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Federica Sciacca

Individual and psychosocial correlates of gullibility.

TESI DI DOTTORATO

Coordinatore:
Chiar.ma Prof.ssa Liana Maria Daher

Tutor:
Chiar.ma Prof.ssa Zira Hichy

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Introduction

The basis of this thesis is the analysis of individual factors and psychosocial variables related to gullibility within the Italian context. In particular, the thesis has an exploratory objective of the factors related to gullibility, which stands as a still understudied variable.

The reason that prompted me to investigate this topic is twofold. On one hand, the interest in gullibility was influenced by previous research regarding the world of social media and the personality characteristics of users of the new technological tools; on the other hand, by the ever-increasing spread of fake news, which saw a huge increase during the COVID-19 pandemic.

Four studies were conducted, one of which was designed abroad with support from the University of Kent. The first study aimed to propose an Italian version of the Gullibility Scale validated by Teunisse and colleagues in 2020, verifying its psychometric characteristics and factor structure. The second study aimed to test the Italian version of the Gullibility Scale proposed in the first study, verifying its psychometric characteristics and factor structure, and to verify antecedents and consequences of gullibility. The aim of the third study was to analyze the relationship between Gullibility and the religious orientation, paranormal health beliefs, fear of COVID-19, complementary and alternative medicine beliefs, astrology attitude, conspiracy mentality and vaccines conspiracy beliefs. Finally, the fourth study aimed to examine how conspiracy beliefs and gullibility are related to people's response to implausible information.

The thesis is divided into five chapters: in the first chapter an introduction of the phenomenon of gullibility is given, through a historical and social excursus, providing not only a clear definition of it, but also a description of the psychosocial and individual phenomena related to it. The following chapters deal with developing the four previously described studies through a description of the survey procedures and instruments used, the sample and the results.

Thanks to this research work it was possible to analyze some crucial factors related to gullibility in the Italian context, results that will be detailed in the final conclusions of this thesis.

The Gullibility

What is Gullibility?

The word *Gullible* first appeared in 1793, originating from the term "cullibility" (1728), probably related to the word "gull", used to refer to a "dupe, sucker" person. Its etymological roots go back to the bird (sea gull), or the verb "gull" (to swallow). Its synonyms for gullibility, such as credulity, artlessness, ignorance, inexperience, simplicity, emphasize the negative valence of gullibility.

The question that then arises is: are there criteria for defining when a person can be judged gullible?

Conceptually, gullibility can be inferred from the situation, we can speak of a gullible person either when his beliefs are obviously inconsistent with reality, or when his beliefs are at odds with shared social norms about reality. For instance, a person who believes that the earth is flat, despite scientific evidence to the contrary, can be labeled a gullible person. However, the question of criteria for defining gullibility is much more complex. Indeed, we often use the term gullible to refer to people whose beliefs violate some consensus standard about reality, rather than some empirical-scientific standard.

Arguably, if knowledge is subject to falsification, defining the criteria for gullibility will remain a matter of consensus value judgment rather than an incontrovertible statement of fact. History is replete with striking examples of gullibility (Greenspan, 2009a; Koestler, 1967; Rath-Vegh, 1963).

For example, in ancient Mesoamerican culture, people believed that cutting out the beating hearts of captives was necessary to ensure a good harvest and preserve the benevolence of the gods (Koestler, 1967, 1978); or again, in the culture of the Middle Ages, there was a belief, even by well-educated people, in the existence of witches, werewolves, or magic potions (Wooton, in Pinker, 2018).

Without going so far back in time, even today there are some beliefs, such as religious beliefs (e.g., virgin birth, walking on water, resurrection, or transubstantiation) that continue to persist, despite contradicting the knowledge we have of the world. Folktales and literature are also rich in tales and demonstrations of the pitfalls of gullibility, suffice it to consider the fairy tales of "Little Red Riding Hood," in which the little girl is at first deceived and then learns the art of deception herself; and of Pinocchio who had to learn to avoid being deceived by others in order

to become a complete human being; or to the deception of the serpent and the gullibility of Adam and Eve told in the Bible; or to Homer's Trojan Horse tale, or even to Shakespeare's Othello story (Greenspan, 2009a).

These examples seem to highlight how gullibility is a pervasive feature of the human condition. But then what is gullibility? *Gullibility* is defined as the tendency to be deceived or exploited (Greenspan, 2009a). When this term is used, it refers to a pattern of deception that is repeated in different contexts, even in the face of warning or danger signals that highlight the unreliability of the situation (Greenspan, 2009a; Teunisse, Case, Fitness, & Sweller, 2020; Forgas, & Baumeister, 2019).

The detection of deception is also explained, along with the use of veracity, by truth-default theory (TDT); this is a theory of communication according to which the accuracy rates of deception judgement are explained by the proportion of truth to lies. Specifically, this theory argues that there is a default state of truth, i.e. that basically during communication people think others are honest because they do not consider deception as a possibility or because there is insufficient evidence that they have been deceived (Levine, 2014). He suggests that believing communication to be honest is a quality that belongs to human beings, and this makes a person's ability to detect deception weak. According to Levine (2014), McCornack & Parks (1986), the inclination of people to believe what another person says, regardless of whether that person is lying or insincere, is referred to as truth bias. This term was coined by McCornack & Parks in 1984 during an experiment from which the deception detection model was born (McCornack & Parks, 1986) and from which Levine's (2014) truth-default theory was later developed. From these studies, it was possible to conclude that there are two reasons why a person assumes that what the other person says is honest, namely the failure of the person to consider the possibility of deception, and the specific default state of human beings who cannot find definite evidence that they have been deceived. Consequently, a person assesses communication as honest unless he or she can find active evidence to believe he or she is deceived.

Pantazi, Kissine and Klein (2018) conducted experiments in which participants were presented with true and false statements organised into coherent narratives and then distracted half of the participants while they processed the statements. The results showed that explicitly false statements were erroneously remembered as true and influenced participants' judgments regardless of cognitive load. Subsequently, the researchers conducted the same experiment without the participants' distraction and found that truth bias does not depend on the frequency

of true versus false statements. These studies suggest that the truth bias is stronger than suggested by literature studies so far.

In this context, the words gullible and credulous are often used as synonyms. According to Goepp & Kay (1984), both words mean "to trust unduly or confide;" only gullibility emphasizes being deceived or fooled, suggesting a lack of intelligence, while credulity emphasizes uncritical belief formation, suggesting a lack of skepticism. Jewell (2006) asserts, however, that the difference between the two words lies in a matter of degree; the gullible is easier to deceive, while the credulous is one who is all too ready to believe something but are usually not stupid enough to act on what they believe.

Greenspan (2009a) highlights the fundamental difference between *gullibility* and *credulity*. Instead, *Credulity* refers to the tendency to believe things that lack adequately supported evidence, are seemingly ridiculous, or are judged without critical capacity. Whereas, on the other hand, gullibility refers to the behavioral tendency to be deceived, and involves concrete actions (e.g., handing over a check to a scammer or bank details to scam companies via spam emails; Greenspan, 2009a). The first is related to a kind of "state of faith" such as believing that someone really has the truth about something (e.g., people who rely on "magicians" or tarot cards to know the future). When we talk about "state of faith" we are not referring to trust, although it is a concept related to gullibility, it is not equivalent to it. In fact, trust is a positive and healthy trait (Rotter, 1980), while instead the "state of faith" typical of credulity can be defined as a "foolish" and negative trait. Gullibility, on the other hand, involves psychological coercion, as there is some level of "forcing" to do something at its base (Greenspan, 2009a). Thus, according to Greenspan (2009a), these two concepts are closely related, there is a cause-and-effect relationship between the two states, because gullible behaviors -actions performed by people who are deceived- are based on the exploitation of a victim's credulity (state of faith). Therefore, credulity is the basis of gullibility. These two constructs, in fact, although they have been distinguished over time, are easily assimilated into the same notion; in fact, the literature uses them almost indiscriminately.

Gullibility is often referred of as if it were a personality trait, but Greenspan (2009a) describes gullibility as a situationally resulting behavior that interacts with three factors internal to the individual, one of which is called personality. Thus, he views personality as an input variable, i.e., a factor that can contribute to gullible behavior. This view differs, in fact, from a conceptualization of gullibility as a personality trait, i.e., as the tendency an individual carries

around that causes him or her to behave in a gullible manner. However, individuals differ in the ease with which they can be deceived; this greater tendency toward social vulnerability can be explained, according to Greenspan (2009a), by a combination of cognitive and personality factors. Personality factors that may predispose an individual to behave in a gullible manner may include high interpersonal trust, accommodation, also known as agreeableness, and hypnotic suggestibility. Accommodation/ agreeableness, one of the components of the "Big Five" personality model, refers to the individual's need to please others, which leads him/her on the one hand to behave in a pleasant way, and on the other, to say "yes" even when his/her interests push him/her in the opposite direction. Hypnotic suggestibility is also another personality variable that could contribute to gullible behavior in combination with other personality indices of suggestibility.

Therefore, there are many factors that can contribute to gullible behavior; as mentioned above, Greenspan (2009a) proposed a causal model to explain gullible behavior that is based on four types of factors, each of which can be further subdivided. These factors are situational (e.g., a salesperson making false claims in order to sell a product), cognitive (e.g., the victim is naïve and believes in the type of investment the scammer is offering), affective (e.g., the victim is emotionally attached to or attracted by the salesperson), and personality (e.g., the victim is a trusting or pleasant person; Greenspan, 2009a). Hence, gullible behavior, according to the additive model described by Greenspan, Loughlin, & Black (2001), is the result of one or more of these factors, which give varying degrees of contribution to the outcome depending on the situation and the person. Briefly, this model can be expressed by the formula:

$$\text{Gullible Action} = \text{Situation} + \text{Cognition} + \text{Personality} + \text{State}$$

Each of the four factors could individually explain gullible behavior, but in the majority of cases, it is explained by at least two of these factors.

To better explain the nature of gullibility, Greenspan (2009b) views it as a form of *foolish action*, that is, behavior that has a high probability of backfiring on the individual himself, sometimes with disastrous consequences due to the failure to consider serious risks that are obvious to most people of the same age. He argues that there are two broad categories of foolish actions, the *practically foolish actions,* and the *socially foolish actions*. The latter can be further divided into two subtypes, *induced* and *non-induced*; gullibility can be considered, according to the author, synonymous with socially induced foolish action.

Certain forms of belief can also be considered manifestations of gullibility. These include belief in pseudoscience, i.e., believing in a methodology that is claimed to be scientific but does not adhere to an approach believed to be so (Hansson & Sven Ove, 1996; Hewitt et al., 2003; Bennett et al, 2003; Gauch, 2003), belief in superstition, i.e., belief in popular knowledge deemed irrational, practices concerning luck, prophecies and/or spiritual practices, but more generally the belief that future events can be influenced or predicted by specific unrelated previous events (Vyse, 1997; Bunge, 1991), religious belief, i.e., belief in thought that includes narratives, symbols, beliefs and practices that give meaning to life experiences by referring to a higher power, such as God (Geertz, 1973). Atheists and members of other religions may, in fact, consider many people who believe in other faiths or religious cults to be credulous (Laynton, 2013).

When can gullibility be positive?

Gullibility, as seen so far, is often connoted with a negative meaning. However, according to Forgas and Baumeister (2019), it can also be considered in a positive sense, as accepting, sharing and considering social information from others as true, even if it is unconfirmed and fictitious, can be considered functional as well as the foundation on which large-scale social organizations are based. We need only think of how our current culture is based precisely on shared fictitious beliefs, such as the idea of the nation-state as the entity on which current political organization is based (Harari, 2014), or the use of paper money, the usefulness of which depends on the shared fictitious belief that it has real value, but also on the shared beliefs, stemming from the Enlightenment, that humanism, individual freedom and equality are universal, desirable and natural values. All these beliefs on which human beings base social living and political organization turn out to be in reality as fictitious as the beliefs associated with religiosity. Despite this, this form of gullibility has proven to be extremely useful for social living and has enabled people, as citizens, to design and maintain a successful civilization (Pinker, 2018). In this sense, then, gullibility can be seen as a useful and adaptive cognitive mechanism that enables large social organizations to function well.

Psychological mechanisms underlying gullibility

According to Forgas (2019), gullibility can be a particularly useful, adaptive cognitive mechanism, and is considered a universal human trait. But what are the psychological mechanisms that promote it?

One of the psychological underpinnings of gullibility seems to be the universal human ability to trust, in the sense of accepting information we receive from others as a proxy for reality (Deutsch & Gerard, 1955).

Another fundamental mechanism is the search for patterns, associations, and meaning (von Hippel, 2018), which is particularly evident when people perceive an order in objectively random, and therefore meaningless, events, but tend to under-recognize randomness (Forgas, 2019).

Another potential mechanism is the tendency of humans to accept rather than reject incoming information; indeed, received information tends to be first encoded as "true," and only then to be evaluated in the correct way (Krueger et al., 2019; Cooper & Avery, 2019; Dunning, 2019).

Additional factors relate to the tendency of humans to rely on heuristics, i.e., to believe interesting and appealing stories and narratives that are salient and easy to imagine (Forgas, 2013; Kahneman & Tversky, 2000); indeed, when we are exposed to salient, frequent, and easy-to-remember information, we tend to evaluate that information as true, reliable, and valid (Strack, 2019; Unkelbach & Koch, 2019). However, reliance on heuristics as a source of gullibility offers a partial understanding of the phenomenon; heuristics can explain many "false positive" errors, such as believing something that is not true, but fail to explain "false negative" errors, such as not believing something that is true (Mayo,2019).

Overconfidence can also be a promoter of gullibility, as people often believe their judgments are more accurate than they really are and overestimate their competence relative to others (Dunning, 2019; Macrae et al.,2019)

Another important aspect concerns the influence that moods and emotions have on gullibility (Forgas & Baumeister, 2019). According to Forgas (2019), in fact, mood influences how we process incoming information. In his argumentation, he points out that underlying the influence of moods in thinking and judgements are two complementary cognitive mechanisms, as suggested by recent theories of affect-cognition (Bless, 2001; Fiedler, 2001), namely informational effects (which influence the content and valence of cognition), and processing effects (which influence the process of cognition). Specifically, positive mood facilitates fast,

automatic, intuitive, uncritical thinking and gullibility, while negative mood often recruits slower, careful, cautious, analytical, rational processing, and scepticism. The results of his studies show that the negative mood has beneficial and protective effects with respect to believing implausible things, while the positive mood can be the basis for possible undesirable consequences.

Factors related to gullibility

The literature on the topic of gullibility is indeed extremely scarce, perhaps because there are many factors can contribute to this type of behavior (Greenspan, 2009a; Greenspan, 2009b; Greenspan, Loughlin, & Black, 2001; Langenderfer & Shimp, 2001; Mercier, 2017; Yamagishi, Kikuchi, & Kosugi, 1999). In this chapter, I aim to review studies that investigate factors related to gullibility and a person's motivations for being gullible.

Religion, Magic Thinking and Superstitious Rituals

A fertile field for gullible behavior is certainly the religious field (Greenspan, 2009a).
Religion plays a significant role in many people's individual and social lives because it influences that person's experience, values, and meaning in life (Park, 2005; Roccas & Elster, 2013). For this very reason, religious beliefs influence intergroup relationships, group membership, and social issues in general (Goplen & Plant, 2015; Hunsberger & Jackson, 2005). There are, however, different ways of being religious, and this is identified through so-called *religious orientations* (Allport & Ross,1967). The most famous and widely used distinction involves *intrinsic* and *extrinsic orientation*: the first one refers to an internalized and mature form of religiosity in which the person experiences religion as a primary motive in life, while the second orientation, refers to an impulsive and self-gratifying form of religiosity in which the person views religion only as a utilitarian means to a well-defined end (Allport, 1950). Batson et al. (1993) added to these two orientations a third one called quest, which refers to an open and questioning form of religiosity characterized by a dialogue about religious issues. Furthermore, the authors have two new concepts to replace those of intrinsic and extrinsic orientation, namely, respectively, *religion as end*, in which religion is an ultimate end, and *religion as means*, in which as the word itself says, religion is a means to a specific end (Batson et al., 1993).
Mercier (2017) argues that people with religious beliefs are wrongly accused of being gullible; in fact, according to him, what makes religious beliefs so in vogue is a matter of power and incentive. Contrary, for most people, believing in God is a matter of faith, i.e., an emotionally driven position that makes it acceptable.

The problem arises when it begins to use rational arguments as a means to justify this non-rational but faith position; this is where the issue revolving around gullibility, magical beliefs, and superstitious thinking comes in.

According to Dawkins (2003), gullibility is an important trait for the survival of the species, as the unconditional acceptance of "memes", i.e., cultural units for the transmission of information, prevents young children from being exposed to danger. It continues to be present in adulthood and explains the susceptibility of many people to believe supernatural beliefs and dubious religious doctrines. Dawkins considered supernatural beliefs to be "mind viruses" that creep into the minds of human beings who are programmed to accept memes transmitted by authority figures such as parents and religious leaders. Important qualities for resisting these "viruses" and being skeptical about religion are an impulse to solve mysteries, and a willingness to resist authority.

The finest modern treatise explaining the connection between religion and magical beliefs is the book "Believing in Magic: The Psychology of Superstition," by Vyse (1997). This book highlights how magic is an integral part of religion and how magical belief is a variant of superstitious thinking, i.e., the idea that performing or not performing certain acts can influence outcomes; however, engaging in a superstitious ritual does not necessarily imply believing in magic. *Superstitions* may, in fact, be universal anxiety management mechanisms. Nevertheless, when such rituals are enacted to achieve specific outcomes, one enters the world of magical and gullible thinking. Superstitious beliefs are used when the perceived control of a situation appears to be low or in jeopardy (Case, Fitness, Cairns & Stevenson, 2004). Other authors have also found that the likelihood of believing in superstitious or paranormal events is influenced by gender (Garrett & Fisher, 1926; Preece & Baxter, 2000), educational level (Preece & Baxter, 2000; Grimmer & White, 1992; Standing & Huber, 2003), religious background (Vail, Arndt, & Abdollahi, 2012), and hypnotic suggestibility (Wagner & Ratzeburg, 1987). Furthermore, superstitious beliefs are affected by cognitive factors such as the use of heuristics and biased judgments (Epley & Gilovich, 2006; Gilovich, Vallone, & Tversky, 1985; Tversky & Kahneman, 1974). Thus, the propensity for superstitious, pseudoscientific, and other unconventional beliefs could be relevant as well as associated with gullible behavior.

Another alternative field equally fertile for gullible behavior is Spiritualism, a religious movement which offers an alternative to official religion and a direct means of communication with God and loved ones after death. Belief in such possibilities, according to Bunge (1991) is

a basic conceptual fallacy because there is no experimental evidence for the existence of ghosts or disembodied souls.
Despite numerous studies in the literature, the relationship between religion, magical thinking, superstitious rituals, and gullibility still remains questionable; there are yet no studies demonstrating this connection.

Trust and Social Intelligence

As mentioned in the first chapter, at the basis of gullibility there is a "state of faith" that pushes people to trust something (e.g., people who rely on "magicians" or tarot cards to know the future). When we talk about "state of faith" we are not referring to trust. In fact, trust is a positive and healthy trait (Rotter, 1980) and as indicated by Rotter (1967), Hardin (2001) and Sturgis and colleagues (2010), it can be understood as the generalized expectation of a person or group that someone can be relied upon, or that they will not knowingly act in a way that is harmful to themselves. Instead, the "state of faith" typical of credulity can be defined as a "foolish" and negative trait. In common usage, a gullible person is equated with an overly trusting person, but many studies suggest that highly trusting individuals are not necessarily gullible (Carter & Weber, 2010; Rotter, 1980; Sturgis et al., 2010; Yamagishi et al., 1999; Yamagishi, 2001). In fact, these studies highlight how high trust leads to more social interactions, which in turn leads to greater social intelligence (or the ability to perceive clues to untrustworthiness) that reduces the likelihood of a person being deceived (Carter & Weber, 2010; Rotter, 1967, 1980; Sturgis et al., 20 10; Yamagishi et al., 1999; Yamagishi, 2001). A study by Teunisse et al. (2020) showed that there were no correlations between trust and gullibility. Although gullibility and trust are thus two entirely different concepts, trust is an important aspect of gullibility (Teunisse, 2020) that, along with social intelligence plays a key role in understanding it.

