

## Article

# COVID-19 Related Knowledge, Risk Perceptions, and Practices amongst Irish Residents

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**Abstract:** The COVID-19 disease was declared a global pandemic by the 11th of February 2020, presenting a major threat to public health worldwide. Success in the battle against COVID-19 depends on public adherence to control measures. Their adherence is greatly affected by their knowledge, perceptions, and practices; therefore, the aim of this study was to assess and understand the knowledge, perceptions, practices, and trusted information sources of COVID-19 among Irish residents. A quantitative survey was performed by means of an online questionnaire, which comprised five sections to collect data regarding demographics, knowledge, perceptions, practices, and information sources. A total of 1007 participants completed the online survey between February and March 2021. The majority of respondents (69.4% female and 30.3% male) had a correct rate of knowledge (88%) and practices (68.1%), with health organisations being the most trusted information source (70.7%); 87.4% understand good mask etiquette. Only 53.7% agreed that closing schools or mass gathering events are an effective way to reduce the spread of the virus, while 81.3% are aware that COVID-19 is more severe than the flu; 64% of respondents said that the pandemic has negatively affected their mental health. It was observed that a higher level of knowledge is positively correlated with good practices. The study concludes that most of the respondents have shown a good level of knowledge and right practices towards the COVID-19 pandemic, and that the higher the level of knowledge of individuals, the better the COVID-19 safety practices are that they perform. It has been observed that the continuous improvement on an individual's level of knowledge of COVID-19 is essential to maintain good safety practices and reduce the spread.

**Keywords:** COVID-19; coronavirus; knowledge; perceptions; practices



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## 1. Introduction

In late December 2019, infectious pneumonia resulting from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) emerged in Wuhan, China [1]. By 11 February 2020, the World Health Organisation (WHO) named the disease resulting from SARS-CoV-2 as coronavirus disease 2019 (COVID-19). The disease was declared a global pandemic, presenting a major threat to public health worldwide. Recent studies concerning the origin of the outbreak of COVID-19 claim that the virus was synthetically created in a laboratory. Indeed, even though its origin is not completely understood, it was shown that the bat coronavirus contributed 96% of its genome to SARS-CoV-2, thus suggesting a bat origin and a transmission to humans through an intermediate host [2,3].

COVID-19 presents itself in a spectrum of clinical manifestations, including fever, cough, shortness of breath, fatigue, a loss of taste and smell, and gastrointestinal issues. COVID-19 is highly infectious, and most individuals are susceptible to infection; however, older individuals and patients with underlying conditions are at greater risk. Indeed, many reports dismissed the myth that children cannot catch COVID-19. Usually, paediatric

patients with COVID-19 have mild symptoms and will recover within 1 to 2 weeks because of active innate immune response and healthier respiratory tracts [3–5]. Respiratory droplets and contact transmission are the main routes of transmission for the person-to-person spread of COVID-19 [6].

Non-pharmaceutical interventions have been put in place by the governments of many countries around the world to try to limit the spread of the virus and reduce transmission. Such interventions include the implementation of ‘lockdowns’ in certain countries, the quarantine of individuals exposed to the virus, isolation of any confirmed or suspected cases and of those deemed a ‘close contact’ of an individual, and sensitisation of the general population to control measures to limit the spread. Control measures include mask-wearing, social distancing, and regular handwashing; information on which has been shared by the World Health Organisation [7].

As of July 2021, there have been over 197 million confirmed COVID-19 patients in over 210 countries, 298,000 of which have been in Ireland. There have been a total of 4.21 million deaths worldwide, 5035 being in Ireland [8]. The multi-faceted approach to control COVID-19 followed in Ireland involves measures to limit the spread in the community and institutional settings, test and trace suspected close contacts, ensure adequate healthcare to those becoming seriously ill due to COVID-19, and limit the financial burden on individuals and businesses. Public health advice issued to the republic of Ireland by the government and Health Service Executive (HSE) includes emphasis on frequent handwashing, appropriate respiratory etiquette, and maintaining a two-metre distance between others. The need to avoid touching one’s eyes and mouth is also highlighted, as well as the use of wearing face masks in indoor settings and on public transport. The success of the battle against the disease depends on public adherence to infective control measures. If the virus is not given the opportunity to spread, it will not spread [9].

Public adherence to the control measures is vital in the limitation of the spread of the virus, and their adherence is greatly influenced and affected by their level of knowledge, risk perceived, and practices towards the COVID-19 pandemic [10]. The level of knowledge individuals have regarding COVID-19 can lead to better protection and promotion of their health [11]. A high level of knowledge regarding the aforementioned information on the infection is determined by effective communication between health authorities, such as National Public Health Emergency Team (NPHET) and the HSE in Ireland, the WHO, the Irish government, and the general population [10].

The perception of an individual’s susceptibility to the disease and the perceived severity of COVID-19 will influence the preventative actions taken by individuals. An understanding of the severity would mean individuals perceive that they are susceptible to COVID-19, and that the contraction and spread of the disease would have severe consequences [11]. A correct level of knowledge will highlight the individual’s perception of factual versus fictional information spread regarding COVID-19. The right perception regarding misconceptions around COVID-19 will encourage and promote better practices of the Irish public towards COVID-19 [10].

The correct preventative practices taken are influenced by the effective communication of practices, including handwashing etiquette, disinfection of surfaces, avoiding touching one’s face and eyes, mask etiquette, physical distancing, non-essential travel, as well as a good level of knowledge of COVID-19 [10].

To understand the level of knowledge and perceived risk of COVID-19 amongst the Irish population, knowing where they trust to actively go and seek out new and updated information on COVID-19 is important. Effective means of sourcing and providing the information is important for healthcare professionals and government officials to effectively communicate with the public. Choosing credible information sources ensures individuals acquire accurate and up-to-date information of COVID-19 [12].

Success in the battle against COVID-19 depends on public adherence to control measures. Their adherence is greatly affected by their knowledge, perceptions, and practices; therefore, the aim of the study was to assess and understand the knowledge, perceptions,

practices, and trusted information sources of COVID-19 among the Irish residents. This study will help to identify the common practices of the Irish population with regards to COVID-19 and identify any common misconceptions.

