Knowledge, Risk Perception and Precautionary Behaviour in Relation to COVID-19 Among Swedish Older Adults

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SUMMARY

The present study explores the relationship between COVID-19 knowledge, risk perception and precautionary behaviour among Swedish older adults. The aim of this research was to explore whether COVID-19 knowledge would predict risk perception and precautionary behaviour, and whether risk perception would predict precautionary behaviour. The present study was conducted with a sample of 97 adults (56.7% females and 43.3% males) aged 65 to 78 (M=70.91, SD=3.64). When testing for age and sex differences among the participants, no significant sex differences were found, in contrast to several previous studies. We did however find age to be significantly and positively correlated with risk perception and precautionary behaviour. That is, an increase in age corresponded to an increase in risk perception and precautionary behaviour. Furthermore, older age significantly predicted elevated risk perception and precautionary behaviour. Our results also accentuate previous research findings in that COVID-19 knowledge was significantly and positively correlated with risk perception as well as precautionary behaviour. In consonance with previous studies we found that COVID-19 knowledge significantly predicted perception and precautionary behaviour.

Keywords: COVID-19; Knowledge; Risk Perception; Precautionary Behaviour; Correlation; Predictor; Clinical; Pandemic; Swedish Older Adults; Age; Sex

Introduction

The outbreak of the COVID-19 pandemic has resulted in substantial disruptions to the normal course of our everyday lives as we know it. During the course of the pandemic, many of us have had to go through extraordinary and unparalleled shifts in our environment as the emergence of COVID-19 came suddenly and without warning, catching us off guard. The Global Burden of Disease 2020 study estimated that there was more than a 25% increase in the global prevalence of depression and anxiety during the first year of the COVID-19 pandemic. The primary reason for this great increase is thought to be the unprecedented stress originating from the social isolation which is a direct result of the pandemic. Related to this stress were limitations on one's ability to work, engage oneself in the local community as well as pursue support from loved ones (Santomauro et al. [1]). As has been well established (Dong Y, et al. [2,3]) (WHO, [4]), the risk of contracting a COVID-19 infection increases with age; older adults above the age of 60 years face a substantially greater risk of severe illness, being admitted to a hospital or the intensive care unit, as well as death (US CDC, [5]). The Centre for Evidence-Based Medicine offers greater insight in terms of statistics through their case fatality rate (CFR) data: approximately 4% of patients above the age of 60 years, 8% for patients above the age of 70 years, and about 15% for patients above the age of 80. In contrast, the case fatality rate for patients younger than 45 years of age is only 0.0026%–0.3% (Oxford COVID-19 Evidence Service, [6]). Previous research has systematically shown that individuals perceive sudden and unexpected changes in our environment such as that of the COVID-19 pandemic as a threat to

our very own existence, which in turn causes us to experience negative emotions such as anxiety, anger, sadness, and hostility (Szuster, et al. [7]). Risk perception in regards to COVID-19 is conceptualised as the cognitive response and assessment of this particular threat. According to the psychometric paradigm known as Perception of Risk Posed by Extreme Events introduced by Paul Slovic in 1987 (Slovic [8]), risk perception encompasses two psychological constructs; "dread risk", which is defined as our perceived lack of control, the catastrophic potential and fatal consequences, and "unknown risk", defined as hazards which are unobservable, unknown or new (Peters [9]). The outbreak of the COVID-19 virus may potentially excite these psychological constructs resulting in individuals feeling threatened. Furthermore, previous research suggests that individuals typically perceive risks cognitively while responding emotionally (Loewenstein, et al. [10]). Moreso, how individuals subjectively experience worry and potential threats has been shown to affect our mental health and may cause anxiety and depression (Dyer [11]), while fear in relation to COVID-19 has been shown to elicit feelings of loneliness, uncertainty and anxiety (Fitzpatrick, et al. [12]). Other factors which further complicate health professionals' strife to ameliorate public health include individuals own specific beliefs, particularly perceptions of locus of control, self-efficacy, susceptibility and vulnerability (Van der Linden [13,14]).While a small number of peer-reviewed studies on risk perception in relation to COVID-19 among Swedes have begun to emerge in the last couple of years, until now the studied population has been limited to university students (Andersson, et al. [15]), pregnant women (Sällman [16]), and young adults (Hassan, et al. [17]). To the best of our knowledge, this is the first study to focus on examining knowledge, risk perception and precautionary behaviour in relation to COVID-19 among Swedish older adults.