Scientific and Paranormal Beliefs related to health

Health, according to the WHO is *a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity*. Among the many psychological dimensions involved in this process, there are the true or illusory beliefs related to health.
It is important to underline that, today, the approach to medicine is divided into two visions, on one side we find those who believe in the so-called “scientific” or evidence-based medicine,

and on the other side we find instead those who believe in the so-called “alternative medicine practices”, among which homeopathy is included. This practice was created by a German physician, Samuel Hahnemann, in 1796, who believed that diseases were caused by *miasms* that could be cured with homeopathic preparations (Nayernouri, 2017). It seems that the basis of homeopathic practices is a great trust in the doctor, the placebo effect, and the suggestibility of the patient (Nayernouri, 2017; Schmacke, 2020). Evidence-based medicine originated in the mid-19th century in Paris and is defined as a practice that integrates the physician's clinical expertise with external clinical evidence from systematic research, the use of diagnostic tests, prognostic markers, and evidence of efficacy of therapeutic, rehabilitative, and preventive care (Sackett et al., 1996). Based on these two views, it appears important to deepen our understanding of the ways in which people position themselves with respect to beliefs regarding health. Firstly, a distinction must be made between illusory beliefs and scientific beliefs. The former, also known as beliefs in the paranormal (Irwin, 1999; Thalbourne, 2003) involve a complex field of beliefs that are religious, superstitious, extraordinary, etc. (Tobacyk & Milford 1983). Many studies have investigated the relationship between health and paranormal beliefs showing that there is a positive correlation with mental illness (Kelly, 2011) and manic-depressive experiences (Thalbourne & French, 1995), while there are mixed results with neuroticism (Lester & Monoghan K, 1995; Thalbourne, Dunbar & Delin, 1995) and anxiety (Okebukola,1986; Tobacyk, 1982). Much research has shown that certain types of beliefs, such as religious and fatalistic and illusory beliefs, can hinder demand for health care and behaviors related to early healing practices, disease prevention, and overall health promotion (Franklin et al., 2007; Gall et al., 2005; Donizzetti & Petrillo, 2017). In contrast, it appears that those who believe in science, i.e., see science as a unique and central value, have a genuine rejection of notions that lie outside the traditional scientific framework, e.g., paranormal beliefs (Dagnall et al., 2019). Those who have faith in science, in fact, rely on objective, fact-based evidence, using scientific thinking that is associated with analytical thinking, rational inquiry, and consideration of empirical evidence (Farias et al., 2013). Then there are the people who hold pseudo-scientific beliefs of a bio-medical nature, that is, beliefs about specific categories, such as homosexuals or immigrants, that are considered socially deviant or marginal, as well as threats to human health (Donizzetti, 2018). These beliefs are positively related to general illusory beliefs, external health-related locus of control, and negatively related to internal health-related locus of control (Petrillo & Donizzetti, 2012; Donizzetti & Petrillo, 2017).

Taking into consideration the several types of beliefs people hold about health, it therefore seems important to deepen our understanding of the ways in which humans position themselves with respect to this process, and how gullibility may intervene on health.

Astrology

In today's Western society, astrology is a very present phenomenon, many newspapers, magazines, and websites report and publish daily or monthly horoscopes (Sugarman et al., 2011); many dating sites create pairings between their users based on compatible "sun signs," or even many influencers of the most popular social networks post feeds or stories with information about horoscopes and zodiac signs.

The term *astrology* refers to *the study of the movements of the planets, sun, moon, and stars in the belief that these movements can have an influence on people's lives* (Collins English Dictionary, 2018).

Although astrology has historically been considered a science, it does not possess any scientific validity (Sugarman et al., 2011). In fact, according to Carlson (1998), the basis of astrology is the illusory characteristic, self-justification, and anecdotal evidence.

Despite this, astrological beliefs are extremely popular in modern society; one of the most popular factors that is used to explain belief in astrology is the *Barnum Effect* (Farley-Icard, 2007), which is the phenomenon that explains people's tendency to accept vague and general information about themselves as accurate. Those who believe in astrology seem to be more likely to accept as accurate any kind of description of themselves, regardless of whether it is positive or negative. Nevertheless, it seems that even those who do not believe in astrology are prone to the Barnum Effect, especially if their descriptions of themselves are positive (Glick, Gottesman & Jolton, 1989). Swann (1990) and Markus (1977) argued that people who were initially neutral toward astrology changed their attitudes in favor of it if they were exposed to horoscopes and positive descriptions of their personalities. Lillqvist and Lindeman (1998), studying factors that may influence belief in astrology, found that susceptibility to vague but positive descriptions of self, and seeking explanations for stressful or uncertain life events are crucial factors. Similarly, Padgett and Jorgenson (1982) found that during the two world wars interest in astrology increased as economic and political threat and uncertainty increased. Sales (1973) study also showed an increased interest in astrology during the Great Depression in the

United States. Beliefs in astrology and the uncertainty of situations and events that people may encounter in their lives seem, therefore, to be a fertile ground for gullibility (Forer, 1949).

Conspiracy Theories

The term *conspiracy* refers to *a secret agreement made between two or more people or groups to do something bad or illegal that will harm someone else* (Cambridge Business English Dictionary, 2011). Today, conspiracy theories are described as attempting to explain events in relation to a machination put in place by powerful individuals who attempt to conceal their role until, they achieve their goals (Sunstein & Vermeule, 2009). Van Prooijen and Van Vugt (2018) argue that conspiracy theories are the result of five factors, namely the causal interconnectedness between individuals, events, and objects, the belief that the conspirators act intentionally, the coalition of the group of conspirators, the threat of the conspirators' dangerous plan being dangerous, and the secrecy with which they act. The fundamental question surrounding the topic of conspiracy concerns why an individual is driven to develop a conspiracy theory. According to Soukup (2008) one of the goals behind conspiracy theories is the attempt to provide alternative evidence to common beliefs about events or phenomena in human life. According to Moscovici (1987) another goal that leads to the development of a conspiracy theory is the desire to diminish the social influence of minorities on the masses. While Douglas et al. (2017), argue that adherence to conspiracy theories is driven by motivations that are epistemic in nature, related to understanding the environment around us; existential, i.e., related to the need to be safe and in control of one's surroundings; and psychosocial, i.e., related to the desire to maintain a positive self-image and social group. According to van Prooijen (2019), conspiracy theories seem to originate from gullibility. In fact, the author talks about *gullible conspiracist hypothesis*, i.e., those who believe in conspiracy theories are less likely to use a rational mindset (van Prooijen, 2019). According to this hypothesis, people who believe in such theories show a low level of analytical thinking (Adam-Troian et al., 2019; Barron et al., 2018; Georgiou et al., 2019; Ståhl & van Prooijen, 2018; Stojanov & Halberstadt, 2019; Swami et al., 2014; van der Wal et al., 2018; van Prooijen, 2017; Wagner-Egger et al., 2019).

Moreover, Douglas, Sutton, and Cichocka (2017), argue that those who believe in conspiracy theories cannot simply be characterized as gullible because, as noted above, there are multiple factors underlying such theories.

Another point that links gullibility and conspiracy theories is the *Dunning-Kruger effect* (DKE), which is a cognitive distortion due to the metacognitive inability of some individuals to realize their incompetence about something (Kruger & Dunning, 1999). According to this effect, individuals who do not recognize their own incompetence and who are uninformed about a specific topic tend to be confident in what they say (Kruger, Dunning, 1999).
It appears important, therefore, to study the relationship between gullibility and conspiracy theories in more detail.

Personality Factors

By the term personality we refer to the set of psychic characteristics and modes of behavior that define a person.

Today, contemporary psychology has identified five major dimensions of personality (called the Big 5), namely extroversion, agreeableness, openness, conscientiousness, and neuroticism (Norman, 1967; Goldberg, 1981; McCrae & Costa, 1987; John et al., 1991; John, Naumann & Soto, 2008).

Open-mindedness is a trait characterized by imagination, creativity, intuition, and a tendency to have many interests and curiosity. Conscientiousness, instead, is characterized by elevated levels of thoughtfulness, good impulse control, and goal-oriented behaviors. Extroversion is a trait that features sociability, talkativeness, and assertiveness. Agreeableness is characterized by trust, altruism, kindness, and prosocial behaviors. Finally, Neuroticism is a trait characterized by sadness, moodiness, and emotional instability (McCrae & Costa, 1987).

Many studies have found that personality traits such as extroversion, agreeableness, and conscientiousness could emphasize social conformity and be linked to gullibility (Bègue, et al., 2015; Gil de Zúñiga, Diehl, Huber, & Liu, 2017).

Other studies have shown, however, that only agreeableness is related to gullibility (Neel et al., 2016; Greenspan, 2009b; Teunisse et al., 2020); some scholars even identify gullibility as a maladaptive personality trait that ranks as an extreme on the agreeableness spectrum (Gore, et al., 2012; Petterson et al. 2014).

In contrast, there are no studies investigating the link between gullibility, neuroticism, and openness. However, Wiseman and Watt (2004) showed that the trait of neuroticism is related to an elevated level of belief in superstition, while Swami and colleagues (2016) showed a negative relationship between belief in myths and openness to experience. Moreover, there

are also no studies that analyze the link between gullibility, extroversion, and conscientiousness; however, these two traits are positive predictors of fake news fruition (Gil de Zúñiga et al., 2017).

Therefore, it seems important to further investigate the link between personality factors and gullibility.

Social desirability and conformism

Social desirability refers to an individual's tendency to give a socially acceptable response rather than a true one, and to give a favorable self-image to avoid receiving negative evaluations (Lavrakas, 2008; Holden & Passey, 2009).

In their study, Bègue et al. (2015) found that agreeableness is emphasized by the personality trait of agreeableness. Indeed, agreeable people seem to be more likely to conform to public opinion and obey suggestions more readily than others. Other studies have found that other personality traits such as extroversion and conscientiousness could also emphasize social conformity (Bègue, et al., 2015; Gil de Zúñiga, et al., 2017). However, the link between social desirability, conformity, and gullibility is still questionable, although a study by Teunisse et al. (2020) showed that there is no correlation between social desirability and gullibility.

Locus of Control

By the term locus of control, we refer to the degree to which an individual perceives a phenomenon as the result of their own actions or external forces (Rotter, 1966). Individuals with internal locus of control, believe that outcomes depend on their behavior or personal characteristics, while those who believe that their life outcomes depend on forces outside of their control are called having an external locus of control (Lefcourt, 1991; Norman & Bennett, 1996).

Studies conducted on locus of control and persuadability have shown that people with external locus are more suggestible than those with internal locus (Crowne & Liverant, 1963; Pines, 1973; Pines & Julian, 1972; Strickland, 1977; Sabatelli, Buck & Dreyer, 1983).

Many studies that have been concerned with investigating the relationship between locus of control and superstitious behavior have found that individuals with a high degree of external locus of control exhibit greater superstitious behavior, while individuals with a high degree of

internal locus of control exhibit less superstitious behavior (García Mieres et al., 2012; Irwin, 1993; Fluke et al; 2011). Other studies, however, have highlighted the relationship between locus of control and paranormal beliefs, showing that external locus of control is associated with a greater tendency to believe in paranormal explanations (Tobacyk, Nagot & Miller, 1988), while internal locus of control is associated with low levels of paranormal beliefs (Tobacyk, 2004).

Studies investigating the relationship between locus of control and gullibility have not yet been conducted, but it is presumable to think that it is associated with an external locus of control.

Fake news and Misinformation

Today, experience with media turns out to be an important way to gain knowledge about the world; it has consequences in terms of attitudes and behaviors (Bryant & Zillmann, 2002). One of the main limitations of social media is the ability to quickly spread false information that can be confusing and distracting (Venegas-Vera et al., 2020). In terms of definition and rigor, it is still not easy to capture the complexity of the meaning and spread of *fake news* (Lazer et al., 2018; Wardle, 2017; House of Commons, 2019). In common sense, the term fake news is used to refer to the intentional dissemination of false or otherwise empirically unverified news about a specific topic. What makes fake news potentially viral is the source from which it is transmitted, i.e., if this type of news is spread by prominent political figures, government leaders, and major news outlets, the effect it will have on the public is sure to be amplified, viral, and devastating (Orso et al., 2020).

Today, a distinction is made between *misinformation* and *disinformation*. The first one is used to refer to information that is inadvertently false and shared without the intent to cause harm, and the second one to refer to the creation and sharing of false information knowingly to cause harm (Wardle & Derakhshan, 2017). According to Wang et al. (2019), while noting these distinctions, it would be better to use *misinformation* as an umbrella term to encompass all forms of false information, thus giving those who generate it the benefit of the doubt.

The central question now is to understand the type of link between fake news, misinformation, and gullibility. Shen et al. (2019) studied social users' susceptibility to fake news and found that this susceptibility depends on a combination of user, network, and news content characteristics. Specifically, Gil de Zúñiga & Huber's (2017) study, which investigated the link between social network users' personality traits and news consumption, showed that traits such as extroversion,

agreeableness, and conscientiousness are positive predictors of news consumption, whereas emotional stability and openness turn out to be negative predictors. Furthermore, fake news beliefs are predicted by a conspiratorial worldview and schizotypal personality, these mechanisms therefore may be useful in understanding the individual characteristics underlying such beliefs (Anthony & Moulding, 2019). Further investigation is therefore needed to understand the link between gullibility and belief in fake news.

Measuring gullibility

Regarding measures to assess gullibility, early attempts used the Barnum Effect paradigm (Dickson & Kelly, 1985; Furnham & Schofield, 1987; Standing & Keays, 1987). The Barnum Effect consists of people evaluating and accepting false descriptions of themselves as true (Layne, 1979). However, this method has been criticized because the descriptions presented to participants were highly generic, trivial, and favorable to be approved by most rational people (Layne, 1979).

The other best-known method involves the Social Vulnerability Scale (Pinsker, McFarland, & Stone, 2011) which consists of using Greenspan's (2009b) theoretical model. This scale consists of 15 items divided into two factors: gullibility and credulity. The first factor (gullibility) concerns the behaviors of financial exploitation and consists of 8 items; the second factor (credulity), however, concerns the tendency to believe information from misleading sources and consists of 7 items. The Social Vulnerability Scale was designed to identify gullible seniors at risk of financial exploitation. This method of measurement, like the Barnum Effect paradigm, is not without its limitations; the scale was designed to be used with cognitively impaired individuals and is therefore not generalizable to healthy individuals, and it is also unable to differentiate between whether an individual is truly gullible or responding to a desire for social acceptance.

In 2020, Teunisse et al. validated the Gullibility Scale, a new scale that has as its basis the definition of gullibility as the tendency to believe false information even in the face of signs of unreliability. The initial version of the scale consisted of 66 items (e.g., "I think I'm more gullible than the average person," "I'm not as good at reading signals from someone trying to manipulate me") taken from other scales, such as the Social Vulnerability Scale (Pinsker et al., 2011), that involved the concept of gullibility in some way. Through validation studies, the final and validated version of the scale is composed of 12 items organized into two factors: Persuadability and Insensitivity. The first factor concerns personal beliefs about susceptibility to persuadability, while the second concerns the ability and speed of detecting signs of unreliability. This scale also has potential limitations as a self-report instrument; truly gullible individuals, in fact, may not perceive themselves as such and the scale may not accurately capture their levels of gullibility. However, George et al. (2020) investigated the behavioral

validity of the Gullibility Scale, further confirming the psychometric properties of the scale by Teunisse et al. (2020) and emphasizing its usefulness in identifying individuals at risk of cheating.

In subsequent studies the Gullibility Scale of Teunisse et al. (2020) will therefore be used, attempting to validate it in the Italian context.

The Research

Study 1: An Italian version of the Gullibility Scale

Goals

The general aim of the present study was to propose an Italian version of the Gullibility Scale (Teunisse et al., 2020), verifying its psychometric characteristics and factor structure. In the original paper, Teunisse et al. (2020) proposed a two-factor (persuadability and insensitivity) structure of the Gullibility Scale; however, they used also the general score of gullibility. For this reason, we tested a structure with a second-order factor (gullibility) and two first-order factors (insensitivity and persuadability). Moreover, the correlations with social desirability, social intelligence, trust, personality factors, age, level of education, and sex were tested.

Hypothesis

As discussed in the first part of this thesis, literature studies have shown that personality traits such as extroversion, agreeableness, and conscientiousness can be linked to gullibility as they emphasize social conformity (Bègue et al., 2015; Gil de Zúñiga et al., 2017; Standing, & Keays, 1987). Notably, some studies have indicated that gullibility is a maladaptive personality trait considered extreme on the agreeableness spectrum (Gore et al., 2012; Pettersson et al., 2014). However, no studies have examined the relationship between gullibility, neuroticism, and openness to experience. However, Wiseman & Watt (2004) showed that an elevated level of neuroticism correlated with a high level of superstition, and thus it could be hypothesized that it should correlate positively with gullibility, while Swami et al. (2016) found a negative relationship between belief in myths and openness to experience. On the other hand, about extroversion, the literature has shown that introverted people are more susceptible to suggestion than extroverted people (White, 2008). Finally, no studies have examined the relationship between conscientiousness and gullibility; however, it seems plausible to hypothesize that conscientiousness is negatively related to gullibility in that being attentive or diligent should lead to not being deceived. For these reasons, we hypothesized that gullibility should positively

correlate with agreeableness, and neuroticism; it should negatively correlate with openness; and it did not correlate with extroversion and conscientiousness.

Furthermore, as discussed in chapter one, in common parlance, a gullible person is equated with an overly trusting person; however, many studies suggest that highly trusting individuals are not necessarily gullible (Carter & Weber, 2010; Rotter, 1980; Sturgis et al., 2010; Yamagishi et al., 1999; Yamagishi, 2001). In fact, these studies highlight how high trust leads to more social interactions, which in turn leads to higher social intelligence that reduces the likelihood of a person being deceived (Carter & Weber, 2010; Rotter, 1967, 1980; Sturgis et al., 2010; Yamagishi et al., 1999; Yamagishi, 2001). Therefore, we hypothesized that gullibility is positively correlated with trust.

Finally, in agreement with the study by Teunisse et al. (2020), we also hypothesized that there is no correlation between gullibility and social desirability,

Methods

Participants and procedure

Participants were 198 Italians (35 males and 163 females) born and living in Italy, who answered an online questionnaire posted on popular social networks (e.g., Facebook) between February and March 2020. Regarding the age of participants, it was ranged from 19 to 70 years (M = 29.20, $S.D.$ = 10.65); while, regarding the level of education, 116 participants had a middle or high school diploma, and 82 participants had a bachelor or master's degree. Participants were informed that their responses would remain confidential. Ethical approval for this research was granted by the principal investigator's institution.

Measures

Gullibility Scale. The Italian version of the Gullibility Scale (Teunisse et al., 2020) consists of 12 items representing two factors: persuadability and insensitivity to cues of untrustworthiness. The items of the scale were gained by translating the original items into the Italian language using the forward-backward method, preserving as much as possible the original meaning of the items. An example of items is "I'm pretty good at working out when someone is trying to fool me" for insensitivity factor and "My family thinks I am an easy target

for scammers" for persuadability factor (the Italian version of the scale is available upon request from authors). For each item, participants indicated their level of agreement on a 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*) with 4 meaning *neither agree nor disagree*. Higher scores mean greater insensitivity and persuadability and, therefore, tendencies to gullibility.

