

Gullibility: A Review of the Literature and Devising a Self-Report Measure

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Table of Contents

Gullibility: A Review of the Literature	1
Defining Gullibility.....	2
Existing Research	4
Trust and Insensitivity to Untrustworthiness Cues	15
Reducing Sensitivity to Untrustworthiness Cues.....	22
Motivation.....	26
Conclusion	28
Gullibility: Devising a Self-Report Measure	30
Study 1: Exploratory Factor Analysis of Gullibility Items	34
Method.....	34
Participants.....	34
Materials and Procedure	35
Overview of Analyses.....	37
Results	38
Data Preparation	38
Exploratory Factor Analysis	38
Descriptive and Demographic Data	41
Intercorrelations	41
Characteristics of the Gullibility Scale	42
Discussion.....	43
Study 2: Confirmatory Factor Analysis of the Gullibility Scale	44
Method.....	44
Participants.....	44
Materials and Procedure	46
Overview of the Analyses.....	49

Results	49
Data Preparation	49
Confirmatory Factor Analysis	49
Descriptive and Demographic Data.....	55
Intercorrelations	56
Discussion	59
General Discussion.....	61
References	64
Appendix A: List of Online Forms.....	82
Appendix B: Participant Information and Consent Forms	83
Appendix C: Marlowe and Crowne Social Desirability Scale	87
Appendix D: Gullibility Item Pool	89
Appendix E: Demographic Questions for Study 1	92
Appendix F: Scree Plot of Eigenvalues.....	94
Appendix G: Gullibility Scale- Reduced.....	95
Appendix H: Tests of Normality for the Reduced Gullibility Scale	97
Appendix I: Participant Information and Consent Forms	100
Appendix J: Interpersonal Trust Scale	104
Appendix K: Agreeableness Scale	106
Appendix L: Machiavellianism Personality Scale	107
Appendix M: Tromsø Social Intelligence Scale.....	108
Appendix N: Demographic Questions for Study 2	109
Appendix O: Standardised Regression Weights for Models.....	111
Appendix P: Tests of Normality for the final Gullibility Scale and Three Factors.....	114
Appendix Q: Ethics Approval Letters	116

List of Tables

Table 1. <i>Rotated Factor Matrix</i>	40
Table 2. <i>Summary of Descriptive Statistics for the Gullibility and Four Factors</i>	41
Table 3. <i>Intercorrelations Between the Variables</i>	42
Table 4. <i>Descriptive Statistics for the Variables</i>	43
Table 5. <i>Fit Indices for Various Models</i>	51
Table 6. <i>Item Descriptions</i>	54
Table 7. <i>Summary of Descriptive Statistics for the Gullibility Scale Three and Factors</i> ...	56
Table 8. <i>Factor Correlation Matrix</i>	58
Table 9. <i>Standardised Regression Weights for the Four Factor Model</i>	111
Table 10. <i>Standardised Regression Weights for the Hierarchical Model</i>	112

List of Figures

Figure 1. <i>Model of the Gullibility Scale with the standardised regression weights</i>	54
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Abstract

Gullibility refers to a vulnerability to being manipulated. Although almost 300,000 people in the United States of America in 2014 fell victim to various scams (Federal Bureau of Investigation Internet Crime Complaint Center, 2014), this area is surprisingly under researched. The dissertation begins with a review of the empirical literature, drawing together findings from research on the Barnum Effect, superstition, social vulnerability, scam compliance, trust, social intelligence, deception detection, and Theory of Mind. The review concludes by arguing that insensitivity to signs of untrustworthiness may be central to understanding the propensity for gullibility. Following the review, two empirical studies describe the development of a self-report measure of gullibility. In Study 1 ($N = 371$), a pool of items were generated and administered in an anonymous online survey. Demographic items and a measure of social desirability were also administered. An exploratory factor analysis produced a 35-item scale consisting of four factors labelled Persuadable, Trust, Unassertive, and Unsuspecting, which were not related to social desirability. In Study 2, a confirmatory factor analysis was conducted using a new sample ($N = 325$). Respondents completed the Gullibility Scale as well as measures of trust, agreeableness, Machiavellianism, and social intelligence. On the basis of the confirmatory factor analysis, the Trust factor was removed, which reduced the measure to a reliable 24-item scale, consisting of three factors. The Gullibility Scale had a moderate negative correlation with social intelligence and a weak positive correlation with agreeableness. The utility of this new self-report measure of gullibility for research and applied contexts is discussed.

Declaration of Originality

This thesis conforms to the requirements of the Master Degree by Research rules. This work has not been submitted for a higher degree at any other university or institution. All empirical research contained within this thesis was approved by the Human Research Ethics Committee at Macquarie University (Reference Numbers: 5201500219 and 5201500596).

A handwritten signature in black ink, reading 'Teunisse'. The script is cursive and elegant, with a large initial 'T'.

Alessandra Teunisse

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If you say “gullible” slowly, it sounds like “oranges”.

Anonymous

Gullibility: A Review of the Literature

Last year, scams cost consumers in the United States an estimated US\$800 million, with the average loss per person lodging a complaint being US\$6,472 (Federal Bureau of Investigation Internet Crime Complaint Center, 2014). In the same year over AUD\$80 million was lost to scammers in Australia, with over 90,000 Australians making scam complaints (Scamwatch, 2015). The most common types of scams were dating and romance, investment schemes, and betting and sports investment schemes, with 91% of scams delivered via phone or email (Australian Competition & Consumer Commission, 2014b). These types of events and situations demonstrate the value in understanding why some people are more likely to be manipulated than others.

Factors that influence compliance have been well documented (e.g., Cialdini, 2001) and are likely to be influential in persuading unsuspecting victims to surrender their personal details or their money, as in the examples listed above. However, there may also have been some underlying personality variables that interacted with these situational influences to produce such a dramatic result. Much of the research has focused on the persuader, persuasion techniques, and social situations that enhance the likelihood of a person being fooled (Cialdini, 2001). However, this review attempts to focus on the victim of these situations and considers whether there are individual differences in gullibility.

The aim of this review is to provide an up to date summary and synthesis of the empirical research relevant to gullibility and to investigate the idea that gullibility results from a combination of high trust and an insensitivity to detect cues of untrustworthiness. Firstly, this review will define gullibility. Although several definitions have emerged from the scant empirical literature these are inconsistent and unclear.

Secondly, a brief background on the research that is broadly relevant to gullibility will be provided. This research includes the Barnum Effect (Layne, 1979), superstition (Case,

Fitness, Cairns, & Stevenson, 2004; Grimmer & White, 1990), social vulnerability (Pinsker, Stone, Pachana, & Greenspan, 2006), and scam compliance (Langenderfer & Shimp, 2001).

Thirdly, research on trust as well as research on insensitivity to untrustworthiness will be summarised. An attempt will be made to disentangle trust from the concept of gullibility. Instead, it will be suggested that gullibility stems from an insensitivity to cues of untrustworthiness. This notion will be examined by reviewing the literature on social intelligence, deception detection, and cheater detection.

Fourthly, this review will evaluate other means by which sensitivity to untrustworthiness cues can be reduced such as divided attention, fatigue, or limitations to Theory of Mind. Divided attention or participant fatigue might act to camouflage or misdirect attention away from cues of untrustworthiness. Further, the role Theory of Mind plays in gullibility (e.g., in Autism) will be discussed.

Lastly, the role of motivation in gullibility will be examined. The influence of visceral factors (Langenderfer & Shimp, 2001; Loewenstein, 1996), psychological needs (Baumeister & Leary, 1995; Williams, 1997), and motivated decision making (Kunda, 1990) will be reviewed in terms of their impact on insensitivity to untrustworthiness.

Defining Gullibility

“Gullible” is defined in the Oxford English Dictionary (OED) as “capable of being gulled or duped; easily cheated, befooled” and its first recorded usage was in 1825 (OED Online, 2015c). “Gullibility” had been used over thirty years prior to that, in 1793 (OED Online, 2015b), and “gull”, as a verb (i.e., to fool someone), had been used as early as 1550 (OED Online, 2015a). However, the OED’s definition does not touch on relevant psychological issues such as trust or social intelligence, which seem to be intrinsic to the concept of gullibility. Rotter (1980) defined gullibility as “believing another person where there was some clear-cut evidence that the person should not be believed” (p.4). Yamagishi,

Kikuchi, and Kosugi (1999) elaborated on Rotter's (1980) definition, arguing that the gullible person is insensitive to cues of untrustworthiness. Further stating that gullibility and trust must be logically independent of each other (Yamagishi et al., 1999).

In defining gullibility, there are two elements to consider: (a) cues indicating an untrustworthy situation and (b) the ability and willingness to detect those cues. The cues to a potentially untrustworthy situation can vary from overt cues (e.g., flattery from a person who is trying to sell you something; or receiving the prototypical email from the "Prince of Nigeria" promising great riches) to subtle cues (e.g., goods or services offered at "unbeatable" prices) The second element to consider is the ability and willingness of the person to detect those cues. One's ability to detect cues could be due to an impairment to Theory of Mind, low social intelligence, fatigue, divided attention, and cognitive busyness (i.e., significantly increasing working memory load). However, even if the ability to detect the cues is present, motivation has the potential to moderate the ability to detect these cues. For example, a strong desire for love may blind a normally critical person to the warning signs that they are being taken in by a romance scam.

Adapting Yamagishi et al.'s definition, the present review considers the personality trait of gullibility as an *acceptance* of a false premise in the presence of untrustworthiness cues. As such, the gullible person could be reasonably trusting, while also lacking in an ability or motivation to detect cues of untrustworthiness. Thus, the false belief that the gullible person forms is based on their insensitivity to cues of untrustworthiness. They may or may not act upon this belief, but the formation of that belief is central to the concept of gullibility.

The definition adopted here differs from that offered by Greenspan's (2009a) definition of gullibility in an important way. Greenspan (2009a) draws a distinction between credulity – an uncritical acceptance of information presented – and gullibility – a tendency to be tricked or manipulated (Greenspan, Loughlin, & Black, 2001; Greenspan, 2009a). He

suggests that credulity is merely a belief, but that gullibility requires a behaviour or concrete action. Furthermore, he argues that the constructs are related, wherein someone might manipulate a potential victim's credulity in order to have them perform a gullible action (Greenspan et al., 2001). However, one major problem for Greenspan et al.'s requirement of gullible action is that such actions might represent compliance rather than an acceptance of a false promise. An unassertive person might be fully aware that a sales person is making exaggerated claims regarding the effectiveness of a product. However, in order to end the high-pressure interaction, the person acquiesces and purchases the product. This is but one example when a seemingly foolish action is unaccompanied by belief. It points the necessity of focussing on the belief, rather than behaviour, in defining gullibility. Hence, for the remainder of the review, gullibility will refer to both instances of credulity (uncritically made beliefs), and gullibility (foolish actions).

Existing Research

The following section of the review will discuss existing research on gullibility. Firstly it will examine the Barnum Effect, then research on superstition, social vulnerability, and conclude with a discussion of scam compliance.

The Barnum Effect. The Barnum Effect, also known as the fallacy of personal validation (Forer, 1949), refers to a tendency for people to accept bogus personality feedback (Layne, 1979). It is named after the famous 19th century American entrepreneur P. T. Barnum, who allegedly said, "there's a sucker born every minute" (Layne, 1979). The standard Barnum procedure begins with participants completing a personality test such as Cattell 16 PF (Furnham, 1989), Rorschach cards (Snyder & Clair, 1977; Snyder & Shenkel, 1976), or the Eysenck Personality Inventory (Christman, Henning, Geers, Propper, & Niebauer, 2008; Furnham, 1989). Then the participants' test results are "analysed" and they are provided with a "unique" personality profile based on their questionnaire responses (actually, all participants

are given an identical profile). Finally, participants are asked to rate the profile for accuracy (for a full review of the Barnum Effect see Dickson & Kelly, 1985; Furnham & Schofield, 1987).

Using the Barnum Effect paradigm, a variety of individual differences have been investigated. Gender differences have been found, with females rating the false personality profile as more accurate than males (Carrier, 1963; Piper-Terry & Downey, 1998). Personality differences such as extraversion, neuroticism, or insecurity are also related to the Barnum Effect. Extraverted participants, compared with introverted participants, were found to be more accepting of positive feedback, whereas participants high in neuroticism were more accepting of negative feedback than those who were low in neuroticism (Furnham, 1989). Level of insecurity, both state and trait, were positively related to acceptance of feedback (Snyder & Clair, 1977). Interestingly, handedness was also found to be related to acceptance of feedback. That is, participants with a mixed-handed preference (i.e., the use of the non-dominant hand for a certain number of physical activities) were more accepting of feedback than strongly right-handed participants (Christman et al., 2008). However, there are a few limitations to the studies mentioned above. They all used exclusively undergraduate psychology students as their participants, with predominantly female samples. Moreover, most of the studies used sample sizes of fewer than 100 participants and more importantly, none of them provided a definition of gullibility, instead operationalising it as the acceptance of a fake personality profile which limits the generalisability of the concept.

Most important, however, as Layne (1979) argued, is that the Barnum Effect lacked construct validity. It is most likely measuring rationality, rather than gullibility, as the profiles presented to participants are so generic that most rational people would endorse them (Layne, 1979). The personality profiles that participants received, such as the ones created by Forer (1949), tended to use favourable and trivial descriptions such as “Security is one of your

major goals in life.” Most typical rational people would validate this type of statement as true, otherwise you would be endorsing the converse of the statement, wherein you yearn for a life plagued by insecurity. Essentially, participants are presented with a personality profile that is so generic that a large proportion of the population will endorse it. Not surprisingly, it is being endorsed by a large proportion of people. However, labelling it as gullibility may be incorrect. Therefore, construct validity may have been compromised in this body of research.