## 2. Materials and Methods

### 2.1. Questionnaire Design

To gain an insight into the level of COVID-19 related knowledge, risk perceptions perceived, practices performed, and trusted information sources amongst the Irish population, a quantitative survey was performed by means of an online questionnaire. It was important to ensure the questions were short and appropriately worded so that the various demographics had the ability to fully understand what was being asked and to receive sufficient quantitative data. Short and simple yet effective questions also ensured a greater participant response, as the elimination of long-winded questions could result in many incomplete responses. To minimize the possibility of the participant selecting a random answer, the choices of "I Don't Know" or "Not Sure" were added to some questions.

The literature review of various published scientific articles from different countries determining similar questions aided the development of the questions for the different sections, including articles on Medical Students from Jordan [10], Nigerians [13], Chinese residents [14], and Latinx farmworker/non-farmworker families in North Carolina [11]. A six-page, 47 multiple choice questionnaire was developed, modified, simplified, and tested.

The questionnaire was divided into six sections: (1) Screening Question: one question to ensure participants are from the Republic of Ireland; (2) Demographic Characteristics: to determine the socio-demographic factors of the participant, such as age, gender, level of education, relationship status, occupational status, and gross income level; (3) COVID-19 Level of Knowledge: 11 multiple choice questions to determine the level of knowledge surrounding COVID-19 of the participants; (4) Risk Perceptions: 11 statement questions followed by Likert-scale type answers including a neutral response to determine the risk perceived of COVID-19 among participants; (5) Practices: 15 frequency Likert scale questions to establish the COVID-19 related safety measures undertaken by the population; (6) Trusted Information Sources: one question to find out which of the nine listed information sources the participants are most likely to utilize to seek out new, updated, and accurate information on COVID-19.

Furthermore, there was an option to decline participation from the survey at any point during the study. Adequate information was given at the beginning of the survey detailing the purpose of the study, and questions were simplified for a greater understanding from the participant's point of view.

TU Dublin is a data controller under the Data Protection Acts 2003 and General Data Protection Regulation 2018. Any information provided is treated with strict confidentiality and all data are anonymised prior to data analysis.

### 2.2. Data Collection

The advantages of the online survey are not limited to flexibility, convenience, speed, timeliness, and ease of data management. With the advancement of technology, an online survey is used more frequently and better accepted by researchers than ever before [15,16]. Furthermore, due to the pandemic, the distribution of the survey was limited to electronic means only. Social media is capable of opening up a new era in social and behavioural science research [17]. These present-day communication platforms provide the ability to examine social data on a diverse theme, on an enormous scale, and over short periods of time [18]. The online survey contained 47 questions and was completed with the restrictions that the participant was over the age of 18 and resided in Ireland. The online survey was distributed on multiple social media platforms, such as Facebook, Instagram, Twitter, and LinkedIn.

### 2.3. Data Analysis

Once the survey was complete, the results were filtered to only display complete responses, and incomplete responses were disregarded. The data were then exported from survey monkey to MS Excel, where they were coded. Data were then run through SPSS where they were compiled, summarised, and analysed. The means, standard deviations, percentages, pass rates, and *p*-values were calculated. The demographic characteristics of the population were compared against their level of knowledge, practices and risk perceptions, and any statistical significance was calculated. The effect of socio-demographic characteristics of respondents on their level of knowledge, risk perceptions, and practices of COVID-19 was analysed by calculating the percentage and mean score with Chi-square ( $\chi^2$ ) test for each. Mann–Whitney U test was employed to determine the statistical significance of the residence of the population, while the Kruskal–Wallis test was utilised to determine the statistical significance of age, gender, place of residence, highest level of education obtained, relationship status, occupational status, and gross annual income. Finally, the linear relationship between the level of knowledge of COVID-19 and the COVID-19 practices of the population was calculated using Spearman rho statistics to determine if there is a correlation between a good level of knowledge and practices of COVID-19.

## 3. Results and Discussion

### 3.1. Demographic Characteristics of Participants

A total of 1007 respondents from the Republic of Ireland completed the questionnaire through survey monkey. Any incomplete responses or responses indicating the participant did not reside in the Republic of Ireland were not counted in this figure. Eight demographics were explored in this study, as seen in Table 1. In the age demographic, most of the participants (33.5%) were between the ages of 46–55, with 19.3% between the ages of 18–25. A total of 69.4% of participants were female, with 30.3% being male. A total of 83.4% of the demographic resided in a city/town, with 16.6% residing in the countryside/rural areas. Over half (54.2%) of respondents have received third-level education status. More than half (53.5%) of the population were married, with 46.5% unmarried (either single, divorced, widowed, or other). The majority of the population was also employed (53.2%), with the highest level of gross annual income being below €30,000 (30.5%).

**Table 1.** Demographic characteristics of participants.

Demographic Characteristics	N	Category	Participants (n)	Percentage (%)
Age	1007	18–25	194	19.3
		26–35	94	9.3
		36–45	178	17.7
		46–55	337	33.5
		56–65	146	14.5
		66+	58	5.8
Gender	1007	Female	699	69.4
		Male	305	30.3
		Prefer not to say	3	0.3
Residence	1007	Countryside/Rural	167	16.6
		City/Town	840	83.4

Table 1. Cont.