Social Desirability Scale. The Italian adaptation of the Social Desirability Scale proposed by Manganelli, Rattazzi, Canova, and Marcorin (2000) was used. The scale consists of 9 items, for each of which participants responded on a 7-point scale ranged from 1 (*absolutely false*) to 7 (*absolutely true*) with 4 meaning *neither true nor false*. An example of items is "It doesn't matter who I'm talking to, I'm always a good listener", "There have been times when I've taken advantage of someone", "When I make a mistake, I'm always willing to admit it". The reliability was .57.

Big Five Inventory. The Italian adaptation of the Big Five Inventory (BFI) proposed by Ubbiali, Chiorri, Hampton, and Donati (2013) was used. The scale consists of 44 items representing five factors: extraversion, agreeableness, conscientiousness, neuroticism, and openness. An example of items is "I see myself as a person who is talkative", "I see myself as a person who tends to find fault with others", "I see myself as a person who works accurately". For each item, participants indicated their level of agreement on a 5-point scale ranged from 1 (*strongly disagree*) to 5 (*strongly agree*) with 3 meaning *neither agree nor disagree*. The Cronbach's alphas in the present study were .86 for extraversion, .72 for agreeableness, .82 for conscientiousness, .79 for neuroticism, and .83 for openness.

The Tromso Social Intelligence Scale. We have translated the items of the English version of Grieve and Mahar (2013) into Italian. The scale consists of 21 items representing three factors: social information processing, social skills, and social awareness. An example of items is "I adapt easily in social situations", "Other people get mad at me without me being able to explain why". For each item, participants indicated their level of agreement on a 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*) with 4 meaning *neither agree nor disagree*. The Cronbach's alphas in the present study were .75 for social information processing and .73 for social awareness. The factor social skills did not present a good reliability, so we used only items 7,10,18 (we eliminated items 4,12,15) of the Social Skill factor, which has an alpha of .80.

Surveys on Trust. We have translated and adapted the items of the English version of Miller & Mitamura (2003) into Italian context. The scale consists of 8 items representing two factors: interpersonal caution and interpersonal trust. An example of items is "I think I can trust other Italians", "Do you think you can trust casual acquaintances?". For each item, participants indicated their level of agreement on a 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*) with 4 meaning *neither agree nor disagree*. The Cronbach's alphas in the present study were .64 interpersonal caution and .70 for interpersonal trust.

Results

Table 1 shows the item analysis of the Italian version of the Gullibility Scale. As it is possible to see skewness and kurtosis for most items were between –1.00 and + 1.00 (Bollen, 1989). Moreover, Mardia's (1970) index was acceptable (1.81) and respected the criteria (between –1.96 and +1.96). However, the tests for multivariate skewness ($Z = 5.48$, $p < .001$) and kurtosis ($Z = 5.53$, $p < .001$) were significant.

To test the factor structure of the Gullibility Scale a confirmatory factor analysis, with a second-order factor (gullibility) and two first-order factors (insensitivity and persuadability), was performed (LISREL 8; Jöreskog & Sörbom, 1996-2001). Because results indicated that it is not possible to accept the assumption of multivariate normality, confirmatory factor analysis with the robust maximum likelihood method was carried out (Schermelleh-Engel, Moosbrugger, & Müller, 2003). To verify the adequacy of the models we used the χ^2: a solution fits the data well when χ^2 is non-significant ($p > .05$). Given that this statistic is sensitive to sample size, the two-index strategy (Hu & Bentler, 1999) proposing the combined use of comparative fit index (CFI; Bentler, 1990) and standardized root mean square residual (SRMR; Bentler, 1995) was applied. The model fits the data well if CFI is greater than or equal to .95 and SRMR is smaller than or equal to .08. Results showed that the model fitted the data well [χ^2 (53) = 206.28, $p < .001$, CFI = .95, SRMR = .08] and all factor loadings were significant (Figure 1). Finally, with regards to reliability, Table 2 shown that both insensitivity and persuadability factors as well as and total scale of gullibility have good internal reliability.

Table 3 shows means, standard deviations, and correlations. Results showed that participants have low levels of gullibility, both for the general score and for the two subfactors. Instead, they showed medium-high levels of extraversion, agreeableness, conscientiousness, and

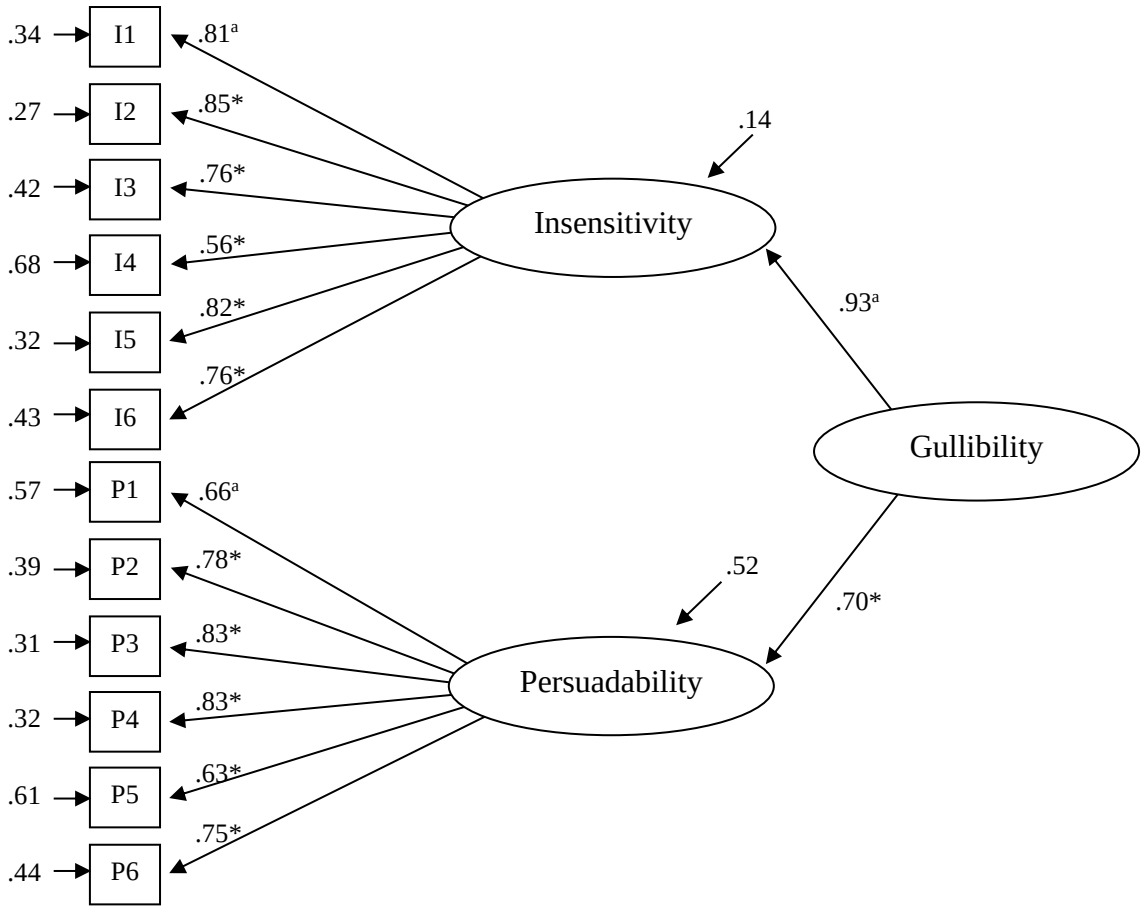
openness, and low levels of neuroticism. In addition, participants showed medium-high levels of social information processing, interpersonal caution, interpersonal trust, social desirability, and low levels of social awareness. Moreover, correlations showed that both the general score and for the two subfactors are negatively correlated with extraversion, conscientiousness, and social information processing, whereas they are positively correlated with neuroticism, social awareness, and interpersonal trust. Results showed that for both insensitivity and persuadability, as well as the total score of gullibility, no correlations were found with and social desirability, interpersonal caution, agreeableness, and openness. Finally, regarding socio-demographic variables, for both insensitivity and persuadability, as well as the total score of gullibility, no significant differences emerged for sex [t_s (196) < 1.28, *ns*] and level of education [t_s (196) < 0.62, *ns*], and no correlations were found with age (r_s < .10, *ns*).

Table 1. Item analysis of the Italian version of gullibility scale

Item	Mean	SD	Skewness	Kurtosis
Insensitivity 1	2.98	1.33	.74	.49
Insensitivity 2	3.23	1.33	.45	-.08
Insensitivity 3	2.87	1.56	.78	-.20
Insensitivity 4	2.89	1.39	.73	-.08
Insensitivity 5	2.99	1.57	.66	-.31
Insensitivity 6	2.90	1.60	.78	-.34
Persuadability 1	2.08	1.37	1.40	1.65
Persuadability 2	2.24	1.42	1.32	1.39
Persuadability 3	2.13	1.33	1.35	1.52
Persuadability 4	1.97	1.20	1.29	1.14
Persuadability 5	2.81	1.64	.64	-.71

Persuadability 6	2.18	1.31	.98	-.07

Figure 1. Standardized parameter estimates in a second-order confirmatory factor analysis of the Italian version of Gullibility Scale



[a] fixed parameter. * $p < 001$.

Table 2. Descriptive statistics and reliability

	Mean	SD	Alpha	Split-half
Insensitivity	2.99	1.18	.89	.80
Persuadability	2.24	1.09	.88	.76
Gullibility	2.61	1.01	.91	.86

Table 3. Means, standard deviations, and correlations

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Insensitivity	2.97	1.17	1													
2 Persuadability	2.23	1.09	0.58**	1												
3 Gullibility	2.60	1.00	0.89**	0.88**	1											
4 Extraversion	3.29	0.79	-0.18*	-0.22**	-0.22**	1										
5 Agreeableness	3.72	0.59	-0.01	0.08	0.01	0.21**	1									
6 Conscientiouness	3.80	0.63	-0.34**	-0.43**	-0.43**	0.39**	0.25**	1								
7 Neuroticism	3.12	0.71	0.24**	0.37**	0.34**	-0.40**	-0.23**	-0.45**	1							
8 Openness	3.78	0.62	-0.13	-0.04	-0.10	0.30**	0.19**	0.20**	-0.23**	1						
9 Social information processing	4.90	0.78	-0.49**	-0.18*	-0.38**	-0.09	0.02	0.16*	-0.02	0.15*	1					
10 Social skills	5.31	1.20	-0.29**	-0.18**	-0.27**	0.56**	0.27**	0.25**	-0.40**	0.41**	0.16*	1				
11 Social awareness	3.21	0.98	0.35**	0.40**	0.42**	-0.11	-0.21**	-0.27**	0.35**	-0.06	-0.28**	0.20**	1			
12 Interpersonal caution	3.93	1.04	0.03	-0.01	0.02	-0.02	-0.20**	0.08	0.21**	-0.05	0.12	0.09	0.28**	1		
13 Interpersonal trust	3.79	1.00	0.15*	0.21**	0.20**	0.05	0.23**	-0.08	-0.18*	0.05	-0.06	0.01	-0.12	-0.52**	1	
14 Social desirability	4.47	0.77	-0.08	-0.11	-0.10	0.13	0.56**	0.22**	-0.27**	0.21**	0.07	0.03	-0.19**	-0.14	0.12	1

Furthermore, we conducted a multivariate linear regression, as shown in Table 4, to test the effect of personality on the two components (persuadability and insensitivity) and the overall gullibility score. The results showed that agreeableness, conscientiouness and neuroticism are predictors of the overall gullibility score and persuadability, while only conscientiouness is a predictor of insensitivity.

Table 4. Linear multivariate regression model between the independent variables (i.e., extraversion, agreeableness, conscientiousness, neuroticism, and openness) and dependent variables (i.e., gullibility, insensitivity, and persadability) with 95% bias-corrected and CIs.

	Standardized Coefficients			95,0% CI for B	
	b	t	p-value	Lower Bound	Upper Bound
gullibility					
Constant		3.778	.000	1.511	4.813
extraversion	-.030	-.416	.678	-.222	.145
agreeableness	.147	2.202	.029	.026	.467
conscientiouness	-.367	-4.958	.000	-.809	-.349
neuroticism	.194	2.612	.010	.067	.480
openess	.001	.010	.992	-.212	.214
insensitivity					
Constant		4.157	.000	2.261	6.343
extraversion	-.026	-.329	.742	-.265	.189
agreeableness	.108	1.526	.129	-.062	.484
conscientiouness	-.296	-3.773	.000	-.829	-.260
neuroticism	.103	1.302	.195	-.087	.424
openess	-.062	-.869	.386	-.380	.147
persuadibility					
Constant		2.264	.025	.260	3.784
extraversion	-.029	-.397	.692	-.235	.156
agreeableness	.155	2.359	.019	.046	.517
conscientiouness	-.359	-4.921	.000	-.859	-.367
neuroticism	.248	3.386	.001	.158	.598
openess	.068	1.025	.307	-.109	.346

Conclusions

This study aimed to propose an Italian version of the Gullibility Scale (Teunisse et al., 2020). We, therefore, tested a structure with one second-order factor (gullibility) and one with two first-order factors (insensitivity and persuasibility) and the effect of personality characteristics, social intelligence, trust, and social desirability. The results showed that the scale possesses good internal consistency, and its bi-factorial structure with a high-order factor was confirmed. Regarding the relationship between gullibility and the other factors studied, the results showed that gullibility, both in its general factor and for insensitivity and persuasibility, does not correlate with social desirability, confirming our initial hypothesis; that both the general score and for the two subfactors are negatively correlated with extraversion, conscientiousness, and positively correlated with neuroticism, while persuadability, as well as the total score of gullibility, do not correlate with agreeableness, and openness, only partially confirming our initial hypothesis. In addition, both the general score and for the two subfactors are negatively correlated with social information processing and social skills, positively correlated with social awareness and interpersonal trust, and no correlations were found with interpersonal caution, again only partially confirming our hypotheses.

Regarding socio-demographic variables, for both insensitivity and persuadability, as well as the total score of gullibility, no significant differences emerged for sex and level of education, and no correlations were found with age.

Finally, regarding the effect of personality on two components and the overall gullibility score, the results showed that agreeableness, conscientiousness, and neuroticism are predictors of the overall gullibility score and persuadability, whereas only conscientiousness is a predictor of insensitivity.

The study confirmed that the Gullibility Scale is a reliable and valid measure of gullibility.

Study 2: The effects of personality factors, health locus of control, religious life and orientation, paranormal health beliefs, perceived vulnerability to disease, fear of COVID-19, beliefs in fake news about COVID-19

Goals

The aim of the second study was to test the Italian version of the Gullibility Scale (Teunisse et al., 2020) proposed in study 1, verifying its psychometric characteristics and factor structure, and to verify antecedents and consequences of gullibility. Regarding antecedents, we considered the personality factors, health locus of control, religious life and orientation, paranormal health beliefs, perceived vulnerability to disease, fear of COVID-19; Concerning consequences, we considered beliefs in fake news about COVID-19. Moreover, age, level of education, and sex were tested.

Hypotesis

There are no studies in the literature that analyze the effects of gullibility on fake news. For this reason, we decided to conduct an exploratory study.

Several studies have shown that individuals prone to wishful thinking exhibit high trust in fake news that often contains implausible and irrelevant content (Bronstein et al., 2019; Colliander, 2019; Fletcher & Nielsen, 2018). Specifically, Shen et al. (2019), showed that some social media users are more likely to believe fake news than others because they are more susceptible. It appears that susceptibility to fake news is related to the degree of agreement shown by other network users. For this reason, we hypothesized that gullibility should be positively related to fake news on COVID-19. We also decided to study the antecedents to gullibility and fake news, and in particular we hypothesized that religious orientation is not an antecedent of gullibility, as argued by Mercier (2017) that people with religious beliefs are wrongly accused of being gullible and what makes religious beliefs is a matter of belief, i.e., an emotionally driven position that makes it acceptable. Much research has shown that certain types of beliefs, such as paranormal and illusory beliefs, rather than scientific beliefs, can promote or hinder certain types of health-related behaviors (Franklin et al., 2007; Gall et al., 2005; Donizzetti & Petrillo, 2017; Dagnall et al., 2019). However, the effect these have on fake news beliefs and behavior remains uncertain. For this reason, we decided to test the effect of paranormal health beliefs on gullibility and fake news about COVID-19. In addition, studies conducted on locus of control

and persuadability have shown that individuals with external locus are more suggestible than those with internal locus (Crowne & Liverant, 1963; Pines, 1973; Pines & Julian, 1972; Strickland, 1977; Sabatelli, Buck & Dreyer, 1983). For this reason, we hypothesized that external locus of control has a positive effect on beliefs in fake news. Furthermore, in line with literature studies that have shown the link between extraversion, agreeableness, and gullibility (Bègue et al., 2015; Gil de Zúñiga et al., 2017), and study 1 that showed the positive correlation between gullibility and neuroticism, we hypothesized that only neuroticism, extraversion, and agreeableness were antecedents of belief in fake news. We also hypothesized that fear toward COVID-19 and perceived susceptibility to the disease might be positively related to greater susceptibility to believing fake news about COVID-19, due to the bombardment of information and the spread of misinformation related to the pandemic period (Venegas-Vera et al., 2020). Finally, given the link between independent variables (personality factors, locus of control, religious orientation, paranormal beliefs, perceived susceptibility to the disease, and COVID-19) and dependent variable (fake news) we hypothesized that gullibility could be a mediator. So, we hypothesized that both factors of gullibility (persuadability and insensitivity) are mediators of the independent variables considered so far, and the fake news about COVID-19.

Methods

Participants and procedure

Participants were 287 Italians (170 males and 117 females) born and living in Italy, who answered an online questionnaire posted on popular social networks (e.g., Facebook) between February and May 2020. Regarding the age of participants, it was ranged from 21 to 80 years (*M*age = 32.73, *S.D.* = 11.11). Participants were informed that their responses would remain confidential. Ethical approval for this research was granted by the principal investigator's institution.

Measure

Gullibility Scale. The 12 items of the Italian version of the Gullibility Scale described in Study 1 were used. For each item, participants indicated their level of agreement on a 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*) with 4 meaning *neither agree nor*

disagree. The Cronbach's alphas in the present study were .90 for insensitivity, .90 for persuadability, and .92 for the general score of gullibility.

Big Five Inventory. The Italian adaptation of the Big Five Inventory (BFI) proposed by Ubbiali, Chiorri, Hampton, and Donati (2013) was used. The scale consists of 44 items representing five factors: extraversion, agreeableness, conscientiousness, neuroticism, and openness. An example of items is "I see myself as a person who is talkative", "I see myself as a person who tends to find fault with others", "I see myself as a person who works accurately". For each item, participants indicated their level of agreement on a 5-point scale ranged from 1 (*strongly disagree*) to 5 (*strongly agree*) with 3 meaning *neither agree nor disagree*. The Cronbach's alphas in the present study were .81 for extraversion, .71 for agreeableness, .81 for conscientiousness, .80 for neuroticism, and .77 for openness.

Health Locus of Control Scale. The Italian adaptation of the Health Locus of Control Scale (HLCS) proposed by Donizzetti and Petrillo (2015) was used. The scale consists of 15 items representing three factors: internal health locus of control, God health locus of control, and other health locus of control. An example of items is "My physical health depends on my closest friends", "I feel that my physical health is something that depends on myself", "I am solely responsible for my health". For each item, participants indicated their level of agreement on a 5-point scale ranged from 1 (*strongly disagree*) to 5 (*strongly agree*) with 3 meaning *don't know*. The Cronbach's alphas in the present study were .88 for internal health locus of control, .83 for God health locus of control, and .71 for other health locus of control.