Overall, the Barnum Effect has provided limited insights into gullibility but has been influential. The research has typically lacked clear definitions of what it is measuring and acceptance of the Barnum profiles seems to reflect a justified response to the over-inclusive statements that are characteristic of the profiles (Layne, 1979).

Superstition. Another area that is relevant to gullibility is the investigation of factors associated with pseudoscientific and other non-conventional beliefs (e.g., Case et al., 2004; Dudley, 2002; Emme, 1940; Garrett & Fisher, 1926; Grimmer & White, 1990, 1992; Preece & Baxter, 2000; Standing & Huber, 2003). Acceptance of phenomena such as the reality of psychic abilities (BBC News, 2006; Cosgrove-Mather, 2002; Thompson, 2011), the therapeutic claims of homeopathy (Hall, 2009), or that immunisation of children is a conspiracy intended to cause harm (L. E. Taylor, Swerdfeger, & Eslick, 2014; Walker, 2014) all share a rejection of mainstream scientific thinking. Further, many people embrace such pseudo-scientific claims, despite the availability of information that such claims are untrue. For example, the website of Skeptic magazine (www.skeptic.com) frequently debunk many of these pseudoscientific claims. As such, belief in the paranormal, and other non-conventional beliefs might represent a general underlying tendency to be gullible.

Although studies have attempted to determine the underlying factor structure of superstitious beliefs (Emme, 1940; Garrett & Fisher, 1926; Grimmer & White, 1990; Preece & Baxter, 2000; Tobacyk & Milford, 1983), it is the motivation to believe in superstitious and

paranormal phenomenon that are inherently more interesting. Case, Fitness, Cairns, and Stevenson (2004) examined control strategies and superstitious beliefs. They suggest that when perceived control is threatened or low, superstitious strategies are more likely to be employed (Case et al., 2004). Other studies have suggested that a person's gender (Garrett & Fisher, 1926; Preece & Baxter, 2000), level of education (Preece & Baxter, 2000), educational major (Grimmer & White, 1992; Standing & Huber, 2003), religious background (Vail, Arndt, & Abdollahi, 2012), and hypnotic suggestibility (Wagner & Ratzeburg, 1987) all influence the likelihood of believing in superstitious or paranormal events.

Cognitive factors that could motivate superstitious behaviour include heuristics and biased judgements, as described by Gilovich and colleagues (Epley & Gilovich, 2006; Gilovich, Vallone, & Tversky, 1985) and Tversky and Kahneman (1974). Gamblers spend more time explaining and discounting losses rather than wins, thereby creating an overly optimistic assessment of their gambling skills, which can spur them on to continue gambling (Gilovich, 1983). Biases and faulty judgements can be caused by many different aspects of our cognition such as seeing order in random events or testing propositions by only seeking confirmatory evidence (Gilovich et al., 1985; Gilovich, 1983). Random sequences, such as a series of heads in a coin toss or "streak shooting" in a game of basketball, are often misperceived as a "hot hand" and depart systematically from the laws of chance (Gilovich et al., 1985). Judgements made with heuristic principles – which are used to assess probabilities and predict values – can lead to biases and maladaptive effects (Epley & Gilovich, 2006; Tversky & Kahneman, 1974). Therefore, heuristics and biased judgements could facilitate belief in superstitious phenomenon.

As briefly reviewed above, the research on superstitious and paranormal beliefs has indeed provided evidence for the role of motivation, cognitive errors, and deliberate trickery in the acquisition and maintenance of such beliefs. Superstitious, pseudoscientific, and other

non-conventional beliefs are relevant to understanding gullibility because they are associated with at least one clear cue that the veracity of such claims should be doubted: they incorporate claims about phenomena that stand outside of current scientific explanation. However, gullibility is not confined to premises that incorporate paranormal or pseudoscientific content. Moreover, the most common scams (by total monetary loss) that are reported typically involve some form of “get rich quick” scheme or romance scam (Australian Competition & Consumer Commission, 2014b). It is possible that propensity to believe in a range of superstitious phenomena might be associated with the tendency to be gullible. However, this would be a question for future research.

Social Vulnerability. Certain vulnerable individuals, such as those with cognitive impairments, developmental delays, or the elderly, are more likely to miss signals of untrustworthiness. Building upon Greenspan and colleagues’ (Greenspan & Black, 2001; Greenspan et al., 2001; Greenspan, Switzky, & Woods, 2011; Greenspan, 2009a) work, a scale measuring social vulnerability has been developed to identify those who are at risk of being manipulated (Pinsker, McFarland, & Stone, 2011; Pinsker et al., 2006). Social vulnerability is defined as “an impaired ability to detect or avoid potentially harmful interpersonal interactions” (p.110, Pinsker et al., 2006). In short, cognitive impairments such as congenital abnormalities, dementias, or strokes can compromise memory (e.g., impaired ability to recall important information of previous mistreatment), executive functioning (e.g., limited ability to solve problems and plan), and social reasoning (e.g., the impaired ability to predict behaviours of others based on inferences about thoughts, beliefs, and their intentions) thus leaving those afflicted more vulnerable to exploitation (Pinsker et al., 2006).

The research on social vulnerability has produced the only measure of gullibility. The approach taken in social vulnerability research holds that cognitive impairment renders people (e.g., the elderly) gullible (Pinsker et al., 2011, 2006; Pinsker, 2011). However, the research

using the Social Vulnerability Scale has the potential to inform our understanding of gullibility in non-impaired people. The Social Vulnerability Scale comprises two factors: a Credulity factor (e.g., “Believes things that are clearly untrue”) that encompasses beliefs, and Gullibility factor (e.g., “Paid for items that never arrived”) that encompasses behaviours (Pinsker et al., 2011).

The Social Vulnerability Scale has been found to correlate negatively with social intelligence and social skills – that is, higher social intelligence and greater social skills are associated with less social vulnerability (Pinsker & McFarland, 2010). This would suggest that factors apart from cognitive deterioration could influence a person’s social vulnerability. However, social intelligence was measured with a number of Theory of Mind tests rather than a measure purely devoted to social intelligence. Pinsker and McFarland (2010) argue that the two major aspects relevant to social intelligence are the ability to understand and predict the motives and intentions of other people, and the ability to reflect and understand one’s own mental experiences. They claim that these two abilities are essentially encompassed by Theory of Mind and this justifies the use of Theory of Mind tests to measure social intelligence. Although Baron-Cohen et al. (1999) likens Theory of Mind to social intelligence, Kosmitzki and John (1993) argue that social intelligence consists of both cognitive and behavioural components, which are not adequately measured in Theory of Mind tests. However both Theory of Mind and social intelligence are discussed in more detail in subsequent sections. Regardless of whether the skill is labelled social intelligence or Theory of Mind, Pinsker and McFarland (2010) found a significant negative correlation between it and social vulnerability which leaves room for further research to confirm if the same relationship exists between social intelligence (or Theory of Mind) and gullibility in a normal, non-cognitively impaired population.

In terms of the implication of the research using the Social Vulnerability Scale to understand gullibility more generally, there are several limitations. First, the Social Vulnerability Scale is designed to be completed by a friend or relative of the impaired participant, which, as Pinsker et al. (2006) note, may not always be objective. More importantly, the Social Vulnerability Scale does not truly capture gullibility within a normal population. Instead the Social Vulnerability Scale focuses on a specific vulnerable subset of the population using only an informant-based behaviour rating scale without confirming it with any self-report measure or behavioural indices. Therefore, although social vulnerability is a related concept, it may only apply to those with cognitive deterioration (e.g., the elderly) and not to a wider population.

Scam compliance. Other existing research relevant to gullibility has investigated people's tendency to fall victim to scams – particularly online scams. A scam is a fraudulent or dishonest business practice intended to con a person out of money, valuables, or personal details (Fischer, Lea, & Evans, 2013). Furthermore, a scam is different from a fraud because they “attempt to create a transaction within which the fraud can be perpetrated” (p. 2061, Fischer et al., 2013). After analysing nine series of the BBC documentary series, *The Hustle* (a program in which the most common scams were replicated on unsuspecting victims), Stajano and Wilson (2011) named seven principles that aid scammers to manipulate their potential victims.

The *distraction principle* holds that if a person's interest is distracted, they should not notice what the scammers are doing (Stajano & Wilson, 2011). For example, there is a scam frequently used on store cashiers. A person will claim that incorrect change was provided, and so much money is passed backwards and forwards that the cashier unintentionally ends up handing across too much money (Scambusters.org, 2015). The cashier is simultaneously

trying to recall how much money was initially given while being distracted with requests for change in different denominations.

The *social compliance principle*, holds that people are trained to obey and not question authority and it is this compliance that is utilised by the scammers to attain their nefarious goals (Stajano & Wilson, 2011). They provide the example of someone who, dressed as a policeman, entered a jewellery store and demanded that the owner hand over a diamond necklace as evidence in a case he is investigating. He promised that he would return it later, which he did not (Stajano & Wilson, 2011).

The *herd principle*, labelled “social proof” by Cialdini (2001), states that in uncertain situations we look to others to guide our behaviour (Stajano & Wilson, 2011). For example, if a seller on Amazon seems dubious, people will read the reviews to ascertain the seller’s credibility. However, those very reviews might have been written by the dubious seller themselves (Stajano & Wilson, 2011).

The *dishonesty principle* holds that when a victim becomes involved in a scam, the realisation that they themselves have done something dishonest will prevent them from reporting it (Stajano & Wilson, 2011). For example, in the “Nigerian Prince” scam (Australian Competition & Consumer Commission, 2014a), the scammer poses as Nigerian royalty who has access to vast sums of money but requires a small fee from the victim to help him transfer the money out of Nigeria. Once the victim becomes aware they are involved in a scam he or she would be hesitant to go to the police because they perceive themselves as already (unintentionally) involved in money laundering and part of the criminal circuit.

The *kindness principle* simply states that most people are kind and such kindness can be easily taken advantage of (Stajano & Wilson, 2011).

The *need and greed principle*, labelled “visceral influences” by Loewenstein (1996), essentially plays on our emotions and motivations (Stajano & Wilson, 2011). For example, a

potential victim is struggling financially and then an email arrives in their inbox telling them they have won a large sum of money. It is like an answer to their prayers. Their need made them vulnerable to being scammed.

Lastly, the *time principle*, labelled “scarcity” by Cialdini (2001), holds that when a person is under a time pressure to make a decision they will employ different decision making strategies which are lacking in reasoning (Stajano & Wilson, 2011). Simon (1956) argued that humans have evolved to *satisfice* but not to *optimize* their lot. Essentially, humans will use heuristics to make a “good enough” decision (i.e., *satisfice*), rather than use complex reasoning to optimize their situation (Stajano & Wilson, 2011). For example, an offer that requires a decision immediately will prompt people to “go with their gut” and potentially make an error in judgement. This perspective of human decision making has also been labelled “cognitive miser” (S. E. Taylor, 1981).

Overall, these seven principles draw heavily from Cialdini’s (2001) – reciprocity, commitment and consistency, social proof, liking, authority, and scarcity – and emphasises that persuasion techniques and heuristics are the sole reason people could be taken in by scams. What is suggested here is that there is an underlying assumption that these techniques would be equally effective on all people (with the exception of the “need and greed principle” or visceral influences). This underlying assumption may not be correct as there may be a personality variable involved interacting with these principles (i.e., gullibility).

Langenderfer and Shimp (2001) developed a theory to explain why some people are more likely to succumb to a scam than others above and beyond these seven principles of scam compliance. They suggest that vulnerability to scams is due to a combination of visceral influences and levels of motivation to elaborate on the message, as described in the Elaboration Likelihood Model (Petty & Cacioppo, 1986). The Elaboration Likelihood Model suggests that there are two routes to persuading someone, a central route – wherein

individuals are motivated to elaborate on a message, or a peripheral route – wherein individuals are lacking in motivation to elaborate and instead focus on non-message peripheral cues (Petty & Cacioppo, 1986).

Using the Elaboration Likelihood Model, Langenderfer and Shimp (2001) suggest that a person's vulnerability to being scammed is related to high motivation (as seen in the central route of persuasion) but mediated by their visceral influences. They suggest that under high motivation situations but low visceral influences, the trait of gullibility (as well as social isolation, cognitive impairment, and consumer susceptibility to interpersonal influence) is expected to increase a person's vulnerability to being scammed. A simple example would be a person offering free money to people passing by. Someone who has enough money (i.e., low visceral influences as there is no urgent need for money) and is motivated to question the proposition is not likely to be vulnerable to scams, unless they are high in gullibility.

In contrast, under high motivation and high visceral influence conditions, gullibility would have little or no effect on a person's vulnerability to being scammed (Langenderfer & Shimp, 2001). Using the same example again, the passer-by this time is quite desperate for money (i.e., high visceral influences), so they will focus on the reward, making themselves vulnerable to being scammed and making their level of gullibility irrelevant. Therefore, this theory of visceral influences on persuasion certainly touches on a lot of the relevant ideas, however it has not been verified empirically. Langenderfer and Shimp (2001) state that gullibility "...it seems, if not an essential component of scam vulnerability, is at least a trait that often is present" (p.779). Therefore, scam compliance research could possibly be subsumed within the category of gullibility.