COVID-19 Knowledge

Knowledge in this study is defined as knowledge related to COVID-19, that is, knowledge about the transmission of COVID-19, its source, as well as precautionary behaviour related to COVID-19. Vartti et al. (2009) found that individuals who have acquired a high knowledge about the etiology of an infectious disease typically experience more worry about potentially becoming infected which suggests a relation between risk perception and knowledge. Furthermore, it has been established that it is often the behaviour of people which determines the course of an infectious disease such as COVID-19. Factors which in turn have been deemed important in influencing this behaviour are risk perception (Abdelrahman [18-20]) as well as beliefs about the disease (Janz & Becker, 1984). Similarly, (Shrestha, et al. [21]) in their study among community health workers in Nepal found that proper and adequate knowledge and attitude towards COVID-19 is essential when it comes to adopting preventive measures and controlling the infectious disease. Risk perception related to COVID-19 is typically determined by the level of preventive knowledge of COVID-19: adequate knowledge enables a form of

self-assessment in relation to risk of a certain event and its related potential consequences (Rana, et al. [22,23]). As such, proper and adequate knowledge is integral if populations are to adopt appropriate preventive measures in the future, which in turn will help minimise the risk of infection as well as the spread and magnitude of the infectious disease. Several studies have previously suggested that there exists a significant and positive association between risk perceptions and knowledge (Cerase [24-26]). For instance, a study on health anxiety, perceived stress and coping styles related to COVID-19 found that in both the USA and in Italy, knowledge pertaining to COVID-19 either increased or decreased risk perception as well as fear (Garbóczy, et al. [27]). Similarly, an African study highlighted an association between knowledge of COVID-19 and a high risk perception of contracting the disease (Abu, et al. [28]).

Risk Perception

Risk perception refers to people's subjective evaluations of threats or hazards that they are or could possibly be exposed to, including an abundance of harmful and unwanted effects which people relate to a certain cause. These evaluations of threats are developed from experience or knowledge of occurrences and information about potential impacts (Rohrmann [29]). Furthermore, how we choose to perceive and evaluate such risks is typically determined by various factors, both on an individual and societal level, including cultural, social as well as contextual factors. These in turn are based on our beliefs, attitudes, experiences, feelings and (mis)conceptions along with more broad cultural, social and institutional processes (Pidgeon [30]). Even though risk perceptions functions as triggers for precautionary action (Wiedemann [31]). the level of engagement in relation to health behaviors is not solely influenced nor determined by objective health risk awareness, but rather health beliefs as well as particular health cognitions also play an important role (Renner, et al. [32]). Through extensive research we know that risk perception is a significant determinant of an individual's willingness to engage in health-promoting behaviors (Frimpong, et al. [33-35]). A fair amount of studies have been conducted in recent years with the intention of closely examining the relation between people's COVID-19 risk perceptions and the implementation of coping behaviors. To illustrate these findings, in the UK and The Netherlands, researchers found that risk perception coupled with fear of COVID-19 had a positive causal effect on citizens' coping strategies (Dryhurst, et al. [36-39]). Likewise, among US residents it was found that higher levels of risk perception positively influenced implementation of higher functional and problem-focused coping strategies during the pandemic (Wise, et al. [40,41]). Similar results have been found in Asian nations like China (Ning, et al. [42-44]). and African nations such as Ethiopia (Asefa, et al. [45]) and Nigeria (Lorfa, et al. [46]). Interestingly and in contrast, studies from European nations like Albania and Asian nations like Malaysia showed poor coping strategies among its residents due to low risk perception (Kamberi, et al. [47]). High risk and the severity of the COVID-19 ep-

idemic are factors most likely to cause populations to adopt disease coping strategies and take precautionary action, while populations with low risk perceptions of COVID-19 (i.e., ignoring the potential harm of risk) are less likely to employ active and problem-focused coping mechanisms to decrease the disease's effects (Frimpong, et al. [33,40,48,49]).

