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Extraversion in COVID-19 Coping and Actionable Insights from Considering Self-Directed Learning

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Abstract: Extraversion, of the Big Five personality traits, has been identified as the most socially relevant of the traits with respect to positive COVID-19 coping—yet relevant research is found conflicting. Studies assessing this discrepancy have not situated the influence of extraversion within a geographical and historical context. Thus, a likely contributor has been missed. Furthermore, extraversion is based on other-directed learning with respect to COVID-19 coping, and this has not been considered regarding its contrast to self-directed learning. To provide context, an examination of high-ranking Google Scholar results on extraversion and COVID-19 coping from different countries during the pandemic's various waves is undertaken, including the introduction of vaccines as a factor in decreasing COVID-19's perceived threat. These are then examined for relationships regarding 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 be an effective personality trait for positive COVID-19 coping and when it will not. Extraversion's effect is found inherently inconsistent for identifying positive COVID-19 coping because of its dependence on other-directed learning. The conclusion: stability in positive COVID-19 coping is contingent on personal values that guide self-directed learning rather than extraversion's other-directed learning.

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

1. Introduction

Various studies have recognized the Big Five personality trait of extraversion as the most socially relevant of the traits with respect to positive COVID-19 coping [1–5]. This follows from extraversion being defined as a predisposition to experience positive affect and usually to have the highest correlations with measures of well-being [6]. Yet extraversion and COVID-19 coping has also been found negatively related in some results [7–9]. The fundamental reasons for this discrepancy have not been investigated with respect to a historical and geographical context; therefore, the influences of these disparities have remained unknown—relevant to know in response to future COVID-19 mutations.

Research has indicated that personality traits are tied to learning behaviors and that those who demonstrate extraversion, although often self-motivated, are other-directed in their learning [10]. In extraversion depending on other-directed learning, the aim of this study is to investigate the conditions under which what is learned about COVID-19 is associated with positive COVID-19 coping by those expressing the personality trait of extraversion and how this compares with public opinion dependent on the particular COVID-19 wave and the country. Once examined, a comparison with self-directed learning and COVID-19 coping will be considered with respect to actionable insights. The hypothesis is that the ability of extraversion to influence positive COVID-19 coping will be directly affected by other-directed learning depending on the various waves of COVID-19, the countries in which extraverted people reside, the perception of the seriousness of COVID-19

affected by the introduction of vaccines, and the reliability of the information available. In contrast, it is also hypothesized that self-directed learners will not be similarly influenced by these variables regarding their COVID-19 coping.

The Big-Five Theory of personality traits identifies five broad dimensions: extraversion, agreeableness, conscientiousness, openness, and neuroticism [11] advocated for since the early 1990s [12]. The reliability of these five dimensions emerged over a decades-long factor analysis of participant descriptions in relation to ordinary language traits [12]. 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 [13].

As a result of a new virus first reported by the World Health Organization (WHO) in December 2019, and declared a pandemic on 11 March 2020 [14], various waves have been reported of COVID-19. The relevance of the number of waves to COVID-19 coping is that the effect of the pandemic on subjective well-being has been found time-dependent [15] and that people's response to different waves is influenced by their country's culture [16]. In Iran, for example, five waves of the COVID-19 pandemic were identified between March 2020 and December 2021 [17], when COVID-19 became endemic throughout the world [18]. These five waves noted in Iran are in contrast to, for example, nine waves specified in the UK [19], and seven waves identified in Canada [20], 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 [18]. What the WHO timeline shows in its breakdown by country is that what represents a wave and when it occurred is entirely country dependent.

