whether a study was supportive or disproving of positive coping for COVID-19 with respect to extraversion in a particular country during a specific wave. Although the author has intended to be unbiased with respect to this assessment, cognitive bias could be a factor of which the author was not aware during the examination [141]. It is as a result of these limitations that this study and its conclusions must be considered cautiously.

5. Conclusions

Traditionally, extraversion has been considered the Big Five personality trait most closely tied to COVID-19 positive coping [5], presenting the problem of explaining why extraversion coincides with negative coping in certain studies [15,16}. Examining high-ranking studies searched with Google Scholar late February and throughout March of 2023, it becomes evident that extraversion is covariant with COVID-19 positive coping if and only if the public's position on COVID-19 is itself positive. Furthermore, how this position is positive will relate to the geography, the historical traditions of the country, the progress of vaccine introduction, and the changing nature of the questions that are important to the public during the specific waves of COVID-19. These ranged from questions about mortality rates in Wave 1, when there was little knowledge of COVID-19, to those concerning views on vaccines in successive waves—their possible discovery, introduction, efficacy, and need for boosters. As such, positive coping with COVID-19 in relation to extraversion is based on the particular country (its geography and history), the wave in question, the standing of vaccines, and a positive attitude towards what was the current public opinion regarding COVID-19 based on trust. The conclusion is that extraversion in a particular country can be expected to produce COVID-19 positive coping during periods when the mood of the public is positive in relation to the trending public concerns regarding COVID-19 and the information provided is considered trustworthy by the extraverted individual.

In this way, perhaps the simplest way to gauge whether extraversion will produce COVID-19 positive coping is to know the popular public concern regarding COVID-19 during the various waves in relation to the geography and history of the country while tracking the prevalent issue during that wave regarding vaccine introduction and public sentiment and trust in relation to it. COVID-19 coping and the country's popular opinion regarding the significant issues during a particular wave can be expected to coincide because extraversion as a personality trait means that the individual looks to others to determine how to interpret and act in a situation. Because of this co-dependence between extraversion and other-direction, coping with respect to COVID-19 will be either positive or negative depending on the mood of the public; and this will depend on the trust individuals have regarding the information that they receive from significant others, including family, friends, chat rooms, broadcasts, educational institutions, public health officials, and government dictates. It will be trust that determines who of these potential sources of information extraverted individuals choose to follow.

This dependence of extraversion on other-direction means that neither researchers nor the extraverted individual living in a specific country can predict the response of extraversion to COVID-19 until a particular wave is present, the status of vaccines, and public sentiment is clear. Until then, researchers and the extraverted individual must wait to know in what way those with extraverted

personality traits will respond. During the course of COVID-19, as a pandemic, this presented a problem to anticipating individual views and public officials responses in accessing public opinion in knowing how to plan for action and regarding what to expect as the pandemic unfolded.

If, instead, the concern of researchers is knowing how an individual will behave regardless of the current public interest regarding COVID-19 then turning to those people who are self-directed in their learning about COVID-19 will produce internally predictable results. The reason is that self-directed learning is based on what an individual personally values. Therefore, to know how such people behave during COVID-19 does not require gauging public sentiment. In contrast, it necessitates understanding what self-directed learners personally value regarding their relationship to COVID-19 given the available information. This is something that the self-directed learner knows by considering how they would respond given various scenarios with respect to COVID-19 and would best be determined by researchers conducting individual psychological tests on self-directed learners [27], rather than engaging in the type of geographical, historical and sociological research necessary to understand the decisions of those demonstrating extraverted personality traits.

Thus, it will be up to individual countries to determine what is most important in their geographical and historical composition regarding Big Five personality traits in guiding citizens to learn about COVID-19 virus mutations either as other-directed learners or self-directed learners in relation any future possible waves.

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References

1. Anglim, J.; Horwood, S.; Smillie, L.D.; Marrero, R.J.; Wood, J. K. Predicting Psychological and Subjective Well-Being From Personality: A Meta-Analysis. *Psychol. Bul.* **2020**, *146*, 279–323. https://doi.org/10.1037/bul0000226.
2. Johnson, J. A. Big-Five model. In *Encyclopedia of Personality and Individual Differences*; Zeigler-Hill, V., Shackelford, T.K., Eds.; Springer: New York, USA. 2017; pp. 1-16. https://doi.org/10.1007/978-3-319-28099-8_1212-1.
3. Kocjan, G.Z., Kavčič, T.; Avsec, A. Resilience matters: Explaining the association between personality and psychological functioning during the COVID-19 pandemic. *Inter. J. Clin. Health Psychol.* **2021**, *21*, 100198. https://doi.org/10.1016/j.ijchp.2020.08.002.
4. Sahinidis. A.G.; Tsaknis, P.A.; Gkika, E.; Stavroulakis, D. The influence of the big five personality traits and risk aversion on entrepreneurial intention. In *Strategic innovative marketing and tourism*; Kavoura, A., Kefallonitis, E., Theodoridis, P. Eds.; Springer: Cham, Switzerland, 2020; pp 215–224. https://doi.org/10.1007/978-3-030-36126-6_24.
5. Gashi, D.; Gallopeni, F.; Imeri, G.; Shahini, M.; Bahtiri, S. The relationship between big five personality traits, coping strategies, and emotional problems through the COVID-19 pandemic. *Current Psychol.* **2022**, 1-10. https://doi.org/10.1007/s12144-022-03944-9.
6. World Health Organization (WHO). Timeline: WHO's COVID-19 Response. Available online: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/interactive-timeline#! (accessed on 4 March 2023).
7. Amin, R.; Sohrabi, M.R.; Zali, A.R.; Hannani, K. Five consecutive epidemiological waves of COVID-19: a population-based cross-sectional study on characteristics, policies, and health outcome. *BMC Infect. Dis.* **2022**, *22*, 906. https://doi.org/10.1186/s12879-022-07909-y.
8. Are, E.B.; Song, Y.; Stockdale, J.E.; Tupper, P.; Colijn, C. COVID-19 endgame: From pandemic to endemic? Vaccination, reopening and evolution in low-and high-vaccinated populations. *J. Theoret. Bio.* **2023**, *559*, 111368. https://doi.org/10.1016/j.jtbi.2022.111368.
9. Proto, E.; Zhang, A. COVID-19 and mental health of individuals with different personalities. *PNAS* **2021**, *118*, 1–. https://doi.org/10.1073/pnas.2109282118.