Demographic Characteristics	N	Category	Participants (n)	Percentage (%)
Highest Level of Education Obtained	1007	Primary School Education	13	1.3
		Secondary School Education	208	20.7
		Post-Leaving Certificate (PLC/FETAC/QQI)	240	23.8
		Third Level Education	546	54.2
		No Formal Education	0	0
Relationship Status	1007	Married	539	53.5
		Single	286	28.4
		Divorced	43	4.3
		Widowed	20	2.0
		Other	119	11.8
Occupational Status	1007	Employed	563	53.2
		Self-Employed	110	10.9
		Unemployed	36	3.6
		Out of Work due to COVID-19	95	9.4
		Student	103	10.2
		Other	127	12.6
Gross Annual Income (in Euro)	1007	Below 30,000	307	30.5
		30,000 to 60,000	283	28.1
		60,000 to 100,000	143	14.2
		100,000 and above	79	7.8
		Not in full-time employment	195	19.4

### 3.2. COVID-19 Level of Knowledge

The level of knowledge section was split up into two as this section contained both single response and multiple response answers. Table 2a consists of 7 questions and concerns the single response answers. As shown in Table 2a, the mean score is 0.879 and the standard deviation is  $\pm 0.325$ . The overall pass rate of COVID-19 related knowledge of the respondents was 88%. This good level of knowledge is reflected by 92.0% understanding the correct definition, 84.6% being aware it is possible to die from the coronavirus without having any underlying conditions, and 86.9% of the respondents were aware that spraying alcohol or chlorine over one's body will not kill the virus. A total of 92.0% understand good mask etiquette while wearing the mask, and 87.4% understand good etiquette with regards to the removal of face masks, but only 48.6% believe masks are only effective when you frequently clean your hands.

Table 2b explores the multiple-choice questions relating to the COVID-19 level of knowledge. These total percentages do not equal 100%, as there may have been multiple responses from each participant. The level of knowledge is generally good in this section also, as 97.6% understand the virus can spread from person to person via contact with airborne droplets; however, only 46.3% chose kissing, hugging, or other physical contact as a means of transmission. The most common scenario chosen for deeming a person a close contact of a positive COVID-19 infectious individual was spending more than 15 min of face-to-face contact within 2 metres of someone who has COVID-19, indoors or outdoors, with 87.1% choosing this answer. The most popular answer for preventing the spread of COVID-19 was regular hand washing and social distancing, with 93.4% choosing this, followed by 91.2% choosing staying at home if feeling sick or unwell. A total of 81.6% selected abiding by public health guidelines, but 53.7% chose closing schools/cancelling

mass gathering events, which is a public health guideline. A total of 39.1% and 34.4% were aware headaches and sore throat/blocked nose, respectively, were common symptoms of COVID-19.

**Table 2. (a) COVID-19 level of knowledge of participants. (b) COVID-19 level of knowledge of participants—multiple-choice responses.**

(a)				
Questions	N	Category	Participants (n)	Percentage (%)
1. Which of the following statements do you think is correct about the definition of COVID-19, the disease that results from the coronavirus?	1007	Coronavirus is an exaggeration by news media to cause fear and panic	31	3.1
		Coronavirus is a biological weapon	24	2.4
		Coronavirus is a virus designed by pharmaceutical industry to sell their	8	0.8
		Coronavirus is a respiratory disease caused by a viral infection	926	92.0
		Coronavirus is designed to reduce or control the population	18	1.8
6. Do you believe it is possible to die from the Coronavirus with no underlying conditions?	1007	Yes	852	84.6
		No	71	7.1
		Not sure	84	8.3
7. If you are healthy, you need only wear a mask only if taking care of a person with suspected COVID-19.	1007	Yes	85	8.4
		No	886	88.0
		Not sure	36	3.6
8. Masks are effective only when you frequently clean your hands with alcohol-based hand sanitiser or soap and water.	1007	Yes	489	48.6
		No	430	42.7
		Not sure	88	8.7
9. You should avoid touching the mask while using it; if you do end up touching the mask, you should clean your hands with alcohol-based hand sanitiser or soap and water.	1007	Yes	926	92.0
		No	38	3.8
		Not sure	43	4.3
10. You should remove the mask from behind (i.e., you should not touch the front of mask). You should immediately discard the used mask in a closed bin and clean your hands with alcohol-based hand sanitiser or soap and water	1007	Yes	880	87.4
		No	67	6.7
		Not sure	60	6.0
11. Spraying alcohol or chlorine all over your body will kill the novel coronavirus	1007	Yes	28	2.8
		No	875	86.9
		Not sure	104	10.3
Total Pass	885			88
Mean score ± Standard deviation				0.879 ± 0.325

**Table 2. Cont.**

(b)				
Questions	N	Category	Participants (n)	* Percentage (%)
2. The Coronavirus is typically spread (i.e., passed from person-to-person) by which means?	1007	Contact with airborne droplets via breathing, sneezing, or coughing	980	97.6
		Kissing, hugging or other physical contact	465	46.3
		Consuming contaminated water or food	0	0
		Touching contaminated objects or surfaces	600	59.8
		Through 5G phone network or masts	0	0
3. Which of the following scenarios would you consider a 'close contact' of a person who has tested positive for COVID-19?	1007	Living in the same house or shared accommodation as someone who has COVID-19.	839	84.6
		Spending more than 15 min of face-to-face contact within 2 metres of someone who has COVID-19, indoors or out-doors	864	87.1
		Spending less than 15 min of face-to-face contact within 2 metres of someone who has COVID-19, indoors or out-doors	0	0
		Living next door to someone who has COVID-19	0	0
		Walking past an infected person on the street	0	0
		Sitting within 2 seats of someone who has COVID-19 on public transport or an airplane.	525	52.9
		Being in the same room as an infected person for less than two hours	626	63.1
4. The spread of coronavirus can be prevented by	1007	Regular hand washing and social distancing.	935	93.4
		Eating a balanced diet	0	0
		Avoiding exposure to or use of 5G networks	0	0
		Exercising	0	0
		Staying home when sick/feeling un-well	913	91.2
		Wearing a face mask in public spaces	893	89.2
		Closing schools and cancelling mass gathering events	538	53.7
		Taking herbal supplements	0	0
		Disinfecting contaminated surfaces	826	82.5
		Abiding by public health guidelines	817	81.6

Table 2. Cont.

(b)				
Questions	N	Category	Participants (n)	* Percentage (%)
5. The most common symptoms of COVID19/Coronavirus infection are ...	1007	Dry cough, fever, shortness of breath	965	96.8
		Loss of taste and smell	909	91.2
		Headache	390	39.1
		Sore throat, blocked nose	343	34.4
		Don't know	0	0

\* The total percentage is not 100% as there are multiple responses from the participant.