A substantial amount of evidence links personality traits with coping [21]. Coping has been categorized in numerous ways and found dependent on both core human functions and individual differences [22]. As a response to the historical development of the term, a recent theory of coping defines coping as cognitive and behavioral reactions to reduce unpleasant emotions [23]. As such, coping relates to an individual's capabilities in responding to a perceived threat or uncertainty to alleviate their stress [24]. It can be adaptive (positive) or maladaptive (negative) dependent on the context in which the coping occurs [25]. Coping strategies are thus a progression in relation to stress [26]. When an event is perceived as a challenge (or, for that matter, an opportunity [27]), the response is adaptive; when it is perceived as a threat, a maladaptive response is the result [28]. 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 [28]. 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 [28]. 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, which is important to whether extraversion as a personality trait will determine the type of coping as positive or negative. What is more, the interpretation of an occurrence as a challenge, opportunity, or threat may change in the course of an encounter with a conflicting situation such as COVID-19 [29]. As such, personality traits such as extraversion can be expected to have different effects in the various waves of the pandemic [30].

Coping can be reflected through health behaviors representing either health-promoting or health-deteriorating activities that are particularly evident with respect to extraversion. Although extraversion is often found beneficial for health, it may also result in unhealthy behaviors [31]. During COVID-19, extraversion became associated with both reduced social distancing and increased conscientiousness regarding the need for both social distancing as well as additional handwashing [32]. Yet, with respect to extraversion, health behaviors may be further influenced by untrustworthy information based on conspiracy theories evident during COVID-19 [33]. In this regard, COVID-19 coping differs from coping in

general as a result of the continuously changing nature of information concerning the: seriousness of the disease, the efficacy of vaccines, and the unreliability of news—creating a general atmosphere of anxiety, fear, uncertainty, and insecurity [34]. In these circumstances, the intensity of the perceived danger is augmented, increasing the probability of personality traits, such as extraversion, being expressed in coping [35].

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 [36]. When noting extraversion as the Big Five trait most likely to predict how people coped with COVID-19 [37], it is therefore important to consider how people differentially responded to (1) the changing social climate, (2) consecutive waves of the pandemic, (3) their individual country's viewpoint, and (4) the introduction of vaccines for COVID-19 in December 2020 [38]. The reason is that each of these aspects in the historical and geographical progression of the pandemic made a noticeable difference to the perceived level of threat regarding COVID-19. As a personality trait dependent on other-directed learning, these progressive changes in the perceived threat of COVID-19 would particularly affect those demonstrating extraversion as a personality trait [7,39]. 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 [9,40], throughout each of the various waves.

The purpose of this work will be to (1) understand the results from examples of studies on coping with COVID-19 both geographically and historically from the perspective of extraversion, (2) compare this understanding 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 because their introduction produced a reduction in the perceived threat of COVID-19 [41,42]—and (3) provide the context for understanding why there are varying results in 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, by 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, unlike those who make their decisions regarding COVID-19 based on self-directed learning. 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 as a measure that significantly changed the nature of the perceived threat of COVID-19, provides the social structure on which extraversion as a personality trait is dependent.

The principal conclusions are that caution should be used when 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 [43,44]—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 can be identified by researchers using individual psychological testing focused on the important factors regarding self-directed learners [45].

2. Materials and Methods

The materials and methods used in this study involve placing examples of 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 on COVID-19 coping conducted over as many COVID-19 waves that have been studied by researchers from various countries. The purpose of collecting materials in this way was not to undertake a thorough literature review regarding each topic. Rather, the point was to identify what research is most highly ranked regarding each of the different COVID-19 waves using the most comprehensive search engine at a particular time. This approach was important to this project because the aim was to gauge the popularity of research as an indicator of public sentiment regarding each wave.

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 [46]. That Google Scholar is the most comprehensive search engine for academics was additionally reconfirmed with 2023 research [47]. The examples of research to be highlighted were selected as the ones that received the highest relevant ranking, inclusive of all the keywords searched in relation to each individual search performed at the particular time the search was conducted. The exclusion criteria were that one or more of the keywords was not evident in the returned results. Given that after the first page of returned results, one or more of the keywords were not present, this resulted in the searches in practice being confined to the first page of returns for each search. In the case of waves higher than five, ten pages were searched before concluding there were no studies on waves higher than five at the time searched. This result (that returned results did not meet the inclusion criteria after the first page of returned results) was unanticipated and might have been otherwise.