Precautionary Behaviour

Precautionary behaviours, sometimes referred to as preventive health behaviours, are actions and behaviour aimed to reduce the transmission of COVID-19. These play an important role in curbing any pandemic as well as preventing people from becoming ill (Notoatmodjo [6]). Thus, precautionary behaviours in this study is defined as any measure designed to suppress the transmission of COVID-19. Precautionary behaviours such as social distancing, quarantine of those infected as well as hygienic practices (e.g, regularly washing hands with soap, using a face mask, using hand sanitizers) have been recognized to be measures aimed to control the infection which assist in curbing the spread of the virus (Leppin [50]). According to (Hatchett, et al. [51]) we can thank the quarantine control measures implemented during the Influenza pandemic of 1918 for curbing the spread of the influenza, effectively putting an end to the pandemic. Another study on the SARS breakout in 2003 found that the frequency of secondary cases from an infected person was substantially decreased when the infected person was put in isolation within four days after the commencement of symptoms (Li, et al. [52]) No matter where in the world, the most beneficial method of suppressing the transmission of infections, particularly when there is no readily available vaccines, has been the implementation of precautionary behaviours (Sjödin, et al. [53]),nevertheless, the obstacle is typically the degree of awareness and knowledge of those individuals at risk, and whether or not this knowledge will render into precautionary behaviour (Li, et al. [54]).

Current Study

Around the world, what has proven to be the most effective way of suppressing infectious diseases, particularly when there are no vaccines readily available, has been the implementation of precautionary behaviors (Ebrahim, et al. [53,55]). The challenge often lies in raising the level of knowledge and awareness among individuals discerning the contagiousness of the diseases (Alam, et al. [56]) and furthermore, whether or not this knowledge will bring about precautionary behaviour (Cain, et al. [54,57]). While there have been a number of health studies suggesting little or no relationship between knowledge of an infectious disease and implementation of precautionary behaviour (Phillips, et al. [58-60]) more recent studies demonstrate a route from knowledge and awareness to precautionary behaviour which is mediated by specific factors, namely risk perception (Brug, et al. [61,62]) self-efficacy (Rimal [63]), and information surveillance (Raza, et al. [64]). Several recent studies have also demonstrated that

risk perception is influenced by several demographic factors, namely: level of education, sex and age (Alsoghair, et al. [65-67]). Other recent studies have concluded that female students as well as people of higher education perceived higher levels of risk related to COVID-19 than did their male counterparts (Ding, et al. [68-70]). Furthermore, knowledge of COVID-19 was found to be positively associated with higher levels of risk perception (Qin, et al. [67,71,72]). This was true in the case where a group of researchers compared Finnish citizens with Dutch citizens during the SARS outbreak in 2003 and found that in times of infectious disease outbreaks, those who were more knowledgeable about SARS typically worried more about the disease.

Hypotheses

Considering these findings, the present study aims to function as an extension of the results found in previous studies on knowledge, risk perception and precautionary behaviour. Based on these considerations, the following hypotheses were formulated:

- Hypothesis 1: COVID-19 knowledge predicts precautionary behaviour (e.g., higher levels of knowledge of COVID-19 will result in higher levels of precautionary behaviour).

- Hypothesis 2: COVID-19 knowledge predicts risk perception (e.g., higher levels of knowledge of COVID-19 will result in higher levels of risk perception).

- Hypothesis 3: Risk perception will predict precautionary behaviour (e.g., higher levels of risk perception will result in higher levels of precautionary behaviour).

Design of the Study

A quantitative design survey was created using Qualtrics adopting the previously developed and validated questionnaire for COVID-19 knowledge, risk perception, and precautionary behaviour related to COVID-19 constructed by Iorfa, et al. [46]. For hypothesis 1 (COVID-19 knowledge predicts precautionary behaviour) and hypothesis 2 (COVID-19 knowledge predicts risk perception), the independent variable is COVID-19 knowledge, and the dependent variables are risk perception and precautionary behaviour. For hypothesis 3 (risk perception will predict precautionary behaviour), the independent variable is risk perception, the dependent variable is precautionary behaviour.

Sample Method

The participants were gathered through convenience sampling by publishing a link to the survey in a number of groups centering on Swedish older adults on Facebook. The survey was posted in the period March, 2022 - October, 2022.

Measures

The survey first collected the participants demographic information (age, sex, marital status, education level and area of residence),

followed by three scales used to measure knowledge of COVID-19, risk perception and precautionary behaviour.