10. Detsky, A.S.; Bogoch, I.I. COVID-19 in Canada—The Fourth Through Seventh Waves. *JAMA Health Forum* **2022**, *3*, e224160. doi:10.1001/jamahealthforum.2022.4160.
11. Breakwell, G. M. Identity resilience: its origins in identity processes and its role in coping with threat. *Contemp. Soc. Sci.* **2021**, *16*, 573-588. https://doi.org/10.1080/21582041.2021.1999488.
12. Fischer, R.; Scheunemann, J.; Moritz, S. Coping Strategies and Subjective Well-being: Context Matters. *J. Happiness Stud*. **2021**, *22*, 3413–3434. https://doi.org/10.1007/s10902-021-00372-7.
13. Ewert, C.; Vater, A.; Schröder-Abé, M. Self-compassion and coping: a meta-analysis. *Mindfulness* **2021**, *12*, 1063–1077. https://doi.org/10.1007/s12671-020-01563-8.
14. Pietromonaco, P.R.; Overall, N.C. Applying relationship science to evaluate how the COVID-19 pandemic may impact couples' relationships. *Amer. Psychol*. **2021**, *76*, 438–450. https://doi.org/10.1037/amp0000714.
15. Burro, R.; Vicentini, G.; Rocca, E.; Barnaba, V.; Hall, R.; Raccanello, D. Development and validation of the robust-pandemic coping scale (R-PCS). *Front. Psychol.* **2021**, *12*, 725344. https://doi.org/10.3389/fpsyg.2021.725344.
16. Dal'Bosco, E.B.; Floriano, L.S.M.; Skupien, S.V.; Arcaro, G.; Martins, A.R.; Anselmo, A.C.C. Mental health of nursing in coping with COVID-19 at a regional university hospital. *Rev. Bras. Enferm*. **2020**, *73*. https://doi.org/10.1590/0034-7167-2020-0434.
17. Sawalha, I.H. A contemporary perspective on the disaster management cycle. *Foresight* **2020**, *22*, 469–482. https://doi.org/ 10.1108/FS-11-2019-0097.
18. Šrol, J.; Ballová Mikušková, E.; Čavojová, V. When we are worried, what are we thinking? Anxiety, lack of control, and conspiracy beliefs amidst the COVID-19 pandemic. *Appl. Cogn. Psychol*. **2021**, *35*, 720–729. https://doi.org/10.1002/acp.3798.
19. Bedford-Petersen, C.; Saucier, G. Identifying contrasting themes that orchestrate personality expression across situations. *Pers. Individ. Differ*. **2021**, *171*, 110495. https://doi.org/10.1016/j.paid.2020.110495.
20. Afifi, W.A.; Afifi, T.D. Uncertainty and coping during COVID-19. In *Communicating COVID-19: Interdisciplinary Perspectives*; Lewis, M., Govender, E., Holland, K. Eds.; Palgrave MacMillan: Cham, Switzerland 2021; pp. 325-344. https://doi.org/10.1007/978-3-030-79735-5_16.
21. Pfund, G.N., Harriger, J.; Hill, P.L. Video chat usage and the big five in women during the COVID-19 pandemic. *Personal. Individ. Differ*. **2021**, *171*, 110537. https://doi.org/10.1016/j.paid.2020.110537.
22. Lamb, Y.N. BNT162b2 mRNA COVID-19 Vaccine: First Approval. *Drugs* **2021**, *81*, 495–501. https://doi.org/10.1007/s40265-021-01480-7.
23. Schmiedeberg, C., and Thönnissen, C. Positive and negative perceptions of the COVID- 19 pandemic: does personality play a role? *Soc. Sci. Med*. **2021**, *276*, 113859. https://doi.org/10.1016/j.socscimed.2021.113859
24. Bacon, A.M.; Krupić, D.; Caki, N.; Corr, P.J. (2022). Emotional and behavioral responses to COVID-19. Explanations from three key models of personality. *Eur. Psychol*. **2022**, *26*, 334–347. https://doi.org/10.1027/1016-9040/a000461
25. Sawatsky, A.; Ratelle, J.; Bonnes, S.; Egginton, J.; Beckman, T. Faculty Support for Self-Directed Learning in Internal Medicine Residency: A Qualitative Study Using Grounded Theory. *Academ. Med.* **2018**, *93*, 943-951. https://doi.org/10.1097/ACM.0000000000002077.
26. Loeng, S, Self-Directed Learning: A Core Concept in Adult Education. *Edu. Res. Intern.* **2020**, *2020*, 3816132-381644. https://doi.org/10.1155/2020/3816132.
27. Yang, C.; Zhu, Y.; Jiang, H.; Qu, B. Influencing factors of self-directed learning abilities of medical students of mainland China: a cross-sectional study. *BMJ open* **2021**, *11*, e051590. http://dx.doi.org/10.1136/bmjopen-2021-051590.
28. Gusenbauer, M. Google Scholar to overshadow them all? Comparing the sizes of 12 academic search engines and bibliographic databases. *Scientometrics* **2019**, *118*, 177–214. https://doi.org/10.1007/s11192-018-2958-5.
29. Healey, M., & Healey, R. L. Searching the Literature on Scholarship of Teaching and Learning (SoTL): An Academic Literacies Perspective: Part 1. *Teach. Learn. Inquir*. **2023**, *11*, 1–20. https://doi.org/10.20343/teachlearninqu.11.4.
30. Aschwanden, D.; Strickhouser, J.E.; Sesker, A.A.; Lee, J.H.; Luchetti, M.; Stephan, Y.; Sutin, A.R.; Terracciano, A. Psychological and behavioural responses to Coronavirus disease 2019: The role of personality. *Euro. J. Personal.* **2021**, *35*, 51–66. https://doi.org/10.1002/per.2281.
31. Zolotareva, A.; Shchebetenko, S.; Belousova, S.; Danilova, I.; Tseilikman, V.; Lapshin, M.; Sarapultseva, L.; Makhniova, S.; Sarapultseva, M.; Komelkova, M.; Hu, D.; Luo, S.; Lisovskaya, E.; Sarapultsev, A. Big Five

Traits as Predictors of a Healthy Lifestyle during the COVID-19 Pandemic: Results of a Russian Cross-Sectional Study. *Int. J. Environ. Res. Public Health* **2022**, *19*, 10716. https://doi.org/10.3390/ijerph191710716.