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 [48]. Still, Google Scholar compares well with Scopus as a search engine, which has an estimated 12.6% duplicates to Google Scholar's 10% [46]. Furthermore, Google Scholar provides a multidisciplinary database found to outperform the coverage of either Web of Science or Scopus [46]. As the searches performed were not intended for either a systematic review or a meta-analysis, a PRISMA statement and flowchart are not included in this assessment [48].

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 2066 adults in March 2020 found that 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 [49]. In a Slovakian study of 2722 adults, also conducted in March 2020, extraversion was seen to present a predisposition to experience positive affect, bringing on the highest correlations with measures of well-being. Given 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 [6]. 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 [50]. In another study conducted during March and April 2020, Greek research on university students found that extraversion had little to no effect on student satisfaction with online learning [51]. In Germany, studies regarding extraversion and COVID-19 coping (undertaken as part of investigations into all the Big Five personality traits) were researched with the help of 5 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. [52].

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 an online study of Italian adults, extraversion was found to protect against worry [53]. A sample of 625 Israeli–Palestinian college students during the first 3 months of the pandemic found extraverts more likely to use a greater number of problem-focused methods for coping and fewer maladaptive emotion-focused strategies for coping [54]. 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 for "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 [55]. In a German study on 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 [7]. 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 in anhedonia rather than negative mood [56]. In Slovakia, in April 2020, extraversion predicted positive purchasing and stockpiling as well as a negative emotional response. Then, it was also only extraversion in 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 in 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 society [57]. A Norwegian study of 5783 residents collected data in both April 2020 and December 2020 in which exhibiting anxious-depressive symptoms in the early phases of the pandemic was found as the strongest predictor for similar symptoms 9 months after the outbreak, with extraversion being a pronounced protective factor for mental distress [58].

2.1.2. Wave 2

A subsequent Google Scholar search was then undertaken in early March 2023 for "COVID-19 coping extraversion second wave". In one study from this search, 1096 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 [59]. A May 2020 study of 51 adults in Germany showed that extraversion correlated with poorer coping during strict contact restrictions as well as an improvement as these restrictions were relaxed [60]. 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) [61]. 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 [62].

This search also returned results from other studies on 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 on United States adults in mid-June 2020 found extraversion to be negatively correlated with 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 [3]. A further United States study on women found that higher extraversion was associated with greater video chat usage prior to and following the beginning of the pandemic [37]. Unfortunately, the date when the data were collected is not mentioned for this study nor for the larger study in which it was a part. However, as the research on the larger study was published in October 2020, the data collection occurred before this date [63].

2.1.3. Waves 3 and 4

During the second week of March 2023, two additional searches were performed using 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, which 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 [64]. 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 against depression [65]. An Iranian cross-sectional study was performed during the fourth wave of the 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 the psychological consequences of the COVID-19 outbreak. Extraverts were found able to obtain more social support in this period using their verbal abilities and by generating intimate relationships, resulting in their greater satisfaction and happiness [66].

2.1.4. Waves 5 and Higher

A Google Scholar search also conducted during the second week of March 2023 for "COVID-19 coping extraversion fifth wave" and one for "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 1429 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 [67]. Furthermore, 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 [68]. There were no studies found that concentrated on the sixth wave alone when this search was undertaken. However, a UK study on extraversion regarding 8772 people in relation to coping with COVID-19 (among assessing the other 4 personality traits of the Big Five) is unique in combining seven different COVID-19 waves from April 2020 to January 2021 [19]. 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 as 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 to extraversion [69].

2.2. Methods

The materials were 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 [14]. The method then used involved 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 were 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 were 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 were merged into one column. In other words, for any particular country, there may be different information regarding extraversion listed separately under more than one wave as well as results covering a number of waves. Germany is an example of a country where each of these types of results is represented.