By the same token, Fischer et al. (2013) suggests that scam compliance is dependent upon our bounded rationality. That is, the heuristics we use to make satisficing decisions. The focus here is on the decline of rational decision making, and the psychological processes

implicated are high motivation, trust, social influence techniques, and scarcity and urgency (Fischer et al., 2013). Although, it could be argued that “scarcity and urgency” could be subsumed by the “social influence techniques” category, as scarcity was one of the six persuasion techniques Cialdini (2001) described. Taking an experimental approach, Fischer et al. (2013) sent a package to participants via mail as a simulated scam and manipulated several elements including: motivation (e.g., altering the amount of money to be gained), positive emotion (including or omitting triggers to how it would feel to possess the money), and trust (including or omitting symbols of authority). Furthermore, the packaging order for each participant was manipulated (either receiving the simulated scam first, followed by the questionnaire or vice versa). Participants completed the enclosed measures and returned them to the researchers. Fischer et al. found evidence for high motivation affecting scam compliance, but the other three components of trust, social influence techniques, and scarcity and urgency, were not statistically related to scam compliance. They suggested that a personality trait may underlie the social influences that enhance the susceptibility of persuasion (Fischer et al., 2013). This, it is proposed, is gullibility.

Overall, the existing research on gullibility has been varied and performed under a number of different labels, making it difficult to track down. As argued earlier, the Barnum Effect is not a valid measure of gullibility. The research into superstition is potentially looking at the symptoms of gullibility rather than an underlying cause. Social vulnerability begins to describe gullibility, however it is restricted purely to the realms of the elderly or people with cognitive impairments, relying on cognitive deterioration to explain gullible actions. Lastly, the research on scam compliance begins to explore parts, but not all, of the concept adequately.

Trust and Insensitivity to Untrustworthiness Cues

This section of the review will firstly discuss the literature on trust and attempt to disentangle it from the concept of gullibility. Then, this section will suggest possible reasons for insensitivity to untrustworthiness cues. Firstly, it will examine the concept of social intelligence, then research on deception detection, cheater detection, possible scenarios when sensitivity to cues of untrustworthiness could be reduced (such as with fatigue or divided attention) and lastly discuss Theory of Mind and its effect on sensitivity to cues of untrustworthiness.

Trust. In common usage, people often equate gullibility to overly trusting individuals. The argument here is that trust is an important aspect of gullibility, but is not synonymous with it. Trust can be considered a generalised expectancy held by individuals or groups that another party can be relied upon (Rotter, 1967), or that others will not knowingly act in a detrimental way towards our interests (Hardin, 2001; Sturgis, Read, & Allum, 2010). High trusters take a default position of believing that most people can be trusted, whereas low trusters generally believe that you cannot be too careful in dealing with people.

There is a growing body of work which suggests that highly trusting individuals are not necessarily gullible (Carter & Weber, 2010; Rotter, 1980; Sturgis et al., 2010; Yamagishi et al., 1999; Yamagishi, 2001). Rotter (1967), in a study using students from college fraternities and sororities, found no significant relationship between gullibility and trust. The students completed measures of trust, social desirability, as well as sociometric ratings of their peers. Apart from nominating the members of the peer group who were lowest and highest in interpersonal trust, the participants also nominated peers based on dependency, gullibility, and trustworthiness. Rotter (1967) found no significant relationship between gullibility and the trust measure nor between gullibility and the sociometric measure of trust. Yamagishi et al. (1999) describe a series of experiments wherein participants were divided

into high and low trusting groups and presented with vignettes containing characters. Furthermore, with regard to the central character of the vignette, participants were given either no information; one piece, or two pieces of *positive* information; one piece, or two pieces of *negative* information; or one positive and one negative piece of information. When there was no information supplied, the high trusters were much more likely to say that the character would act in a trustworthy manner compared with the low trusters. Interestingly, when negative information about the central character was presented, the high trusters responded much quicker to it than the low trusters, lowering the likelihood that the central character would act in a trustworthy manner more quickly than the low trusters (Yamagishi et al., 1999). This suggested that the high trusters were more sensitive to the negative information.

Another study by Carter and Weber (2010) found that high trusters were better lie detectors than low trusters in a job interview context. The participants viewed eight videos of simulated job interview, half of the interviewees were completely truthful and the other half told a number of lies. Those participants who scored higher on a measure of trust were better able to detect the lies than those participants in the low truster group. This supports the previous findings of Yamagishi et al. (1999), demonstrating a positive relationship between trust and ability to detect untrustworthiness.

The research on trust, reviewed above, suggests that high trust may lead to a greater number of social interactions which in turn leads to a greater social intelligence, and it is this social intelligence (or ability to perceive cues of untrustworthiness) which reduces the likelihood that a person will be duped (Carter & Weber, 2010; Rotter, 1967, 1980; Sturgis et al., 2010; Yamagishi et al., 1999; Yamagishi, 2001). Importantly, these few preliminary studies suggest the counterintuitive idea that gullibility is not synonymous with high trust. Further, they suggest that, together with trust, social intelligence plays an important role in

understanding gullibility. However, further empirical verification of these findings using a reliable measure of gullibility is necessary.

Social intelligence. Nearly a century ago Thorndike (1920) suggested that intelligence fell into three distinct categories: mechanical intelligence, social intelligence, and abstract intelligence. He defined social intelligence simply as “the ability to understand and manage men and women, boys and girls – to act wisely in human relations” (p.228). Since then, the bulk of the research on social intelligence has stated that it has been operationalised problematically and, as a result, researched inconsistently (Brown & Anthony, 1990; Grieve & Mahar, 2013; Kosmitzki & John, 1993; Silvera, Martinussen, & Dahl, 2001; Weis & Süß, 2007). However, there are two elements in the Thorndike definition worth considering. He suggests that social intelligence is comprised of both cognitive – “ability to understand and manage” – and behavioural – “to act wisely” – components (Kosmitzki & John, 1993). Some studies have operationalised social intelligence purely as a cognitive ability (Barnes & Sternberg, 1989; Petrides, Mason, & Sevdalis, 2011) whereas others define it in terms of behaviour (Ford & Tisak, 1983). Furthermore, empirically separating social intelligence from “academic” intelligence has been problematic. A number of studies, all measuring social intelligence differently, have come to the conclusion that social intelligence is a distinct but overlapping concept to academic intelligence (Brown & Anthony, 1990; Riggio, Messamer, & Throckmorton, 1991; Weis & Süß, 2007). However, the inconsistency in definitions and operationalisation of the term social intelligence remains an issue.

Emotional intelligence has been measured as a personality trait (Cooper & Petrides, 2010) and as an ability that correlates with IQ (MacCann & Roberts, 2008; Mayer, Salovey, Caruso, & Sitarenios, 2003). Ability emotional intelligence can be defined as a set of cognitive skills that support the processing of emotionally relevant information (Mayer et al., 2003). Defined in this way, emotional intelligence seems to be specifically focussed only on

emotions present in interactions. Therefore, it could be considered a smaller part of social intelligence.

In contrast, Riggio et al. (1991) suggest that communication encompasses skill in sending a message, skill in receiving a message, and skill in regulating communication processes. Furthermore, these skills can operate in verbal or non-verbal domains and it is the non-verbal domain that is dominated by emotions (Riggio et al., 1991). Although this seems a neat distinction (i.e., verbal domain is social intelligence and non-verbal domain is emotional intelligence), it is not entirely helpful as social information could be conveyed non-verbally (e.g., thumbs up indicating support) and emotional information can be conveyed verbally (e.g., a person telling you they feel sad). Therefore, emotional intelligence could be considered as a small subdivision of social intelligence, specifically related to emotions.

If social intelligence could be developed through regular interactions and taking risks (Yamagishi et al., 1999; Yamagishi, 2001), it could be a protective factor against being duped. As Kosmitzki and John (1993) argue, social intelligence is a multifaceted construct, comprising of both behavioural components (e.g., social adaptability, people skills) and cognitive components (e.g., knowing social rules, perspective taking, understanding people). Within both components there are elements that could potentially improve with repeated exposure and adequate feedback hopefully decreasing a person's insensitivity to cues of untrustworthiness, and therefore making them less gullible. To date, however, this has not been empirically demonstrated.

Deception detection. A literature review on gullibility, with a focus on insensitivity to mistrust cues, would not be complete without reviewing literature on deception detection. Although, it is argued here that deception detection is a small part of the superordinate category of gullibility. The field of deception detection research is a large one. Essentially, *deception* is an action or occurrence that can mislead someone whereas *lying*, a subcategory

of deception, is when someone *deliberately* misleads another person without prior notification (Frank & Svetieva, 2013). An example of deception could be a tiger's distinctive striped coat. The tiger did not consciously select to wear those stripes; it deceives its prey by blending into its environment but it does not lie (Frank & Svetieva, 2013). However, most of the research in deception detection is interested in detecting lies, rather than deception.

Can people perceive when they are being lied to? According to Bond and DePaulo (2006), who undertook a large meta-analysis of 206 studies, people are correct in deception detection tasks an average of 54% of the time. Most of the studies in this area examine cues for deception such as blink rate, eye contact, illustrators (e.g., hand or head movements), response latencies (e.g., pauses), body language (e.g., fidgeting or gait), and microexpressions (Bond & DePaulo, 2006; Driskell, 2012; Ekman, 1992; Frank & Svetieva, 2013; Hartwig & Bond, 2011, 2014). Moreover, Hartwig and Bond (2014) suggest that lies can be detected with nearly a 70% accuracy when multiple cues are used. However, many of these cues must be measured with or captured by sophisticated software. For example, measuring the pause before answering a question by counting frames on the recording, or slowing the recording to accurately perceive the microexpressions. These methods of detecting the cues may be useful for law enforcers recording interviews with suspects but not for the average person who is trying to determine if they are being lied to.

Overall, the research on lie detection aims to discover ways to increase a person's ability to detect deception. There is conflicting evidence on the effectiveness of training, with some arguing that the behavioural cues are too weak to be perceived effectively (Hartwig & Bond, 2011) and others insisting that there is a positive and significant effect (Driskell, 2012; Frank & Feeley, 2003). Even bogus training in deception detection was more effective than control conditions (Levine, Feeley, McCornack, Hughes, & Harms, 2005). A possible

explanation for this could be that training, regardless of the content, could focus participants on the task and increases their motivation (Driskell, 2012).

If training the lie detectors produces inconsistent results, another method of improving judgements could be to increase the behavioural differences between the liars and truth tellers (Hartwig & Bond, 2011). For example, Vrij et al. (2008) found that increasing the cognitive load of participants assisted lie detection. Participants were asked to relay an incident that was either true or false in reverse chronological order. This cognitively demanding task on participants made it easier for the sample of police officers to detect the lies (Vrij et al., 2008). Therefore, while the effects of lie detection training may be inconsistent and still debated, there is promise in this area of behavioural differences in facilitating lie detection. Another study found that participants primed with self-protection motives, compared with a sadness or control condition, were better able to distinguish true (Duchenne) smiles from fakes smiles (Young, Slepian, & Sacco, 2015). Therefore, the mood of the lie-detector may also influence their ability to perceive trustworthiness.

Although gullibility has been defined in terms of an insensitivity to cues of untrustworthiness, it is not synonymous with deception detection. This field has a narrow focus on cues of mistrust, such as facial, verbal, and non-verbal cues. Analysis of these cues and training of people to recognise them is central. However susceptibility to being scammed is broader than this. Many situations when a person could be manipulated do not include interpersonal, face-to-face interactions. For example, the Prince of Nigeria email scam, mentioned earlier, is usually confined to email correspondence. Furthermore, the cues to detecting lying are not very clear to most people, with detection rates at around chance level (Bond & DePaulo, 2006). However, detection rates for scams such as the Nigerian Prince scam are very high (Herley, 2012). Whereas, believing lies is an instance of gullibility it is

argued that gullibility extends to include a wider range of phenomena than face-to-face interactions.

Cheater detection. Evolutionary psychology has suggested that humans have developed a module to detect when a social contract is being violated (i.e., to detect cheaters; Cosmides, Barrett, & Tooby, 2010; Cosmides & Tooby, 2005). Cosmides and Tooby (2005) defined a cheater as “an individual who fails to reciprocate – who accepts the benefit specified by a social contract without satisfying the requirement that provision of that benefit was made contingent on” (p.591). Essentially, our minds have evolved, via natural selection, social contract algorithms (i.e., programs for reasoning about social exchanges) to detect people who do not comply or reciprocate (Cosmides et al., 2010). For example, if person A gives person B a goat (depriving person A of this resource), then person A would expect to be adequately compensated for this deprivation in some form. Person A should hopefully have evolved the social contract algorithm to detect if Person B is going to cheat them, or if they have already been cheated with inadequate compensation. For if we did not have this module, cheaters could receive unconditional benefits without equal reciprocation, giving them an advantage over those that they have taken resources from. Thus, the ability to detect cheaters is needed for contingent cooperation to evolve (Cosmides & Tooby, 2005).

Is gullibility simply an impairment in the cheater detection module? Cheater detection seems to focus on the logic between social interactions and a person’s ability to detect when they are being cheated. This is frequently tested with the Wason selection task. In the Wason selection task, the participant is given a conditional rule, *if P then Q*, and given four cards with information related to this rule, that may either satisfy or violate it. They can only see one side of each card, which display values *P*, *not-P*, *Q*, and *not-Q*. Participants are asked which of the four cards they would need to flip over in order to see if any of the instances presented violate the rule (Fiddick, Cosmides, & Tooby, 2000). The Wason selection task is a

logical problem that most people tend to fail unless it is presented in terms of taking benefits without paying costs, whereupon most people tend to solve it reliably and correctly (Vohs, Baumeister, & Chin, 2007). This suggests that, when something is in the context of a social contract being violated, most people can instantly detect when they are being cheated.