Religious life and orientation scale. The Italian adaptation of the Religious Life and Orientation Scale proposed by Voci, Bosetti, and Veneziani (2017) was used. The scale consists of 18 items representing three factors: end-intrinsic religious orientation, means-extrinsic religious orientation, and quest religious orientation. For each of which participants responded on a 7-point scale ranged from 1 (*absolutely false*) to 7 (*absolutely true*) with 4 meaning *neither true nor false*. An example of items is "I often question my religious beliefs", "I attach importance to my religious uncertainties and doubts", "My religion serves the needs of belonging and security". The Cronbach's alphas in the present study were .92 for end-intrinsic religious orientation, .74 for means-extrinsic religious orientation, and .77 for quest religious orientation.

Paranormal Health Beliefs Scale. The Italian adaptation of the Paranormal Health Beliefs Scale for adults (PHBS) proposed by Donizzetti and Petrillo (2017) was used. The scale consists of 31 items representing five factors: religious beliefs, superstitious beliefs, beliefs in extraordinary events, parapsychological beliefs, biomedical pseudo-scientific beliefs. For each item, participants indicated their level of agreement on a 5-point scale ranged from 1 (*strongly disagree*) to 5 (*strongly agree*) with 3 meaning *don't know*. An example of items is "Sickness can be overcome with the strength of the mind", "In case of surgery it is preferable to avoid Friday 17", "There are saints who ensure the care and health of the body". The Cronbach's alphas in the present study were .92 for end-intrinsic religious orientation, .92 for religious beliefs, .71 for superstitious beliefs, .76 for beliefs in extraordinary events, .82 for parapsychological beliefs, .70 for biomedical pseudo-scientific beliefs.

Perceived Vulnerability to Disease Questionnaire. We have translated the items of the English version of Duncan, Schaller, and Park (2009) into Italian. The scale consists of 15 items representing two factors: perceived infectability, and germ aversion. An example of items is "In general, I am very susceptible to colds, flu and other infectious diseases", "I am unlikely to catch a cold, flu or other illness, even if it is 'going around", "If an illness is 'going around', I will get it". For each item, participants indicated their level of agreement on a 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*) with 4 meaning *neither agree nor disagree*. The Cronbach's alphas in the present study were .72 for perceived infectability, and .69 for germ aversion.

Multidimensional Assessment of COVID-19-Related Fears. The Italian version of the Multidimensional Assessment of COVID-19-Related Fears (MAC-RF) proposed by Schimmenti, Starcevic, Giardina, Khazaal, and Billieux (2020) was used. The scale consists of 8 items, for each item, participants indicated their level of agreement on a 5-point scale ranged from 1 (*very different from me*) to 5 (*very similar to me*) with 3 meaning *neither different from me nor like me*. The overall total score ranges from 0 to 32; a score of 12 or higher indicates the presence of psychological distress on one or more areas of mental, relational and/or behavioral functioning, whereas a score of 20 or higher indicates the presence of pathological fears. An example of items is "I don't trust that my body can protect me from infection by coronavirus infection", "I am terrified that my body meeting objects contaminated with the coronavirus", "I am afraid that people around me may infect me". The Cronbach's alpha was .77.

Fake news about COVID-19. 12 fake news about COVID-19, identified by the Italian Ministry of Health (Ministero della Salute, 2020) was used (e.g., "Drinking water or hot drinks kills COVID-19", "Pets can transmit COVID-19", "Eating lots of oranges and lemons prevents contagion because vitamin C has a protective action against COVID-19"). For each item, participants indicated their level of agreement on a 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*) with 4 meaning *neither agree nor disagree*. The reliability was .81.

Results

Factor structure

As in Study 1, to test the factor structure of the Gullibility scale, we performed a confirmatory factor analysis, with a second-order factor (gullibility) and two first-order factors (insensitivity and persuadability). To verify the adequacy of the models the same goodness-of-fit indices as in Study 1 were used. Also in this case, Mardia's (1970) index was acceptable (1.64) and respected the criteria, nevertheless, the tests for multivariate skewness ($Z = 35.62$, $p < .001$) and kurtosis ($Z = 17.89$, $p < .001$) were significant, therefore, confirmatory factor analysis with the robust maximum likelihood method was carried out (Schermelleh-Engel, Moosbrugger, & Müller, 2003). Results showed that the model fitted the data well [χ^2 (53) = 304.83, $p < .001$, CFI = .97, SRMR = .08], all factor loadings were significant (λ_s comprised between .69 and .91; $\gamma_{1\,1} = .77$ and $\gamma_{2\,1} = .71$), and the paths form higher-order factor to first-order factors were significant.

Table 1 shows descriptive statistics and correlation between all measures and gullibility. Results showed that participants have low levels of gullibility, both for the general score and for the two subfactors. Instead, they showed medium-high levels of extraversion, agreeableness, conscientiousness, openness, pathological fears about COVID-19, internal health locus of control, quest religious orientation, germ aversion, perceived infectability and low levels of neuroticism, God health locus of control, other health locus of control, religious beliefs, superstitious beliefs, beliefs in extraordinary events, parapsychological beliefs, biomedical pseudo-scientific beliefs, intrinsic and extrinsic religious orientation. Finally, participants deny the fake news and accept the real ones. Moreover, correlations showed that both insensitivity

and the total score of gullibility are negatively correlated with extraversion, conscientiousness, and openness, whereas, they are positively correlated with neuroticism. Persuadability is negatively correlated with conscientiousness and positively correlated with neuroticism. Both insensitivity and persuadability, as well as general score of gullibility positively correlate with fake news about COVID-19, while only persuadability and the total score of gullibility were negatively correlated with true news about COVID-19. Both factors, as well as the total score of gullibility, were positively correlate with fear of COVID-19 and other health locus of control. Only persuadability was positively correlate with God health locus of control and extrinsic religious orientation. Both persuadability and the total score of gullibility are positively correlated with religious beliefs, superstitious beliefs, beliefs in extraordinary events, parapsychological beliefs, biomedical pseudo-scientific beliefs, and quest religious orientation. No correlations were found with internal health locus of control and intrinsic religious orientation. Only persuadability was negatively correlate with germ aversion, while both insensitivity and the total score of gullibility are positively correlated with perceived infectability.

Table 1. Means, standard deviations, and correlations

		M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	Gullibility	2.61	1.12	1																						
2	Insensitivity	3.04	1.30	.88**																						
3	Persuadability	2.19	1.25	.87**	.54**	1																				
4	Extraversion	3.40	0.70	-.15**	-.18**	-.08	1																			
5	Agreeableness	3.76	0.58	.07	.03	.09	.23**	1																		
6	Conscientiouness	3.84	0.63	-.17**	-.15**	-.15**	.34**	.27**	1																	
7	Neuroticism	3.16	0.73	.24**	.23**	.19**	-.30**	-.22**	-.46**	1																
8	Openness	3.85	0.59	-.13*	-.18**	-.04	.31**	.09	.12*	-.12*	1															
9	Fake news	1.81	0.74	.29**	.15*	.37**	-.01	-.11	.02	.02	-.04	1														
10	Fear of Covid-19	22.56	6.09	.19**	.18**	.16**	-.04	-.05	-.01	.19**	.04	.17**	1													
11	LOC internal	3.96	0.70	-.05	-.10	.01	.11	.07	.10	-.12*	.13*	-.01	-.02	1												
12	LOC God	2.37	1.27	.07	.01	.12*	.11	.17**	.22**	-.02	-.06	.12*	.13*	.08	1											
13	LOC other	1.95	0.82	.25**	.17**	.28**	-.07	-.12	-.16**	.34**	.04	.29**	.19**	-.11	.21**	1										
14	Religious beliefs	1.66	0.85	.15**	.05	.22**	.12*	.14*	.20**	-.08	-.03	.28**	.22**	.01	.73**	.24**	1									
15	Superstitious beliefs	1.25	0.41	.12*	.01	.19**	.05	-.06	.11	-.06	-.10	.34**	.18**	-.06	.32**	.28**	.59**	1								
16	Straordinary event beliefs	1.31	0.50	.18**	.07	.24**	.11	-.04	-.04	.03	.05	.35**	.08	.01	.15**	.30**	.33**	.49**	1							
17	Parapsychological beliefs	2.28	0.89	.16**	.04	.24**	.11	.02	-.02	.10	.17**	.24**	.13*	.12*	.30**	.31**	.45**	.44**	.53**	1						
18	Pseudoscientic beliefs	1.30	0.53	.19**	.07	.27**	.14*	.01	.11	-.12*	-.07	.48**	.13*	-.02	.33**	.24**	.52**	.57**	.45**	.39**	1					
19	Intrinsic religious	3.25	1.63	.05	.04	.05	.14*	.26**	.21**	-.06	.01	.04	.20**	-.02	.62**	.01	.67**	.28**	.09	.20**	.25**	1				
20	Extrinsic religious	2.54	1.17	.08	.01	.14*	.07	.12*	.19**	-.02	-.03	.25**	.26**	.13*	.53**	.05	.61**	.34**	.21**	.30**	.37**	.59**	1			
21	Quest religious	3.58	1.48	.15**	.11	.15**	-.03	.01	-.14*	.12*	.21**	-.05	.05	.11*	.02	-.01	-.04	-.03	.11	.16**	-.03	.01	.08	1		
22	Germ avversion	4.58	1.09	-.09	-.02	-.14*	.04	-.03	.14*	.03	.12	-.05	.45**	-.06	.16**	.07	.16**	.11*	-.01	.10	.13*	.22**	.16**	-.01	1	
23	Perceived infectability	3.56	1.05	.13*	.12*	.11	-.07	-.01	-.12*	.24**	-.06	-.01	.35**	-.18**	.02	.13*	.04	.10	-.01	.04	.01	.01	.01	-.01	.16**	1

* $p < .05$. ** $p < .01$.

Antecedents and Consequences of Gullibility

In this section, the goal is to test the effects of independent variables (personality factors, health locus of control, religious life and orientation, paranormal health beliefs, perceived vulnerability to disease, fear of COVID-19) on gullibility and fake news.

Mediation analysis was estimated on JASP Version 0.16.1 (JASP Team, 2022) to study whether and to what extent the effect of variables X (personality factors, health locus of control, religious life and orientation, paranormal health beliefs, perceived vulnerability to disease, fear of COVID-19) on variable Y (fake news about COVID-19) is explained by variable M (gullibility).

The independent variables were divided into macro-categories according to the type of factor, the 5 factors of the Big Five, the 3 factors of the health locus of control, the 3 factors of religious orientation, the different types of paranormal health beliefs, and finally the perceived vulnerability to disease and the fear of COVID-19.

Personality factors

To verify antecedents and consequences of gullibility, as well as its potential mediating effects on the relationship between the Big Five factors and fake news about COVID-19, a mediation analysis was estimated on JASP Version 0.16.1 (JASP Team, 2022). Results are shown in Table 2, 3, and 4. Results showed that agreeableness and neuroticism correlated positively with both insensitivity and persuadability; furthermore, persuadability correlated positively with fake news on COVID-19, confirming that people characterized by high levels of trust, conformity, emotional instability, and maladjustment tend to be more gullible and that people characterized by high levels of persuadability tend to believe in fake news. As for the mediating effects of persuadability and insensitivity, results indicated a significant indirect effect only for agreeableness and neuroticism, whose effects on fake news were partially mediated by persuadability, while the mediating effects of insensitivity were not significant. Concerning the mediating effect of persuadability, the direct effect of agreeableness and neuroticism on fake news is negative, while the indirect effect is positive, indicating that persuadability acts as a suppressor variable (MacKinnon, 2008; MacKinnon et al., 2000). Finally, the other personality factors appear to have no effect on gullibility and fake news about COVID-19.

Table 2. Direct effects of Personality factors on Fake news about COVID-19

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
extraversion	→	Fake news	0.023	0.065	0.360	0.719	-0.104	0.151
agreeableness	→	Fake news	-0.247	0.073	-3.403	< .001	-0.390	-0.105
conscientiouness	→	Fake news	0.140	0.074	1.886	0.059	-0.005	0.285
neuroticism	→	Fake news	-0.039	0.063	-0.617	0.537	-0.163	0.085
openness	→	Fake news	-0.055	0.071	-0.768	0.443	-0.195	0.085

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Table 3. Indirect effects of Personality factors on Fake news about COVID-19

								95% Confidence Interval	
					Estimate	Std. Error	z-value	p	Lower	Upper
extraversion	→ insensitivity	→	Fake news		0.006	0.008	0.821	0.412	-0.009	0.022
extraversion	→ persuadability	→	Fake news		-0.016	0.032	-0.501	0.617	-0.078	0.046
agreeableness	→ insensitivity	→	Fake news		-0.011	0.012	-0.904	0.366	-0.034	0.012
agreeableness	→ persuadability	→	Fake news		0.097	0.038	2.590	0.010	0.024	0.171

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
conscientiouness	→ insensitivity	→ Fake news	0.004	0.006	0.624	0.532	-0.009	0.017
conscientiouness	→ persuadability	→ Fake news	-0.058	0.037	-1.564	0.118	-0.130	0.015
neuroticism	→ insensitivity	→ Fake news	-0.013	0.014	-0.944	0.345	-0.039	0.014
neuroticism	→ persuadability	→ Fake news	0.078	0.032	2.412	0.016	0.015	0.141
openness	→ insensitivity	→ Fake news	0.011	0.012	0.914	0.361	-0.013	0.035
openness	→ persuadability	→ Fake news	-0.008	0.034	-0.232	0.817	-0.076	0.060

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Table 4. Total and Total indirect effect of Personality factors on Fake news about COVID-19

			Total effects						Total indirect effect					
							95% Confidence Interval						95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper	Estimate	Std. Error	z-value	p	Lower	Upper
extraversion	→	Fake news	0.014	0.071	0.196	0.844	-0.125	0.153	-0.009	0.030	-0.313	0.755	-0.068	0.050
agreeableness	→	Fake news	-0.161	0.079	-2.042	0.041	-0.315	-0.006	0.087	0.035	2.476	0.013	0.018	0.155
conscientiouness	→	Fake news	0.086	0.081	1.062	0.288	-0.073	0.245	-0.054	0.034	-1.559	0.119	-0.121	0.014
neuroticism	→	Fake news	0.026	0.068	0.379	0.704	-0.108	0.159	0.065	0.031	2.111	0.035	0.005	0.125
openness	→	Fake news	-0.052	0.078	-0.665	0.506	-0.204	0.101	0.003	0.034	0.096	0.923	-0.063	0.070

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Health Locus of Control

To verify antecedents and consequences of gullibility, as well as its potential mediating effects on the relationship between the Locus of control and fake news about COVID-19, a mediation analysis was estimated on JASP Version 0.16.1 (JASP Team, 2022). Results are shown in Table 5, 6, and 7. Results showed that Locus of control link to other correlated positively with persuadability; furthermore, persuadability correlated positively with fake news on COVID-19, confirming that people characterized by high levels of control from significant others (e.g., friends and family) tend to be more gullible and that people characterized by high levels of persuadability tend to believe in fake news. As for the mediating effects of persuadability and insensitivity, results indicated a significant indirect effect only for LOC other, whose effects on fake news were partially mediated by persuadability, while the mediating effects of insensitivity were not significant. Concerning the mediating effect of persuadability, the direct and indirect effect of LOC other on fake news is positive. Finally, the other types of Locus of control appear to have no effect on gullibility and fake news about COVID-19.

Table 5. Direct effects of Locus of control on Fake news about COVID-19

						95% Confidence Interval	
		Estimate	Std. Error	z-value	p	Lower	Upper
LOC internal	→ Fake news	0.007	0.058	0.126	0.900	-0.106	0.120
LOC God	→ Fake news	0.020	0.032	0.615	0.539	-0.043	0.083
LOC other	→ Fake news	0.187	0.052	3.593	< .001	0.085	0.288

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Table 6. Indirect effects of Locus of control on Fake news about COVID-19

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
LOC internal	→ insensitivity	→ Fake news	0.007	0.007	0.908	0.364	-0.008	0.021
LOC internal	→ persuadability	→ Fake news	0.012	0.022	0.558	0.577	-0.031	0.055
LOC God	→ insensitivity	→ Fake news	6.874e-4	0.003	0.250	0.803	-0.005	0.006
LOC God	→ persuadability	→ Fake news	0.012	0.012	0.953	0.341	-0.012	0.036
LOC other	→ insensitivity	→ Fake news	-0.012	0.010	-1.109	0.267	-0.032	0.009
LOC other	→ persuadability	→ Fake news	0.089	0.025	3.558	< .001	0.040	0.138

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Table 7. Total and Total indirect effect of Locus of control on Fake news about COVID-19

			Total effects											
							95% Confidence Interval						95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper	Estimate	Std. Error	z-value	p	Lower	Upper
LOC internal	→	Fake news	0.026	0.060	0.430	0.667	-0.092	0.144	0.019	0.021	0.904	0.366	-0.022	0.059
LOC God	→	Fake news	0.032	0.034	0.951	0.342	-0.034	0.099	0.012	0.011	1.106	0.269	-0.010	0.034
LOC other	→	Fake news	0.264	0.053	4.991	< .001	0.160	0.368	0.077	0.022	3.509	< .001	0.034	0.121

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Paranormal Health beliefs

To verify antecedents and consequences of gullibility, as well as its potential mediating effects on the relationship between the health beliefs and fake news about COVID-19, a mediation analysis was estimated on JASP Version 0.16.1 (JASP Team, 2022). Results are shown in Table 8, 9 and 10. Results showed that Pseudoscientific beliefs correlated positively with persuadability; furthermore, persuadability correlated positively with fake news on COVID-19, confirming that people characterized by high levels of beliefs that appear to have a scientific basis but are based on other methods tend to be more gullible and that people characterized by high levels of persuadability tend to believe in fake news. As for the mediating effects of persuadability and insensitivity, results indicated a significant indirect effect only for Pseudoscientific beliefs, whose effects on fake news were partially mediated by persuadability, while the mediating effects of insensitivity were not significant. Concerning the mediating effect of persuadability, the direct and indirect effects of Pseudoscientific beliefs on fake news are positive. Finally, the other types of beliefs appear to have no effect on gullibility and fake news about COVID-19.