32. Sahinidis, A.G.; Tsaknis, P.A. Exploring the relationship of the big five personality traits with student satisfaction with synchronous online academic learning: The case of Covid-19-induced changes. In *Strategic Innovative Marketing and Tourism in the COVID-19 Era: 9th ICSIMAT Conference 2020* Springer International Publishing: Cham, Switzerland, 2021; pp. 87-94. https://doi.org/10.1007/978-3-030-66154-0_10.
33. Levacher, J.; Spinath, F.M.; Becker, N.; Hahn, E. How did the beginnings of the global COVID-19 pandemic affect mental well-being? *Plos one* **2023**, *18*, e0279753. https://doi.org/10.1371/journal.pone.0279753.
34. Sebri, V.; Cincidda, C.; Savioni, L.; Ongaro, G.; Pravettoni, G. Worry during the initial height of the COVID-19 crisis in an Italian sample. *J. Gen. Psychol*. **2021**, *148*, 327–359. https://doi.org/10.1080/00221309.2021.1878485
35. Agbaria, Q.; Mokh, A.A. Coping with Stress During the Coronavirus Outbreak: the Contribution of Big Five Personality Traits and Social Support. *Int. J. Ment .Health Addiction* **2022**, *20*, 1854–1872. https://doi.org/10.1007/s11469-021-00486-2.
36. Chernova, A.; Frajo-Apor, B.; Pardeller, S.; Tutzer, F.; Plattner, B.; Haring, C.; Holzner, B.; Kemmler, G.; Marksteiner, J.; Miller, C.; Schmidt, M. The mediating role of resilience and extraversion on psychological distress and loneliness among the general population of Tyrol, Austria between the first and the second wave of the COVID-19 pandemic. *Front. Psychia.* 2021, 27, 766261. https://doi.org/10.3389/fpsyt.2021.766261.
37. Zacher, H.; Rudolph, C.W. Big Five traits as predictors of perceived stressfulness of the COVID-19 pandemic. *Personal. Individ. Differ.* **2021**, *175*, 110694. https://doi.org/10.1016/j.paid.2021.110694.
38. Alt, P.; Reim, J.; Walper, S. Fall from grace: increased loneliness and depressiveness among extraverted youth during the German COVID-19 lockdown. *J. Res. Adoles*. **2021**, *31*, 678-691. https://doi.org/10.1111/jora.12648.
39. Kohút, M.; Kohútová, V.; Halama, P. Big Five predictors of pandemic-related behavior and emotions in the first and second COVID-19 pandemic wave in Slovakia. *Personal. Individ. Differ*. **2021**, *180*, 110934. https://doi.org/10.1016/j.paid.2021.110934.
40. Lassen, E.R.; Hagen, K.; Kvale, G.; Eid, J.; Le Hellard, S.; Solem, S. Personality traits and hardiness as risk- and protective factors for mental distress during the COVID-19 pandemic: a Norwegian two-wave study. *BMC Psychia.* **2022**, *22*, 610. https://doi.org/10.1186/s12888-022-04237-y
41. Shokrkon, A.; Nicoladis, E. How personality traits of neuroticism and extroversion predict the effects of the COVID-19 on the mental health of Canadians. *Plos one* **2021**, *16*, e0251097. https://doi.org/10.1371/journal.pone.0251097.
42. Weiß, M.; Rodrigues, J.; Hewig, J. Big Five Personality Factors in Relation to Coping with Contact Restrictions during the COVID-19 Pandemic: A Small Sample Study. *Soc. Sci*. **2022**, *11*, 466. https://doi.org/10.3390/socsci11100466.
43. Airaksinen, J.; Komulainen, K.; Jokela, M.; Gluschkoff, K. Big Five personality traits and COVID-19 precautionary behaviors among older adults in Europe. *Aging Health Res.* **2021**, 1, 100038. https://doi.org/10.1016/j.ahr.2021.100038.
44. Zhao, Y.; Guo, J.; Liu, S.; Aizezi, M.; Zeng, Q.; Sidike, A.; Abliz, R.; Kudireti, A.; Xie, Y.; Taineikuli, A.; Zhang, B. Prevalence and related factors of depression, anxiety, acute stress, and insomnia symptoms among medical staffs experiencing the second wave of COVID-19 pandemic in Xinjiang, China. *Front. Public Health* **2021**, *9*, 671400. https://doi.org/10.3389/fpubh.2021.671400.
45. Nikčević, A.V.; Marino, C.; Kolubinski, D.C.; Leach, D.; Spada, M.M. Modelling the contribution of the Big Five personality traits, health anxiety, and COVID-19 psychological distress to generalised anxiety and depressive symptoms during the COVID-19 pandemic. *J. Affect. Disord*. **2021**, *279*, 578-584. https://doi.org/10.1016/j.jad.2020.10.053.
46. Pfund, G.N.; Hill, P.L.; Harriger, J. Video chatting and appearance satisfaction during COVID-19: Appearance comparisons and self-objectification as moderators. *Inter. J. Eating Disord.* **2020**, *53*, 2038–2043. https://doi.org/10.1002/eat.23393.
47. Lo, C.F.; Leung, F.K.Y.; Lui, C.P.F.; Ng, E.C.B. Predictive Effect of Extraversion and Neuroticism on Mental Health during the Covid-19 Pandemic in Hong Kong: The Mediating Role of Coping Strategies. *Psychol.* **2022**, *13*, 1391-1412. https://doi.org/10.4236/psych.2022.139089.