The notions that a person is unable to detect the violation of a social contract (i.e., utilising a cheater detection mechanism) or unable to detect cues of untrustworthiness (i.e., gullibility) could be related. However, the relevance of cheater detection to understanding gullibility will depend on similarity of the scam to the elements of a prototypical typical social exchange. If the features are similar, the cheater detection mechanism should lead to enhanced detections—less gullibility. However, the proliferation of successful scams (e.g., Federal Bureau of Investigation Internet Crime Complaint Center, 2014) suggests that gullibility involves much more than cheater detection. Future research will determine the true nature of their relationship.

This section of the review attempted to clarify the relationship between trust and gullibility. There was also a brief discussion of social intelligence as well as deception detection and cheater detection and how they differed from and were related to gullibility – with gullibility considered a superordinate category that encompassed deception detection and cheater detection.

Reducing Sensitivity to Untrustworthiness Cues

This section of the review will examine how sensitivity to cues of untrustworthiness could be influenced by a number of different factors including fatigue (such as mental depletion), divided attention, cognitive busyness, or by reduced levels of Theory of Mind. Reducing a person's sensitivity to untrustworthiness cues could increase their susceptibility to persuasion techniques.

Fatigue, Divided Attention, and Cognitive Busyness. Fatigue could be a factor involved in gullible or foolish decisions. A study on mental fatigue found that it facilitated greater primacy effects (Webster, Richter, & Kruglanski, 1996). That is, if a participant was first presented with positive information about a fictional character and then followed by negative information about that character, those participants in the mentally fatigued condition were far more likely to have a positive impression of that character i.e., a greater primacy effect (Webster et al., 1996). Generalising these results, people might be far more likely to leap to conclusions, and be less critical, when they are tired. Interestingly, this effect disappeared if participants were held accountable for their judgements (Webster et al., 1996).

A study of Jewish-Israeli judges found that judicial rulings could be influenced by extraneous factors – that is, when required to make repeated rulings, they were more likely to rule in the favour of the status quo i.e., deny parole (Danziger, Levav, & Avnaim-Pesso, 2011). This evidence supports the notion that fatigue, especially mental depletion, could affect a person's decision making skills, encouraging them to use heuristics or make satisficing decisions, as mentioned earlier in the section on scam compliance. Essentially, it is suggested that fatigue could facilitate cognitive miser effects (S. E. Taylor, 1981). As mentioned earlier, in the section on scam compliance, the cognitive miser processing style is characterised by a tendency to make decisions that save time and effort at the cost of accuracy. This area of mental (or energy) depletion and its relationship to undesirable or deviant behaviours has been widely researched by Baumeister and colleagues (Muraven & Baumeister, 2000; Muraven, Tice, & Baumeister, 1998; Stucke & Baumeister, 2006). They suggest that people have less self-control (Muraven & Baumeister, 2000; Muraven et al., 1998) or are less likely to inhibit aggressive behaviour (Stucke & Baumeister, 2006) when energy levels are diminished. Therefore, fatigue could potentially influence a person's sensitivity to mistrust cues and increase likelihood of gullible decisions being made.

Divided attention or cognitive busyness could also reduce a person's sensitivity to mistrust cues and impair judgements. Gilbert, Pelham, and Krull (1988) found that when participants had an increased cognitive load, an essential component of person-perception was compromised. Participants were less able to incorporate information concerning situational constraints, or external factors, on an actor's behaviour and more likely to determine (unwarranted) dispositional interpretations (Gilbert et al., 1988). A study on multitasking and persuasion found that when participants were multitasking, their ability to form counterarguments (or be critical) to the information presented to them was significantly reduced (Jeong & Hwang, 2012). Lastly, a study that manipulated cognitive busyness by asking participants to focus closely on product features, found that participants were less able to perceive a difference in value than non-busy participants (i.e., participants who did not complete extra tasks; Sivaramakrishnan & Manchanda, 2003). Therefore, increasing cognitive busyness or dividing attention could potentially affect gullibility by reducing a person's normal levels of sensitivity to cues of untrustworthiness.

Theory of Mind. Theory of Mind is considered the ability to infer another person's mental state, such as beliefs, desires, emotions, and intentions, which can motivate actions (Baron-Cohen, 2001). Baron-Cohen et al. (1999) liken it to social intelligence, suggesting that it not only facilitates the interpretation of another person's behaviour in terms of their mental states but also allows us to interact in complex social groups and close relationships, empathise with others, and allow us to predict how others will think, feel, and behave.

A distinctive feature of Autism Spectrum Disorders is a difficulty with understanding other minds (Baron-Cohen, 2001). It is suggested that an impaired ability to understand another person's motivations could leave someone more vulnerable to being manipulated and made gullible. In a review of Theory of Mind in relation to autism, Baron-Cohen (2001)

argues that children with autism have difficulties in understanding when they are being deceived.

A method of testing Theory of Mind, a brief self-administered measure of the Autism spectrum, was administered to students at Cambridge University. It was found that participants from the sciences (including mathematicians) scored significantly higher than students from the humanities or social sciences, suggesting that autistic tendencies may be associated with scientific skills (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001). This suggests that non-clinical levels of Theory of Mind deficiency could be adaptive for some scientific research but maladaptive in everyday social encounters.

Apart from people with low and high functioning Autism, it has been suggested that people suffering cognitive deterioration may be more vulnerable to being manipulated or less able to detect cues of untrustworthiness (Pinsker et al., 2006). As mentioned earlier in the section on Social Vulnerability, it is the cognitive deterioration posited as the cause for increased social vulnerability (i.e., gullibility) – or an insensitivity to cues of untrustworthiness – amongst that particular demographic. People with an intellectual disability have “risk-unawareness” or a deficit in common sense (with common sense defined as an awareness of clear practical or social risk) that makes them more susceptible to being manipulated into performing a gullible action (Greenspan et al., 2011). That is, they lack processing ability (c.f., people with cognitive deterioration) or sufficient knowledge to evaluate false claims (Greenspan et al., 2001).

Greenspan (2009b) provides several examples of gullible actions performed by people with an intellectual disability, such as the case of a young woman who was tricked into entering a vehicle with some young men: “...when she got to a house they went into the basement, where she was talked into performing sexual acts after a threat was made to tell her mother that she had gone to the house” (p.163). In another case, an elderly woman is

described thus, "...in the early stages of dementia [she] was tricked into lending her jewels to a crook who offered to get them appraised so she could receive lowered insurance costs" (p.164). Both these examples illustrate situations in which a person with the ability to detect cues of untrustworthiness would likely avoid. Thus, impaired Theory of Mind could leave a person more vulnerable to being pranked, involved in scams, giving false confessions to interrogators, being recruited into cults, participating unwillingly in criminal acts, or being the victim of sexual abuse (Greenspan et al., 2001).

Motivation

This section of the review will examine motivational influences upon gullibility, such as psychological needs motivating behaviour as well as motivated decision making. It is argued that certain motivational states can make the untrustworthy seem trustworthy, making us more vulnerable to being gullible.

As briefly mentioned earlier in the section on scam compliance, visceral factors can influence behaviour. Loewenstein (1996) defines these factors as drive states (such as hunger, thirst, or sexual desire), moods, or physical pain that, at sufficient levels of intensity, can motivate people to enact in behaviours that may be contrary to their own self-interest. These visceral factors are transient and dependent upon external circumstances and will focus attention upon activities that will satisfy the need (Langenderfer & Shimp, 2001; Loewenstein, 1996). This suggests why scammers or swindlers often emphasise the importance of immediate response to their offers (Langenderfer & Shimp, 2001). People seem to be capable of dealing with these influences at low levels of intensity, but at intermediate or extreme levels of intensity can cause spontaneous and impulsive behaviour which can impede rational decision-making processes (Loewenstein, 1996). A person suffering from extreme withdrawal from drugs can become myopic, focusing only on satisfying his or her immediate

craving, regardless of the long-term effects of satisfying that need. Therefore, visceral factors may influence behaviour without engaging rational or critical thought processes.

The visceral factors mentioned above refer to mainly physiological needs such as hunger or pain, however there are also a number of psychological needs that require satisfaction. Thwarting these needs could have long term pathological effects beyond the immediate, or short term, distress (Baumeister & Leary, 1995). Williams (Williams & Nida, 2011; Williams, 1997) has suggested that there are four fundamental psychological needs: belonging, self-esteem, control, and meaningful existence. The fundamental need to belong as first described by Baumeister and Leary (1995), is a universal drive to find and uphold a minimal amount of long, positive, and substantial relationships with others. Williams (1997) described it as an emotionally desirable and evolutionary adaptive need. Thwarting the need for self-esteem can affect self-efficacy, mental health, and the belief that the victim is a good and worthwhile person (Williams, 1997). People whose self-esteem and belonging needs have been thwarted via ostracism are more likely to comply with requests, cooperate, obey orders, or mimic (consciously and non-consciously) the behaviour of others (Williams & Nida, 2011). This suggests that if these psychological needs are thwarted, that person may be more susceptible to being gullible.

Although visceral and psychological needs can motivate behaviour, a person's motivation itself can have an effect on outcomes. Motivation was defined by Kunda (1990) as "any wish, desire, or preference that concerns the outcome of a given reasoning task" (p.480). The central idea is that motivation can affect processes of reasoning in such a way as to ensure that we will arrive at the conclusion that we desire. If the motivation is to be accurate, different decision making processes will be employed compared to situations when the motivation is to arrive at a particular, directional conclusion (Kunda, 1990). Directional goals heighten the accessibility to memories, beliefs, and decision rules consistent with desired

outcomes, ensuring a type of confirmation bias filters our perceptions and judgements and we feel we have made a rational justification for our belief (Kunda, 1990). This supports our illusion of objectivity, even though those justifications are constructed with biased beliefs and memories (Klein & Kunda, 1992). Therefore, visceral factors or psychological needs can demand a certain directional decision. This decision will be influenced by biased and selective memory searches, without seeking disconfirming evidence, and is most likely dependent upon heuristic processing (Gilovich, 1983). Combine the motivating nature of visceral factors and psychological needs with an insensitivity to cues of untrustworthiness and gullibility is likely to result.

Conclusion

Scams, such as romance scams or fake investment schemes, can have a large impact on the lives of many people. Understanding the mechanisms behind their effectiveness will require an understanding of trust and social vulnerability, as well as social elements that can affect a person's ability and willingness to detect cues of untrustworthiness. This review has defined gullibility as an acceptance of a false premise in the presence of untrustworthiness cues, taking the view that the underlying belief driving a behaviour is central. Existing literature was reviewed, including the Barnum Effect (Layne, 1979), superstition (Case et al., 2004; Grimmer & White, 1990), social vulnerability (Pinsker et al., 2006), and scam compliance (Langenderfer & Shimp, 2001). The trust literature was then reviewed, followed by other research that could relate to reduced sensitivity to untrustworthiness cues such as deception detection, cheater detection, divided attention, and fatigue, and Theory of Mind impairments. Finally, the role of motivation was discussed.

The ideas presented above highlight the need for further research in this area. One clear direction is to develop a reliable and valid self-report measure of gullibility so that individual differences in gullibility can be assessed, and constructs potentially related to it can

be investigated. Moreover, such an instrument would have the benefit of assessing gullibility in different samples and could be used in experimental research to screen participants to investigate moderator effects. Other directions for research include the development of a valid behavioural paradigm to study factors, such as motivational state, that might affect gullibility. Future research should be guided by the idea that gullibility represents an insensitivity to cues of untrustworthiness. In short, the benefit of research on gullibility is that it has the potential to prevent people from being excessively fooled, tricked, or cheated in the future.

Gullibility: Devising a Self-Report Measure

In 2007, Arthur Stimpson of Norfolk, England (a university graduate and Member of the Royal Institute of Chartered Surveyors), received an email telling him that he had won £2.7 million in the Spanish National lottery (Bracchi, 2011). However, he was informed that there would be some “administrative costs” in transferring the money to him. Over the course of two years he surrendered not only £50,000 of his own money, but convinced at least thirteen people in his village to lend him money to pay the “transfer fees”. His loans ranged from £10,000 to £400,000. In short, the respectable, intelligent, and accomplished Arthur Stimpson lost everything he owned and left himself in unmanageable debt to his former friends (Bracchi, 2011).

Unfortunately, the case of Arthur Stimpson is not so uncommon. In 2014 alone, there was an estimated US\$800 million lost to online scams in the United States of America (Federal Bureau of Investigation Internet Crime Complaint Center, 2014). Why do some fall victim to such scams, while others immediately heed the warning signs? The present study describes the development of a self-report instrument designed to assess individual differences in gullibility. To begin with, gullibility will be defined.

Gullibility has been defined as a susceptibility to being deceived or manipulated (Greenspan et al., 2001; Layne, 1979). Others have defined gullibility as believing someone when there is clear evidence that you should not (Langenderfer & Shimp, 2001; Rotter, 1980). However, the present approach is guided by Yamagishi, Kikuchi, and Kosugi’s definition (1999), who argue that gullibility can be understood as failure to read the signs that someone is attempting to take advantage of you. Hence gullibility is defined here as an *acceptance* of a false premise in the presence of untrustworthiness cues. While gullibility has been defined by some to include only behaviour (e.g., Greenspan, 2009a), here it is taken to include both

behaviour and belief – as behaviour that is not driven by a gullible belief might represent other psychological phenomena (e.g., compliance).