Table 8. Direct effects of Health beliefs on Fake news about COVID-19

						95% Confidence Interval	
		Estimate	**Std. Error**	**z-value**	**p**	**Lower**	**Upper**
Religious beliefs	→ Fake news	-0.018	0.058	-0.305	0.760	-0.131	0.096
Superstitious beliefs	→ Fake news	0.116	0.126	0.916	0.360	-0.132	0.363
Straordinary event beliefs	→ Fake news	0.195	0.094	2.072	0.038	0.011	0.379
Parapsychological beliefs	→ Fake news	-0.034	0.052	-0.654	0.513	-0.136	0.068

			Estimate	Std. Error	z-value	p	95% Confidence Interval	
							Lower	Upper
Pseudoscientific beliefs	→	Fake news	0.484	0.091	5.292	< .001	0.305	0.663

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Table 9. Indirect effects of Health beliefs on Fake news about COVID-19

				Estimate	Std. Error	z-value	p	95% Confidence Interval	
								Lower	Upper
Religious beliefs	→ insensitivity	→	Fake news	-9.300e-4	0.003	-0.339	0.735	-0.006	0.004
Religious beliefs	→ persuadability	→	Fake news	0.018	0.018	0.990	0.322	-0.017	0.053
Superstitious beliefs	→ insensitivity	→	Fake news	0.004	0.010	0.430	0.667	-0.015	0.024
Superstitious beliefs	→ persuadability	→	Fake news	-0.022	0.039	-0.562	0.574	-0.098	0.054
Straordinary event beliefs	→ insensitivity	→	Fake news	-0.003	0.007	-0.430	0.667	-0.018	0.011
Straordinary event beliefs	→ persuadability	→	Fake news	0.045	0.030	1.495	0.135	-0.014	0.105
Parapsychological beliefs	→ insensitivity	→	Fake news	5.528e-5	0.002	0.032	0.974	-0.003	0.003
Parapsychological beliefs	→ persuadability	→	Fake news	0.023	0.017	1.387	0.165	-0.009	0.056

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
Pseudoscientic beliefs	→ insensitivity	→ Fake news	-0.003	0.007	-0.420	0.675	-0.015	0.010
Pseudoscientific beliefs	→ persuadability	→ Fake news	0.064	0.031	2.045	0.041	0.003	0.125

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Table 10. Total and Total indirect effects of Health beliefs on Fake news about COVID-19

			Total effects						Total indirect effects					
							95% Confidence Interval						95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper	Estimate	Std. Error	z-value	p	Lower	Upper
Religious beliefs	→	Fake news	-6.847e-4	0.060	-0.011	0.991	-0.118	0.117	0.017	0.017	0.998	0.318	-0.016	0.050
Superstitious beliefs	→	Fake news	0.098	0.131	0.749	0.454	-0.159	0.355	-0.017	0.037	-0.470	0.638	-0.090	0.055
Straordinary event beliefs	→	Fake news	0.237	0.097	2.434	0.015	0.046	0.428	0.042	0.028	1.488	0.137	-0.013	0.098
Parapsychological beliefs	→	Fake news	-0.011	0.054	-0.202	0.840	-0.116	0.094	0.023	0.016	1.461	0.144	-0.008	0.054
Pseudoscientific beliefs	→	Fake news	0.545	0.094	5.785	< .001	0.360	0.730	0.061	0.029	2.116	0.034	0.005	0.118

Religious life and orientation

To verify antecedents and consequences of gullibility, as well as its potential mediating effects on the relationship between the religious orientation and fake news about COVID-19, a mediation analysis was estimated on JASP Version 0.16.1 (JASP Team, 2022). Results are shown in Table 11, 12 and 13. Results showed that quest and extrinsic orientation correlated positively with persuadability; furthermore, persuadability correlated positively with fake news on COVID-19, confirming that people characterized by high levels of faith understood as a spiritual search and people characterized by high levels of faith as the ultimate goal tend to be more gullible and that people characterized by high levels of persuadability tend to believe in fake news. As for the mediating effects of persuadability and insensitivity, results indicated a significant indirect effect only for extrinsic and quest religious orientation, whose effects on fake news were partially mediated by persuadability, while the mediating effects of insensitivity were not significant. Concerning the mediating effect of persuadability, the direct and indirect effects of extrinsic religious orientation on fake news are positive, while the direct effect of quest religious orientation on fake news is negative, and the indirect effect is positive, indicating that persuadability acts as a suppressor variable (MacKinnon, 2008; MacKinnon et al., 2000). Finally, the other types of religious orientations appear to have no effect on gullibility and fake news about COVID-19.

Table 11. Direct effects of religious orientation on Fake news about COVID-19

						95% Confidence Interval	
		Estimate	Std. Error	z-value	p	Lower	Upper
Intrinsic religious	→ Fake news	-0.069	0.030	-2.292	0.022	-0.127	-0.010
Estrinsic religious	→ Fake news	0.192	0.042	4.528	< .001	0.109	0.275
Quest religious	→ Fake news	-0.069	0.027	-2.575	0.010	-0.121	-0.016

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Table 12. Indirect effects of religious orientation on Fake news about COVID-19

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
Intrinsic religious	→ insensitivity	→ Fake news	-0.001	0.002	-0.501	0.616	-0.005	0.003
Intrinsic religious	→ persuadability	→ Fake news	-0.007	0.013	-0.547	0.584	-0.032	0.018
Estrinsic religious	→ insensitivity	→ Fake news	9.267e -4	0.002	0.394	0.694	-0.004	0.006
Estrinsic religious	→ persuadability	→ Fake news	0.037	0.019	1.988	0.047	5.366e -4	0.074
Quest religious	→ insensitivity	→ Fake news	-0.002	0.004	-0.591	0.554	-0.010	0.005
Quest religious	→ persuadability	→ Fake news	0.028	0.012	2.300	0.021	0.004	0.052

						95% Confidence Interval	
	Estimate	Std. Error	z-value	p	Lower	Upper

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Table 13. Total and total indirect effects of religious orientation on Fake news about COVID-19

			Total effects						Total indirect effects					
							95% Confidence Interval						95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper	Estimate	Std. Error	z-value	p	Lower	Upper
Intrinsic religious	→	Fake news	-0.077	0.032	-2.384	0.017	-0.140	-0.014	-0.008	0.012	-0.656	0.512	-0.032	0.016
Estrinsic religious	→	Fake news	0.230	0.045	5.109	< .001	0.142	0.319	0.038	0.018	2.096	0.036	0.002	0.074
Quest religious	→	Fake news	-0.043	0.028	-1.514	0.130	-0.099	0.013	0.026	0.011	2.251	0.024	0.003	0.048

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Fear of COVID-19 and Perceived Vulnerability to Disease

To verify antecedents and consequences of gullibility, as well as its potential mediating effects on the relationship between the Fear of COVID-19, Perceived Vulnerability to Disease, and fake news about COVID-19, a mediation analysis was estimated on JASP Version 0.16.1 (JASP Team, 2022). Results are shown in Table 14, 15 and 16. Results showed that fear of COVID-19 and germ aversion correlated positively with persuadability; furthermore, persuadability correlated positively with fake news on COVID-19, confirming that people characterized by high levels of fear of COVID-19 and germs tend to be more gullible and that people characterized by high levels of persuadability tend to believe in fake news. As for the mediating effects of persuadability and insensitivity, results indicated a significant indirect effect only for Fear of COVID-19 and Germ aversion, whose effects on fake news were partially mediated by persuadability, while the mediating effects of insensitivity were not significant. Concerning the mediating effect of persuadability, the direct and indirect effects of Fear of COVID-19 on fake news are positive, while the direct and indirect effects of Germ aversion on fake news are negative. Finally, the other dimensions of Perceived Vulnerability to Disease appear to have no effect on gullibility and fake news about COVID-19.

Table 14. Direct effects of Fear of COVID-19, Perceived Vulnerability to Disease, on Fake news about COVID-19

						95% Confidence Interval	
		Estimate	**Std. Error**	**z-value**	**p**	**Lower**	**Upper**
Germ aversion	→ Fake news	-0.050	0.043	-1.185	0.236	-0.134	0.033
Perceived infectability	→ Fake news	-0.063	0.041	-1.553	0.121	-0.143	0.017
Fear of covid	→ Fake news	0.023	0.008	2.841	0.004	0.007	0.038

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Table 15. Indirect effects of Fear of COVID-19, Perceived Vulnerability to Disease, on Fake news about COVID-19

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
Germ aversion	→ insensitivity	→ Fake news	0.008	0.007	1.130	0.259	-0.006	0.022
Germ aversion	→ persuadability	→ Fake news	-0.074	0.021	-3.516	< .001	-0.115	-0.033
Perceived infectability	→ insensitivity	→ Fake news	-0.004	0.005	-0.826	0.409	-0.013	0.005
Perceived infectability	→ persuadability	→ Fake news	0.018	0.017	1.056	0.291	-0.015	0.051
Fear of covid	→ insensitivity	→ Fake news	-0.002	0.002	-1.237	0.216	-0.006	0.001
Fear of covid	→ persuadability	→ Fake news	0.013	0.004	3.341	< .001	0.005	0.020

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Table 16. Total and indirect total effects of Fear of COVID-19, Perceived Vulnerability to Disease, on Fake news about COVID-19

			Total effects						Total indirect effects					
							95% Confidence Interval						95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper	Estimate	Std. Error	z-value	p	Lower	Upper
Germ avversion	→	Fake news	-0.116	0.044	-2.639	0.008	-0.202	-0.030	-0.066	0.019	-3.524	< .001	-0.102	-0.029
Perceived infectability	→	Fake news	-0.049	0.043	-1.137	0.256	-0.134	0.036	0.014	0.015	0.908	0.364	-0.016	0.044
Fear of covid	→	Fake news	0.033	0.008	4.019	< .001	0.017	0.050	0.011	0.003	3.030	0.002	0.004	0.017

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Overall mediation model

Finally, we decided to create an overall model. As there are many variables used in the study, we first used a forward linear regression to decide which variables to include in the model, as shown in table 17. The results showed that the variables in common in the three regressions were: pseudoscientific beliefs, LOC other, germ aversion, fear of COVID-19, quest religious, and neuroticism. Therefore, we decided to use these variables in the model on antecedents, consequences, and mediating effects of gullibility, as shown in figure 1.

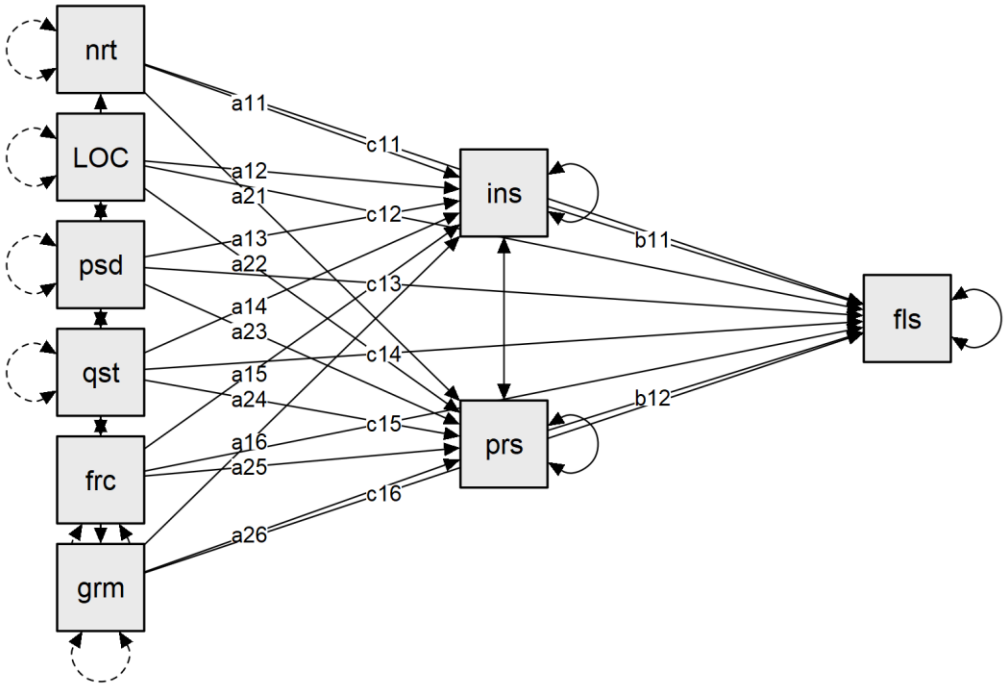
Table 17. Forward linear regression model between the independent variables (all variables used in the study) and dependent variables (i.e., insensitivity, persuadability, and fake news about COVID-19) with 95% bias-corrected and CIs.

					95,0% CI for B	
		Standardized Coefficients Beta	t	p-value	Lower Bound	Upper Bound
Insensitivity						
1	Constant		5.213	.000	1.072	2.372
	neuroticism	.235	4.085	.000	.216	.617
2	Constant		5.131	.000	1.954	4.385
	neuroticism	.216	3.763	.000	.182	.582
	openess	-.158	-2.761	.006	-.596	-.100
3	Constant		4.239	.000	1.446	3.953
	neuroticism	.185	3.189	.002	.125	.529
	openess	-.169	-2.964	.003	-.617	-.125
	Fear of covid	.152	2.633	.009	.008	.057
4	Constant		4.207	.000	1.417	3.908
	neuroticism	.166	2.861	.005	.092	.497
	openess	-.198	-3.410	.001	-.687	-.184
	Fear of covid	.149	2.606	.010	.008	.056
	Quest religious	.127	2.196	.029	.012	.212
Persudability						
1	Constant		7.265	.000	.979	1.706
	LOC other	.282	4.955	.000	.261	.604
2	Constant		3.637	.000	.377	1.265
	LOC other	.229	4.001	.000	.178	.524
	Pseudoscientic beliefs	.220	3.849	.000	.256	.793
3	Constant		5.086	.000	1.069	2.418

	LOC other	.238	4.248	.000	.196	.536
	Pseudoscientic beliefs	.243	4.312	.000	.315	.845
	Germ avversion	-.194	-3.523	.000	-.348	-.099
4	Constant		3.781	.000	.638	2.024
	LOC other	.203	3.650	.000	.144	.480
	Pseudoscientic beliefs	.236	4.279	.000	.304	.822
	Germ avversion	-.294	-4.914	.000	-.474	-.203
	Fear of covid	.231	3.808	.000	.023	.072
5	Constant		2.290	.023	.123	1.631
	LOC other	.205	3.726	.000	.148	.480
	Pseudoscientic beliefs	.241	4.425	.000	.319	.831
	Germ avversion	-.286	-4.839	.000	-.464	-.196
	Fear of covid	.218	3.625	.000	.020	.069
	Quest religious	.149	2.830	.005	.038	.214
6	Constant		-.222	.824	-1.283	1.023
	LOC other	.218	3.981	.000	.170	.501
	Pseudoscientic beliefs	.237	4.378	.000	.311	.820
	Germ avversion	-.285	-4.850	.000	-.461	-.195
	Fear of covid	.222	3.718	.000	.021	.070
	Quest religious	.148	2.822	.005	.038	.212
	agreeableness	.119	2.259	.025	.033	.477
7	Constant		-1.523	.129	-2.325	.297
	LOC other	.164	2.820	.005	.076	.426
	Pseudoscientic beliefs	.272	4.937	.000	.390	.908
	Germ avversion	-.278	-4.789	.000	-.453	-.189
	Fear of covid	.197	3.294	.001	.016	.065
	Quest religious	.131	2.509	.013	.024	.198
	agreeableness	.146	2.761	.006	.090	.538
	neuroticism	.158	2.696	.007	.073	.467
Fake news about COVID-19						
1	Constant		9.035	.000	.726	1.131
	Pseudoscientic beliefs	.482	9.281	.000	.537	.827
2	Constant		5.452	.000	.427	.910
	Pseudoscientic beliefs	.435	8.319	.000	.470	.762
	LOC other	.194	3.705	.000	.083	.271
3	Constant		5.571	.000	.677	1.418
	Pseudoscientic beliefs	.451	8.658	.000	.494	.784
	LOC other	.200	3.867	.000	.090	.276
	Germ avversion	-.134	-2.639	.009	-.160	-.023
4	Constant		4.422	.000	.478	1.244
	Pseudoscientic beliefs	.446	8.677	.000	.488	.774

LOC other	.173	3.350	.001	.065	.251
Germ avversion	-.210	-3.778	.000	-.219	-.069
Fear of covid	.176	3.118	.002	.008	.035

Figure 1. Path plot of antecedents, consequences, and mediating effects of gullibility



Note. Nrt, neuroticism; LOC, Locus of control other; psd, pseudoscientific beliefs; qst, quest religious; frc, fear of COVID-19; grm, germ aversion; ins, insensitivity; prs, persuadability; fls, fake news about COVID-19.

Tables 18, 19, and 20 show the mediation analysis of antecedents, consequences, and mediating effects of gullibility on JASP Version 0.16.1 (JASP Team, 2022). Results showed that as for the mediating effects of persuadability and insensitivity, results indicated a significant indirect effect for pseudoscientific beliefs, LOC other, germ aversion, fear of COVID-19, and quest religious, whose effects on fake news were partially mediated by persuadability, while the mediating effects of insensitivity were not significant. Concerning the mediating effect of persuadability, the direct and indirect effects of pseudoscientific beliefs, LOC other, germ aversion, fear of COVID-19, and quest religious on fake news are positive. Finally, neuroticism appears to have no effect on gullibility and fake news about COVID-19.

Table 18. Direct effects of Fear of pseudoscientific beliefs, LOC other, germ aversion, fear of COVID-19, quest religious, and neuroticism on Fake news about COVID-19

						95% Confidence Interval	
		Estimate	Std. Error	z-value	p	Lower	Upper
neuroticism	→ Fake news	-0.027	0.055	-0.489	0.625	-0.135	0.081
LOC other	→ Fake news	0.129	0.050	2.610	0.009	0.032	0.227
Pseudoscientic beliefs	→ Fake news	0.546	0.076	7.230	< .001	0.398	0.694
Quest religious	→ Fake news	-0.041	0.025	-1.655	0.098	-0.089	0.008
Fear of covid	→ Fake news	0.018	0.007	2.552	0.011	0.004	0.031
Germ avversion	→ Fake news	-0.106	0.038	-2.773	0.006	-0.182	-0.031

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Table 19. Indirect effects of pseudoscientific beliefs, LOC other, germ aversion, fear of COVID-19, quest religious, and neuroticism on Fake news about COVID-19

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
neuroticism	→ insensitivity	→ Fake news	-0.007	0.011	-0.635	0.526	-0.029	0.015
neuroticism	→ persuadability	→ Fake news	0.029	0.015	1.873	0.061	-0.001	0.059
LOC other	→ insensitivity	→ Fake news	-0.002	0.004	-0.553	0.580	-0.010	0.006
LOC other	→ persuadability	→ Fake news	0.032	0.015	2.163	0.031	0.003	0.061
Pseudoscientic beliefs	→ insensitivity	→ Fake news	-0.004	0.007	-0.583	0.560	-0.018	0.010
Pseudoscientic beliefs	→ persuadability	→ Fake news	0.085	0.030	2.874	0.004	0.027	0.143
Quest religious	→ insensitivity	→ Fake news	-0.002	0.003	-0.594	0.553	-0.007	0.004

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
Quest religious	→ persuadability	→ Fake news	0.015	0.007	2.102	0.036	0.001	0.029
Fear of covid	→ insensitivity	→ Fake news	-7.957e-4	0.001	-0.632	0.528	-0.003	0.002
Fear of covid	→ persuadability	→ Fake news	0.005	0.002	2.415	0.016	0.001	0.010
Germ avversion	→ insensitivity	→ Fake news	0.003	0.005	0.617	0.537	-0.007	0.013
Germ avversion	→ persuadability	→ Fake news	-0.043	0.015	-2.862	0.004	-0.072	-0.014

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Table 20. Total and indirect total effects of pseudoscientific beliefs, LOC other, germ aversion, fear of COVID-19, quest religious, and neuroticism on Fake news about COVID-19

Total effects									**Total indirect effects**					
							95% Confidence Interval						**95% Confidence Interval**	
			Estimate	**Std. Error**	**z-value**	**p**	**Lower**	**Upper**	**Estimate**	**Std. Error**	**z-value**	**p**	**Lower**	**Upper**
neuroticism	→	fake news	-0.005	0.055	-0.094	0.925	-0.114	0.103	0.022	0.015	1.400	0.162	-0.009	0.052
LOC other	→	fake news	0.159	0.050	3.176	0.001	0.061	0.258	0.030	0.013	2.215	0.027	0.003	0.056
pseudoscientic beliefs	→	fake news	0.627	0.074	8.458	< .001	0.482	0.772	0.081	0.027	3.009	0.003	0.028	0.134
quest religious	→	fake news	-0.027	0.025	-1.086	0.278	-0.076	0.022	0.014	0.007	2.080	0.038	7.867e-4	0.027
fear of covid	→	fake news	0.022	0.007	3.202	0.001	0.009	0.036	0.005	0.002	2.219	0.026	5.320e-4	0.009
germ avversion	→	fake news	-0.146	0.038	-3.867	< .001	-0.220	-0.072	-0.040	0.013	-2.965	0.003	-0.066	-0.013

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Conclusions

This study aimed to test the Italian version of the Gullibility Scale (Teunisse et al., 2020) proposed in study 1, verifying its psychometric characteristics and factor structure, and to verify antecedents and consequences of gullibility. The study confirmed that the Gullibility Scale is a reliable and valid measure of gullibility.