48. Yamazaki, J.; Kizuki, M.; Fujiwara, T. Association between Frequency of Conversations and Suicidal Ideation among Medical Students during COVID-19 Pandemic in Japan. *Int. J. Environ. Res. Public Health* **2022**, *19*, 6385. https://doi.org/10.3390/ijerph19116385.
49. Norouzi Zad, Z.; Bakhshayesh, A.; Salehzadeh Abarghoui, M. The Role of Personality Traits and Lifestyle in Predicting Anxiety and Depression During the Covid-19 Pandemic: A Web-Based Cross-Sectional Study. *J. Guil. Uni. Med. Sci.* **2022**, *31*, 84-101. Available online: http://journal.gums.ac.ir/article-1-2428-en.html (accessed on 13 March 2023).
50. Akbari, M.; Seydavi, M.; Zamani, E.; Nikčević, A.V.; Spada, M. M. The Persian COVID-19 Anxiety Syndrome Scale (C-19ASS): Psychometric properties in a general community sample of Iranians. *Clin. Psychol. Psychother*. **2022**, *29*, 906–921. https://doi.org/10.1002/cpp.2686.
51. Odachi, R.; Takahashi, S.; Sugawara, D.; Tabata, M.; Kajiwara, T.; Hironishi, M.; Buyo, M. The Big Five personality traits and the fear of COVID-19 in predicting depression and anxiety among Japanese nurses caring for COVID-19 patients: A cross-sectional study in Wakayama prefecture. *Plos one* **2022**, *17*, e0276803. https://doi.org/10.1371/journal.pone.0276803.
52. Wang, S.; Li, H.; Chen, X.; Yan, N.; Wen, D. Learning burnout and its association with perceived stress, social support, and the Big Five personality traits in Chinese medical students during the COVID-19 pandemic: a cross-sectional study. *BMC Psychiatry* **2022**, *22*, 785. https://doi.org/10.1186/s12888-022-04453-6.
53. Becker, S.O.; Rubin, J.; Woessmann, L. Religion in Economic History: A Survey. In *The Handbook of Historical Economics*; Bisin, A., Federico, G. Eds.; Academic Press: Cambridge, MA, USA, 2021; pp. 585-639. https://doi.org/10.1016/B978-0-12-815874-6.00029-0.
54. Holcombe, C. *A history of East Asia: from the origins of civilization to the twenty-first century*, 2nd ed.; Cambridge University Press: Cambridge, United Kingdom, 2017; p. 15.
55. Lake, M. Introduction: Settler Colonialism and Progressivism. In *Progressive New World: How settler colonialism and transpacific exchange shaped American reform*. Harvard University Press: Cambridge, MA, USA, 2019; pp. 1-22.
56. Berend, I.T. *Economic History of a Divided Europe: Four Diverse Regions in an Integrating Continent*. Routledge: New York, NY., USA, 2020. https://doi.org/10.4324/9781003020318.
57. Spater, J.; Tranvik, I. The protestant ethic reexamined: Calvinism and industrialization. *Com. Poli. Stud.* **2019**, *52*, 1963-1994. https://doi.org/10.1177/0010414019830721.
58. Papastefanaki, L.; Potamianos, N. Labour history in the Semi-periphery. Southern Europe, 19th-20th centuries. In *Labour history in the Semiperiphery. Southern Europe, 19th-20th centuries*; Oldenburg De Gruyter: Berlin, Germany, 2021; pp. 1-38.
59. Vashishtha, R.; Pennay, A.; Dietze, P.; Marzan, M.B.; Room, R.; Livingston, M. Trends in adolescent drinking across 39 high-income countries: exploring the timing and magnitude of decline. *Euro. J. Public Health* **2021**, *31*, 424-431. https://doi.org/10.1093/eurpub/ckaa193.
60. Jung, J.; Horta, H.; Postiglione, G. A. Living in uncertainty: The COVID-19 pandemic and higher education in Hong Kong. *Stud. High. Edu.* **2021**, *46*, 107-120. https://doi.org/10.1080/03075079.2020.1859685.
61. Zhang, B. Research on the Transition of National Identity for Hong Kong People. In *6th International Seminar on Education, Management and Social Sciences (ISEMSS 2022)*. Atlantis Press. 2022; pp. 236-245. https://doi.org/10.2991/978-2-494069-31-2_29.
62. Chiu, S.W., Siu, K.Y. Hong Kong as an international hub: The rise of Hong Kong in the modern world-system. In *Hong Kong Society: High-Definition Stories beyond the Spectacle of East-Meets-West*. Palgrave Macmillan: Singapore; 2022; pp. 39-70. https://doi.org/10.1007/978-981-16-5707-8_2.
63. Moghaddam, F.M. Political Plasticity and Culture. In *Culture as Process*; Wagoner, B., Christensen, B.A., Demuth, C. Eds.; Springer: Cham, Switzerland, 2021; pp. 223-230. https://doi.org/10.1007/978-3-030-77892-7_20.
64. Tünsmeyer, V. *Repatriation of sacred indigenous cultural heritage and the law: Lessons from the United States and Canada*; Springer Nature: Cham, Switzerland, 2022; Volume 3.
65. Whitehead, L. United States–Canada: The Two Overlapping Democratic Trajectories in North America. In *Democracy under Pressure. Challenges to Democracy in the 21st Century*; van Beek, U. Ed;. Palgrave Macmillan: Cham, Switzerland, 2022. https://doi.org/10.1007/978-3-031-09123-0_7.