If gullibility results from an insensitivity to cues of untrustworthiness, it might be expected to be higher in those who are particularly trusting, as suggested by Vohs, Baumeister, and Chin (2007). However, several research findings suggest that the relationship between trust and gullibility is not so straightforward; high trusters compared to low trusters were better able to detect lies (Carter & Weber, 2010) and were more attendant to cues of untrustworthiness (Yamagishi et al., 1999). Suggesting that, contrary to popular belief, people who were more trusting were not more gullible. Similarly, Rotter (1967) found no significant relationship between trust and gullibility. Thus, a gullible person is not simply overly trusting. Instead gullibility might represent a failure to detect cues of untrustworthiness, and a failure to act on those cues in order to avoid being manipulated.

The extensive research on detecting deception from facial expressions has taken a similar approach: involuntary behaviours, such as facial expressions of emotion that betray a lie, provide subtle cues that can be used to determine the potential liar's honesty (e.g., Ekman, 1992; Frank & Svetieva, 2013; Hartwig & Bond, 2014; Vrij, Leal, Mann, Vernham, & Brankaert, 2015). However, as the Arthur Stimpson example highlighted, many scams are conducted via mail, email, or over the internet, and subtle cues to deception (such as microexpressions, tone of voice, or gesture) are often absent. As such, failing to detect subtle non-verbal cues to deception may result in gullibility, but general individual differences in gullibility are expected to extend to a broad range of cues to untrustworthiness.

Gullibility is likely to be a multifaceted construct. Gullibility may encompass aspects of trust as mentioned earlier, but also agreeableness, social intelligence, and Machiavellianism. Agreeableness is a personality trait which emphasises conformity, an avoidance of violating social norms or upsetting people, and a compliance with social

expectations (Bègue et al., 2014). Theoretically, there could be a positive relationship between agreeableness and gullibility as gullibility emphasises the acceptance of premise despite the presence of cues indicating that the premise should not be believed. This accepting element of gullibility may be related to the compliance elements of agreeableness. However, this relationship has yet to be investigated empirically.

It has also been argued that gullibility is a combination of high trust and low social intelligence (Carter & Weber, 2010; Greenspan et al., 2001; Rotter, 1967, 1980; Sturgis et al., 2010; Yamagishi et al., 1999). Social intelligence is considered as a person's ability to make accurate social inferences based upon interpretation of social information (Grieve & Mahar, 2013). A person who is very trusting may not necessarily be gullible as they may have the necessary social intelligence to detect when a person is intent on manipulating them (see: Carter & Weber, 2010; Yamagishi et al., 1999). Therefore, it may not be trust alone facilitating gullibility, instead it is this combination of high trust and low social intelligence.

Gullibility might also be related to Machiavellianism. Central features of Machiavellianism include hostile distrust (Gurtman, 1992; McIlwain, 2003) and a manipulative social style (Jonason & Krause, 2013). Earlier it was considered that a gullible person might be overly trusting and have a lower level of social intelligence. Thus, Machiavellians might be expected to be low in gullibility. However, it remains unclear whether Machiavellian characteristics, such as ease at manipulating others, means that they are in turn, resistant to being manipulated. Thus, although the relationship between gullibility and Machiavellianism is not clear, research on the development of a Machiavellian personality style (McIlwain, 2003), or scales that could measure Machiavellianism (Christie & Geis, 1970; Dahling, Whitaker, & Levy, 2008), could potentially inform gullibility.

Current Measures of Gullibility

Early attempts to investigate individual differences in gullibility relied on the Barnum Effect paradigm (e.g., Dickson & Kelly, 1985; Furnham & Schofield, 1987; Standing & Keays, 1987), in which people demonstrated a tendency to accept false personality feedback as true (Layne, 1979). However, the main criticism of this paradigm is that the profiles presented to participants were so generic that most rational people would endorse them (Layne, 1979).

The Social Vulnerability Scale (Pinsker et al., 2011) is the only other measure of gullibility. The Social Vulnerability Scale was designed to be completed by informants (friends or relatives) of people with cognitive impairments such as dementia (Pinsker, 2011) or those with high functioning Autism (Sofronoff, Dark, & Stone, 2011). Pinsker, Stone, Pachana, and Greenspan (2006) argue that it is the cognitive impairments, such as compromised memory, diminished executive functioning, and impaired social reasoning skills, that leave the sufferer more vulnerable to manipulation. Interestingly, the Social Vulnerability Scale has no items dedicated to trust, instead purely focusing on beliefs and behaviours that make a person socially vulnerable (e.g., “Persuaded to purchase items that never arrived”, and “Easily fooled”). Social vulnerability has been found to negatively correlate with social intelligence as well as social skills (Pinsker & McFarland, 2010). As such, the Social Vulnerability Scales has limited application to measuring gullibility in those who are not cognitively impaired.

The Present Research

The aims of present research were to develop a reliable and valid self-report measure of gullibility for a normal population as well as to present preliminary evidence for construct validity. In Study 1, an initial pool of 66 items was administered to participants, along with a measure of social desirability (Crowne & Marlowe, 1960), which was included to assess the

potential problem that respondents might be reluctant to admit that they are gullible. The pool of gullibility items were subjected to an exploratory factor analysis. In Study 2, a refined 35-item version of the scale, along with other personality measures, were administered to a new sample in order to conduct a confirmatory factor analysis as well as to provide preliminary evidence for construct validity.

Study 1: Exploratory Factor Analysis of Gullibility Items

Method

Participants

This study included two samples: an undergraduate sample, and a community sample via online research forums (e.g., Psychological Research on the Net, The Inquisitive Mind, Online Psychology Research. See Appendix A for the full list, as well as the advertisement). Respondents in the undergraduate sample were 326 students enrolled in an introductory psychology unit at Macquarie University. Of the original sample, 51 participants were excluded due to incomplete data. After examining the remaining sample for biased responding, using items included to assess honesty and attentiveness, another nine cases were excluded. The mean age of the remaining 266 participants was 21.20 years ($SD = 5.30$) and ranged from 18 to 52. There were 67 males and 199 females.

Participants in the community sample were 167 people who found the study via online psychology research forums and social media networks. From the community sample, 45 participants were excluded due to incomplete data. After examining the remaining sample for biased responding, using the honesty and attentiveness check items, another 17 cases were excluded. The mean age of the remaining 105 participants was 28.44 years ($SD = 12.52$) and ranged from 17 to 67. There were 23 males and 82 females. Of this sample of participants, 65.7% were from the United States, 6.7% from the United Kingdom, 3.8% were from

Australia, and the remainder came from countries including India, Canada, Germany, Ireland, Mexico, Russia, Spain, and Singapore.

The two samples were examined for significant differences in gullibility prior to combining them. On average, the student sample had higher scores in gullibility ($M = 229.63$, $SD = 34.86$), than those participants in the community sample ($M = 219.91$, $SD = 41.31$). This difference was significant, $t(165.6) = 2.13$, $p = .04$, however, it was a relatively weak effect, $d = .25$. In spite of this, the samples were combined in order to achieve the minimum amount of participants needed for factor analysis. A final combined sample of 371 participants was used, which was considered sufficient for factor analysis, with at least five participants per variable measured (Fabrigar, Wegener, MacCallum, & Strahan, 1999) and the sample was over 300 participants (Field, 2013; Tabachnick & Fidell, 2007). The Kaiser-Meyer-Olkin measure of sampling adequacy was .92, which according to Kaiser's (1974) guidelines would be considered 'marvellous'. Combining the sample, the mean age was 23.25 ($SD = 8.65$), with 90 males and 281 females.

Materials and Procedure

This study was approved by the Human Research Ethics Committee at Macquarie University (Reference Number: 5201500219). Respondents gave informed consent (see Appendix B for Participant Information and Consent Forms) and completed all the measures online using Qualtrics. For the student sample, the study was posted on the introductory psychology unit's online discussion board along with a message asking them to complete the survey by a certain date. Participants clicked on the link, provided consent, and completed the survey online. For the community sample, the study was posted online in five different forums dedicated to advertising psychology research. Again, participants clicked on the link, provided consent, and completed the survey.

First, participants were presented with the ethics information and asked to give informed consent. The Social Desirability Scale, Gullibility Scale, and General Trust Question were presented in a random order. Furthermore, the items within each scale randomised. Finally, the honesty check item and demographic questions were presented.

Social Desirability. The 33-item Marlowe-Crowne Social Desirability Scale (SDS) was used to assess socially desirable responding (see Appendix C for the SDS, Crowne & Marlowe, 1960). This measure was included as respondents might be reluctant to admit that they are gullible and employ a social desirability bias. Participants were asked to rate each statement as either true or false. The possible range of scores fell between 0 and 33, with higher scores indicating more socially desirable responding (15 items are reverse scored). Example items include: *“I have almost never felt the urge to tell someone off”* and *“I sometimes feel resentful when I don’t get my way”*. In the present study, the SDS was considered reliable ($\alpha = 0.74$).

Gullibility. To assess gullibility, an initial 66-item questionnaire was developed (see Appendix D for the full scale). To generate items for the initial pool a number of general categories were created based on the literature (in order to capture the broad nature of the construct), as well as examining the items from existing scales that were conceptually related to gullibility. The categories created included perceptions of own gullibility, affect about being manipulated, sensitivity to cues of untrustworthiness, social intelligence, social vulnerability, trust, and others’ perceptions of the respondent’s gullibility. The existing scales drawn from were measures of social vulnerability (Pinsker et al., 2011), consumer scepticism toward advertising (Obermiller & Spangenberg, 1998), interpersonal trust (Rosenberg, 1957; Rotter, 1967), Machiavellianism (Christie & Geis, 1970), and social intelligence (Grieve & Mahar, 2013; Silvera et al., 2001). Example items include *“I guess I am more gullible than the average person”* and *“My friends think I’m too trusting”*. Participants were asked to rate

how true they believed each statement was of them from 1 (*strongly disagree*) to 7 (*strongly agree*). The possible range of scores falling between 66 and 462. These 66 items produced a reliable scale ($\alpha = 0.91$).

Trust Item. The single item Generalized Trust Question (GTQ) was included to assess overall propensity to trust others (Sturgis et al., 2010). This measure was included to investigate the extent to which the gullibility scale was measuring trust. Responses were made using a 7-point scale, with participants rating their opinion between 1 (*in general, most people can be trusted*) and 7 (*you can't be too careful in dealing with people*).

Honesty and Attentiveness Check. Compared with socially desirable responding, inattentive responding is a distinct construct which can reduce power and add additional error variance above and beyond socially desirable responding (Maniaci & Rogge, 2014). To detect inattentive responding, four additional items were presented with the Gullibility items (see items 6, 21, 39, and 66 in Appendix D). The questions were inspired by the Directed Questions Scale (Maniaci & Rogge, 2014), and required a specific response on the rating scale (e.g., “*Please answer 2 to this question*”). In addition, at the end of the survey, a single honesty check item was presented whereby participants were asked “*Overall, I tried to answer these questionnaires honestly*”, responding on a 5-point scale, from 1 (*strongly agree*) to 5 (*strongly disagree*). Participants who had two or more errors on these four attentiveness items, were excluded from the final analysis.

Demographic questions. Information on age, gender, country of residence, and socio-economic status (including household income and education) were collected at the end of the survey (see Appendix E for demographic questions).

Overview of Analyses

Statistical Package for Social Sciences (SPSS; version 21.0) was used to analyse the data. A factor analysis, using a principal axis factoring extraction and combined with an

oblimin rotation, was applied to these data. This was selected as the most appropriate data reduction approach, considering the high likelihood of correlations between the factors (Fabrigar et al., 1999; Field, 2013).

Results

Data Preparation

After reverse scoring the appropriate item in the scales, the distribution of each of the gullibility items was examined and, based on this examination, one item was removed. The standardised skew of that item (calculated by dividing the skew by its standard error) revealed an extremely positive skew, 16.94, which was much higher than the 1.96 cutoff recommended by McQueen and Knussen (2006). Based on the correlation matrix of the remaining 65 items, eight items were removed (see items 15, 16, 17, 31, 36, 37, 40, and 70 Appendix D) as they had either zero or only one correlation of greater than $r = .3$ with each of the other items.

Exploratory Factor Analysis

A principal axis factor analysis was conducted on the remaining 57 items, with an oblimin rotation. Seven items had factor loadings below .32 and were removed from the analysis, as Tabachnick and Fidell (2007) recommend. The analysis was repeated on the remaining 50 items. Four further items were removed on the basis of having factor loadings below .32. This process was repeated until all the items remaining in the analysis had factor loadings above .32. A total of 41 items remained.

An initial analysis was conducted to obtain eigenvalues for each factor in the data. Eight factors had eigenvalues over Kaiser's criterion of one and in combination explained 49.40% of the variance. However, three factors consisted of only three or less items, had high cross-loadings, and together only explained an additional 4.05% of the variance. Further, an examination of the scree plot's point of inflection suggested 4 factors (see Appendix F for the

scree plot). Therefore, the principal axis factor analysis was conducted again with an oblimin rotation, this time extracting 3-, 4-, and 5-factor solutions.