Regarding antecedents, we considered the Big Five personality factors, health locus of control, religious orientations, paranormal health beliefs, perceived vulnerability of disease and fear of COVID-19; whereas, regarding consequences, we considered beliefs in fake news about COVID-19. Our results showed that persuadability mediates the relationship between agreeableness and fake news. The direct effect of agreeableness on fake news is negative: the more agreeable people are, the less they believe fake news. However, the indirect effect is positive: elevated levels of agreeableness correlate with high levels of persuaadability, which in turn correlate with belief in fake news. Persuadability also mediates the relationship between Locus of control with others and fake news. The direct and indirect effects of LOC other on fake news is positive: the more people have a Locus of control based on significant other the more they believe in fake news, and elevated levels of this type of Locus of control are correlated with high levels of persuadability. Again, persuadability mediates the relationship between pseudoscientific beliefs and fake news. The direct and indirect effects of pseudoscientific beliefs on fake news are positive: people characterized by elevated levels of beliefs that appear to have a scientific basis but are based on other methods tend to be more gullible, and high levels of these beliefs correlate with high levels of persuadability. In addition, the relationship between quest religious orientation, extrinsic religious orientation, and fake news is also mediated by persuadability. The direct and indirect effects of extrinsic religious orientation on fake news are positive: people characterized by high levels of goal-oriented faith tend to be more gullible, and high levels of extrinsic orientation correlate with high levels of persuadability. Whereas the direct effect of religious quest orientation on fake news is negative: people characterized by high levels of faith understood as a spiritual quest tend to be less gullible to fake news, and the indirect effect is positive: high levels of quest orientation correlate with high levels of persuasibility. Finally, persuadability mediates the relationship between fear of COVID-19, germ aversion, and fake news. The direct and indirect effects of Fear of COVID-19 on fake news are positive: confirming that people characterized by high levels of Fear of

COVID-19 tend to be more gullible and that high levels of fear are related to high levels of persuadability, and in turn to belief in fake news; while the direct and indirect effects of germ aversion on fake news are negative: the more people are worried about germs the less they believe in fake news, and high levels of aversiveness are related to low levels of persuadability and thus belief in fake news.

Furthermore, we decided to create an overall model of variable used in the study. As there are many variables, we first used a forward linear regression to decide which variables to include in the model. The results showed that the variables in common in the three regressions (insensitivity, persuadability, and fake news) were: pseudoscientific beliefs, LOC other, germ aversion, fear of COVID-19, quest religious, and neuroticism. Therefore, we decided to use these variables in the model on antecedents, consequences, and mediating effects of gullibility. Results showed that persuadability mediates the relationship between pseudoscientific beliefs, LOC other, germ aversion, fear of COVID-19, quest religious, and fake news about COVID-19. The direct and indirect effects of pseudoscientific beliefs, LOC other, germ aversion, fear of COVID-19, and quest religious on fake news are positive: people characterized by elevated levels of beliefs that appear to have a scientific basis but are based on other methods, a Locus of control based on significant other, high levels of faith understood as a spiritual quest, are worried about germs and COVID-19, tend to be more gullible, and high levels of these variables correlate with high levels of persuadability.

Regarding consequences, our results showed that persuadability is positively related to fake news on COVID-19, suggesting that people with high persuadability are more likely to believe fake news. That means that people believing in fake news do so more because they are easily persuaded than because they are insensitive to untrustworthy clues. In conclusion, the results show that gullible people have elevated levels of external locus of control related to others, have an extrinsic religious orientation, have pseudoscientific beliefs, and a greater fear of COVID-19.

Study 3: The relationship between Gullibility and different beliefs

Goals

The aim of the third study was to analyze the relationship between Gullibility and the religious orientation, paranormal health beliefs, fear of COVID-19, complementary and alternative medicine beliefs, astrology attitude, conspiracy mentality and vaccines conspiracy beliefs. In addition, we wanted to test whether gullibility was a moderator between the variables considered and vaccines conspiracy beliefs. We considered the religious orientation, paranormal health beliefs, fear of COVID-19, complementary and alternative medicine beliefs, astrology attitude, and conspiracy beliefs as independent variables, gullibility as moderator and vaccines conspiracy beliefs as dependent variable. This study is also exploratory in nature; as there are no other studies in the literature, our aim is to explore the factors related to gullibility in order to explore this issue further.

Hypothesis

Even today, in modern society, there are people who are reluctant to vaccinate. In fact, vaccination reluctance is considered by the World Health Organization to be one of the leading causes of threats to global health (World Health Organization, 2019). This resistance has led to an increase in preventable diseases (Atwell & Salmon, 2014; Cherry, 2012; Jansen et al., 2003; Pearce et al., 2008; Phadke et al., 2016) and today this is even more alarming given the COVID-19 pandemic (Orrù et al., 2021).

Psychological research looks at vaccination resistance from the perspective of attitudes; in fact, several psychological theories link behaviors, such as adherence to vaccination campaigns, to related attitudes (Ajzen, 2001; Ajzen & Fishbein, 2000; Nisson & Earl, 2020). Even today, beliefs in dubious phenomena such as homeopathy, crystals, alternative therapies, astrology, anti-vaccination, supernatural interventions in daily life, as well as conspiracy beliefs of all kinds abound (Douglas et al., 2017; van Prooijen, 2019). For these reasons, we decided to study the relationship between beliefs in dubious phenomena (such as paranormal health beliefs, beliefs about complementary and alternative medicine, beliefs about astrology, and conspiratorial beliefs) or specific attitudes (such as religious orientation and fear of COVID-19), gullibility, and conspiratorial beliefs about vaccines.

We considered gullibility as a moderating variable, that is, a variable that can increase or decrease the relationship between the independent variable (conspiratorial beliefs about vaccines) and the independent variables (paranormal health beliefs, beliefs about complementary and alternative medicine, beliefs about astrology, conspiratorial beliefs, religious orientation, and fear of COVID-19). Although in study 2 we chose to use gullibility as a mediator, the choice to use the same variable as a moderator in this study is supported by the fact that this study is exploratory in nature. In studies of this kind, a few times, the same variable can be considered as both mediator and moderator, as also shown in the literature (Creed & Bartrum, 2008; Garnett et al., 2008).

We hypothesized that a relationship exists between the independent variables considered and conspiratorial beliefs about vaccines. Specifically, we hypothesized that elevated levels of gullibility increase the relationship between the independent variables and conspiratorial beliefs about vaccines, whereas low levels of gullibility decrease the strength of this relationship.

Methods

Participants and procedure

Participants were 154 Italians (24 males and 130 females) born and living in Italy, who answered an online questionnaire posted on popular social networks (e.g., Facebook) between November 2020 and February 2021. Regarding the age of participants, it was ranged from 19 to 58 years (*M*age = 28,45, *S.D.* = 7,131). Participants were informed that their responses would remain confidential. Ethical approval for this research was granted by the principal investigator's institution.

Measure

Gullibility Scale. The 12 items of the Italian version of the Gullibility Scale described in Study 1 and Study 2 were used. For each item, participants indicated their level of agreement on a 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*) with 4 meaning *neither agree nor disagree*. The Cronbach's alphas in the present study were .87 for insensitivity, .88 for persuadability, and .91 for the general score of gullibility.

Religious life and orientation scale. The Italian adaptation of the Religious Life and Orientation Scale proposed by Voci, Bosetti, and Veneziani (2017) was used. The scale consists of 18 items representing three factors: end-intrinsic religious orientation, means-extrinsic religious orientation, and quest religious orientation. For each of which participants responded on a 7-point scale ranged from 1 (*absolutely false*) to 7 (*absolutely true*) with 4 meaning *neither true nor false*. An example of items is "I often question my religious beliefs", "I attach importance to my religious uncertainties and doubts", "My religion serves the needs of belonging and security". The Cronbach's alphas in the present study were .93 for end-intrinsic religious orientation, .72 for means-extrinsic religious orientation, and .69 for quest religious orientation.

Paranormal Health Beliefs Scale. The Italian adaptation of the Paranormal Health Beliefs Scale for adults (PHBS) proposed by Donizzetti and Petrillo (2017) was used. The scale consists of 31 items representing five factors: religious beliefs, superstitious beliefs, beliefs in extraordinary events, parapsychological beliefs, biomedical pseudo-scientific beliefs. For each item, participants indicated their level of agreement on a 5-point scale ranged from 1 (*strongly disagree*) to 5 (*strongly agree*) with 3 meaning *don't know*. An example of items is "Sickness can be overcome with the strength of the mind", "In case of surgery it is preferable to avoid Friday 17", "There are saints who ensure the care and health of the body". The Cronbach's alphas in the present study were .90 for religious beliefs, .80 for superstitious beliefs, .65 for beliefs in extraordinary events, .83 for parapsychological beliefs. The factor biomedical pseudo-scientific beliefs had bad Cronbach's alphas, so it was eliminated.

Multidimensional Assessment of COVID-19-Related Fears. The Italian version of the Multidimensional Assessment of COVID-19-Related Fears (MAC-RF) proposed by Schimmenti, Starcevic, Giardina, Khazaal, and Billieux (2020) was used. The scale consists of 8 items, for each item, participants indicated their level of agreement on a 5-point scale ranged from 1 (*very different from me*) to 5 (*very similar to me*) with 3 meaning *neither different from me nor like me*. The overall total score ranges from 0 to 32; a score of 12 or higher indicates the presence of psychological distress on one or more areas of mental, relational and/or behavioral functioning, whereas a score of 20 or higher indicates the presence of pathological fears. An example of items is "I don't trust that my body can protect me from infection by coronavirus

infection", "I am terrified that my body meeting objects contaminated with the coronavirus", "I am afraid that people around me may infect me". The Cronbach's alpha was .73.

Conspiracy Mentality Scale. We have translated the items of the English version of Stojanov and Halberstadt (2019) into Italian. The scale consists of 11 items representing two factors: conspiracy theory ideation and skepticism. An example of items is "The government or covert organizations are responsible for events that are unusual or unexplained", "Some things are not as they seem". For each item, participants indicated their level of agreement on a 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*) with 4 meaning *neither agree nor disagree*. The Cronbach's alphas in the present study were .93 for conspiracy theory ideation, .88 for skepticism, and .95 for the general score of conspiracy.

Complementary and Alternative Medicine Beliefs Inventory. We have translated the items of the English version of Grzywacz et al. (CAMBI; 2012) into Italian. The scale consists of 17 items representing three factors: perceived value of natural treatments, preferences for participation in treatments, and orientations toward holistic health. An example of items is "Health-related treatments should have no negative side effects", "Health care providers should treat patients as equal partners", "Health is about harmonizing your body, mind, and spirit". For each item, participants indicated their level of agreement on a 5-point scale ranged from 1 (*strongly disagree*) to 5 (*strongly agree*) with 3 meaning *neither agree nor disagree*. The Cronbach's alphas in the present study were .82 for perceived value of natural treatments. The factor participation in treatments did not present a good reliability, so we used only items 7,8, 10,11 (we eliminated item 9) of the factors, which has an alpha of .63. The factor orientations toward holistic health did not present a good reliability, so we used only items 12, 13, 15, 16 (we eliminated items 14 and 17) of the factor, which has an alpha of .70.

Measure of these 5C psychological antecedents of vaccination. We have translated the items of the English version of Betsch et al. (2019) into Italian. The scale consists of 5 items representing 5 subscales correlated with relevant psychological concepts, such as attitude (confidence), perceived personal health status and invulnerability (complacency), self-control (constraints), preference for deliberation (calculation), and communal orientation (collective responsibility). An example of items is "I am completely confident that vaccines are safe", "Vaccination is unnecessary because vaccine preventable diseases are not common anymore", "Everyday stress prevents me from getting vaccinated". For each item, participants indicated

their level of agreement on a 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*) with 4 meaning *neither agree nor disagree*. The scale did not present a good reliability, so we used only items 2, 3, 5 (we eliminated items 1 and 4) of the scale. The Cronbach's alpha in the present study was .61.

Vaccine Conspiracy Beliefs Scale. We have translated the items of the English version of Shapiro et al. (VCBS; 2016) into Italian. The scale consists of 7 items, for each item participants indicated their level of agreement on a 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*) with 4 meaning *neither agree nor disagree*. An example of items is "Vaccine safety data is often fabricated", "Immunizing children is harmful, and this fact is covered up", "Pharmaceutical companies cover up the dangers of vaccines". The Cronbach's alpha in the present study was .92.

Conspiratorial ideation Scale. We have translated the English items of the Conspiratorial ideation Scale used in the study of Hornsey, Harris, and Fielding (2018) into Italian. The scale consists of 4 items, for each item participants indicated their level of agreement on a 6-point scale ranged from 1 (*strongly disagree*) to 5 (*strongly agree*) with 3 meaning *neither agree nor disagree*, and 6 treated as a missing value (*don't know*). An example of items is "A powerful and secretive group known as the New World Order are planning to eventually rule the world through an autonomous world government, which would replace sovereign governments", "The U.S. government allowed the 9-11 attacks to take place so that it would have an excuse to achieve foreign (e.g. wars in Afghanistan and Iraq) and domestic (e.g. attacks on civil liberties) goals that had been determined prior to the attacks". The Cronbach's alpha in the present study was .70.

Questions about Astrology. Two questions about astrology ware used (e.g., "To what extent do you believe in astrology?", "How often do you read the horoscope?"). For the first item, participants indicated their level of belief on a 7-point scale ranged from 1 (*not at all*) to 7 (*quite*) with 4 meaning *don't know*, for the second item, participants indicated their level of frequency on a 7-point scale ranged from 1 (*never*) to 7 (*everyday*). The reliability was .83.

Results

Table 1 shows descriptive statistics and correlation between all measures and gullibility. Results showed that participants have low levels of gullibility, both for the general score and for the

two subfactors. They showed low levels of religious, superstitious beliefs, extraordinary event, and parapsychological beliefs, extrinsic religious, conspiracy theory ideation and skepticism, conspirational beliefs attitude, fear of COVID-19, vaccine conspiracy, astrology attitude, and psychological antecedents of vaccine. Instead, they showed medium-high levels of intrinsic religious, and quest religious, whereas they showed elevated levels of participation in treatments, holistic health and natural treatments.

Moreover, correlations showed that both insensitivity, persuadability and the total score of gullibility are positively correlated with fear of COVID-19 and astrology attitude. Persuadability is positively correlated with extraordinary event beliefs and participation in treatments. No correlations were found with religious beliefs, superstitious beliefs, parapsychological beliefs, intrinsic religious, extrinsic religious, quest religious, conspiracy theory ideation, skepticism, conspirational beliefs attitude, holistic health, natural treatments vaccine conspiracy, and psychological antecedents of vaccine.

Table 1. Means, standard deviations, and correlations

		M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	**Persuadability**	2.35	1.12	1																			
2	**Insensitivity**	2.83	1.05	.62**	1																		
3	**Gullibility**	2.59	.97	.90**	.89**	1																	
4	**Religious beliefs**	1.54	.66	.01	.03	.02	1																
5	**Superstitious beliefs**	1.20	.39	.11	.09	.11	.57**	1															
6	**Extraordinary event beliefs**	1.37	.46	.15*	.02	.10	.41**	.50**	1														
7	**Parapsychological beliefs**	2.20	.88	.15	.11	.14	.42**	.35**	.45**	1													
8	**Intrinsic religious**	3.13	1.63	-.03	-.01	-.02	.61**	.14	.06	.15	1												
9	**Extrinsic religious**	2.66	1.05	.08	.11	.10	.45**	.14	.23**	.30**	.61**	1											
10	**Quest religious**	3.81	1.27	.14	.12	.15	.14	.02	.08	.26**	.17*	.31**	1										
11	**Conspiracy theory ideation**	2.76	1.38	.14	.01	.09	.27**	.30**	.38**	.41**	.12	.06	.18*	1									
12	**Skepticism**	2.54	1.40	.13	.07	.11	.29**	.31**	.38**	.41**	.13	.06	.18*	.90**	1								
13	**Conspirational Beliefs Attitude**	2.01	.74	-.06	-.07	-.07	.24**	.38**	.35**	.34**	.08	.15	.12	.55**	.57**	1							
14	**Fear of COVID-19**	2.94	.75	.19*	.24**	.24**	-.01	-.08	-.33**	-.08	.06	.07	.21**	-.10	-.13	-.14	1						
15	**Participation in treatments**	4.99	1.07	.19*	.12	.18*	.17*	.06	.05	.21**	.21**	.08	.08	.00	.02	.03	.03	1					
16	**Holistic health**	4.75	1.15	.07	-.07	.01	.15	-.02	.14	.33**	.08	.19*	.09	.25**	.21**	.04	-.06	.44**	1				
17	**Natural treatments**	4.54	1.14	-.05	-.07	-.07	.13	.11	.10	.24**	.05	.02	.06	.27**	.29**	.27**	-.00	.34**	.43**	1			
18	**Vaccine Conspiracy**	2.34	1.22	.00	-.00	-.00	.26**	.17*	.25**	.38**	.12	.02	.13	.51**	.57**	.49**	-.08	.15*	.21**	.16*	1		
19	**Astrology Attitude**	1.98	1.16	.355**	.16*	.28**	.18*	.34**	.23**	.21**	.04	.04	.12	.10	.14	.22**	.03	.04	.01	.05	.16*	1	
20	**Psychological antecedents of Vaccine**	1.64	.834	.03	-.074	-.023	.11	.146	.33**	.30**	-.05	-.03	.01	.22**	.21**	.25**	-.18*	.09	.20*	.23**	.54**	.10	1

**p < .001; *p < .01.

The role of Gullibility as a moderator on beliefs about vaccines

In this section, the goal is to test the role of Gullibility on beliefs about vaccines.

Hierarchical regression analysis was estimated on SPSS and the PROCESS macro to study whether and to what extent the effect of variables X (conspiratorial beliefs, paranormal health beliefs, alternative medicine beliefs, astrology beliefs, religious life and orientation, paranormal health beliefs, psychological antecedents of vaccination, and fear of COVID-19) on variable Y (vaccine conspiracy beliefs) is explained by variable M (gullibility).

The independent variables were divided into macro-categories according to the type of factor, the 3 factors of conspiratorial beliefs, the 4 factors of paranormal health beliefs, the 3 factors of alternative medicine beliefs, the 3 factors of religious life and orientation, the psychological antecedents of vaccination, the astrology beliefs, and finally the fear of COVID-19.

Conspiratorial beliefs

To test the moderation model, we conducted a hierarchical regression analysis using vaccine conspiracy beliefs as the dependent variable. All continuous predictor variables were centered at their grand mean. In the first step, we included the following predictors of vaccine conspiracy beliefs: (M) gullibility, (a) conspiracy theory ideation; (b) skepticism; and (c) conspiratorial ideation.

In a second step, we included in addition to the variables already mentioned the interactions between these variables and gullibility (moderator). The 95% bootstrap confidence intervals were obtained with SPSS (regression coefficients) and the PROCESS macro (Hayes, 2013). Results are reported in Table 2.

Table 2. Hierarchical regression analysis.