The WHO timeline [14] identifies six waves internationally; however, although there was one study on the seven different waves in a particular country (the UK), there were no studies on 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 for organizing the various studies by country and by wave is extended 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 was 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 was 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 were returned in the various Google Scholar searches performed. This additional research was undertaken to identify the relationship between public opinion and extraversion, which 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 on 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 in 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 are less resilient/Those under 30 lonelier/Mediated partnerships and psychological distress				
Canada		Higher emotional, psychological, and social well-being/ Fewer mental health issues			

Table 1. *Cont.*

Country	Wave 1	Wave 2	Wave 3	Wave 4 ‡	Wave 5
China		Negatively identified with: minorities, pandemic worries, spending time on pandemic information	Significant predictor of mental health concerns in Hong Kong/High levels use active problem-focused coping, adaptive emotion-focused coping		Related negatively to perceived stress and learning burnout
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 High rates in adolescents, high depression resulting from anhedonia rather than negative mood, a third of these from loneliness	Decreases in perceived stressfulness		
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	Used greater problem-focused methods for coping and fewer maladaptive emotion-focused strategies for coping	No association with COVID-19 precautionary behaviors			
Italy	Protective against worry				
Japan				Protective against depression in medical students	Played no protective role against depression or anxiety/Did not predict better coping

Table 1. *Cont.*

Country	Wave 1	Wave 2	Wave 3	Wave 4 ‡	Wave 5
Norway	Protective factor against depression and anxiety		If depressed and anxious in Wave 1, more so in Wave 3		
Russia	Predicted focus on diet, nutrition, 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 with more flexible coping/ Predictive of positive purchasing and stockpiling and negative emotional response	Predictive of decrease in purchasing and stockpiling once the 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 was a stronger predictor of mental health deterioration			
United States	Associated with more preparations, more optimistic outcomes, shorter pandemic duration and US economy recovery estimates Greater video chat usage in women	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			

* 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. Extraversion and Geographical Differences

In relation to the searches performed using 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 1 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 of these articles. Only four of the publications 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 for making geographical and historical comparisons. Europe and Israel share a common history through religion, and their economic development is interconnected [70]. Asia has separate, though country-specific, traditions from the rest of the world [71], 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 [72].

3.1.1. Europe and Israel

The European countries individually represented in the research regarding extraversion and COVID-19 coping include Austria [55], Germany [7,56,60], Greece [51], Italy [53], Norway [58], Slovakia [6,57], and the United Kingdom [19]. As well, 27 European countries were studied together along with Israel [61], for which an independent study was also conducted including Palestinians [54]. Although it is possible to divide Europe into four diverse regions [73], European countries generally are divided into Northern Europe and Southern Europe as the former are bound by Protestant traditions and early industrialization [74], while the latter are connected by Catholic/Orthodox traditions and later industrialization [75]. 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 [76]. 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, when comparing those from Austria, Germany, Norway, and the United Kingdom, show that, during Wave 1, extraversion led to negative coping as a result of less resilience and 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 for mental health deterioration, which was 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 precautionary behaviors no longer being undertaken.

Given this support demonstrated for the hypothesis, it can therefore be considered that the findings from the 27 countries in Europe, plus Israel [61], were skewed towards the effect of extraversion found in Southern European countries since the results were similar to those from 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 in 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 [77], traditionally, it has been a democracy [78], unlike the rest of China, which has been ruled by a dictatorship. In this respect, then, Hong Kong economically still compares more with Japan than the rest of China [79]. Furthermore, although China, Russia, and Iran differ in many respects, each is and has been a dictatorship [80].

Comparing the areas that are democracies: in Hong Kong, during Wave 3, extraversion was a significant predictor of mental health concerns in Hong Kong. Although in Wave 4, extraversion was seen to be protective against 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 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 used 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 being 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 [81], Canada has a greater law-abiding, socialist tendency than the United States, which is more individualist and achievement-oriented in nature [82]. 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 [83], 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 was not 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

Considering the results in Table 1, it is hypothesized that the noted responses regarding COVID-19 coping and extraversion are comparable to the concurrent public sentiment during a particular wave. To this effect, the relevant concern is what information among the different waves changed the results most evidently and to the greatest extent when comparing the waves. In this regard, what is most important when comparing the material in various waves of COVID-19 presented in Table 1 is the relationship between the time of the wave and the introduction of vaccines for COVID-19 in all countries because the introduction of vaccines, unlike any other information provided, decreased the perceived threat of COVID-19 [42,43].