The respondents have a good level of knowledge of COVID-19 with an 88% pass rate. This high pass rate would be due to the country-wide initiatives (lockdowns, exposure to information, etc.) that have been taken by the Irish government and public awareness since the beginning of the pandemic. In comparison to similar studies in China, India, and Iran, Ireland has a good level of knowledge, with the pass rates for correct levels of knowledge being 90% in China [14] and Iran [19] and 74.7% in India [20]. A reason for the difference in the knowledge scores here could be due to the differences in the time at which the studies were conducted, as well as the differences in the areas. China's high level of knowledge was 'unexpected', as their survey was conducted very early into the pandemic, but their demographic consisted of a majority of people with a high degree of education. The study in India, which was conducted during a nationwide lockdown during May, 2020, reported a poor level of knowledge with regards to the transmission of the virus, with results showing their respondents believed the virus could be transmitted through the air. A similar study in Jordan found that, similar to India, 41.8% of their respondents believe the virus can be transmitted to the air. More than 90% of respondents from Jordan and 97.6% of respondents from this study had correct knowledge of respiratory droplets and contaminated surfaces. The study in Jordan was performed a year prior, which could indicate that the information communicated to the public in the early period of the pandemic was effective as the population had a good level of knowledge [10].

Although the respondents showed a good level of knowledge of respiratory droplet transmission, only 46.3% believed kissing, hugging, or other physical contact acted as a means of transmission. Physical contact would imply that there is no social distancing, which is contradictory to the 93.4% who were aware that social distancing could reduce the spread of the virus. Respondents also had a good level of knowledge of the definition of a close contact of a confirmed case of COVID-19, with 87.1% choosing 'spending more than 15 min of face-to-face contact within 2 metres of someone who has COVID-19, indoors or out-doors'. These definitions, along with 'living in the same house or shared accommodation as someone who has COVID-19' and sitting within two seats of someone who has COVID-19 on public transport or an airplane are the definitions issued by the HSE for the meaning of a close contact [21].

A study by Lee et al. [22] on the proper practice and technique of mask-wearing highlighted several techniques on the proper use of a face mask to achieve the desired effect—which would be to prevent the spread of respiratory infection. Said techniques are split into two sections, for wearing the mask and for removing the mask. The correct way to wear the face mask includes performing correct hand hygiene, choosing the correct size of face mask, ensuring the mask fits over the nose and chin, and to avoid touching the mask whilst wearing it. For the removal of the mask, hand hygiene should be performed, only the elastics should be touched (i.e., removed from behind), and they should be discarded appropriately. A total of 92.0% of survey respondents understand good mask etiquette that you should avoid touching the mask while wearing, and clean your hands immediately after removing the mask, but only 48.6% believe masks are only effective when you frequently clean your hands. Interim guidance on mask use issued by the WHO

in December 2020 states that the use of masks alone is not sufficient enough to provide an adequate level of protection against COVID-19, and multiple other measures, including hand hygiene, are critical to prevent transmission. The WHO recommends mask use in both healthcare and community settings, with 88.0% of the respondents showing an understanding that healthy individuals must wear a mask in such settings, not just when taking care of someone with suspected COVID-19 [23].

A total of 86.9% of the respondents were aware that spraying alcohol or chlorine over one's body will not kill the virus. As mentioned on the WHO Mythbusters platform, spraying or introducing bleach/disinfectant to one's body will not provide protection against COVID-19 and does not kill the novel coronavirus. Disinfecting surfaces in the home is a recommended practice to reduce contact transmission of COVID-19, but should be performed carefully as these substances can be poisonous when ingested and damage/irritate skin [24].

### 3.3. Risk Perceptions

Knowing which risk perceptions influence populations in such a complex phenomenon are important for the planning of a pandemic. Risk perceptions guide the judgements and evaluations of threats and can limit or promote their compliance with control measures that have been put in place by authorities. The correct perception towards COVID-19 myths and facts will encourage good practices among the public [20]. This section consisted of 11 questions, as shown in Table 3. A mean score and pass rate were not calculated for the risk perceptions of COVID-19, as a perception of an individual may not have a correct or incorrect answer. Some notable findings on the respondents' risk perceptions of COVID-19 include 34.7% believing their health will be severely damaged if they contracted COVID-19, 40.0% disagreeing that they are more at risk than contracting COVID-19 compared to others, 69.5% disagreeing that Ireland should open up as normal to attempt to achieve herd immunity against COVID-19, and 44.4% saying that their perception of the severity of COVID-19 has changed after contracting the virus or of knowing someone who has contracted the virus. A total of 81.3% of respondents were under the impression that COVID-19 is more severe than the flu, and 64.0% of respondents agree that the COVID-19 pandemic has negatively affected their mental health.

We asked if the population believes contracting COVID-19 would severely damage their health. The same question was asked in a study by Quandt et al. [11] among a group of Latinx farmworker/non-farmworker families in North Carolina. A total of 34.7% of the population of this study believed their health would be severely damaged upon contracting COVID-19, compared to 91.04% and 92.11% of the Latinx farmworker/non-farmworker families believing so in North Carolina, respectively. The differing answers could be because that the Latinx study was performed at the earlier time of August 2020 and that their survey population was also lower at N = 67 for farmworkers and N = 38 for non-farmworkers, compared to the 1007 respondents in this study. It was also asked in both surveys if the respondent believes they are more likely or more at risk to contract COVID-19 compared to others. The survey on the Irish population clarified in the question that a higher risk could be due to a person's workplace or underlying health conditions. A total of 0% of farmworkers and 42.11% of non-farmworker families believed they were more likely to contract COVID-19 compared to others, while 33.7% of the Irish population believing they were more at risk of contracting COVID-19. With most of both populations having a neutral response or believing they are less likely to contract COVID-19 compared to others, it could be because they perform good practices towards COVID-19 and believe that they can protect themselves [11].