66. Merkley, E.; Bridgman, A.; Loewen, P.J.; Owen, T.; Ruths, D.; Zhilin, O. A rare moment of cross-partisan consensus: Elite and public response to the COVID-19 pandemic in Canada. *Can. J. Poli. Sci./Rev. can. de sci. poli.* **2020**, *53*, 311-318. https://doi.org/10.1017/S0008423920000311.
67. Stokes, J.; Turner, A.J.; Anselmi, L.; Morciano, M.; Hone, T. The relative effects of non-pharmaceutical interventions on wave one Covid-19 mortality: natural experiment in 130 countries. *BMC Public Health* **2022**, *22*, 1113. https://doi.org/10.1186/s12889-022-13546-6.
68. Patterson, N.J.; Paz-Soldan, V.A.; Oberhelman, R.; Moses, L.; Madkour, A.; Miles, T.T. Exploring perceived risk for COVID-19 and its role in protective behavior and COVID-19 vaccine hesitancy: a qualitative study after the first wave. *BMC Public Health* **2022**, *22*, 1-11. https://doi.org/10.1186/s12889-022-12900-y.
69. Villani, L.; McKee, M.; Cascini, F.; Ricciardi, W.; Boccia, S. Comparison of deaths rates for COVID-19 across Europe during the first wave of the COVID-19 pandemic. *Front. Public Health* **2020**, *8*, 620416. https://doi.org/10.3389/fpubh.2020.620416.
70. Zenk, L.; Steiner, G.; Pina e Cunha, M.; Laubichler, M.D.; Bertau, M.; Kainz, M.J.; Jäger, C.; Schernhammer, E.S. Fast Response to Superspreading: Uncertainty and Complexity in the Context of COVID-19. *Int. J. Environ. Res. Public Health* **2020**, *17*, 7884. https://doi.org/10.3390/ijerph17217884.
71. Middleman, A.B.; Klein, J.; Quinn, J. Vaccine Hesitancy in the Time of COVID-19: Attitudes and Intentions of Teens and Parents Regarding the COVID-19 Vaccine. *Vaccines* **2022**, *10*, 4. https://doi.org/10.3390/vaccines10010004.
72. Mathieu, E.; Ritchie, H.; Ortiz-Ospina, E.; Roser, M.; Hasell, J.; Appel, C.; Giattino, C.; Rodés-Guirao, L. A global database of COVID-19 vaccinations. *Nat. Hum. Behav.* **2021**,*5*, 947–953. https://doi.org/10.1038/s41562-021-01122-8
73. Plumb, I.D.; Fette, L.M.; Tjaden, A.H.; Feldstein, L.; Saydah, S.; Ahmed, A.; Link-Gelles, R.; Wierzba, T.F.; Berry, A.; Friedman-Klabanoff, D.; Larsen, M.P., Estimated COVID-19 Vaccine Effectiveness Against Seroconversion from SARS-CoV-2 Infection, March–October, 2021. *Vaccine* **2023**. https://doi.org/10.1016/j.vaccine.2023.03.006.
74. Metzler, B.; Siostrzonek, P.; Binder, R. K.; Bauer, A.; Reinstadler, S. J. Decline of acute coronary syndrome admissions in Austria since the outbreak of COVID-19: the pandemic response causes cardiac collateral damage. *Euro. Heart J.* **2020**, *41*, 1852-1853. https://doi.org/10.1093/eurheartj/ehaa314.
75. Ioannidis, J.P.; Axfors, C.; Contopoulos-Ioannidis, D.G. Population-level COVID-19 mortality risk for non-elderly individuals overall and for non-elderly individuals without underlying diseases in pandemic epicenters. *Environ. Res.* **2020**, *188*, 109890. https://doi.org/10.1016/j.lanepe.2021.100188.
76. Zeymer, U.; Ahmadli, V.; Schneider, S.; Werdan, K.; Weber, M.; Hohenstein, S.; Hindricks, G.; Desch, S.; Bollmann, A.; Thiele, H. 2022. Effects of the COVID-19 pandemic on acute coronary syndromes in Germany during the first wave: the COVID-19 collateral damage study. *Clin. Res. Cardio*l. **2022**,*.111*, 1-11. https://doi.org/10.1007/s00392-022-02082-3.
77. Demertzis, N.; Eyerman, R. Covid-19 as cultural trauma. *Amer. J. Cultur. Sociol*. **2020**, *8*, 428-450. https://doi.org/10.1057/s41290-020-00112-z.
78. Goldman, S.; Pinhas-Hamiel, O.; Weinberg, A.; Auerbach, A.; German, A.; Haim, A.; Zung, A.; Brener, A.; Strich, D.; Azoulay, E.; Levy-Khademi, F. Alarming increase in ketoacidosis in children and adolescents with newly diagnosed type 1 diabetes during the first wave of the COVID-19 pandemic in Israel. *Pediatr. Diabetes* **2022**, *23*,.10-18. https://doi.org/10.1111/pedi.13296.
79. Giacomelli, A.; Ridolfo, A.L.; Milazzo, L.; Oreni, L.; Bernacchia, D.; Siano, M.; Bonazzetti, C.; Covizzi, A.; Schiuma, M.; Passerini, M.; Piscaglia, M., 30-day mortality in patients hospitalized with COVID-19 during the first wave of the Italian epidemic: a prospective cohort study. *Pharmacolog. Res.* **2020**, *158*, 104931. https://doi.org/10.1016/j.phrs.2020.104931.
80. Singh, S.; Diwaker, A.; Singh, B.P.; Singh, R.K. Nutritional immunity, zinc sufficiency, and COVID-19 mortality in socially similar European populations. *Front. Immunol*. **2021**, *12*, 699389. https://doi.org/10.3389/fimmu.2021.699389.
81. Scherbov, S.; Gietel-Basten, S.; Ediev, D.; Shulgin, S.; Sanderson, W. COVID-19 and excess mortality in Russia: Regional estimates of life expectancy losses in 2020 and excess deaths in 2021. *Plos one* **2022**, *17*, e0275967. https://doi.org/10.1371/journal.pone.0275967.
82. Smaha, J.; Jackuliak, P.; Kužma, M.; Max, F.; Binkley, N.; Payer, J. Vitamin D Deficiency Prevalence in Hospitalized Patients with COVID-19 Significantly Decreased during the Pandemic in Slovakia from 2020

to 2022 Which Was Associated with Decreasing Mortality. *Nutrients* **2023**, *15*, 1132. https://doi.org/10.3390/nu15051132.