Scale of COVID-19 Knowledge

COVID-19 knowledge was assessed with the use of the adapted scale, constructed and validated by Iorfa, et al. [46]. Prior to being adapted to measure COVID-19 knowledge, this scale was previously known as the Ebola knowledge scale and was constructed by Rolison, et al. [73]. The scale uses a 5-item Likert-type scale where there is one correct answer to each of the five items. Item 3, transmission of COVID-19, includes 2 possible correct answers. The correct responses are then summed up with each correct response to an item giving one point and incorrect responses giving 0 points. The higher the score is, the higher the respondents level of measured knowledge of COVID-19. The items are as follows: item 1, familiarity of COVID-19, item 2, source of COVID-19, item 3, transmission of COVID-19, item 4, common symptoms of COVID-19, item 5, awareness of COVID-19 fatality. As such, the maximum attainable score is five.

Scale of Risk Perception

This scale uses a Likert-type scale consisting of a total of seven items which have been modified and validated for the purpose of measuring COVID-19 risk perceptions, by Iorfa, et al. [46]. Originally, the scale was developed as the SARS risk perception Scale and created by Brug, et al. [61]. The scale consists of items such as, "The likelihood of me contracting the Coronavirus is", and "How likely do you think your friends or family members are of contracting the Coronavirus?". The participants are asked to rate the items on a Likert-type scale with 7 possible answers (1 - Very unlikely, to 7 = Very likely). During pilot testing by Iorfa, et al. [46] the scale showed good internal reliability obtaining a Cronbach's alpha of 0.71, while a more recent and larger data set from 2020 obtained 0.75 Iorfa, et al. [46].

Scale of Precautionary Behaviour

This scale was originally constructed to measure precautionary behaviour related to pandemic influenza in Australia (Barr, et al. [74]) and contagious diseases in general (Duncan, et al. [75]). Since then it has been adapted and validated by Iorfa, et al. [46] to measure precautionary behaviour related to COVID-19. The scale is composed of a total of 10 items using a 7-point Likert-type scale to assess the participants' precautionary behaviour in relation to the COVID-19 pandemic. Items include statements such as, "I don't mind going to very crowded places, which is a reversed item, and "I prefer to use hand sanitizer or wash my hands after shaking someone's hand". The answering options range from 1 - Strongly disagree, to, 7 - Strongly agree. Items four and six are reversed. A pilot study conducted by the authors obtained a Cronbach's alpha of 0.80 while a more recent data set by the same authors obtained a reliability coefficient of 0.75, suggesting good internal reliability Iorfa, et al. [46].

Participants

In total there are 106 individuals who participated in this study, however the inclusion criterion for participating in the study is being a Swedish resident above the age of 65.Therefore, after adjusting for the criterion we are left with 97 Swedish older adults (N=97), as 5 were excluded (N=5) due to being younger than 65 years of age and an additional 4 were excluded (N=4) due to living outside of Sweden. The sample consists of 42 males and 55 females. The mean age of the participants is 70.9 years of age (M=70.9, SD=3.64), ranging from 65 years old to 78 years old.

Results

Hypothesis 1

COVID-19 knowledge predicts precautionary behaviour (e.g., higher levels of knowledge of COVID-19 will result in higher levels of precautionary behaviour). Here the independent variable is COVID-19 knowledge, the dependent variable is precautionary behaviour. A simple regression was conducted to predict precautionary behaviour from COVID-19 knowledge. It was found that COVID-19 knowledge explains a significant amount of the variance in precautionary behaviour, $F_{(1,95)}$ =131.905, R^2=.581, R^2adj=.577. The regression coefficient (B=.762, SE=.086, p<.001) suggests that an increase in knowledge of COVID-19 corresponds to an increase in precautionary behaviour of 0.762 points.

Hypothesis 2

COVID-19 knowledge predicts risk perception (e.g., higher levels of knowledge of COVID-19 will result in higher levels of risk perception). Here the independent variable is COVID-19 knowledge, the dependent variable is risk perception. A simple regression was conducted to predict risk perception from COVID-19 knowledge. It was found that COVID-19 knowledge explains a significant amount of the variance in risk perception, $F_{(1,95)}$ =59.399, R^2=.385, R^2adj=.378. The regression coefficient (B=.620, SE=.623, p<.001) suggests that an increase in knowledge of COVID-19 corresponds to an increase in risk perception of 0.620 points.