**Table 3.** Risk perceptions of COVID-19.

Questions	N	Category	Participants (n)	Percentage (%)
1. How likely do you think people in Ireland are to contract the Coronavirus compared to other countries in the EU?	1007	More Likely	90	8.9
		Just as Likely	879	87.3
		Less Likely	38	3.8
2. My health will be severely damaged if I contract COVID-19	1007	Agree	349	34.7
		Neither agree nor disagree	554	55.0
		Disagree	104	10.3
3. The Covid-19 pandemic negatively affected my mental health (lockdowns, isolation, restrictions etc.).	1007	Agree	644	64.0
		Neither agree nor disagree	184	18.3
		Disagree	179	17.8
4. COVID-19 is more severe than the flu	1007	Agree	819	81.3
		Neither agree nor disagree	146	14.5
		Disagree	42	4.2
5. I would consider myself more at risk to contract COVID-19 compared to other people (due to age, workplace, underlying conditions, etc.)	1007	Agree	339	33.7
		Neither agree nor disagree	265	26.3
		Disagree	403	40.0
6. Everything should open back up as normal in an attempt to achieve herd immunity against COVID-19	1007	Agree	136	13.5
		Neither agree nor disagree	171	17.0
		Disagree	700	69.5
7. Without vaccines, people's actions alone could eradicate the coronavirus	1007	Agree	205	20.4
		Neither agree nor disagree	201	20.0
		Disagree	601	59.7
8. If the COVID-19 vaccine was offered to you tomorrow, would you agree to receive it?	1007	Yes	776	77.1
		No	90	8.9
		Not Sure	84	8.3
		I have already received the vaccine	57	5.7
9. Has your perception of the severity of COVID-19 changed after contracting/knowing of someone who has contracted the virus	1007	Yes	447	44.4
		No	376	37.3
		I have not/do not know anyone who has contracted COVID-19	184	18.3
10. I consider myself immune to COVID-19 as my immunity is strong	1007	Agree	45	4.5
		Neither agree nor disagree	834	82.8
		Disagree	128	12.7
11. How soon do you expect life to return to normal in Ireland?	1007	Summer 2021	76	7.5
		Winter 2021	193	19.2
		Early 2022	437	43.4
		Late 2022	182	18.1
		2023	119	11.8

A study carried out by Beatty et al. [25] observed that 81.3% of respondents were under the impression that COVID-19 is more severe than the flu. The authors measured the severity and impact of COVID-19 from the healthcare sector and compared the statistics to hospitalisations from influenza. The right perception of a population towards the myths and facts of COVID-19 can also encourage good practices among the public.

Regarding the risk COVID-19 lockdown and restriction measures in place poses on one's mental health, 64.0% of survey respondents agreed that the COVID-19 pandemic had

a negative effect on their mental health. In the qualitative study of ‘child and adolescent mental health during the COVID-19 pandemic in Ireland’, O’Sullivan et al. [26] illustrated the psychological consequences young people are at risk of suffering from as a result of the pandemic. They also discussed the effects it may have on the parents of young people—they found that some of the greatest impacts were social isolation, depression, anxiety, as well as the stress posed by home-schooling on parents and children. It was highlighted in the study that support services are needed to support young people to develop healthy coping mechanisms while processing the adverse effects of COVID-19.

### 3.4. Practices

As seen in Table 4, the COVID-19 related practices undertaken by residents in Ireland in response to the COVID-19 pandemic and government guidelines were analysed by 15 questions. The mean score was 0.681, with a standard deviation of  $\pm 0.46$  and a total pass rate of 68.1%. Most of the respondents have good self-reported COVID-19 related practices, with 90.1% wearing masks, 61.3% feeling uncomfortable without a mask, and 87.5% implementing physical distancing when in crowded places. A total of 79.3% use hand sanitiser in crowded places and 73.1% wash their hands with soap and water for at least 20 s after being in a crowded place. A total of 52.1% of participants always use disinfectants on frequently used surfaces in the home, with 40.1% occasionally doing so. A total of 49.4% always avoid touching their eyes, nose, and mouth with unwashed hands, with 44.4% occasionally avoiding doing so. A majority (78.0%) of the population avoid shaking hands with others since the beginning of the pandemic. A total of 93.8% of the respondents have avoided leaving the country for non-essential travel, with 6.2% having travelled for non-essential reasons since the beginning of the pandemic. A total of 62.8% have also responded, stating they are not planning to travel outside of Ireland in 2021.

**Table 4.** COVID-19 related practices.

Questions	N	Category	Participants (n)	Percentage (%)
1. Do you wear a mask when in crowded places?	1007	Always	907	90.1
		Occasionally	74	7.3
		Never	26	2.6
2. Do you implement physical distancing in crowded places?	1007	Always	881	87.5
		Occasionally	111	11.0
		Never	15	1.5
3. Do you use hand sanitizer in crowded places?	1007	Always	799	79.3
		Occasionally	169	16.8
		Never	39	3.9
4. Do you wash your hands with soap for at least 20 s after being in a crowded place	1007	Always	736	73.1
		Occasionally	237	23.5
		Never	34	3.4
5. Have you immediately changed your clothes before entering your house/having contact with family members?	1007	Always	67	6.7
		Occasionally	221	21.9
		Never	719	71.4
6. Do you avoid the touching door handles and staircase railing at public locations?	1007	Always	556	55.2
		Occasionally	385	38.2
		Never	66	6.6
7. Have you implemented more healthy foods in your diet since the beginning of the pandemic in an attempt to boost your immune system?		Yes	233	23.1
		No	565	56.1
		Sometimes	209	20.8

Table 4. Cont.

Questions	N	Category	Participants (n)	Percentage (%)
8. Have you began taking vitamins or supplements since the beginning of the pandemic in an effort to increase your immune system?	1007	Yes	422	41.9
		No	494	49.1
		Sometimes	91	9.0
9. Do you use disinfectants on frequently used surfaces in your home since the beginning of the pandemic?	1007	Always	525	52.1
		Occasionally	404	40.1
		Never	78	7.7
10. Do you avoid touching eyes, nose, and mouth with unwashed hands?	1007	Always	497	49.4
		Occasionally	447	44.4
		Never	63	6.3
11. Do you feel uncomfortable in public places without wearing a face mask?	1007	Always	617	61.3
		Occasionally	279	27.7
		Never	111	11.0
12. Since the beginning of the pandemic, it really bothers me when people sneeze or cough without covering their mouths/into their elbows.	1007	Agree	885	87.9
		Neither agree nor disagree	101	10.0
		Disagree	21	2.1
13. Do you prefer to wash hands soon after shaking someone's hand?	1007	Yes	146	14.5
		Occasionally	42	4.2
		No	34	3.4
		I avoid shaking people's hands	785	78.0
14. Since the beginning of the pandemic, I have avoided leaving the country for non-essential travel.	1007	Yes	945	93.8
		No	62	6.2
15. Are you planning to travel outside of Ireland in 2021?	1007	Yes	141	14.0
		No	632	62.8
		I haven't decided yet	234	23.2
Total Pass		682		68.1
Mean score $\pm$ Standard deviation				0.681 $\pm$ 0.46

Respondents had a total pass rate of 68.1%, meaning a majority of the public adhere to good COVID-19 related practices. This is potentially due to the high level of knowledge of the public, which will translate into good practice. Some uncertainties can also be seen with regards to practices, particularly around the implementation of healthier foods and vitamins into one's diet. A limitation of analysing the practices the population undertakes is that these are self-reported and not observed practices.