The 3-factor solution had a high proportion of cross-loading items and only explained 40.49% of the variance, the lowest of all the solutions. Although the 5-factor solution explained more variance, 44.81%, and had no cross-loading items, it was not as interpretable as the 4-factor solution. Further, the point of inflection on the scree plot suggested a 4-factor solution. The 4-factor solution explained a total of 42.89% of the variance. The factors were interpretable, however two items had factor loading scores of less than .32, and a further four items had very low communality scores, below .25. Low communality scores can indicate that the item is unrelated to the other variables and can potentially distort the interpretation of the data (Fabrigar et al., 1999; Tabachnick & Fidell, 2007). Hence, these items were removed. The principal axis factoring was run again, with an oblimin rotation on the 35 items. Four factors explained a total of 46.37% of the variance. Removing 31 items from the scale lowered the Cronbach's alpha by only .01; the 35-item scale had sufficient reliability ($\alpha = 0.90$).

Table 1 shows the factor loadings after rotation (with values below .32 suppressed). Items clustering on factor 1 suggest a propensity to be manipulated were labelled "Persuadable". Items clustering on factor 2 were related to trusting others, and was be called "Trust". Items clustering on factor 3 suggested an inability to assert oneself, and so were called "Unassertive". The items clustering on factor 4 seemed to focus on an unsuspecting nature, and so was called "Unsuspecting".

Table 2
Rotated Factor Matrix

	1	2	3	4
G22 People think I'm a little naive	.745			
G23 My family thinks I am easily led	.704			
G2 If anyone is likely to fall for a scam, it's me	.642			
G18 I am probably a little too quick to believe others	.632			
G1 I guess I am more gullible than the average person	.607			
G20 My family think I am an easy target for scammers	.587			
G14 I often fall for things when I should know better	.586			
G19 My friends think I'm easily fooled	.583			
G36 Overall, I'm pretty easily manipulated	.543			
G21 My friends think I'm too trusting	.506			
G39 When debating an idea, I am easily convinced of another person's point of view	.499			
G25 People say I will agree to anything	.465			
G27 I believe most people are honest		.722		
G31 I believe most people can be relied upon to keep their word		.692		
G26 I trust what people say		.654		
G34 Usually people don't try to take advantage of others		.603		
G29 If you are not careful, people will try to take advantage of you*		.585		
G33 Completely trusting someone is asking for trouble*		.540		
G37 I believe people are sincere when they flatter me		.535		
G35 When people compliment me, it is because they want something from me*		.517		
G28 Most people only look out for themselves*		.517		
G30 People are usually honest in all aspects of their lives		.509		
G11 I am often surprised when people are untrustworthy		.450		
G4 I am often put in a situation where I have to pay for others			.760	
G6 People often take advantage of my generosity			.646	
G5 I usually offer to pay for others, even when I don't have much money			.580	
G38 People often use me to get what they want			.522	
G3 I have been persuaded to make donations to charities when I couldn't really afford it			.519	
G7 I often end up doing other people's work			.501	
G9 I'm pretty good at working out when someone is trying to fool me*				.827
G15 I'm usually quick to notice when someone is trying to cheat me*				.793
G13 It usually takes me a while to 'catch on' when someone is deceiving me				.674
G12 I'm pretty poor at working out if someone is tricking me				.672
G10 I'm not that good at reading the signs that someone is trying to manipulate me				.647
G17 I quickly realise when someone is pulling my leg*				.551

Note. * denotes a reverse-scored item

Descriptive and Demographic Data

The means and *SD*'s (Standard Deviations) for Gullibility (see Appendix G for the reduced Gullibility Scale) and the four factors can be seen in Table 2. The difference between males and females on overall Gullibility and each the four factors was not significant. The largest sex difference was observed in the Persuadable factor, with the female mean being 2.16 points higher than males.

Table 2

Summary of Descriptive Statistics for Gullibility and Four Factors

	Gullibility	Persuadable	Trust	Unassertive	Unsuspecting
Male (n = 90)	119.18 (21.15)	35.57 (10.78)	43.76 (9.03)	20.71 (6.31)	19.14 (5.58)
Female (n = 281)	120.80 (24.73)	37.73 (13.30)	42.76 (9.67)	21.05 (6.67)	19.26 (6.53)
Total (N = 371)	120.40 (23.89)	37.20 (12.76)	43.00 (9.52)	20.97 (6.57)	19.23 (6.31)

Note. Standard deviations appear in parentheses

Intercorrelations

Table 3 presents the intercorrelations between the factors and there was no significant correlation between the Gullibility Scale and social desirability, suggesting that participants were not reluctant to report their gullibility. There were significant positive correlations between the four factors, with the strongest correlation occurring between Persuadable and Unsuspecting, $r = .64$, $p < .0001$. The relationship between Trust and the other factors was ambiguous, with a significant negative relationship occurring between Unassertive and Trust, $r = -.13$, $p = .015$, and significant positive correlations with the remaining two factors. However the strength of these correlations were weak. The strength of the relationship between the Trust factor and the General Trust Question was positive, strong and significant, $r = .70$, $p < .0005$. This suggests that the Trust factor was measuring trust rather than another

positive trait (e.g., optimism), but more importantly, the low correlations between the General Trust Question and the other Gullibility factors confirmed that gullibility is not simply high trust.

Table 3

Intercorrelations Between the Variables

	1	2	3	4	5	6	7
1. Social Desirability	-	.082	.147**	-.171**	.082	.184**	-.130*
2. Gullibility		-	.894**	.463**	.551**	.707**	.371**
3. Persuadable			-	.135**	.500**	.637**	.147**
4. Trust				-	-.126*	.105*	.702**
5. Unassertive					-	.222**	-.063
6. Unsuspecting						-	.115*
7. General Trust Question							-

Note. * $p < .05$, ** $p < .01$

Characteristics of the Gullibility Scale

A histogram of the 35-item Gullibility Scale (see Appendix H for the histogram) suggests a normal distribution and kurtosis. The Shapiro-Wilk test of normality (see appendix H) was not significant, indicating that the distribution did not significantly differ from a normal distribution. Furthermore, the standardised skew of the Gullibility Scale (calculated by dividing the skew by its standard error) and the standardised kurtosis (calculated the same way) did not exceed 1.96 (McQueen & Knussen, 2006), indicating no significant skew and a mesokurtic distribution (see Table 4). Although, the individual factors may have slight violations to normality (see Appendix H for the histograms of the factors), Tabachnick and Fidell (2007) advise that if factor analysis is used descriptively to summarise relationships in a large set of variables, the assumptions regarding variable distributions, such as normality and linearity, do not apply.

Table 4

Descriptive Statistics for the Variables

	N	Mean	SD	Skewness		Kurtosis	
				Statistic	Std. Error	Statistic	Std. Error
Gullibility	371	120.40	23.89	-.108	.127	-.186	.253
Persuadable	371	37.20	12.76	.311	.127	-.649	.253
Trust	371	43.00	9.52	-.435	.127	.594	.253
Unassertive	371	20.97	6.57	.176	.127	-.514	.253
Unsuspecting	371	19.23	6.31	.454	.127	.190	.253

Note. SD = Standard Deviations

In sum, the 35-item Gullibility Scale was normally distributed and encompassed four factors: Persuadable, Trust, Unassertive, and Unsuspecting. However, the Trust factor was only weakly correlated with the other three Gullibility factors. Responses to the Gullibility scale did not appear to be related to social desirability.

Discussion

The aim of this study was to discover the underlying factor structure of the Gullibility Scale and to eliminate items that did not significantly contribute to this structure. The method employed was an exploratory factor analysis. The original scale was reduced to 35 items and demonstrated sufficient reliability. A principal axis factoring analysis, with oblimin rotation, determined that the scale contained four factors: Persuadable, Trust, Unassertive, and Unsuspecting. This four factor structure is quite different to the structure of the Social Vulnerability Scale (Pinsker et al., 2011). Within the Social Vulnerability Scale, there were only two factors, with behavioural items loading onto the Gullibility factor and beliefs items loading onto the Credulity factor. This follows Greenspan's (2009a) definition of gullibility as a purely behavioural phenomenon and credulity only applying to foolish beliefs. This distinction between beliefs and behaviours did not emerge in the current study, suggesting that the construct of gullibility has a more complex structure.

The relationship between the Gullibility Scale and the Social Desirability Scale was small and non-significant. This result suggests that participants were not reluctant to endorse the gullibility items honestly.

In terms of the relationship between gullibility and trust, the Trust factor and the General Trust Question were only weakly correlated with the remaining Gullibility factors. This suggests that trust might not be a feature of the construct of gullibility, which is consistent with evidence suggesting that gullibility is not a consequence of high trust (Carter & Weber, 2010; Rotter, 1967; Yamagishi et al., 1999). The utility of incorporating the Trust factor in the assessment of gullibility was examined further in Study 2.

Study 2: Confirmatory Factor Analysis of the Gullibility Scale

The refined Gullibility Scale and several self-report personality measures were completed by a new sample in Study 2. The first aim of this study was to test the fit of three different models using confirmatory factor analysis. The second aim of this study was to investigate the construct validity of this measure using a number of personality measures that were theoretically expected to be related to gullibility. It was expected that gullibility would be positively correlated with trust and agreeableness, and negatively correlated with Machiavellianism and social intelligence. Based on the findings of Study 1, trust was only expected to be correlated with the Gullibility Scale Trust factor.

Method

Participants

This study included two samples: a student sample, and a community sample via the same online research forums as Study 1 (e.g., Psychological Research on the Net, The Inquisitive Mind, and Online Psychology Research. See Appendix A for the full list as well as the advertisement). The student sample included 248 undergraduates enrolled in an introductory psychology unit at Macquarie University. Of the original sample, five

participants were excluded due to incomplete data. A further twelve cases were excluded on the basis of the response to the honesty and attentiveness check items. The mean age of the remaining 231 participants was 20.59 years ($SD = 5.35$ years) and ranged from 17 to 53 years. There were 36 males and 195 females.

Participants in the community sample were 152 people who found the study via online psychology research forums and social media networks. Of the original sample, 28 cases were excluded due to incomplete data and a further 30 cases were removed on the basis of response to the honesty and attentiveness check items. The mean age of the remaining 94 participants was 31.96 years ($SD = 14.51$ years) and ranged from 16 to 71 years. There were 23 males and 71 females. 57.4% were from Australia, 29.8% were from the United States of America, 5.3% were from the United Kingdom, and the remainder came from countries such as Singapore, Canada, India, Sweden, South Africa, and New Zealand.

The two samples were examined for significant differences in gullibility prior to combining them. On average, the student sample had higher scores in gullibility ($M = 126.25$, $SD = 21.49$), than those participants in the community sample ($M = 116.64$, $SD = 24.78$). This difference was significant, $t(323) = 3.49$, $p = .001$, and was approaching a medium effect size, $d = .41$. In spite of this, the samples were combined in order to achieve the minimum amount of participants needed for factor analysis. The two samples (undergraduate and community) were combined for the analyses in Study 2 to produce a total of 325 participants (266 women), with a mean age of 23.88 years ($SD = 10.36$ years). This sample was considered sufficient for factor analysis, with at least five participants per variable measured (Fabrigar et al., 1999) and the sample was over 300 participants (Field, 2013; Tabachnick & Fidell, 2007).

Materials and Procedure

This study was approved by the Human Research Ethics Committee at Macquarie University (Reference Number: 5201500596). Respondents gave informed consent (see Appendix I for the participant information and consent forms) and completed all measures online. For the student sample, the study was advertised on a departmental online psychology participation site in which students clicked on the link, completed the survey online, and were granted course credit for their participation. For the community sample, the study was posted online in six different forums dedicated to advertising psychology research as well as on various social media forums (the same research forums were utilised as in Study 1, see Appendix A). Again, participants clicked on the link, provided consent, and completed the survey.

First, participants were presented with the ethics information and asked to give informed consent. The scales were all presented randomly and items within each scale were randomised. After completing the scales, the honesty check item and demographic questions were presented.

Gullibility. To assess gullibility, the reduced 35-item version of the Gullibility Scale used in Study 1 was used (see Appendix H for the reduced scale). The possible range of scores fell between 35 and 245, with higher scores indicating higher levels of gullibility. These 35 items produced a reliable scale ($\alpha = 0.88$).

Honesty and Attentiveness Check. Four additional items were presented with the Gullibility Scale in an effort to detect acquiescent and inattentive responding (see the items 8, 16, 24, and 32 in Appendix H). These were identical to the ones used in Study 1. In addition, at the end of the survey, a single honesty check item was presented whereby participants were asked “*Overall, I tried to answer these questionnaires honestly*” and had to respond either “yes” or “no”. This was an alteration from Study 1. In Study 1, participants had to respond on

a 7-point Likert-style scale to this question. By making the response option a binary, there was less room for error or confusion for the participants. Participants who had two or more errors on these four attentiveness items were excluded.

Trust. The 25-item Interpersonal Trust Scale (ITS; Rotter, 1967) was used to assess individual differences in trust (see Appendix J for the ITS). Respondents were asked to rate their level of agreement with each statement on a 5-point Likert-style scale ranging from 1 (*strongly agree*) to 5 (*strongly disagree*). The possible range of scores fell between 25 and 125. Example items include; “*In dealing with strangers one is better off to be cautious until they have provided evidence that they are trustworthy*” and “*Most elected officials are really sincere in their campaign promises*”. Of the 25 items, 13 items were reverse scored. For this study, the ITS was scored so that higher scores indicated higher levels of trust. Rotter (1967) reported a Cronbach’s $\alpha = .76$; in the present study the scale was considered reliable ($\alpha = .78$).