Hypothesis 3

Risk perception will predict precautionary behaviour (e.g., higher levels of risk perception will result in higher levels of precautionary behaviour). Here the independent variable is risk perception, the dependent variable is precautionary behaviour. A simple regression was conducted to predict precautionary behaviour from risk perception. It was found that risk perception explains a significant amount of the variance in precautionary behaviour, $F_{(1,95)}$ =225.987, R^2=.704, R^2adj=.701. The regression coefficient (B=.839, SE=.093, p<.001) suggests that an increase in risk perception corresponds to an increase in precautionary behaviour of 0.839 points.

Additional Results
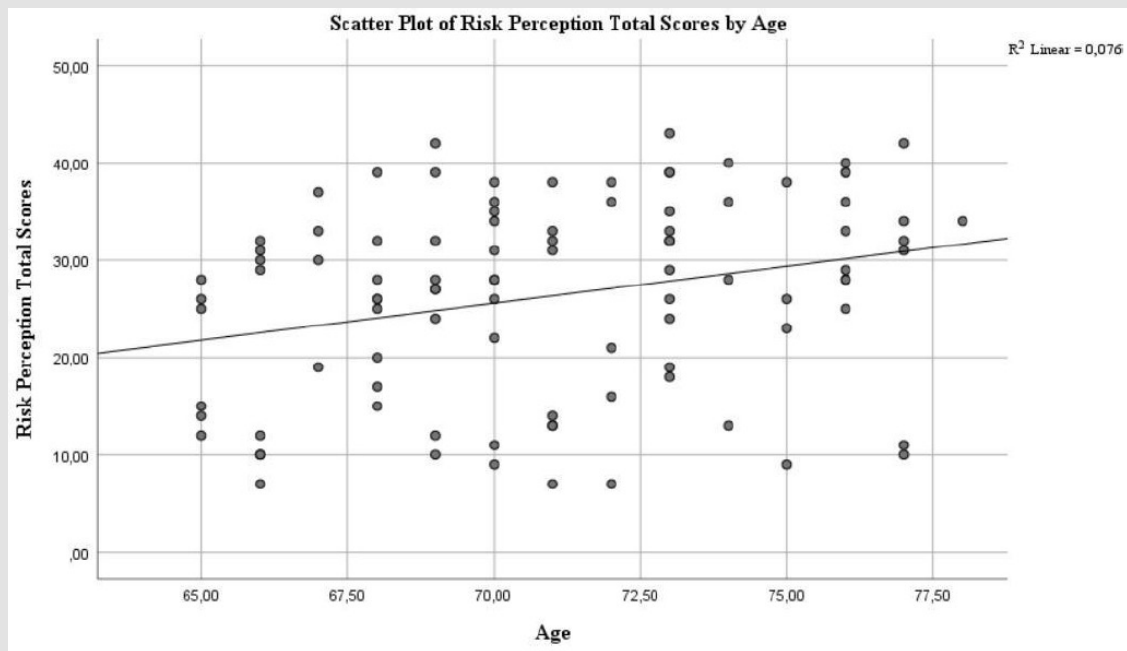
Age Differences in Risk Perception

A Pearson correlation coefficient was computed to assess the linear relationships between age and risk perception. A weak positive linear relationship which is statistically significant exists between age and risk perception (N=97, r=0.275, p=0.006). The direction of the relationship is positive, meaning that an increase in one variable leads to an increase in another. In this case, an increase in age leads to an increase in risk perception. The strength of the association is weak. We can conclude that age is positively and weakly correlated with risk perception Figure 1.

Figure 1.