Predictor	B	SE	LBCI	UBCI	R2	Fch	df	F
STEP I					.36	21.82**	4	21.82**
(a) Conspirancy Ideation theory	-.05	.13	-.3	.211				
(b) Skepticism	.42**	.13	.149	.706				
(c) Conspirational Beliefs Attitude	.39*	.12	.153	.641				
(M) gullibility	-.05	.1	-.225	.167				
STEP 2					.42	5.11*	7	15.69**
A	-.03	.13	-.277	.264				
B	.39*	.14	.102	.665				
C	.36*	.12	.108	.598				
M	- 0	.09	-.166	.199				
a x M	-.16	.17	-.484	.195				
b x M	-.07	.16	-.408	.22				
c x M	.065	.10	-.109	.338				

LBCI, lower bound of 95% bootstrap confidence interval; UBCI, upper bound of 95% bootstrap confidence interval. F (4,149) = 21.82, p<.001; F (3,146) = 5.11, p < .01. ∗∗p < .001; ∗p < .01.

Results showed that both skepticism and conspirational beliefs attitude are significantly related to vaccine conspiracy beliefs, this means that beliefs in conspiracy theories and conspiracy attitudes are linked to an increase in conspiracy beliefs about vaccines; whereas gullibility, and conspiracy theory ideation had no significant relation. The interactions were no significant.

Then, we considered the two subfactors (insensitivity and persuadability) of gullibility as moderating variables and we conducted hierarchical regression analysis, but we noted that the results of the analysis did not change compared to using the general factor of gullibility.

Paranormal health beliefs

To test the moderation model, we conducted a hierarchical regression analysis using vaccine conspiracy beliefs as the dependent variable. All continuous predictor variables were centered at their grand mean. In the first step, we included the following predictors of vaccine conspiracy beliefs: (M) gullibility, (a) religious beliefs, (b) superstitious beliefs, (c) event beliefs, and (d)parapsychological beliefs.

In a second step, we included in addition to the variables already mentioned the interactions between these variables and gullibility (moderator). The 95% bootstrap confidence intervals were obtained with SPSS (regression coefficients) and the PROCESS macro (Hayes, 2013). Results are reported in Table 3.

Table 3. Hierarchical regression analysis.

Predictor	B	SE	LBCI	UBCI	R2	Fch	df	F
STEP I					.16	5.97**	5	5.97**
(M) gullibility	-.07	.09	-.242	.135				
(a) religious beliefs	.21	.23	-.240	.693				
(b) superstitious beliefs	-.11	.29	-.709	.459				
(c) event beliefs	.22	.30	-.362	.836				
(d) parapsychological beliefs	.44**	.12	.188	.690				
STEP 2					.24	3.70	9	5.21**
(M)	-.08	.09	-.248	.113				
(a)	.22	.23	-.248	.668				
(b)	-.03	.33	-.689	.633				
(c)	.16	.32	-.446	.842				
(d)	.37*	.12	.121	.615				
a x M	-.36	.24	-.876	.062				
b x M	.64	.40	-.176	1,465				
c x M	-.34	.21	-.749	.129				
d x M	-.22	.14	-.527	.047				

LBCI, lower bound of 95% bootstrap confidence interval; UBCI, upper bound of 95% bootstrap confidence interval. F (5,148) = 5.97, p<.001; F (4,144) = 3.70, p < .001. ∗∗p < .001; ∗p < .01.

Results showed that only parapsychological beliefs are significantly related to vaccine conspiracy beliefs, this means that beliefs in parapsychological phenomena are linked to an increase in conspiratorial beliefs about vaccines; whereas gullibility, religious beliefs, superstitious beliefs, and event beliefs had no significant relation. The interactions were no significant.

Then, we considered the two subfactors (insensitivity and persuadability) of gullibility as moderating variables and we conducted hierarchical regression analysis, but we noted that the results of the analysis did not change compared to using the general factor of gullibility.

Religious life and orientation

To test the moderation model, we conducted a hierarchical regression analysis using vaccine conspiracy beliefs as the dependent variable. All continuous predictor variables were centered

at their grand mean. In the first step, we included the following predictors of vaccine conspiracy beliefs: (M) gullibility, (a) intrinsic religious, (b) extrinsic religious, and (c) quest religious. In a second step, we included in addition to the variables already mentioned the interactions between these variables and gullibility (moderator). The 95% bootstrap confidence intervals were obtained with SPSS (regression coefficients) and the PROCESS macro (Hayes, 2013). Results are reported in Table 4.

Table 4. Hierarchical regression analysis.

Predictor	B	SE	LBCI	UBCI	R2	Fch	df	F
STEP I					.39	1.51	4	1.51
(M) gullibility	-.01	.10	-.198	.192				
(a) intrinsic religious	.14	.07	-.006	.286				
(b) extrinsic religious	-.16	.11	-.386	.070				
(c) quest religious	.13	.09	-.043	.324				
STEP 2					.77	2.00	7	1.74
(M)	.01	.09	-.174	.208				
(a)	.11	.07	-.029	.277				
(b)	-.12	.12	-.391	.109				
(c)	.12	.09	-.064	.305				
a x M	-.07	.06	-.193	.078				
b x M	-.08	.09	-.271	.097				
c x M	-.10	.11	-.395	.082				

LBCI, lower bound of 95% bootstrap confidence interval; UBCI, upper bound of 95% bootstrap confidence interval. F (4,149) = 1.51, p >.05; F (3,146) = 2.00, p > .05. ∗∗p < .001; ∗p < .01.

Results showed that gullibility, intrinsic, extrinsic, and quest religious are not significantly related to vaccine conspiracy beliefs. The interactions were, also, no significant.

Then, we considered the two subfactors (insensitivity and persuadability) of gullibility as moderating variables and we conducted hierarchical regression analysis, but we noted that the results of the analysis did not change compared to using the general factor of gullibility.

Fear of COVID-19

To test the moderation model, we conducted a hierarchical regression analysis using vaccine conspiracy beliefs as the dependent variable. All continuous predictor variables were centered

at their grand mean. In the first step, we included the following predictors of vaccine conspiracy beliefs: (M) gullibility, and (a) fear of COVID-19.

In a second step, we included in addition to the variables already mentioned the interactions between these variables and gullibility (moderator). The 95% bootstrap confidence intervals were obtained with SPSS (regression coefficients) and the PROCESS macro (Hayes, 2013). Results are reported in Table 5.

Table 5. Hierarchical regression analysis.

Predictor	B	SE	LBCI	UBCI	R2	Fch	df	F
STEP I					.01	.55	2	.55
(M) gullibility	.023	.09	-.152	.218				
(a)fear of COVID	-.14	.16	-.465	.199				
STEP 2					.02	1.31	3	.81
(M)	-.01	.09	-.182	.207				
(a)	-.15	.16	-.465	.196				
a x M	.15	.15	-.165	.467				

UBCI, lower bound of 95% bootstrap confidence interval; UBCI, upper bound of 95% bootstrap confidence interval. F (2,151) = .55, p >.05; F (1,150) = 1.31, p > .05. ∗∗p < .001; ∗p < .01.

Results showed that both gullibility and fear of COVID-19 are not significantly related to vaccine conspiracy beliefs. The interaction was no significant.

Then, we considered the two subfactors (insensitivity and persuadability) of gullibility as moderating variables and we conducted hierarchical regression analysis, but we noted that the results of the analysis did not change compared to using the general factor of gullibility.

Alternative medicine beliefs

To test the moderation model, we conducted a hierarchical regression analysis using vaccine conspiracy beliefs as the dependent variable. All continuous predictor variables were centered at their grand mean. In the first step, we included the following predictors of vaccine conspiracy beliefs: (M) gullibility, (a) intrinsic religious, (b) extrinsic religious, and (c) quest religious.

In a second step, we included in addition to the variables already mentioned the interactions between these variables and gullibility (moderator). The 95% bootstrap confidence intervals were obtained with SPSS (regression coefficients) and the PROCESS macro (Hayes, 2013). Results are reported in Table 6.

Table 6. Hierarchical regression analysis.

Predictor	B	SE	LBCI	UBCI	R2	Fch	df	F
STEP I					.15	6.87**	4	6.87**
(M) gullibility	.02	.09	-.157	.220				
(a) participation in treatments	.01	.09	-.177	.192				
(b) holistic health	.05	.09	-.135	.251				
(c) natural treatments	.39**	.09	.210	.580				
STEP 2					.21	3.43*	7	5.58**
M	-.00	.10	-.204	.199				
a	.03	.09	-.158	.206				
b	-.01	.09	-.191	.181				
c	.38**	.09	.198	.576				
a x M	.07	.10	-.129	.276				
b x M	-.26*	.10	-.465	-.058				
c x M	-.09	.09	-.277	.082				

LBCI, lower bound of 95% bootstrap confidence interval; UBCI, upper bound of 95% bootstrap confidence interval. F (4,149) = 6.87, p<.001; F (3,146) = 3.43, p < .01. ∗∗p < .001; ∗p < .05.

Results showed that only natural treatment is significantly related to vaccine conspiracy beliefs, this means that preferences in natural treatments as a medical approach to disease are linked to an increase in conspiratorial beliefs about vaccines; whereas gullibility, participation in treatments, and holistic health had no significant relation. Only the interaction between holistic health and gullibility was significant, the others were no significant. This means that gullibility moderates the effect of beliefs in holistic health on conspiratorial beliefs about vaccines, and especially those who believe in holistic health will have fewer negative beliefs about vaccines. Given that the interaction between (b) holistic health and (M) gullibility was significant, we conducted a simple slopes analysis to test the effects in the case of high and low gullibility, as shown in Table 7. Simple slopes analysis revealed that both low and elevated level of gullibility on vaccine conspiracy beliefs were not significant. We note that the zero fall between LBCI and UBCI (Heyes, 2013), meaning that the effect is not significant.

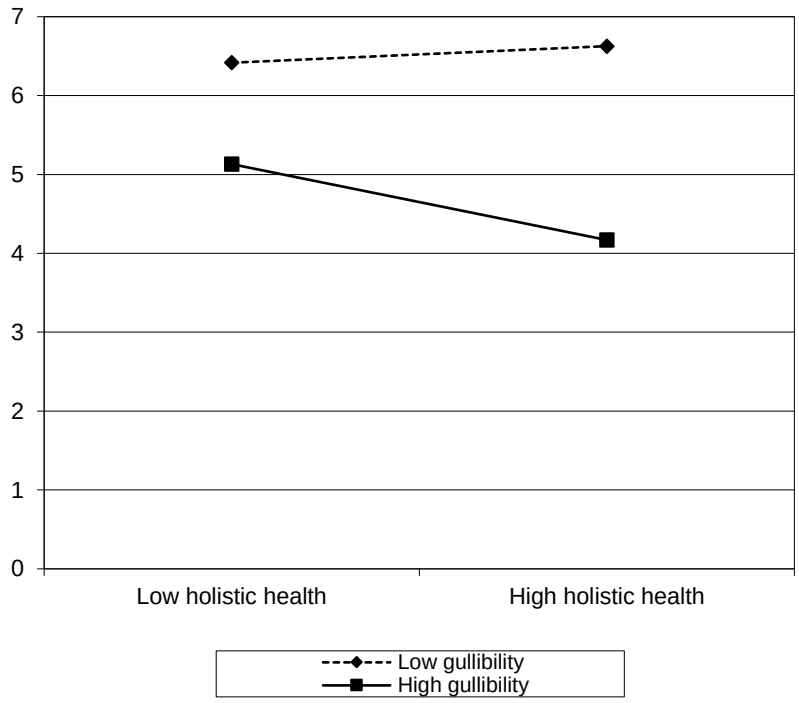
Then, we considered the two subfactors (insensitivity and persuadability) of gullibility as moderating variables and we conducted hierarchical regression analysis, but we noted that the results of the analysis did not change compared to using the general factor of gullibility.

Table 7. Simple slopes analysis of interaction between (b) holistic health and (M) gullibility on vaccine conspiracy beliefs.

	B	SE	LBCI	UBCI
b x M low	.23	.12	-.009	.486
b x M high	-.27	.15	-.571	-.026

LBCI, lower bound of 95% bootstrap confidence interval; UBCI, upper bound of 95% bootstrap confidence interval; F (3,146) = 3.43, p < .01. ∗∗p < .001; ∗p < .01.

Figure 1. Simple slopes graph of interaction between (b) holistic health and (M) gullibility on vaccine conspiracy beliefs.



Psychological antecedents of vaccine

To test the moderation model, we conducted a hierarchical regression analysis using vaccine conspiracy beliefs as the dependent variable. All continuous predictor variables were centered at their grand mean. In the first step, we included the following predictors of vaccine conspiracy beliefs: (M) gullibility, (a) psychological antecedents of vaccine.

In a second step, we included in addition to the variables already mentioned the interactions between these variables and gullibility (moderator). The 95% bootstrap confidence intervals

were obtained with SPSS (regression coefficients) and the PROCESS macro (Hayes, 2013). Results are reported in Table 8.

Table 8. Hierarchical regression analysis.

Predictor	B	SE	LBCI	UBCI	R2	Fch	df	F
STEP I					.29	32.12**	2	32.12**
(M) gullibility	.01	.08	-.150	.182				
(a) psychological antecedents of vaccine	.80**	.11	.603	1,038				
STEP 2					.32	5.05*	3	23.67**
(M)	-.06	.10	-.258	.147				
(a)	.79**	.10	.607	1,003				
a x M	-.29	.16	-.622	.017				

LBCI, lower bound of 95% bootstrap confidence interval; UBCI, upper bound of 95% bootstrap confidence interval. F (2,151) = 32.12, p<.001; F (1,150) = 5.05, p < .01. ∗∗p < .001; ∗p < .01.

Results showed that only psychological antecedents of vaccine are significantly related to vaccine conspiracy beliefs, this means that the idea that vaccination is not considered a necessary preventive action, that vaccine availability and accessibility is an issue, and the idea that herd immunity depends on collective responsibility are linked to the rise of conspiratorial beliefs about vaccines, whereas gullibility had no significant relation. The interactions were no significant.

Then, we considered the two subfactors (insensitivity and persuadability) of gullibility as moderating variables and we conducted hierarchical regression analysis, but we noted that the results of the analysis did not change compared to using the general factor of gullibility.

Astrology Attitude

To test the moderation model, we conducted a hierarchical regression analysis using vaccine conspiracy beliefs as the dependent variable. All continuous predictor variables were centered at their grand mean. In the first step, we included the following predictors of vaccine conspiracy beliefs: (M) gullibility, (a) astrology attitude.

In a second step, we included in addition to the variables already mentioned the interactions between these variables and gullibility (moderator). The 95% bootstrap confidence intervals

were obtained with SPSS (regression coefficients) and the PROCESS macro (Hayes, 2013). Results are reported in Table 9.

Table 9. Hierarchical regression analysis.

Predictor	B	SE	LBCI	UBCI	R2	Fch	df	F
STEP I					0.28	2.21	2	2.21
(M) gullibility	-.06	.10	-.259	.149				
(a) astrology attitude	.18*	.08	.032	.375				
STEP 2					0.71	6.91*	3	3.83*
(M)	-.08	.10	-.277	.141				
(a)	.30**	.09	.119	.508				
a x M	-.21**	.08	-.370	-.052				

LBCI, lower bound of 95% bootstrap confidence interval; UBCI, upper bound of 95% bootstrap confidence interval. F (2,151) = 2.21, p>.05; F (1,150) = 6.91, p < .01. ∗∗p < .001; ∗p < .01.

Results showed that only astrology attitude are significantly related to vaccine conspiracy beliefs, this means that believing in astrology is linked to the rise of conspiratorial beliefs about vaccines, whereas gullibility had no significant relation. The interaction between astrology beliefs and gullibility was significant. This means that gullibility acts as a moderator between beliefs in astrology and conspiratorial beliefs about vaccines.

Given that the interaction between (a) astrology attitude and (M) gullibility was significant, we conducted a simple slopes analysis to test the effects in the case of high and low gullibility, as shown in Table 10. Simple slopes analysis revealed that only the low level of gullibility on vaccine conspiracy beliefs was significant. Result showed that for low levels of gullibility, those who believe in astrology will have negative beliefs about vaccines.

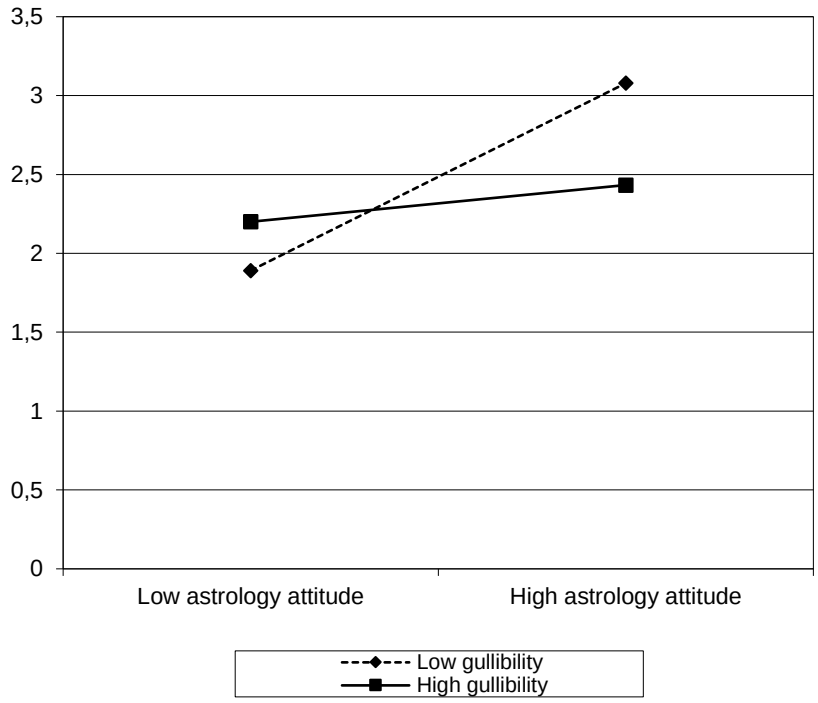
Then, we considered the two subfactors (insensitivity and persuadability) of gullibility as moderating variables and we conducted hierarchical regression analysis, but we noted that the results of the analysis did not change compared to using the general factor of gullibility.

Table 10. Simple slopes analysis of interaction between (a) astrology attitude and (M) gullibility on vaccine conspiracy beliefs.

	B	SE	LBCI	UBCI
a x M low	.510**	.150	.212	.808
a x M high	.095	.092	-.087	.279

LBCI, lower bound of 95% bootstrap confidence interval; UBCI, upper bound of 95% bootstrap confidence interval. F (1,150) = 6.91, p < .01. ∗∗p < .001; ∗p < .01.

Figure 2. Simple slopes graph of interaction between (a) astrology attitude and (M) gullibility on vaccine conspiracy beliefs.



Conclusions

This study aimed to analyze the relationship between Gullibility and the religious orientation, paranormal health beliefs, fear of COVID-19, complementary and alternative medicine beliefs, astrology attitude, conspiracy mentality and vaccines conspiracy beliefs, and to test whether gullibility was a moderator between the variables considered and vaccines conspiracy beliefs. We considered gullibility as a moderating variable, that is, a variable that can increase or

decrease the relationship between the independent variable (conspiratorial beliefs about vaccines) and the independent variables (paranormal health beliefs, beliefs about complementary and alternative medicine, beliefs about astrology, conspiratorial beliefs, religious orientation, and fear of COVID-19). Results showed that participants have low levels of gullibility, both for the general score and for the two subfactors. They showed low levels of religious, superstitious beliefs, extraordinary event, and parapsychological beliefs, extrinsic religious, conspiracy theory ideation and skepticism, conspirational beliefs attitude, fear of COVID-19, vaccine conspiracy, astrology attitude, and psychological antecedents of vaccine. Instead, they showed medium-high levels of intrinsic religious, and quest religious, whereas they showed elevated levels of participation in treatments, holistic health and natural treatments. Moreover, correlations showed that both insensitivity, persuadability and the total score of gullibility are positively correlated with fear of COVID-19 and astrology attitude. Persuadability is positively correlated with extraordinary event beliefs and participation in treatments. No correlations were found with religious beliefs, superstitious beliefs, parapsychological beliefs, intrinsic religious, extrinsic religious, quest religious, conspiracy theory ideation, skepticism, conspirational beliefs attitude, holistic health, natural treatments vaccine conspiracy, and psychological antecedents of vaccine.