During Wave 1, there was little understanding of the virus that caused COVID-19 and, as a result, interventions were non-pharmaceutical in nature [84], and the public concern was mortality rates [85,86]. By Wave 2, there was a better understanding of the cause of COVID-19, but intensive global research had yet to produce a vaccine [87]. 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 [88]. By Wave 4, vaccines were available after a waiting period [89]. 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 [90].

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. This information was searched in March 2023, starting with Wave 1 and progressing through each of the waves with individual searches ending at Wave 5. The inclusion criteria were that all of the keywords had to be evident in the returned results. Results were excluded if any of the keywords were missing. The highest-ranking result is the one reported.

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 in March 2023.

Country	Wave 1	Wave 2	Wave 3	Wave 4 ‡	Wave 5
Austria	Noted hospital admission 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	Overall, 76% of youths surveyed from November 2020 to March 2021 indicated acceptance of a future COVID-19 vaccine		Only older individuals in mainland China and Hong Kong were reluctant to receive a vaccine once they were available
Europe (27 countries)		Conspiracy theories regarding vaccines and an international Judeo–Bolshevik conspiracy became popular			

Table 2. *Cont.*

Country	Wave 1	Wave 2	Wave 3	Wave 4 ‡	Wave 5
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 mortality rates	Overall, 67% of the population was 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		
Greece	Experienced "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 of the 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 a 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

Table 2. *Cont.*

Country	Wave 1	Wave 2	Wave 3	Wave 4 ‡	Wave 5
Norway	Higher levels of "trained immunity" and serum "vitamin D" levels may have protected from high mortality rates		Vaccine hesitancy based on political values and ideology even when controlling for trust		
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	Overall, 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 provided by mainstream broadcast media	Those who felt powerless were more susceptible to conspiracy theories with vaccine hesitancy increasing overall in comparison with Wave 1			

* 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 Scholar search performed in mid-March 2023 for "Wave 1 [country name] COVID-19 speculation mortality rates". These are the results: in Austria, the decrease in hospital admissions noted may accompany a substantial increase in mortality [91]; in 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 [92], 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 [93]; in Greece, as a result of COVID-19, was found to have experienced "cultural trauma" from increased mortality [94]; in 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 [95]; in Italy, older patients may be more likely to die from COVID-19 because of age-related changes in immunological functions [96]; in Norway, higher levels of "trained immunity" and serum "vitamin D" levels may have protected the population from high mortality rates [97]; in Russia, larger households of extended families was generally considered a health-protective behavior; however, the tradition might have contributed to higher social exposure and, hence, higher losses [98]; Slovakia, an increased vitamin D supplementation was thought to correspond to decreased mortality [99]; in the United Kingdom, high mortality was considered to relate to previous cardiovascular disease, diabetes, and low vitamin D particularly in the Black, Asian, and minority ethnic group [100]; 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 [101]. 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 [102].

By Wave 2, the results speculated regarding COVID-19 specifically related to the development of vaccines. These results are with respect to those countries for which research data are reported in Table 1 and tabulated in Table 2. This research regarding public sentiment represents those articles with the highest rank on a Google Scholar search performed in mid-March 2023 for "Wave 2 [country name] COVID-19 speculation vaccines". These are the results: in Austria, the feeling of vulnerability regarding COVID-19 was not decreased as a result of the anticipated development of vaccines [103]; in 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 [104]; in China, citizens were proud of China's involvement in developing vaccines but believed they may be too expensive to afford for their entire families [105]; in Europe as a whole, conspiracy theories regarding vaccines and an international Judeo–Bolshevik conspiracy became popular [106]; in 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 [107]; in Israel, it was speculated that Familial Mediterranean fever (FMF)-associated genetic mutations may confer milder disease course of COVID-19 irrespective of vaccines [108]; in 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 [109]; in the United Kingdom, 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. This means that the majority of the population was

not vaccine-hesitant [110]; and in the United States, those who felt powerless were more susceptible to conspiracy theories with vaccine hesitancy increasing overall in relation to Wave 1 [111]. Fake news during Wave 2 continued to influence the views of Americans, the British, and Canadians with little evidence that repeated fact-checks have enduring effects on beliefs about COVID-19 vaccination in these populations [112].