Age Differences in Precautionary Behaviour

A Pearson correlation coefficient was computed to assess the linear relationships between age and precautionary behaviour. A weak positive linear relationship which is statistically significant exists between age and precautionary behaviour (N=97, r=0.2150, p=0.034). The direction of the relationship is positive, meaning that an increase in one variable leads to an increase in another. In this case, an increase in age leads to an increase in precautionary behaviour. The strength of the association is weak. We can conclude that age is positively and weakly correlated with precautionary behaviour Figure 2.
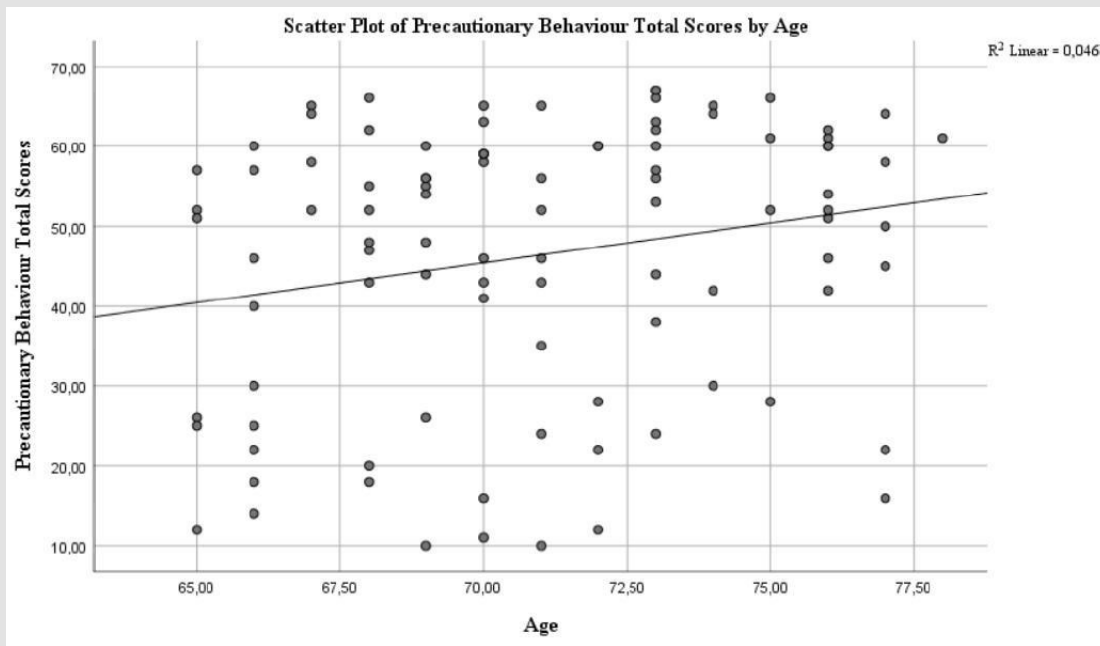
Figure 2.

COVID-19 Knowledge and Precautionary Behaviour

A Pearson correlation coefficient was computed to assess the linear relationships between COVID-19 knowledge and precautionary behaviour. In this sample, COVID-19 knowledge and precautionary behaviour have a statistically significant linear relationship (N=97, r=0.762, p <.001). The direction of the relationship is positive, meaning that an increase in one variable leads to an increase in another. In this case, an increase in COVID-19 knowledge leads to an increase in precautionary behaviour. The strength of the association is strong. We can conclude that COVID-19 knowledge is positively and strongly correlated with precautionary behaviour Figure 3.
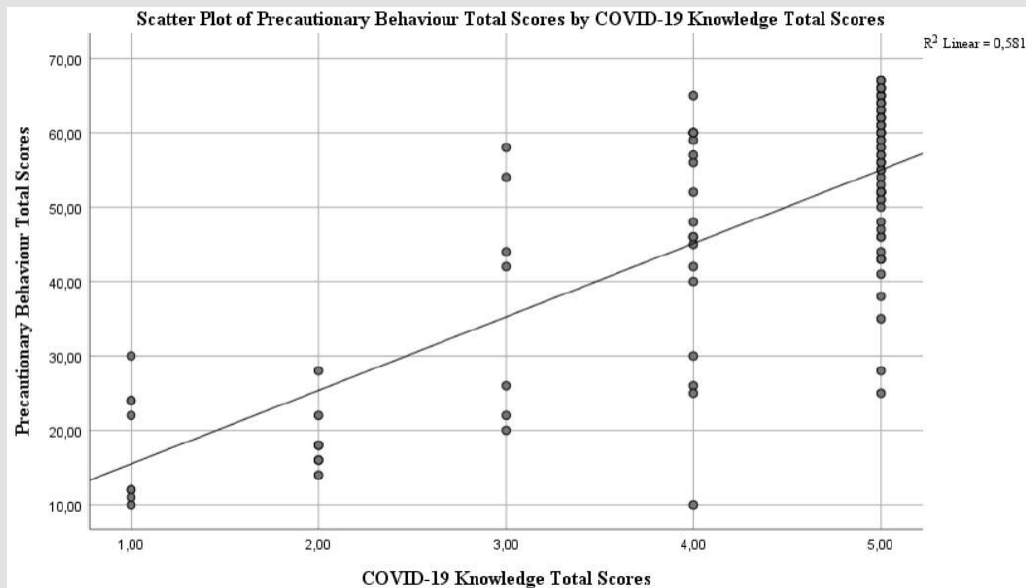