Most of the respondents have high percentages in their self-reported COVID-19 related practices, such as mask-wearing physical distancing, and good handwashing etiquette (washing hands for 20 s with soap and water, hand sanitiser). These are all in line with the guidelines issued by both the Health Service Executive (HSE) and the WHO on safe COVID-19 practices to reduce the spread of the virus. The HSE encourages proper handwashing often, social distancing, covering coughs and sneezes, as well as stating the importance of wearing face masks, as it is now a law in Ireland to do so on public transport, in shops, and other indoor settings [27]. The WHO also encourages mask-wearing and physical distancing, as well as reminding individuals of the basics of good hygiene [7]. The wearing of masks and socially distancing has been encouraged and promoted as being of greater importance to reduce the transmission of respiratory droplets, in comparison to disinfecting surfaces which would have been more largely encouraged towards the beginning of the pandemic. Only 55.2% of the population avoid touching door handles and staircase railings in public places, which can sometimes be an unavoidable task; however, 38.2% responded

that they occasionally do so, which shows the population does so when they can. The use of hand sanitiser in public or crowded spaces can be reflected upon with this question also, in that the population may use so after touching door handles or railway staircases.

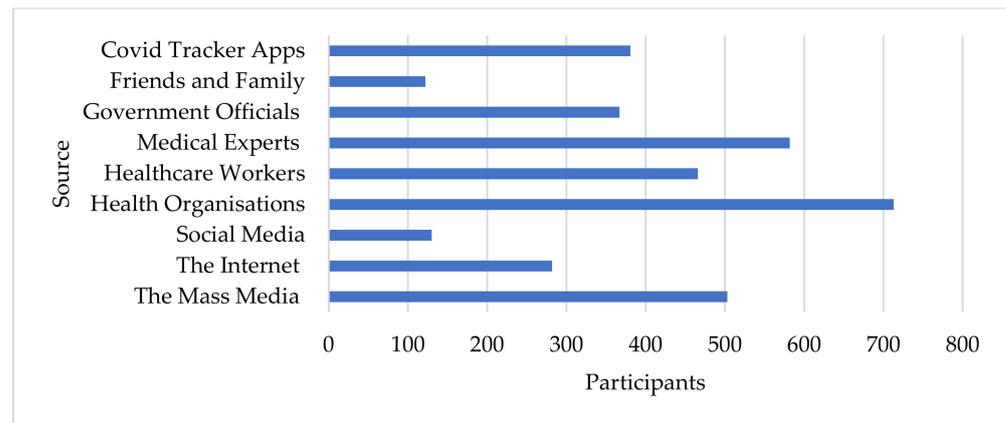
This pass rate of 68.1% is lower in comparison to similar studies in India, which have 88.1% of participants showing the right practices to avoid the spread of COVID-19 (Goruntla et al., 2020) and 89% in Iran [19]; however, all studies had significantly lower scores in comparison to China who's pass rate was above 90% (Zhong et al., 2020). A study in Palestine by Salameh et al. [28] (2021) found respondents were less likely to wear a face mask in comparison to other preventative measures such as good hand hygiene and social distancing, which is similar to another study in Jordan by Khasawneh et al. (2020). A total of 79% of respondents in Palestine responded to wearing a face mask as a preventative measure; however, only 9.7% of respondents in Jordan said they wear a face mask as a preventive measure. The study in China by Zhong et al. (2020) found that the vast majority of respondents reported wearing face masks when going out. A total of 90.1% of the Irish population always wear face masks in crowded places. The differences may be explained by the different approaches countries have taken in promoting the preventative practices and different regulations governments have issued regarding preventative practices, and also the time at which the studies were performed with masks now being enforced laws in most countries.

A study by Moreb et al. [29] discussed the importance of fruit and vegetables and their beneficial role in boosting the immune system, with an emphasis on those in high-risk groups, such as those having underlying health or medical conditions. This prompted asking the survey participants if they have implemented more healthy foods in their diet or began to take vitamins or supplements since the beginning of the pandemic. A total of 23.1% responded yes and 20.8% responded sometimes to incorporating more healthy foods in their diet in an attempt to boost their immune system. A total of 41.9% have begun to take vitamins or supplements, with 9.0% sometimes doing so. The implementation of healthy foods into one's diet was found to be the least common COVID-19 related practice among the population. Perhaps the lack of implementation of healthy foods to boost one's immune system could be due to a lack of knowledge of the benefits. There is an opportunity to raise awareness that although healthy foods/vitamins would not prevent a person from contracting COVID-19, a healthier immune system can reduce the risk of severe illness due to COVID-19.

### 3.5. Trusted Information Sources

The final section of the survey asked the participants where they would most likely go to actively seek out new, updated, and accurate information on COVID-19. This was a multiple-choice question, with many choosing more than one response, so the percentages are not equivalent to 100% of the population. The most trusted source for the population was health organisations, such as the WHO and the HSE in Ireland, with 70.7% choosing so, and friends and family members being the least trusted source. Figure 1 shows that participants chose healthcare workers, government officials, and COVID tracker apps as more trusted sources for accurate and up-to-date information compared to the internet, social media, and friends and family.