Agreeableness. The 10-item Agreeableness Scale from Goldberg’s International Personality Item Pool (Goldberg et al., 2006; IPIP, 2015, see Appendix K) was used to assess agreeableness. Agreeableness is a disposition which emphasises conformity, an avoidance of violating social norms or upsetting people, and a compliance with social expectations (Bègue et al., 2014). Participants were asked to rate their agreement with each statement on a 5-point Likert-style scale ranging from 1 (*inaccurate*) to 5 (*accurate*) where higher scores indicated greater agreeableness. The possible range of scores fell between 10 and 50. Example items include; “*Accept people as they are*” and “*Insult people.*” Of the 10 items, five were reverse scored. Cronbach’s alphas have been reported as $\alpha = 0.77$ (IPIP, 2015). In the present study the Agreeableness Scale was considered reliable ($\alpha = 0.81$).

Machiavellianism. The Machiavellian Personality Scale (MPS; Dahling et al., 2008) was used to assess Machiavellianism. A Machiavellian is someone who endorses a cynical, untrustworthy view of human nature, is willing to manipulate others, and act amorally to

achieve his or her goals (Christie & Geis, 1970; Dahling et al., 2008). The MPS is a 16-item scale (see Appendix L) wherein participants are asked to rate their agreement with each statement on a 5-point Likert-style scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), where higher scores indicate higher levels of Machiavellianism. The possible range of scores fell between 16 and 80. Example items include: “*I am willing to be unethical if I believe it will help me succeed*” and “*I enjoy being able to control the situation.*” Past Cronbach’s alphas have been reported as $\alpha = 0.82$ (Dahling et al., 2008). In the present study the MPS was considered reliable ($\alpha = 0.87$).

Social Intelligence. The 21-item English version (Grieve & Mahar, 2013) of the Tromsø Social Intelligence Scale (TSIS; Silvera, Martinussen, & Dahl, 2001) was used to assess social intelligence (see Appendix M for the TSIS). As mentioned earlier, social intelligence is considered as a person’s ability to make accurate social inferences based upon interpretation of social information (Grieve & Mahar, 2013). The TSIS consists of three components; Social Information Processing, Social Skills, and Social Awareness. Participants were asked to indicate how true each statement was on a 7-point Likert-style scale ranging from 1 (*describes me poorly*) to 7 (*describes me well*), where higher scores indicated higher levels of social intelligence. The possible range of scores fell between 21 and 147. Example items include: “*I can predict other peoples’ behaviour*” and “*Other people become angry with me without me being able to explain why*”. Cronbach’s alphas have been reported as $\alpha = 0.80$ for social information processing, $\alpha = 0.79$ for social skills, and $\alpha = 0.75$ for social awareness (Grieve & Mahar, 2013). In the present study, the Cronbach’s alphas were all considered reliable, with $\alpha = 0.83$ for social information processing, $\alpha = 0.88$ for social skills, and $\alpha = 0.74$ for social awareness.

Demographic questions. Demographic information on age, gender, country of residence, and socio-economic status (including household income and education) were

collected at the end of the survey (see Appendix N for demographic and socio-economic status items).

Overview of the Analyses

The descriptive statistics and the reliability of the Gullibility Scale were calculated with SPSS (version 21.0), whereas the confirmatory factor analysis was conducted with Analysis of Moment Structures (AMOS; version 21.0). In this study three models were tested: a common factor model (wherein all the items loaded onto a single latent construct), a four-factor model (wherein the four a priori factors of Persuadable, Trust, Unassertive, and Unsuspecting were allowed to freely covary), and an a priori hierarchical model (wherein the four latent constructs loaded onto the superordinate construct of Gullibility). The hierarchical model is of particular theoretical interest as it is anticipated that the dimensions of gullibility will be highly interrelated and share similar antecedents and consequences (MacKenzie, Podsakoff, & Jarvis, 2005).

Results

Data Preparation

A correlation matrix of all 35 items was examined for cases of multicollinearity or singularity. Tabachnick and Fidell (2007) state that a correlation above .90 suggests multicollinearity and none of the correlations exceeded .7.

Confirmatory Factor Analysis

A number of goodness-of-fit indices were used. The χ^2 (chi-square) goodness-of-fit statistic assesses the proposed model against the alternative that the variables are simply correlated by chance (Bentler & Bonett, 1980). Failing to reject this test would suggest that the residual covariance estimate equals a matrix that contains only zeros – a sign of perfect model specification (Socha, Cooper, & Mccord, 2010). Therefore, a rejection of this test (i.e., a significant *p*-value) would indicate a poor model fit. However, this test is sensitive to

sample size, with large samples more likely to result in a false rejection of the null hypothesis (Bentler & Bonett, 1980). Due to this sensitivity, some have suggested that taking a ratio of the χ^2 to the degrees of freedom to minimise the effect of sample size. Wheaton, Muthen, Alwin, and Summers (1977) recommend a figure of five or less for this ratio, whereas Tabachnick and Fidell (2007) are more stringent, recommending a figure of less than two as appropriate.

Other measures of goodness-of-fit included in this analysis were the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA). Both CFI and TLI range from zero to one and higher values generally represent a better model fit (Socha et al., 2010). Hu and Bentler (1999) recommend that values above .95 are sufficient for a well-fitting model. The RMSEA statistic estimates how well the covariances can be replicated from the model parameters (Socha et al., 2010). It also ranges from zero to one, but here lower values represent a better model fit, with values below .06 deemed acceptable (Hu & Bentler, 1999).

When comparing nested models, it is appropriate to use the difference in χ^2 tests. However some of the models tested are non-nested e.g., the four factor model. Therefore, in order to compare the goodness-of-fit, an information theory-based criteria will be used. The Akaike Information Criterion (AIC) is a measure of fit that includes a parsimony adjustment, that is, it penalises a model for having more variables (Akaike, 1974; Field, 2013; Tabachnick & Fidell, 2007). Smaller values suggest a better fitting and more parsimonious model (Akaike, 1974; Tabachnick & Fidell, 2007).

Table 5 presents the goodness-of-fit indices for the models tested. The χ^2 statistic was significant (with $p < .0005$) for all the models. However, as mentioned earlier, this test is sensitive to sample size. First, the common factor model was tested, wherein all the 35 items were constrained to a single latent factor, and this model did not fit the data well. Although

the model's ratio of χ^2 to the degrees of freedom was less than five, not all the items had significant loadings onto the one latent variable. Overall, the common factor model was not a good fit for the data and provided further evidence to suggest that gullibility is comprised of more than one latent factor.

Table 5

Fit Indices for Various Models

Model	χ^2	df	χ^2/df	RMSEA	CFI	TLI	AIC
Common factor model	2512.32*	560	4.49	.10	.60	.58	2652.32
Common factor model (minus trust)	797.66*	252	3.17	.08	.84	.83	893.66
Four-factor model	1170.22*	554	2.11	.06	.87	.86	1322.22
Four-factor model with MI	1090.76*	551	1.98	.06	.89	.88	1248.76
Four-factor model (minus trust)	495.56*	249	1.99	.06	.92	.93	597.56
Four-factor model with MI (minus trust)	416.35*	246	1.69	.05	.94	.95	524.35
Hierarchical model	1185.40*	556	2.13	.06	.87	.86	1333.40
Hierarchical model with MI	1106.05*	553	2.00	.06	.89	.88	1260.05
Hierarchical model with MI minus trust	416.35*	246	1.70	.05	.95	.94	524.35

Note. * $p < .0005$, MI = Modification Indices, RMSEA = Root Mean Square Error of

Approximation, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index, AIC = Akaike Information Criterion

Next, the four-factor model was tested. The AIC was almost half that of the common factor model, indicating a better fit. The ratio of χ^2 to the degrees of freedom was less than five, RMSEA was .06, and the goodness-of-fit indices were closer to the minimum .95 cutoff

(CFI = .87, TLI = .86). In addition, all the items had significant loadings onto the latent variables (see Appendix O, Table 9 for the standardised factor loadings). Overall, this model fit the data better than the common factor model.

The AIC for the a priori hierarchical model was less than the common factor model by almost half. This model's fit was very similar to the initial four factor model, with the ratio of χ^2 to the degrees of freedom at less than five (RMSEA = .06, CFI = .87, TLI = .86). In addition, all the items loaded onto the latent variables significantly (see Appendix O, Table 10 for the standardised factor loadings). As this model was the model of interest, based on the theoretical understanding of gullibility as a latent construct with reflective indicators (MacKenzie et al., 2005), the modification indices were examined in order to improve model fit. These indices suggested that model fit can be improved by adding paths, or covariances, between residuals. This process essentially correlates parts of the dependent variables that are not predicted by the independent variables (Tabachnick & Fidell, 2007).

Examining the modification indices, three covariances were added to the model as they were considered outliers. The three covariances were at least 9.8 points above the next modification index that did not crossload onto another latent variable. The first covariance (modification index = 25.4) was between the residuals of G9 (*I'm pretty good at working out when someone is trying to fool me*) and G15 (*I'm usually quick to notice when someone is trying to cheat me*). The second covariance (modification index = 21.4) was between the residuals of G20 (*My family thinks I am an easy target for scammers*) and G2 (*If anyone is likely to fall for a scam, it's me*). The third covariance (modification index = 23.0) was between the residuals of G20 (*My family think I am an easy target for scammers*) and G23 (*My family thinks I am easily led*). Considering these outcomes, it was suggested that the covariance of these items was not accounted for by their latent gullibility, but rather due to the

overlapping content of the items. Adding these covariances to the model slightly improved the model fit (RMSEA = .06, CFI = .89, TLI = .88).

Removal of the Trust factor. Although the hierarchical model with modification indices fit the data well, the standardised regression weight of Gullibility to the Trust factor was low ($r = .08$) compared to the other three factors (Gullibility to Unsuspecting $r = .73$, Gullibility to Unassertive $r = .50$, Gullibility to Persuadable $r = 1.17$). Furthermore, the factor loading of the Trust factor onto Gullibility was not significant and after removing the Trust factor and its associated items, the AIC was much lower (AIC = 524.35) than the hierarchical model with the Trust factor included (AIC = 1260.05). The ratio of χ^2 to the degrees of freedom was less than two. The remaining goodness-of-fit indices were at or just below the cutoff of .95 (CFI = .95, TLI = .94) and an RMSEA of below .06. This final model, (see Figure 1 for the model and Table 6 for the items) fit the data well. Consistent with the results of Study 1, the Trust factor did not relate strongly to the remaining three factors of the Gullibility scale. As the Trust factor items did not improve the model fit, while adding unnecessary level of complexity to the model, the Trust items were removed from the Gullibility Scale.

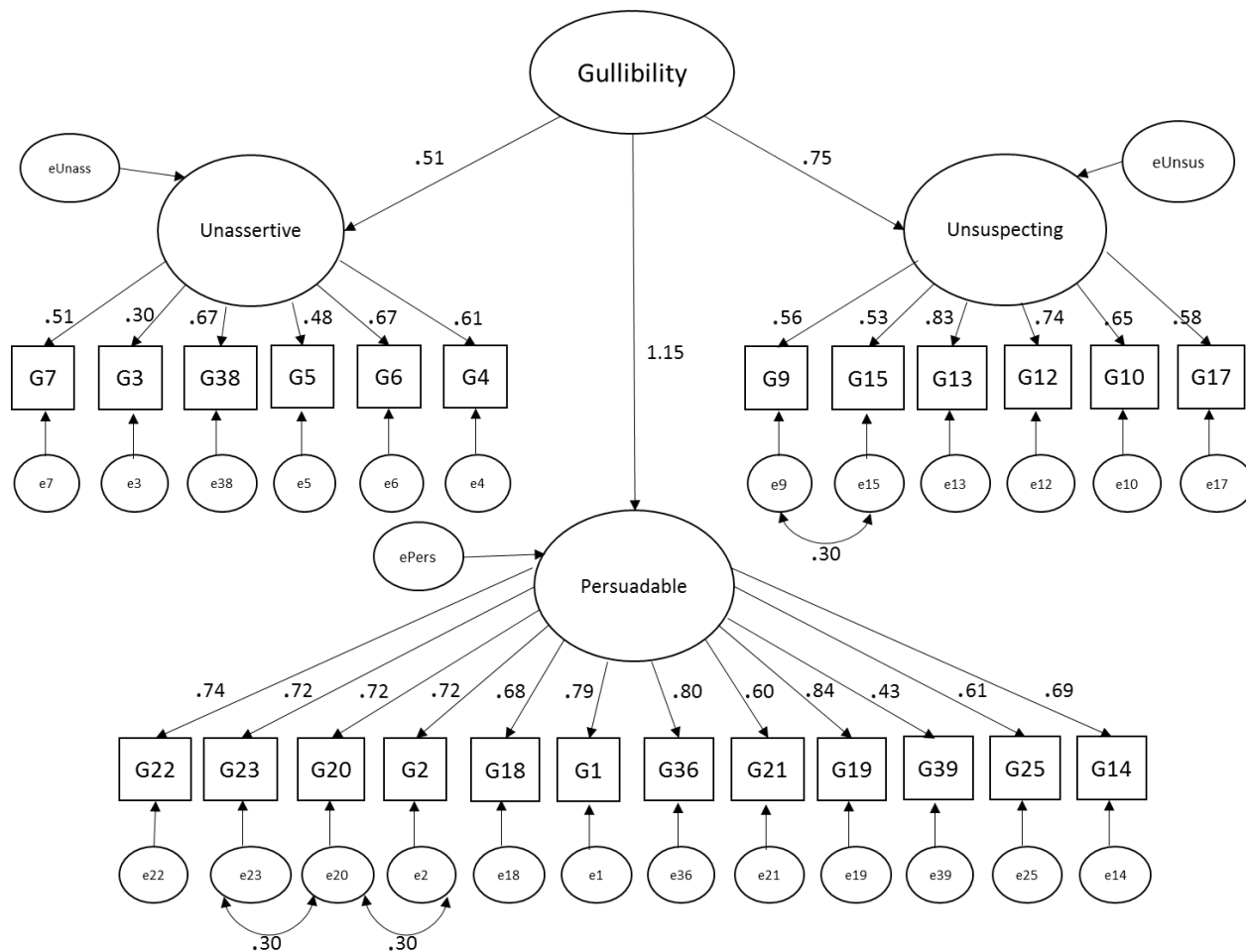


Figure 1. Model of the Gullibility Scale with the standardised regression weights