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 Scholar search performed during the third week of March 2023 for "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 of COVID-19 they reported. The following are the results: in China, 76% of youths surveyed from November 2020 to March 2021 indicated their acceptance of a future COVID-19 vaccine [70]; in Germany, self-assignment to a risk group was in most cases not associated with an increased willingness to be vaccinated [113]; in Norway, there was vaccine hesitancy based on political values and ideology even when controlling for trust [114]; in the United Kingdom, there was a significant decrease in vaccine acceptance in comparison with vaccine receptiveness in Wave 2 [115].

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 waiting period with those in country-defined high-risk groups being the first to receive a vaccine [116,117]. 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 [118].

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 and include: in Iran, the vaccine acceptance rate was 70% in conjunction with a high death rate from COVID-19, although progress in vaccination was slow [119]; Japan was relatively late in beginning its vaccination campaign, which was hindered by supply and bureaucratic problems resulting in challenges with procurement and distribution but not by vaccines hesitancy [120]; and 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 [116].

In relation to Wave 5, the Google Scholar search conducted in late March for the countries identified in Table 1 with research studies on extraversion included the parameters "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 [121]; in 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 [122]; in Japan, the negative sentiments toward vaccines that dominated, where concerns about side effects from Astra-Zeneca in particular and these outweighed fears of infection [123]; and in the United Kingdom, 92% of people were vaccinated or intended to be, although vaccine confidence varied by age and ethnicity, with the lowest confidence in young people and those of Black ethnicity [124].

3.3. Comparing Extraversion in COVID-19 Coping and Public Opinion

The results in Tables 1 and 2 can be compared regarding whether the coping demonstrated by those with the personality trait of extraversion in a particular country during a specific wave was either positive, negative, or neutral, and if the 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 the public opinion was for the most part positive (+), negative (−), or neutral (o) related to 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) (top entry) 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) (bottom entry) *.

Country	Wave 1	Wave 2	Wave 3	Wave 4 ‡	Wave 5
Austria	o o	o o			
Canada		+ +			
China		+ +	+ +		+ +
Europe (27 countries)		o −			
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.

For the 30 paired entries in 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, COVID-19 coping was found to be predominately neutral, and, in 4 cases,

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 to 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 [9,40], this result supports that extraversion provides conflicting results regarding COVID-19 coping.

Of the pairs, 18 had the same results for both the top and bottom, and 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 five of the situations where these two entries differed, one of them was neutral while the other was either positive or negative. Yet, in four of the cases, COVID-19 coping was determined to be opposite to the public sentiment, representing just over 13% of the cases. In these four situations, the reason why 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 during Wave 2, the United Kingdom during 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 used 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 Tables 1 and 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 stress 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 was another study performed during Wave 3 in Germany regarding the first large-scale use of an app for digital contact tracing to track a chain of infection and contain the spread of the virus, which 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 use [125]. This indicates, as highlighted by those who conducted this app-related research, 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 for people's attitudes towards novel interventions. The research represented in Table 1 and that in Table 2 for Germany during this wave depended on populations with different levels of trust, thus representing 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 and relaxing rules, while at the same time blaming citizens for having limited discipline in responding to the pandemic [126]. 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 positive coping in the extraverted White majority and negative coping in 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 of 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%) [127]. As such, this change in public opinion regarding vaccines was not 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 the United States economy would recover during Wave 1. However, at the same time, increased mortality was associated with United States citizens' belief in conspiracy theories generated from social media and their disbelief in the information provided by mainstream broadcast media. The reason why these differences were noted between the effect of extraversion on positive COVID-19 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 [128]. 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 [129].

It has been noted that those who display the personality trait of extraversion will cope with COVID-19 differently dependent on (1) the country in which people reside, (2) the wave in which 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 as providing the information they seek when they want it (resulting in the belief that they can trust their sources [130]), 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.

Therefore, the initial hypothesis—that the ability of extraversion to influence positive COVID-19 coping will be directly affected through other-directed learning depending on the various waves of COVID-19, the countries in which extraverted people reside, the perception of the seriousness of COVID-19 affected by the introduction of vaccines, and the reliability of the information available—has been confirmed.