The survey concluded that the most trusted information source for updated and accurate information regarding COVID-19 in Ireland is health organisations, such as the HSE and the WHO, with the least amount of trust in friends and family, closely followed by social media. This was an expected outcome as the control measures and information issued by the government of Ireland are available for the public on websites such as the HSE and the WHO, with some government control measures put in place usually being recommendations from such health organisations.



**Figure 1.** Trusted information sources.

With over half of the population trusting medical experts to receive information regarding COVID-19, it is not a surprise that the mass media, such as television or radio, was chosen by just under half of the population, as medical experts usually address the population on new, accurate, and updated information on either the television or radio stations in Ireland. A similar study in Palestine found their population had the most trust in the Ministry of Health for information on COVID-19, with social media being the least trusted source of information (Salameh et al., 2021). In a study in Jordan by Khasawneh et al. (2020), 37.8% of their participants reported using social media to obtain information on COVID-19, which contrasts the 12.9% of participants in this study who use social media for information on COVID-19. This is similar to a study by Plaster et al. [30] (2018), which examined the knowledge, attitudes, and sources of information regarding the zika virus epidemic among university students in the United States. For information on the zika virus, news outlets were the main source of information, rather than social media. Since the beginning of the pandemic, social media has become a feeding ground for misinformation and false claims regarding COVID-19, as observed by Shahi et al. [31] (2021) in an exploratory study of COVID-19 misinformation on Twitter. It is a promising find that a small percentage of survey respondents in this study chose social media as a trusted source for information regarding COVID-19.

### 3.6. Relationship Studies

#### 3.6.1. The Relation between the Demographic Characteristics and COVID-19 Level of Knowledge

The results displayed in Table 5 show that at a significance level of  $p < 0.05$ , gender, occupational status, and gross annual income were statistically important factors that impacted the level of knowledge of COVID-19 of the population. Age, level of education, residence, and relationship status of the respondents was shown not to have any significance at  $p > 0.05$ . This means that there was no relation between these demographic characteristics and their level of knowledge of COVID-19. At a significance level of  $p < 0.05$ , gender, gross annual income, and occupational status were statistically important factors that impact the level of knowledge of the population.

Results showed that females had a higher level of knowledge compared to males, with 62.8% and 24.9% pass rates, respectively. These results are also similar to a study by Lee et al. [22] (2021), where females had a higher level of knowledge, and the respondent's age, marital status, income level, and residence were not related to their level of knowledge of COVID-19. The poorer level of knowledge among males renders them particularly vulnerable, and so attention must be given to groups showing low levels of knowledge of COVID-19. This contrasts with a similar study in Pakistan by Afzal et al. [32], where it was found that gender does not influence the level of knowledge of individuals.

**Table 5.** Relation between the demographic characteristics and level of knowledge.

Variables	N	Pass Rate %	<i>p</i> -Value	Mean Score	<i>p</i> -Value
Age					
18–25		16.6		5.69	
26–35		8.1		5.75	
36–45		14.8		5.70	
46–55		30.3		5.89	
56–65		13.0		5.86	
66+	1006	5.2	0.215 <sup>a</sup>	5.70	0.190 <sup>c</sup>
Gender					
Female		62.8		5.89	
Male	1006	24.9	0.001 <sup>a</sup>	5.56	0.001 <sup>c</sup>
Prefer not to say		0.3		5.66	
Residence					
Countryside/Rural		14.8		5.87	
City/Town	1006	73.2	0.587 <sup>a</sup>	5.77	0.235 <sup>b</sup>
Highest Level of Education Obtained					
Primary School Education		1.1		5.76	
Secondary School Education		18.2		5.75	
Post-Leaving Certificate (PLC/FETAC/QQI)	1006	20.2	0.260 <sup>a</sup>	5.67	0.417 <sup>c</sup>
Third Level Education		48.5		5.86	
No Formal Education		0		0	
Relationship Status					
Married		48.1		5.89	
Single		24.9		5.75	
Divorced	1006	3.7	0.130 <sup>a</sup>	5.72	0.138 <sup>c</sup>
Widowed		1.7		5.60	
Other		9.6		5.49	
Occupational Status					
Employed		47.0		5.85	
Self-Employed		9.7		5.74	
Unemployed		3.2		5.80	
Out of Work due to COVID-19	1006	7.3	0.021 <sup>a</sup>	5.33	0.002 <sup>c</sup>
Student		9.2		5.80	
Other		11.5		5.89	
Gross annual income (in Euro)					
Below 30,000		25.8		5.59	
30,000 to 60,000		24.7		5.85	
60,000 to 100,000	1006	13.0	0.172 <sup>a</sup>	5.91	0.014 <sup>c</sup>
100,000 and above		6.9		5.73	
Not in full-time employment		17.6		5.94	

<sup>a</sup> Pearson Chi-square ( $\chi^2$ ) test was conducted. <sup>b</sup> Mann–Whitney U test conducted. <sup>c</sup> Kruskal–Wallis test conducted.

Those employed had a higher level of knowledge with regards to COVID-19 with a 47.0% passing rate, in comparison to those unemployed at a 3.2% passing rate. The reason for this could be due to exposure to COVID-19 in the workplace. The higher level of knowledge among those employed rather than those unemployed could be due to a higher socioeconomic status, although a high socioeconomic status is usually associated with a high level of education as well as occupation, to which level of education did not have any significance on level of knowledge. Residents of a high socioeconomic status having higher scores with regards to the level of knowledge of COVID-19 were also seen in similar studies in China [14] and Iran [19]. The studies in China and Iran also found that women had a higher level of knowledge of COVID-19; however, it is mentioned in the Iran study and so should be kept in mind here that the larger sample size of women respondents could account for its being statistically significant. There was more than half the number of female respondents compared to male respondents in this study. Contrasting the results of this study, in both the China and Iran studies, level of education was significantly associated with a higher level of knowledge of COVID-19. This was also found in a study on Chinese workers by Li et al. [33], where better-educated individuals had a higher level of knowledge of COVID-19, which was explained by the fact that better-educated individuals have a higher capacity to process more information and may be better able to distinguish correct information from the misconceptions of COVID-19. This study did show that individuals who have obtained a third-level education had a higher level of knowledge of COVID-18 than those with primary or secondary school education; however, this was not a statistically significant finding as  $p > 0.05$ .