83. Baumer, T.; Phillips, E.; Dhadda, A.; Szakmany, T. Epidemiology of the first wave of COVID-19 ICU admissions in South Wales—The interplay between ethnicity and deprivation. *Front. Med*. **2020**, *7*, 569714. https://doi.org/10.3389/fmed.2020.569714.
84. Romer, D.; Jamieson, K. H. Patterns of media use, strength of belief in COVID-19 conspiracy theories, and the prevention of COVID-19 from March to July 2020 in the United States: survey study. *J. Med. Internet Res*. **2021**, *23*, e25215. https://doi.org/10.2196/25215.
85. van Der Linden, S.; Roozenbeek, J.; Compton, J. Inoculating against fake news about COVID-19. *Front. Psychol*. **2020**, *11*, 566790. https://doi.org/10.3389/fpsyg.2020.566790.
86. Özlü-Erkilic, Z.; Kothgassner, O.D.; Wenzel, T.; Goreis, A.; Chen, A.; Ceri, V.; Mousawi, A.F.; Akkaya-Kalayci, T. Did the mental health and well-being of young people increase after the COVID-19 vaccination campaign period? A cross-sectional multicentre study in Austria and Turkey. *Curr. Psychol*. **2023**, *42*, 1-14. https://doi.org/10.1007/s12144-023-04366-x.
87. Lavoie, K.; Gosselin-Boucher, V.; Stojanovic, J.; Gupta, S.; Gagné, M.; Joyal-Desmarais, K.; Séguin, K.; Gorin, S.S.; Ribeiro, P.; Voisard, B.; Vallis, M., Understanding national trends in COVID-19 vaccine hesitancy in Canada: results from five sequential cross-sectional representative surveys spanning April 2020–March 2021. *BMJ open* **2022**, *12*, p.e059411. https://doi.org/10.1136/bmjopen-2021-059411.
88. Yin, F.; Wu, Z.; Xia, X.; Ji, M.; Wang, Y.; Hu, Z. Unfolding the determinants of COVID-19 vaccine acceptance in China. *J. Med. Internet Res.* **2021**, *23*, e26089. https://doi.org/10.2196/26089.
89. Pertwee, E.; Simas, C.; Larson, H.J. An epidemic of uncertainty: rumors, conspiracy theories and vaccine hesitancy. *Nat. Med.* **2022**, *28*, 456–459. https://doi.org/10.1038/s41591-022-01728-z
90. Ali, I.; Ali, S.; Iqbal, S. COVID-19 vaccination: concerns about its accessibility, affordability, and acceptability. *Front. Med.* **2021**, *8*, 647294. https://doi.org/10.3389/fmed.2021.647294.
91. Soy, M.; Keser, G.; Atagündüz, P.; Tabak, F.; Atagündüz, I.; Kayhan, S. Cytokine storm in COVID-19: pathogenesis and overview of anti-inflammatory agents used in treatment. *Clin. Rheumatol*. **2020**, *39*, 2085-2094. https://doi.org/10.1007/s10067-020-05190-5.
92. Ižák, Š. Conspiracy Theories about Covid-19 Vaccines on a Slovak Politician's Facebook Accounts. *Politologický časopis* **2023**, *1*, 43-61. https://doi.org/10.5817/PC2023-1-43.
93. Chadwick, A.; Kaiser, J.; Vaccari, C.; Freeman, D.; Lambe, S.; Loe, B.S.; Vanderslott, S.; Lewandowsky, S.; Conroy, M.; Ross, A.R.; Innocenti, S. Online social endorsement and Covid-19 vaccine hesitancy in the United Kingdom. *Soc. media+ society* **2021**, *7*, 20563051211008817. https://doi.org/10.1177/20563051211008817.
94. Romer, D.; Jamieson, K.H. Conspiracy theories as barriers to controlling the spread of COVID-19 in the U.S. *Soc. Sci. Med*. **2020**, *263*, 113356–113356. https://doi.org/10.1016/j.socscimed.2020.113356.
95. Carey, J.M.; Guess, A.M.; Loewen, P.J.; Merkley, E.; Nyhan, B.; Phillips, J.B.; Reifler, J. The ephemeral effects of fact-checks on COVID-19 misperceptions in the United States, Great Britain and Canada. *Nat. Hum. Behav.* **2022**, *6*, 236-243. https://doi.org/10.1038/s41562-021-01278-3.
96. Hettich, N.; Krakau, L.; Rückert, K.; Brähler, E.; Zahn, D.; Yilmaz, S.; Münzel, T.; Gianicolo, E.; Schmidtmann, I.; Schulz, A.; Wild, P.S., Willingness to be vaccinated against SARS-CoV-2 in the German population during the second wave of the pandemic. *Deutsches Ärzteblatt Internat*. **2021**, *118*, 720. https://doi.org/10.3238/arztebl.m2021.0350.
97. Wollebæk, D.; Fladmoe, A.; Steen-Johnsen, K.; Ihlen, Ø. Right-wing ideological constraint and vaccine refusal: The case of the COVID-19 vaccine in Norway. *Scand. Poli. Stud.* **2022**, *45*, 253-278. https://doi.org/10.1111/1467-9477.12224.
98. Hyland, P.; Vallières, F.; Hartman, T.K.; McKay, R.; Butter, S.; Bentall, R.P.; McBride, O.; Shevlin, M.; Bennett, K.; Mason, L.; Gibson-Miller, J., Detecting and describing stability and change in COVID-19 vaccine receptibility in the United Kingdom and Ireland. *Plos one* **2021**, *16*, e0258871. https://doi.org/10.1371/journal.pone.0258871.
99. Mills, M.C.; Salisbury, D., The challenges of distributing COVID-19 vaccinations. *EClinicalMed.* **2021**, *31*. https://doi.org/10.1016/j.eclinm.2020.100674.
100. Rhodes, R. Justice in COVID-19 vaccine prioritisation: rethinking the approach *J. Med. Ethics* **2021**, *47*, 623-631. https://doi.org/10.1136/medethics-2020-107117.