Figure 3.

COVID-19 Knowledge and Risk Perception

A Pearson correlation coefficient was computed to assess the linear relationships between COVID-19 knowledge and risk perception. In this sample, COVID-19 knowledge and risk perception have a statistically significant linear relationship (N=97, r=0.620, p<.001). The direction of the relationship is positive, meaning that an increase in one variable leads to an increase in another. In this case, an increase in COVID-19 knowledge leads to an increase in risk perception. The strength of the association is moderate. We can conclude that COVID-19 knowledge is positively and moderately correlated with risk perception Figure 4.
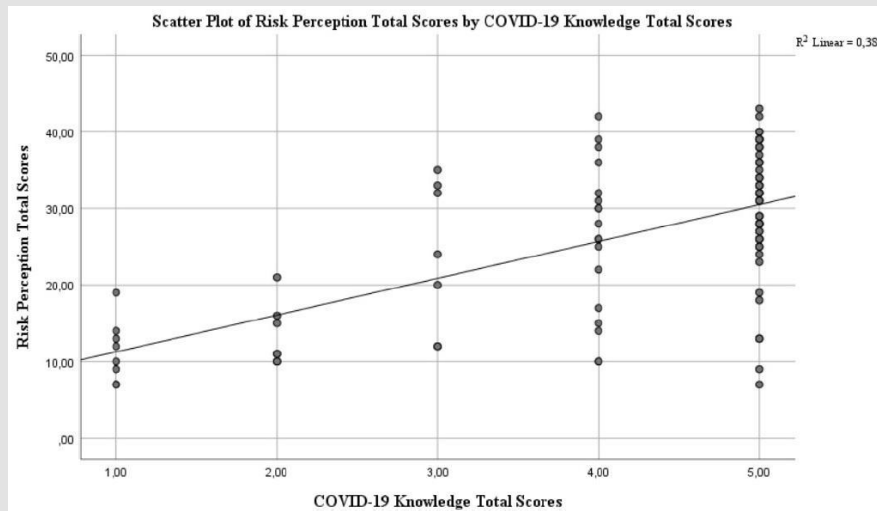

Figure 4.

Risk Perception and Precautionary Behaviour

A Pearson correlation coefficient was computed to assess the linear relationships between risk perception and precautionary behaviour. In this sample, risk perception and precautionary behaviour have a statistically significant linear relationship (N=97, r=0.839, p<.001). The direction of the relationship is positive, meaning that an increase in one variable leads to an increase in another. In this case, an increase in risk perception leads to an increase in precautionary behaviour. The strength of the association is strong. We can conclude that risk perception is positively and strongly correlated with precautionary behaviour Figure 5.
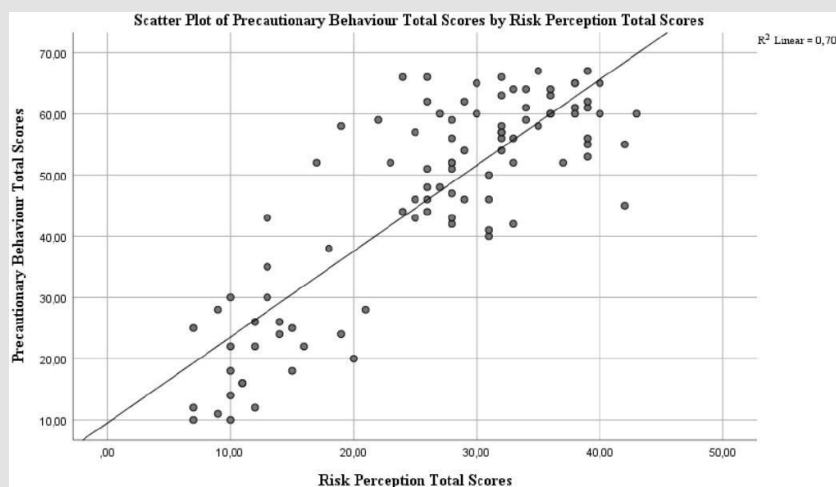

Figure 5.