### 3.6.2. The Relation between the Demographic Characteristics and Practices

Table 6 displays the relationship between the demographic characteristics of the respondents and their practices of COVID-19. The results show that gender, occupational status, and gross annual income is a statistically significant factor (at  $p < 0.05$ ) that determines good COVID-19 practices in the Republic of Ireland; however, similar to the level of knowledge of individuals, females had a higher pass rate at 52.6% in comparison to males with a pass rate of 15.4%. The study by Zhong et al. (2020) also found that females have better practices towards COVID-19. The poor pass rate among men at only 15.4% would deem them quite vulnerable again, and highlights that more attention should be paid to promoting good COVID-19 practices among men.

**Table 6.** Relation between the demographic characteristics and practices.

Variables	N	Pass Rate %	<i>p</i> -Value	Mean Score	<i>p</i> -Value
Age					
18–25		12.1		9.00	
26–35		6.8		9.41	
36–45		11.5		9.23	
46–55		23.5		9.63	
56–65		10.5		9.69	
66+	1001	3.8	0.268 <sup>a</sup>	9.44	0.232 <sup>c</sup>
Gender					
Female		52.6		9.90	
Male	1001	15.4	0.000 <sup>a</sup>	8.31	0.000 <sup>c</sup>
Prefer not to say		0.1		8.33	
Residence					
Countryside/Rural		11.1		9.26	
City/Town	1001	57.0	0.893 <sup>a</sup>	9.45	0.793 <sup>b</sup>

Table 6. Cont.

Variables	N	Pass Rate %	<i>p</i> -Value	Mean Score	<i>p</i> -Value
Highest Level of Education Obtained					
Primary School Education		1.0		9.61	
Secondary School Education		13.9		9.41	
Post-Leaving Certificate (PLC/FETAC/QQI)	1001	15.4	0.493 <sup>a</sup>	9.14	0.317 <sup>c</sup>
Third Level Education		37.9		9.54	
No Formal Education		0		9.42	
Relationship Status					
Married		38.1		9.67	
Single		18.5		9.21	
Divorced	1001	2.5	0.156 <sup>a</sup>	8.58	0.157 <sup>c</sup>
Widowed		1.6		10.3	
Other		7.5		8.9	
Occupational Status					
Employed		35.8		9.38	
Self-Employed		7.5		9.48	
Unemployed	1001	2.9	0.152 <sup>a</sup>	10.41	0.022 <sup>c</sup>
Out of Work due to COVID-19		5.7		8.7	
Student		7.0		9.2	
Other		9.4		9.9	
Gross annual income (in Euro)					
Below 30,000		2.7		9.41	
30,000 to 60,000		20.4		9.63	
60,000 to 100,000		9.2		9.41	
100,000 and above		4.5		8.84	
Not in full time employment	1001	13.4	0.113 <sup>a</sup>	9.35	0.057 <sup>c</sup>

<sup>a</sup> Pearson Chi-square ( $\chi^2$ ) test was conducted. <sup>b</sup> Mann–Whitney U test conducted. <sup>c</sup> Kruskal–Wallis test conducted.

Similar to a study in Palestine by Salameh et al. [28], there was no statistical significance found in the locality of individuals and their practices of COVID-19. Respondents from town/cities in Ireland had a higher pass rate in comparison to those from rural/countryside areas; however, it is important to note that the sample size of respondents from town/cities was significantly greater than those from rural/countryside. In a study by Gao et al. [34], they found that those living in cities or towns compared to urban or rural areas had higher scores with regards to COVID-19 practices, which they deemed could be because of information sources in cities being more available and having the ability to spread faster, as well as medical and protective supplies being more abundant in cities rather than rural areas, meaning there are more opportunities for the population to use such protective supplies to undertake protective practices.

### 3.6.3. Correlation between Level of Knowledge and Practices of COVID-19

The results showed that there is a linear relationship between the level of knowledge of COVID-19 and the COVID-19 practices using Spearman rho statistics. A significant correlation ( $p < 0.01$ ) between the level of knowledge and practices was observed. This implies that the higher the level of knowledge of COVID-19 that the individuals have, the better the safety practices are that they perform. Studies in Pakistan by Afzal et al. [32]

also showed that knowledge is positively correlated with practices. Any increase in the level of knowledge of individuals would increase their practices of COVID-19 also. For example, as seen with the poor pass rate of COVID-19 practices among men, an increase in their level of knowledge would surely increase their practices towards COVID-19. This can be achieved by strengthening public information to increase their awareness of COVID-19, thus improving their practices.

#### 4. Conclusions and Recommendation

Overall, the population of the Republic of Ireland shows high levels of knowledge, a correct perception of risks, and good practices related to COVID-19. The high level of knowledge is reflected by the most trusted source of information being health organisations. The understanding of the severity of COVID-19 would mean that individuals perceive they are susceptible to the disease, and a correct perception towards COVID-19 encourages good practices. Good perceptions are reflected, with the majority believing COVID-19 is more severe than the flu, showing the population is able to seek out factual information from myths. The change of learning and the reduction of general hospital visits have an impact on young residents because they have less time and fewer patients to work with. On the other hand, the reduction of the visits' number led to an increase in challenging medical scenarios (severe forms of cancers, more difficult surgical procedures, etc.). In addition, it has been observed an increased number of televisits and webinars both changed the way of learning and teaching in the COVID-19 pandemic. Concerningly, over half of the population perceived COVID-19 having a negative effect on their mental health, showing that more support services are required in this area. The population has strong self-efficacy, which is shown in the good pass rate of COVID-19 practices. Demographics in relation to knowledge showed that females and employed individuals have a higher level of knowledge compared to males and unemployed individuals, with females also having better COVID-19 related practices. A significant correlation between the level of knowledge and practices of COVID-19 implies that the higher the level of knowledge, the better the practices. So, any increase in the level of knowledge will render the population more likely to take better preventative practices. The Irish residents should continue to perform the preventative practices of COVID-19 to protect themselves and others, as well as keep up to date with any new information. The Irish government should continue to inform the public and encourage protective practices.

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