101. Binagwaho, A.; Mathewos, K.; Davis, S.Time for the ethical management of COVID-19 vaccines. *Lancet Glob. Health* **2021**, *9*, e1169-e1171. https://doi.org/10.1016/S2214-109X(21)00180-7.
102. Omidvar, S.; Firouzbakht, M. Acceptance of COVID-19 vaccine and determinant factors in the Iranian population: a web-based study. *BMC Health Serv. Res.* **2022**, *22*, 652. https://doi.org/10.1186/s12913-022-07948-w.
103. Lipscy, P.Y. Japan's Response to the COVID-19 Pandemic. In *Japan Decides 2021*; Pekkanen, R.J., Reed, S.R., Smith, D.M. Eds. Palgrave Macmillan: Cham, Switzerland, 2023; pp. 239-254. https://doi.org/10.1007/978-3-031-11324-6_16.
104. Wang, G.; Yao, Y.; Wang, Y.; Gong, J.; Meng, Q.; Wang, H.; Wang, W.; Chen, X.; Zhao, Y. Determinants of COVID-19 vaccination status and hesitancy among older adults in China. *Nat. Med*. **2023**, *29*, 623–631. https://doi.org/10.1038/s41591-023-02241-7.
105. Mallapaty, S. Iran hopes to defeat COVID with home-grown crop of vaccines. *Nature* **2021**, *596*, 475. https://doi.org/10.1038/d41586-021-02216-z.
106. Niu, Q.; Liu, J.; Kato, M.; Shinohara, Y.; Matsumura, N.; Aoyama, T.; Nagai-Tanima, M. Public opinion and sentiment before and at the beginning of COVID-19 vaccinations in Japan: Twitter analysis. *JMIR infodemiology* **2022**, *2*, e32335. https://doi.org/10.2196/32335.
107. Ward, H.; Cooke, G.; Whitaker, M.; Redd, R.; Eales, O.; Brown, J.C.; Collet, K.; Cooper, E.; Daunt, A.; Jones, K.; Moshe, M., 2021. REACT-2 Round 5: increasing prevalence of SARS-CoV-2 antibodies demonstrate impact of the second wave and of vaccine roll-out in England. *MedRxiv* **2021**, 2021-02. https://doi.org/10.1101/2021.02.26.21252512.
108. Kozyreva, A.; Lorenz-Spreen, P.; Lewandowsky, S.; Garrett, P.M.; Herzog, S.M.; Pachur, T.; Hertwig, R. Psychological factors shaping public responses to COVID-19 digital contact tracing technologies in Germany. *Sci. Rep*. **2021**, *11*, 18716. https://doi.org/10.1038/s41598-021-98249-5.
109. Klimovský, D.; Nemec, J.; Bouckaert, G. The COVID-19 pandemic in the Czech Republic and Slovakia. *Sci. Pap. Univ. Pardubic* **2021**, *29*, 1320. https://doi.org/10.46585/sp29011320.
110. Bullock, J.; Lane, J.E.; Shults, F.L. What causes COVID-19 vaccine hesitancy? Ignorance and the lack of bliss in the United Kingdom. *Humanit. Soc. Sci. Commun*. **2022**, *9*, 87. https://doi.org/10.1057/s41599-022-01092-w.
111. Stroebe, W.; vanDellen, M.R.; Abakoumkin, G.; Lemay Jr, E.P.; Schiavone, W.M.; Agostini, M.; ... Leander, N.P. Politicization of COVID-19 health-protective behaviors in the United States: Longitudinal and cross-national evidence. *PLoS One* **2021**, *16*, e0256740. https://doi.org/10.1371/journal.pone.0256740.
112. Romer, D.; Jamieson, K.H. Conspiratorial thinking, selective exposure to conservative media, and response to COVID-19 in the US. *Soc. Sci. Med.* **2021**, *291*, 114480–114480. https://doi.org/10.1016/j.socscimed.2021.114480.
113. Rammstedt, B.; Lechner, C.M.; Weiß, B. Does personality predict responses to the COVID-19 crisis? Evidence from a prospective large-scale study. *Euro. J. Person*. **2022**, *36*, 47-60. https://doi.org/10.1177/0890207021996970.
114. Wiley, K. Effects of a Self-Directed Learning Project and Preference for Structure on Self-Directed Learning Readiness. *Nurs. Res.* **1983**, *32*, 181–185. https://doi.org/10.1097/00006199-198305000-00011.
115. Cronin-Golomb, L.M.; Bauer, P.J. Self-motivated and directed learning across the lifespan. *Acta Psychologica* **2023**, *232*, 103816. https://doi.org/10.1016/j.actpsy.2022.103816.
116. Nash C. Challenges Identifying and Stimulating Self-Directed Learning in Publicly Funded Programs. In *The Digital Era of Education: Novel Teaching Strategies and Learning Approaches Designed for Modern Students*; Keator, C.S. Ed. Nova Science Publishers, Inc.: Hauppauge, NY, USA., 2020; pp. 259-300.
117. Knowles, M.S. Innovations in teaching styles and approaches based upon adult learning. J. *Educ. Soc. Work* **1972,** *8*, 32–39. https://doi.org/10.1080/00220612.1972.10671913.
118. Morris, T.H. Self-directed learning: A fundamental competence in a rapidly changing world. *Int. Rev. Educ.* **2019**, *65*, 633–653 https://doi.org/10.1007/s11159-019-09793-2.
119. Ginzburg, S.B.; Santen, S.A.; Schwartzstein, R.M. Self-directed Learning: a New Look at an Old Concept. *Med.Sci.Educ*. **2021**, *31*, 229–230. https://doi.org/10.1007/s40670-020-01121-w.
120. Song, Y.; Lee, Y.; Lee, J. Mediating effects of self-directed learning on the relationship between critical thinking and problem-solving in student nurses attending online classes: A cross-sectional descriptive study. *Nurse edu.today* **2022**, *109*, 105227. https://doi.org/10.1016/j.nedt.2021.105227.