Discussion

The present study aimed to explore the relationship between COVID-19 knowledge, risk perception and precautionary behaviour, as well as how these variables affect each other. The main aim was to examine whether COVID-19 knowledge would predict risk perception, as shown by previous studies (Alves, et al. [46,76], whether COVID-19 knowledge would predict precautionary behaviour, as shown by previous studies (Brug, et al. [54,61,62,77], and whether risk perception would predict precautionary behaviour, as shown by previous studies (Bruine de Bruin, et al. [48,72,78]), Additionally, we were hoping to function as an extension of previous studies made in other parts of the world and accentuate the findings of these studies to further buttress the important concept that COVID-19 related knowledge is a fundamental factor in terms of risk perception and precautionary behaviour, and as our findings indicate, that they are in fact interrelated and thereby, as we would like to propose, part of an existing triad. Accentuating these findings could potentially succour human beings, not just in the case of a potential recrudescence in the form of a new pandemic or other health hazards, but also to act as complementary and more general knowledge within the field of health psychology. Our research findings proclaimed that COVID-19 knowledge had a significant influence on precautionary behaviour. Not only did this support our hypothesis, it is also in line with previous research findings (Brug, et al. [46,54,61]). It is reasonable to expect that when human beings are subjected to potential serious health hazards, we typically implement informed, rational and judicious behaviours to minimise our own risks of coming in harm's way in order to stay alive. As hypothesised and in line with previous research (Alves, et al. [46,76]), we found that COVID-19 knowledge significantly predicted risk perception. The previous studies which have found similar results put forward the notion that individuals' means of promoting precautionary behaviour essentially depends on perceived risk of contracting COVID-19, which in turn heavily relies on our knowledge and awareness of COVID-19 (Qin, et al. [67,71,72]). Thus, in order for individuals to voluntarily adopt and implement precautionary behaviours into their daily lives, it is of essence that they first understand the personal risks associated with the disease,

and secondly, that they have correct knowledge of which type of behaviours will mitigate that risk and how the virus works in general. In support of our third hypothesis and in consonance with previous research (Brug, et al. [46,54,61]), risk perception significantly predicted precautionary behaviour. This suggests that how we as individuals perceive the risk of contracting a disease such as COVID-19 is a fundamental variable when it comes to apprising ourselves of as well as adopting and implementing the right set of precautionary behaviours. This in turn is important knowledge not only on an individual level but also on a societal level because it informs us that if we want people around the world on a societal level to partake in precautionary behaviours of their own volition, then it is of the highest essence that people first perceive the potential danger, the risks, that lies ahead. It also suggests that the Swedish health department's vast COVID-19 educational campaigns have been effective in promoting COVID-19 awareness in terms of protective behaviour as well as the elevated risks associated with being part of the studied population which is a risk group. In line with previous research (Zhang, et al. [20,46]) we found that both risk perception and precautionary behaviour significantly increases with higher age. This finding could suggest that the constant and echoing health recommendations during the pandemic not only from the Swedish Health Department (FHM) and mass media but also from international health organisations like the World Health Organization (WHO) about senior citizens and those with underlying comorbidity being more likely to develop serious COVID-19 symptoms has caught attention in the right place. In contrast to a number of previous studies where female participants frequently outscored male participants in precautionary behaviour (Brug, et al. [46,61,79]), our study did not identify any such sex differences. This may indicate that whereas in samples which include younger people such sex differences may very well exist; females tend to more frequently wash their hands, wear a face mask when out in public, etc, but that as individuals grow older and reach senior age and become part of the same risk group, the sex differences in relation to COVID-19 precautionary behaviour tend to flatten out and thus become insignificant [80-88]. A possible alternative explanation could be that due to our small sample we have made a type II error and that had the sample size been larger, such sex differences could potentially have been observable.

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