Regarding our hypothesis that a relationship between the independent variables considered and conspiratorial beliefs about vaccines exists, it was partially confirmed. In fact, the results showed that a relationship with vaccine conspiracy beliefs exists only for skepticism and conspirational beliefs attitude, parapsychological beliefs, natural treatment, psychological antecedents of vaccine, and astrology attitude.

Specifically, results showed that for low levels of gullibility, the strength of the relationship between conspiracy beliefs about vaccines and beliefs about astrology increases.

In conclusion, results showed that gullible people tend to have a fear of COVID-19 and have a favorable attitude toward astrology. People susceptible to persuadability tend to believe more in extraordinary events and to be more likely to participate in alternative treatments to medical ones. In addition, the results showed that gullibility is a moderator only for the relationship between conspiratorial beliefs about vaccines and astrology attitude. In particular, for low levels of gullibility, those who believe in astrology will tend to have negative beliefs about vaccines.

Study 4: The relationship between Gullibility and Conspiracy beliefs

Goals

The aim of this study is to examine how conspiracy belief and gullibility are related to people's response to implausible information. Specifically, we are interested in whether people mistakenly believe that they are not influenced by implausible material, and how this misperception is associated with their belief in conspiracy and their gullibility.
Therefore, the questions underlying the study are: How much do people perceive their attitudes to change, and how accurate they are about their attitude change? And to what extent do conspiracy belief and gullibility predict actual attitude change, perceived attitude change, and the accuracy of people's estimates as a result of implausible material about COVID-19?

Hypothesis

Today, conspiracy theories are extremely popular, especially due to the events currently taking place on our planet, such as the COVID-19 pandemic, the progression of vaccines and technology such as 5G, and wars. Conspiracy theories are described by Sunstein & Vermeule (2009) as attempting to explain events in relation to a machination perpetrated by powerful individuals who try to hide their role until, they accomplish their purposes. Specifically, according to the Cambridge Business English Dictionary (2011), the term conspiracy refers to a secret agreement made between two or more people or groups to do something bad or illegal that will harm someone else. The question surrounding the topic of conspiracy is why is an individual driven to develop a conspiracy theory? There are several theories that attempt to answer this question. Soukup (2008), for example, argues that the underlying cause of conspiracy theories is an attempt to provide alternative evidence to common beliefs about events or phenomena in human life. According to Moscovici (1987), on the other hand, the basis of a conspiracy theory is the desire to diminish the social influence of minorities on the masses. Douglas et al. (2017) argue that adherence to conspiracy theories is driven by epistemic, existential, and psychosocial motivations. According to van Prooijen (2019), then, conspiracy theories seem to originate from gullibility.

Van Prooijen (2019) argues, in fact, for the gullible conspiracist hypothesis, according to which those who believe in conspiracy theories are less likely to use a rational mindset because they exhibit a low level of analytical thinking.

Douglas, Sutton, and Cichocka (2017), on the other hand, argue that van Prooijen's theorization is reductive because there are many factors underlying conspiracy theories.

Based on these theoretical references, we found it important to study the relationship between gullibility and conspiracy theories in more detail and, in particular, to examine how conspiracy belief and gullibility are related to people's response to implausible information.

This research is cross-sectional. All participants be assigned to two phases: baseline (t1) and second phase (one week later, t2). In the first part (t1), participants asked to answer some questions about COVID-19. The questions will contain implausible statements about COVID-19 (e.g., that hot water or hot drinks can kill COVID-19), and participants asked to rate how much they agree with each statement (baseline). We also measure participants gullibility using Gullibility Scale (Teunisse et al., 2020) and the Conspiracy Mentality Scale (Stojanov & Halberstadt, 2019). In the second part of the study (one week later, t2), participants asked to read some implausible material about COVID-19 and rate their attitudes (current) and what they thought their attitudes were before reading the material (retrospective), using the same questions as in t1.

We have assumed to have three Dependent Variables:

1. Actual attitude change (current - baseline): difference between current ratings at t2 and the baseline attitudes at t1 (current t2 minus baseline t1)

2. Estimated attitude change (current - retrospective): difference between current ratings at t2 and the retrospective attitudes at t2 (current t2 minus retrospective t2)

3. Accuracy of estimation (retrospective - baseline): difference between retrospective ratings at t2 and the baseline attitudes at t1 (retrospective t2 minus baseline t1)

We then thought to examine the correlations between these three DVs and the measures of conspiracy belief and gullibility. Therefore, we asked ourselves: What extend do conspiracy belief and gullibility predict actual attitude change as a result of fake news? How much people perceive their attitudes to change, and how accurate they are about attitude change?

Methods

Participants and procedure

Participants were 136 Italians undergraduate students (21 males and 114 females) born and living in Italy, who answered an online questionnaire during a social psychology lesson at University of Catania between March 2022 and April 2022. We asked them to rate their agreement with the statements taken from the implausible material. We would also need to measure conspiracy belief and gullibility prior to the task through the Gullibility Scale and the Conspiracy Mentality Scale. The experiment consists of test all the same participants in a t1 and t2 design. In t1, we measure "baseline" attitudes and the conspiracy and gullibility measures. In t2 (on another day session), we present the misinformation and then measure the "current" and "retrospective" attitudes. Regarding the age of participants, it was ranged from 19 to 49 years (*M*age = 21,59, *S.D.* = 4,17). Participants were informed that their responses would remain confidential. Ethical approval for this research was granted by the principal investigator's institution. This study was designed during the research period abroad at the University of Kent (UK).

Measures

Baseline attitude. The 12 items that investigated attitudes toward implausible material about COVID-19 (e.g. Drinking water or hot drinks kills COVID-2019, Children are not at risk of being infected with COVID-2019) were used. For each item, participants indicated their level of baseline agreement on a 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*) with 4 meaning *neither agree nor disagree*. The Cronbach's alpha in the present study was .70.

Current attitude. The 12 items that investigated attitudes toward implausible material about COVID-19 (e.g. Drinking water or hot drinks kills COVID-2019, Children are not at risk of being infected with COVID-2019) were used. For each item, participants indicated their level of current agreement on a 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*) with 4 meaning *neither agree nor disagree*. The Cronbach's alpha in the present study was .93.

Retrospective attitude. The 12 items that investigated attitudes toward implausible material about COVID-19 (e.g. Drinking water or hot drinks kills COVID-2019, Children are not at risk of being infected with COVID-2019) were used. For each item, participants indicated their level of agreement before reading the material on a 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*) with 4 meaning *neither agree nor disagree*. The Cronbach's alpha in the present study was .92.

Gullibility Scale. The 12 items of the Italian version of the Gullibility Scale were used. For each item, participants indicated their level of agreement on a 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*) with 4 meaning *neither agree nor disagree*. The Cronbach's alphas in the present study were .87 for insensitivity, .85 for persuadability, and .89 for the general score of gullibility.

Conspiracy Mentality Scale. We have translated the items of the English version of Stojanov and Halberstadt (2019) into Italian. The scale consists of 11 items representing two factors: conspiracy theory ideation and skepticism. An example of items is “The government or covert organizations are responsible for events that are unusual or unexplained”, “Some things are not as they seem”. For each item, participants indicated their level of agreement on a 7-point scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*) with 4 *meaning neither agree nor disagree*. The Cronbach's alphas in the present study were .86 for conspiracy theory ideation, and .86 for skepticism.

Results

Table 1 shows descriptive statistics and correlation between all measures and gullibility. Results showed that participants have low levels of gullibility, both for the general score and for the two subfactors and low levels of conspiracy theory ideation. They showed elevated levels of skepticism. Results showed that there are no correlations between gullibility and the three VDs (Actual attitude change, Estimated attitude, and Accuracy of estimation). Regarding conspiracy, only estimated attitude change correlates with conspiracy theories ideation.

Table 1. Means, standard deviations, and correlations

		M	SD	1	2	3	4	5	6	7	8
1	**actual attitude change**	.57	1.32	1							
2	**estimated attitude change**	.22	.60	.50**	1						
3	**accurancy of estimation**	.34	1.14	.88**	.05	1					
4	**Conspirancy theory ideation**	2.77	1.14	.06	.19*	-.03	1				
5	**skepticism**	4.91	1.37	-.03	.09	-.08	.62**	1			
6	**gullibility**	2.47	.88	.04	-.04	.07	.11	.12	1		
7	**insensitivity**	2.85	.97	.05	-.12	.11	-.04	-.02	.87**	1	
8	**persuadability**	2.09	1.03	.03	.05	.09	.23**	.23**	.88**	.55**	1

∗∗p < .001; ∗p < .01.

Table 2 showed the paired sample T test between baseline, current, and retrospective attitude. Results showed that there are significant differences between baseline, current, and retrospective attitude. Current attitude is greater than baseline attitude, and retrospective attitude, whereas retrospective attitude is greater than baseline. The results show that misinformation about COVID-19 has changed people's attitudes, and participants seem to be aware of this.

Table 2. Differences between baseline, current, and retrospective attitude

		M difference	SD	M	Lower Interval confidence	Upper interval confidence	t	df	p
Pair 1	**current attitude - baseline attitude**	.57	1.32	.11	.348	.799	5.03	134	.000
Pair 2	**current attitude - retrospective attitude**	.22	.61	.05	.123	.330	4.34	135	.000
Pair 3	**retrospective attitude - baseline attitude**	.34	1.14	.09	.150	.540	3.50	134	.001

Finally, using Montoya & Hayes' MEMORE macro for SPSS (2017; in press), it was tested whether this change differs between highly gullible and non-gullible persons. The results showed that there were no significant differences in either the total gullibility score or the two sub-factors (insensitivity and persuadability).

Conclusions

The aim of this study was to examine how conspiracy belief and gullibility are related to people's response to implausible information.

Results showed that participants have low levels of gullibility and conspiracy theory ideation, and elevated levels of skepticism. There are no correlations between gullibility and Actual attitude change, Estimated attitude, and Accuracy of estimation. Regarding conspiracy, only estimated attitude change correlates with conspiracy theories ideation. The results show that misinformation about COVID-19 has changed people's attitudes, and participants seem to be aware of this. Furthermore, it was tested whether this change differs between highly gullible and non-gullible persons. The results showed that there were no significant differences in gullibility.

A possible explanation for the results of this study is given by Fischhoff's (1975) studies on hindsight bias. Indeed, the tendency of people to consider some events more predictable than they actually are defined as hindsight bias, which consists of the error of retrospective judgement (Fischhoff, 1975; Fischhoff & Beyth, 1975). In reality, we cannot know, before an event occurs, what will happen, at most we can make assumptions about the outcome of the event. The tendency of people to believe they know this outcome before it occurs is explained through the phenomenon of 'I knew it all along' (Pezzo, 2011). This phenomenon has been shown in various contexts, especially political and sporting; one example concerns people who, after the defeat of their favorite team, say that they feel convinced that they knew that team would lose, even though before the game they did not think so. Or yet another example concerns people who believe they predicted they would win an election only after receiving the outcome of that election.

Conclusions

This study had an exploratory objective whose focus was to analyze individual factors and psychosocial variables related to gullibility in the Italian context, as it is still an understudied variable.

Gullibility is defined as the tendency to be deceived or exploited (Greenspan, 2009a). When this term is used, it refers to a pattern of deception that is repeated in different contexts, even in the face of warning or danger signals that highlight the unreliability of the situation (Greenspan, 2009a; Teunisse, Case, Fitness, & Sweller, 2020; Forgas, & Baumeister, 2019). Greenspan (2009a) highlights the fundamental difference between *gullibility* and *credulity*. *Credulity* refers to the tendency to believe things that lack adequately supported evidence, are seemingly ridiculous, or are judged without critical capacity; whereas, on the other hand, gullibility refers to the behavioral tendency to be deceived, and involves concrete actions (e.g., handing over a check to a scammer or bank details to scam companies via spam emails; Greenspan, 2009a). Although these two constructs have been distinguished, they are easily assimilated into the same notion, in fact, the literature uses them almost indiscriminately. Many factors can contribute to this type of behavior as personality traits, trust, social intelligence, religious, beliefs, locus of control, social desirability, conspiracy theories, etc. (Greenspan, 2009a; Greenspan, 2009b; Greenspan, Loughlin, & Black, 2001; Langenderfer & Shimp, 2001; Mercier, 2017; Yamagishi, Kikuchi, & Kosugi, 1999).

To this end, four studies were conducted, three designed in Italy with the support of the University of Catania and one abroad with the support of the University of Kent.

The first study aimed to propose an Italian version of the Gullibility Scale (Teunisse et al., 2020), verifying its psychometric characteristics and factor structure, and to verify the relationship with personality factors, social intelligence, trust, and social desirability. In particular, we tested a structure with one second-order factor (gullibility) and one with two first-order factors (insensitivity and persuasibility). The study found that the scale possesses good internal consistency, and its bi-factorial structure with a high-order factor was confirmed. Regarding the relationship between gullibility and the other factors studied, the results showed that gullibility, both in its general factor and two subfactors (insensitivity and persuadability), does not correlate with social desirability. That both the general score and for the two subfactors are negatively correlated with extraversion, conscientiousness, and positively correlated with neuroticism, while persuadability, as well as the total score of gullibility, do not correlate with agreeableness, and openness. Finally, both the general score and for the two subfactors are negatively correlated with social information processing and social skills, positively correlated with social awareness and interpersonal trust, while no correlations were found with interpersonal caution. Regarding socio-demographic variables, for both insensitivity and persuadability, as well as the total score of gullibility, no significant differences emerged for sex and level of education, and no correlations were found with age.

The second study aimed to test the Italian version of the Gullibility Scale (Teunisse et al., 2020) proposed in study 1, verifying its psychometric characteristics and factor structure, and to verify antecedents and consequences of gullibility. Regarding antecedents, we

considered the Big Five personality factors, health locus of control, religious orientations, paranormal health beliefs, perceived vulnerability of disease and fear of COVID-19; whereas, regarding consequences, we considered beliefs in fake news about COVID-19. Our results showed that persuadability mediates the relationship between Locus of control with others and fake news. The more people have a locus of control based on significant other the more they believe in fake news, and elevated levels of this type of locus of control are correlated with high levels of persuadability. Again, persuadability mediates the relationship between pseudoscientific beliefs and fake news. People characterized by elevated levels of beliefs that appear to have a scientific basis but are based on other methods tend to be more gullible, and high levels of these beliefs correlate with high levels of persuadability. In addition, the relationship between quest religious orientation, extrinsic religious orientation, and fake news is also mediated by persuadability. People characterized by elevated levels of goal-oriented faith tend to be more gullible, and high levels of extrinsic orientation correlate with high levels of persuasibility; whereas people characterized by high levels of faith understood as a spiritual quest tend to be less gullible to fake news, and high levels of quest orientation correlate with high levels of persuasibility. Finally, persuadability mediates the relationship between fear of COVID-19, germ aversion, and fake news. People characterized by high levels of Fear of COVID-19 tend to be more gullible and that high levels of fear are related to high levels of persuadability, and in turn to belief in fake news; while the more people are worried about germs the less, they believe in fake news, and high levels of aversiveness are related to low levels of perduadability and thus belief in fake news. Regarding consequences, our results showed that persuadability is positively related to fake news on COVID-19, suggesting that people with high persuadability are more likely to believe fake news. That means that people believing in fake news do so more because they are easily persuaded than because they are insensitive to untrustworthy clues. The study also confirmed that the Gullibility Scale is a reliable and valid measure of gullibility, and gullible people have high levels of external locus of control related to others, have an extrinsic religious orientation, have pseudoscientific beliefs, and a greater fear of COVID-19; whereas, less gullible people have a research-oriented religious orientation (quest), and have little fear of germs.

The third study aimed to analyze the relationship between Gullibility and the religious orientation, paranormal health beliefs, fear of COVID-19, complementary and alternative medicine beliefs, astrology attitude, conspiracy mentality and vaccines conspiracy beliefs, and to test whether gullibility was a moderator between the variables considered and vaccines conspiracy beliefs. Our results showed that gullible people tend to have a fear of COVID-19 and have a favorable attitude toward astrology. People susceptible to persuadability tend to believe more in extraordinary events and to be more likely to participate in alternative treatments to medical ones. In addition, the results showed that gullibility is a moderator only for the relationship between astrology attitude and conspiratorial beliefs about vaccines. For low levels of gullibility, those who believe in astrology will tend to have negative beliefs about vaccines.

Finally, the fourth study aimed to examine how conspiracy belief and gullibility are related to people's response to implausible information. Specifically, we interested in whether

people mistakenly believe that they are not influenced by implausible material, and how this misperception is associated with their belief in conspiracy and their gullibility. Therefore, all participants are assigned to two phases: baseline (t1) in which participants asked to answer some implausible statements about COVID-19, the Gullibility Scale and the Conspiracy Mentality Scale, and second phase (one week later, t2) in which participants asked to read some implausible material about COVID-19 and rate their attitudes (current) and what they thought their attitudes were before reading the material (retrospective), using the same questions as in t1. We have assumed to have three Dependent Variables: Actual attitude change (current – baseline), Estimated attitude change (current - retrospective), and Accuracy of estimation (retrospective – baseline).

Results showed that participants have low levels of gullibility and conspiracy theory ideation, and elevated levels of skepticism. There are no correlations between gullibility and Actual attitude change, Estimated attitude, and Accuracy of estimation. Regarding conspiracy, only estimated attitude change correlates with conspiracy theories ideation. The results show that misinformation about COVID-19 has changed people's attitudes, and participants seem to be aware of this.

In conclusion, these studies explored individual factors and psychosocial variables related to gullibility in the Italian context and have also made it possible to confirm the reliability and validity of the scale by which gullibility has been measured so far, the Gullibility Scale (Teunisse et al., 2020), both in its original version and in its Italian translation.

It has emerged, however, that the scale has limitations; in fact, it appears to be an overly explicit measure, composed of items that are too direct; this sometimes causes the respondent to be inclined to recognize what he or she is being asked and answer in the opposite way. It would be appropriate, in the future, to develop a method of measuring implicit gullibility, using, for instance, the Implicit Association Test (IAT; Greenwald et al., 1998), as is done for measuring self-esteem (Karpinski, 2004).

The exploratory investigation of gullibility conducted in the Italian context through this doctoral dissertation lays the groundwork for potential future studies that will serve to further explore additional variables related to it, as well as explore the much-discussed topic of gullibility as a personality trait or as a variable that changes according to the situation people are exposed to.

In addition, although gullibility is often connoted with a negative meaning, it can also be considered in a positive sense (Forgas & Baumeister, 2019), as accepting, sharing, and considering social information from others as true, even if it is unconfirmed and fictitious, can be considered functional for social living and has enabled people, as citizens, to design and maintain a successful civilization (Pinker, 2018). Furthermore, in a study we conducted (manuscript in preparation), it was found that gullibility can have a positive valence when believing in something prompts people to engage in positive behavior, as in the case of vaccination. In fact, the study found that gullible people tend to believe more readily what is proposed to them, and therefore rely more heavily to pro-vaccine propaganda, believing more easily that vaccines against COVID-19 are effective and are more likely than non-believers to vaccinate.

This view of the positive function of gullibility paves the way for future research that could also investigate this yet little-studied meaning.
In conclusion, we hope that this doctoral thesis can provide valuable insights for the design of operational paths that can be implemented in the territory, and that aim at adequate communication at the national level to decrease gullibility levels in people or raise awareness of the 'gullible' category to correct information.

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