4.2. Other-Directed Versus Self-Directed Learning in Extraversion Regarding COVID-19 Coping

Given that the ability of extraversion to permit positive COVID-19 coping 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 [131]. Under other-directed conditions, learning occurs as a result of the guidance and direction of an "other", such as family, friend, colleague, broadcaster, teacher, or researcher [10]. In this regard, examples of pursuits promoting other-directed learning concern media used by these "others" and may include listening to a phone conversation, reading message boards, following an online 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 for the learning process without question [132] as the point of the learning is to incorporate a way for interpreting information about COVID-19 from a perspective developed externally from the extraverted person.

In contrast to other-directed learning that is the focus of extraversion, self-directed learning—identified as the most appropriate form of learning for adults [133] and a form of learning from which potentially anyone can benefit [134]—is demonstrated when learners take responsibility for organizing and managing their own learning based on what they personally value [132]. They do this by identifying personal knowledge gaps [135]; critically considering information that they seek out on their own [136]; and diagnosing their requirements, identifying their goals, selecting strategies, and designing their evaluations for performances and outcomes [137]. Unlike other-directed learners, self-directed learners demonstrate intrinsic motivation, integrity, agency, diligence, perseverance, and grit toward their learning [138] while being continuously engaged in acquiring, applying, and creating knowledge and skills in the context of their unique needs [139]. Adults are found to have a deep need to self-direct their learning [44]. 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 [140]. Yet, however necessary and in accordance with a deep need, the use of self-directed learning continues to pose a challenge in education and engagement, particularly with respect to medical professionals [141], as other-directed learning has been the accepted norm for an empathetic response during COVID-19 [142].

The Big Five personality traits related to self-directed learning primarily involve conscientiousness and openness [134]. If self-directed individuals display extraversion, it is a factor related to agreeableness within a particular working environment [143], 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 [144] when self-directed learning was required [141]. Self-directed learners can be identified using particular psychological tests developed specifically for this purpose [45]. Self-directed learning can be encouraged in individuals within a context by following a self-developed process [40,43] and has been found most successful in relation to student-led activity structures during COVID-19 restrictions [145]. The importance of COVID-19-related self-directed learning has been supported by educators in various countries during the pandemic [146–148].

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 [149]. 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 [131]. 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 [131]. Importantly, unlike extraversion when it is maladaptive, with self-directed learning, stresses are viewed as challenges or opportunities rather than threats [150–152].

Extraversion has been found as important to consider in motivating a learner's willingness to self-initiate information-seeking behavior in adult populations [131]. 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 [153] not determining if the information provided corresponds with what they personally value given the situation [154]. In contrast, the key feature of self-directed learners is adaptability [155] based on personal values and, although the individual displaying extraversion is readily adaptable to others and their points of 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 [156]. In this way, the veracity of the second hypothesis, that self-directed learners will not be similarly influenced by other-directed variables regarding their COVID-19 coping, has been demonstrated.

4.3. Limitations

The limitations of this study are with respect to three aspects. The first is that the studies selected for the comparison were based on using particular keywords at a certain time with one search engine. Reasons have been provided for why this was performed; 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 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 [157]. As a result of these limitations, this study and its conclusions must be considered cautiously.

5. Conclusions

Positive coping with COVID-19 in relation to extraversion has been found dependent on a number of variables. These variables include the particular country considered (its geography and history), the wave in question, the standing of vaccines, and a positive attitude towards the current public opinion regarding COVID-19 based on trust in the information provided. The conclusion is that extraversion in a particular country can be expected to produce positive COVID-19 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 positive COVID-19 coping is to know the popular public concern regarding COVID-19 during the various waves.

This dependence of extraversion on other-directed learning 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 is

known, 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 the COVID-19 pandemic, this presented a problem for anticipating individual views and public officials' responses when 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, knowing 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, 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 the Big Five personality traits in guiding citizens to learn about upcoming COVID-19 virus mutations either as other-directed learners or self-directed learners in relation to any future possible waves.

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