121. Lejeune, C.; Beausaert, S.; Raemdonck, I. The impact on employees' job performance of exercising self-directed learning within personal development plan practice. *Inter. J. Human Resour. Manage*. **2021**, *32*, 1086–1112. https://doi.org/10.1080/09585192.2018.1510848.
122. Kebritchi, M.; Rominger, R.; McCaslin, M. Contributing Factors for Success of Nontraditional Students at Online Doctoral Programs. J. *College Stu. Retention : Res. Theory Practice* **2023**, *24* https://doi.org/10.1177/15210251231155488.
123. Lalitha, T.B.; Sreeja, P.S. Personalised self-directed learning recommendation system. *Procedia Comput. Sci*. **2020**, *171*, 583-592. https://doi.org/10.1016/j.procs.2020.04.063.
124. Sahu, P. Closure of universities due to coronavirus disease 2019 (COVID-19): Impact on education and mental health of students and academic staff. *Cureus* **2020**, *12*, e7541. https://doi.org/10.7759/cureus.7541.
125. Nash, C. Medical Professionals Require Curricula Support to Overcome Their Reluctance to Embrace Self-Directed Learning in Response to COVID-19. *Med. Sci. Forum* **2021**, *4*, 20. https://doi.org/10.3390/ECERPH-3-08986.
126. Hechler, S.; Wendel, C.; Schneider, D. Dealing with the COVID-19 pandemic: How defense strategies relate to empathic reactions during lockdowns. *Soc. Psychol*. **2023**, 54, 66-77. https://doi.org/10.1027/1864-9335/a000501.
127. Abd El Aziz, A.S.; Taha, E.E.S.; Ramadan, F.H.; Badr, O.E. Self-Directed Learning Readiness Level and Personality Traits Among Nursing Students. *Alexandria Sci.Nurs. J.* **2022**, *24*, 40-50. Available online: https://asalexu.journals.ekb.eg/article_267754_e7c484b3960929b88d516a46bc060b1f.pdf (accessed on 6 April 2023).
128. Tovmasyan, A.; Walker, D.; Kaye, L. Can personality traits predict students' satisfaction with blended learning during the COVID-19 pandemic?. *Col. Teach*. **2023**, *71*, 49-55. https://doi.org/10.1080/87567555.2022.2156450
129. Gerard, L.; Wiley, K.; Debarger, A.H.; Bichler, S.; Bradford, A.; Linn, M.C. Self-directed science learning during COVID-19 and beyond. *J. Sci. Educ. Technol.* **2022**, *31*, 258–271. https://doi.org/10.1007/s10956-021-09953-w.
130. Si, J. Medical students' self-directed learning skills during online learning amid the COVID-19 pandemic in a Korean medical school. Korean *J. Med. Educ*. **2022**, *34*, 145–154. https://doi.org/10.3946/kjme.2022.226.
131. Singaram, V.S.; Naidoo, K.L.; Singh, S. Self-Directed Learning During the COVID-19 Pandemic: Perspectives of South African Final-Year Health Professions Students. *Adv. Med. Educ. Pract*. **2022**, *13*, 1–10. https://doi.org/10.2147/AMEP.S339840.
132. Zuchowski, I.; Cleak, H.; Croaker, S.; Davey, J.-B. It's up to you: The need for self-directed learning for social work students on placement during COVID-19. *Brit. J. Soc. Work* **2022**, *52*, 2875–2893. https://doi.org/10.1093/bjsw/bcab224.
133. Maphalala, M.C.; Mkhasibe, R.G.;Mncube, D.W. Online Learning as a Catalyst for Self-Directed Learning in Universities during the COVID-19 Pandemic. *RESSAT* **2021**, *6*, 233-248. https://doi.org/10.46303/ressat.2021.25.
134. Meletiou-Mavrotheris, M.; Eteokleous, N.; Stylianou-Georgiou, A. Emergency Remote Learning in Higher Education in Cyprus during COVID-19 Lockdown: A Zoom-Out View of Challenges and Opportunities for Quality Online Learning. *Educ. Sci*. **2022**, *12*, 477. https://doi.org/10.3390/educsci12070477
135. van der Baan, N.; Raemdonck, I.; Bastiaens, E.; Beausaert, S. Employability competences of workers in health care and finance. The role of self-directed learning orientation and job characteristics. *Inter. J. Train. Devel.* **2022**, *26*, 427-447. https://doi.org/10.1111/ijtd.12264
136. Siddiqui, F.S.; Nerali, J.T.; Telang, L.A. Relationship between the sense of coherence, self-directed learning readiness, and academic performance in Malaysian undergraduate dental students. *J Educ Health Promot*. **2021**, *10*, 105. https://doi.org/10.4103/jehp.jehp_758_20.
137. Dong, J.; Xiao, T.; Xu, Q.; Liang, F.; Gu, S.; Wang, F.; Huang, J.H. Anxious Personality Traits: Perspectives from Basic Emotions and Neurotransmitters. *Brain Sci.* **2022**, *12*, 1141. https://doi.org/10.3390/brainsci12091141.
138. Sun, J.; Harris, K.; Vazire, S. Is well-being associated with the quantity and quality of social interactions? *J. Personality Soc. Psychol.* **2020**, *119*, 1478–1496. https://doi.org/10.1037/pspp0000272.
139. Morris, T.H. Adaptivity Through Self-Directed Learning to Meet the Challenges of Our Ever-Changing World. *Adult Learn.* **2019**, *30*, 56–66. https://doi.org/10.1177/1045159518814486.

140. Proyer, R.T.; Brauer, K.; Wolf, A. Assessing Other-Directed, Lighthearted, Intellectual, and Whimsical Playfulness in Adults: Development and Initial Validation of the OLIW-S Using Self- and Peer-Ratings. *Euro. J. Psychol. Assess.* **2020**, *36*, 624–634. https://doi.org/10.1027/1015-5759/a000531.
141. Halpern, S.D.; Truog, R.D.; Miller, F. G. Cognitive bias and public health policy during the COVID-19 pandemic. *JAMA* **2020**, *324*, 337-338. https://doi.org/10.1001/jama.2020.11623.