Table 6

Item Descriptions

Unsuspecting	G9	I'm pretty good at working out when someone is trying to fool me*
	G10	I'm not that good at reading the signs that someone is trying to manipulate me
	G12	I'm pretty poor at working out if someone is tricking me
	G13	It usually takes me a while to 'catch on' when someone is deceiving me
	G15	I'm usually quick to notice when someone is trying to cheat me*
	G17	I quickly realise when someone is pulling my leg*
Unassertive	G3	I have been persuaded to make donations to charities when I couldn't really afford it
	G4	I am often put in a situation where I have to pay for others
	G5	I usually offer to pay for others, even when I don't have much money
	G6	People often take advantage of my generosity
	G7	I often end up doing other people's work

	G38	People often use me to get what they want
Persuadable	G1	I guess I am more gullible than the average person
	G2	If anyone is likely to fall for a scam, it's me
	G14	I often fall for things when I should know better
	G18	I am probably a little too quick to believe others
	G19	My friends think I'm easily fooled
	G20	My family think I am an easy target for scammers
	G21	My friends think I'm too trusting
	G22	People think I'm a little naïve
	G23	My family thinks I am easily led
	G25	People say I will agree to anything
	G36	Overall, I'm pretty easily manipulated
	G39	When debating an idea, I am easily convinced of another person's point of view

Descriptive and Demographic Data

After removing the items that loaded onto the Trust factor, the Gullibility Scale now consisted of 24 items. The new Cronbach's alpha increased to $\alpha = .91$. A histogram of the 24-item Gullibility Scale (see Appendix P for the histogram) revealed that the scale responses were normally distributed. Furthermore, the standardised kurtosis of the Gullibility Scale (calculated by dividing the kurtosis statistic by its standard error) and the standardised skew (calculated the same way) did not exceed 1.96 (McQueen & Knussen, 2006) indicating a mesokurtic and normal distribution (see Table 8). The Shapiro-Wilk test of normality (see appendix P) was not significant, indicating that the distribution did not significantly differ from a normal distribution. The three factors were all normally distributed and mesokurtic (see Table 7 and Appendix P). The means and standard deviations for Gullibility and the three factors are displayed in Table 8. There were no gender differences in total Gullibility as well as for each of the three factors.

Table 7

Summary of Descriptive Statistics for Gullibility Scale and Three Factors

				Skewness		Kurtosis	
	N	Mean	SD	Statistic	SE	Statistic	SE
Gullibility							
Male	59	80.19	17.02				
Female	266	80.65	20.96				
Total	325	80.55	20.28	.198	.135	-.183	.270
Persuadable							
Male	59	37.54	10.33				
Female	266	38.62	13.86				
Total	325	38.42	13.30	.399	.135	-.191	.270
Unassertive							
Male	59	22.08	6.21				
Female	266	21.41	6.11				
Total	325	21.54	6.12	.154	.135	-.375	.270
Unsuspecting							
Male	59	18.86	5.76				
Female	266	18.72	5.91				
Total	325	18.74	5.87	.297	.135	.014	.270

Note. SD = Standard Deviations, SE = Standard Error

Intercorrelations

Table 8 presents the intercorrelations between the Gullibility Scale including the Trust factor and the Gullibility Scale excluding the Trust factor with the other the three factors of the Gullibility scale, as well as the other personality measures. The relationship of the Trust factor alone to the other variables is not included in Table 9. The relationship of the Trust factor with the other personality measures were all significant; Interpersonal Trust Scale, ($r = .620, p < .0005$), the Machiavellian Personality Scale ($r = -.524, p < .0005$), the Agreeableness scale ($r = .572, p < .0005$), Social Skills ($r = .310, p < .0005$), Social Awareness ($r = .399, p < .0005$), and Social Information Processing ($r = .133, p = .016$).

However, the Trust factor did not significantly correlate with the other three factors of the model; Persuadable ($r = .061, p = .272$), Unassertive ($r = -.097, p = .080$), and Unsuspecting ($r = .056, p = .314$). The strongest significant correlation between the factors was between the Persuadable factor with the Unsuspecting factor ($r = .71, p < .0005$). It is noteworthy that the correlation of the Persuadability factor with the Gullibility Scale is strong and significant ($r = .96, p < .0005$). This could be in part due to the fact that the half of the 24-item Gullibility Scale comprises of the 12 Persuadability items, inflating the correlation.

Table 8

Factor Correlation Matrix

	Gullibility Scale	Persuadable	Unassertive	Unsuspecting	Agree	MPS	ITS	SIP	SS	SA
Gullibility Scale	-	.957**	.681**	.758**	.133*	.073	-.046	-.135*	-.122*	-.313**
Persuadable	.875**	-	.494**	.712**	.138*	.043	-.015	-.140*	-.119*	-.267**
Unassertive	.561**	.494**	-	.277**	.043	.162*	-.140*	.059	-.005	-.285**
Unsuspecting	.697**	.712**	.277**	-	.113*	-.041	.069	-.325**	-.182*	-.279**
Agree	.370**	.138*	.043	.113*	-	-.526**	.448**	.290**	.289**	.390**
MPS	-.166**	.043	.162*	-.041	-.526**	-	-.442**	-.038	-.233**	-.454**
ITS	.233**	-.015	-.140*	.069	.448**	-.442**	-	.037	.198**	.305**
SIP	-.061	-.140*	.059	-.325**	.290**	-.038	.037	-	.447**	.400**
SS	.029	-.119*	-.005	-.182*	.289**	-.233**	.198**	.447**	-	.451**
SA	-.102	-.267**	-.285**	-.279**	.390**	-.454**	.305**	.400**	.451**	-

Note. Correlations above the diagonal line are from the 3-factor Gullibility scale and correlations below the diagonal are from the 4-factor

gullibility scale (i.e., including the Trust factor), * $p < .05$, ** $p < .0005$, Agree = Agreeableness Scale, MPS = Machiavellian Personality Scale, ITS = Interpersonal Trust Scale, SIP = Social Information Processing, SS = Social Skills, SA = Social Awareness

In terms of evidence for construct validity, the results were mixed. Consistent with expectations, when the Trust factor was removed from the Gullibility Scale, Interpersonal Trust was not correlated with gullibility. It was also expected that the Gullibility Scale would be positively correlated with agreeableness. The results indicated that there was a weak, significant, and positive relationship between the Agreeableness Scale and the Gullibility Scale, providing some preliminary evidence for convergent validity.

Furthermore, it was expected that the Gullibility Scale would negatively correlate with the Machiavellian Personality Scale and the Tromsø Social Intelligence Scale. There was no significant relationship between the Gullibility Scale and the Machiavellian Personality Scale. However, the social intelligence subscales had weak to moderate negative relationship with the Gullibility Scale. Social Awareness had the strongest relationship with the Gullibility Scale. Of the three factors, the Unsuspecting factor had the strongest negative relationship with the three social intelligence subscales, with the relationship between Unsuspecting factor and Social Information Processing being the strongest.

Discussion

This study had two aims: to determine which model would fit the data best and to provide some preliminary evidence for construct validity. Study 2 confirmed that the Gullibility Scale had a factorial structure comprising of Persuadable, Trust, Unassertive, and Unsuspecting factors. However, as found in Study 1, the Trust subscale was not strongly associated with the remaining Gullibility subscales. Moreover, the model of best fit was produced by excluding the trust items from the Gullibility scale. With the trust subscale items removed, the Gullibility Scale comprised of 24 items with three subscales. Overall, gullibility was associated with higher levels of agreeableness and lower levels of social intelligence. There was no significant relationship between gullibility and Machiavellianism, or gullibility and trust.

As in Study 1, the Trust factor was only weakly related to the other three factors of the Gullibility scale. However, the Trust factor was strongly and positively related to the Interpersonal Trust Scale (Rotter, 1967), indicating that those items were most likely measuring trust. Removing the Trust factor from the Gullibility Scale meant that gullibility no longer correlated with the Interpersonal Trust Scale (Rotter, 1967). This is further evidence that trust and gullibility are not conceptually related. However, there was a weak, significant, and positive relationship between the Gullibility Scale and the Agreeableness Scale. Bègue et al. (2014) found a positive relationship between agreeableness and compliance. If there is a compliance element inherent within gullibility, then this may be what the Agreeableness scale is correlating with. However, as the relationship was weak, this suggests that, although there may be a compliance element to gullibility, it is not central to the concept. Thus, the belief motivating the behaviour is likely to be more important.

The relationship between the Gullibility Scale and Machiavellianism was not significant, weakening the evidence for construct validity. But considering the relationship between trust (both the Trust factor and the Interpersonal Trust Scale) and Machiavellianism was negative and strong, removing the trust items would naturally weaken the relationship between Machiavellianism and gullibility. Perhaps the elements of Machiavellianism that are not related to trust would have a stronger relationship with gullibility. However, this is something future research should determine.

The relationship between the Gullibility Scale and the social intelligence subscales was weak to moderate and negative. The strongest relationship was between the Gullibility Scale and the Social Awareness subscale. The Social Awareness subscale focusses on a person's understanding and awareness of social interactions (Grieve & Mahar, 2013). Logically, the lower a person's ability on this facet of social intelligence the higher his or her gullibility. This correlation provides evidence for the construct validity of the Gullibility

Scale. Furthermore, the Unsuspecting factor had a moderate, and negative relationship with the Social Information Processing subscale. The Social Information Processing subscale measures a person's ability to deal with social information (Grieve & Mahar, 2013; Silvera et al., 2001). An inability to correctly process social information seems to be very similar to the inability, or unwillingness, to perceive cues of untrustworthiness (i.e., to be unsuspecting or not sceptical), except that the ability may be broad in scope, rather than specifically related to untrustworthiness detection. Therefore, this moderate relationship between them is logical and provides further evidence for convergent validity.

Finally, it is worth noting that one factor of the scale, Persuadability, had a significant and strong correlation with the Gullibility Scale. Although this could be attributed to the fact that half of the Gullibility Scale's items were purely from that factor thereby inflating the correlation coefficient, it could also suggest that this subscale alone could measure gullibility. This would need to be investigated in future research.

General Discussion

This study aimed to create a reliable self-report scale for gullibility. This was achieved through two studies. Study 1 used exploratory factor analysis to discover the underlying factor structure of a pool of gullibility items. Study 2 refined the factor structure using confirmatory factor analysis and investigated personality correlates of the new scale. The final 24-item Gullibility Scale comprises three factors – Persuadable, Unassertive, and Unsuspecting – and was associated with higher levels of agreeableness and lower levels of social intelligence. Gullibility was not related to Machiavellianism or Trust.

According to the current study, trust was not related to gullibility. As mentioned earlier, common usage tends to equate gullibility with trust, but a number of studies (Rotter, 1967; Yamagishi et al., 1999) have found that this is not the case. If trust is considered a generalised expectancy held by individuals or groups that another party can be relied upon

(Rotter, 1967), or that others will not knowingly act in a detrimental way towards our interests (Hardin, 2001; Sturgis et al., 2010), then it should be independent of our ability to detect cues of untrustworthiness (Yamagishi et al., 1999). The present study found that the relationship between gullibility and trust was weak at best. Therefore, the ability or willingness to accept a premise (either with or without the presence of untrustworthiness cues) may not be related to a person's generalised expectancy of other people's reliability.

Finding that the scale was composed of three factors differs from the result obtained by Pinsker et al. (2011), who found only two factors in the Social Vulnerability Scale: Gullibility and Credulity. They defined the Gullibility factor through behavioural examples whereas the Credulity factor was purely based on beliefs. This was influenced by Greenspan's (Greenspan et al., 2001; Greenspan, 2009a) definition of the concept. Re-examining the factors in this study, it could be argued that the Unassertive factor consists of behaviours and the Persuadable factor consists of beliefs. However, the Unsuspecting factor does not fall cleanly on either side of that distinction. Furthermore, as argued earlier, considering gullibility purely in terms of behaviours does not easily distinguish it from compliance behaviours. The underlying motivation for a behaviour should be due to the belief in the notion presented in order for it to be considered gullible. However, a similarity between the Social Vulnerability Scale (Pinsker et al., 2011) and the present Gullibility scale is that neither measures contain items pertaining to trust. This is further evidence that suggest a person's disposition to trust may not be related to his or her ability to detect cues of untrustworthiness.

Strengths and Limitations

The strengths of the current study include the diversity of its sample (i.e., it encompasses both university students and members of the community), its use of both exploratory and confirmatory factor analysis, and the novelty of its findings. However, despite these strengths, the evidence for construct validity was weak and only preliminary, a

potential limitation of the current study. Future research will need to validate this scale, especially against measures of Emotional Intelligence, Social Vulnerability, Theory of Mind, or other social intelligence scales. Similarly, future research could provide evidence for criterion validity. In order to test criterion validity both within and outside of the laboratory, a behavioural measure of gullibility should be developed and compared with scores on the Gullibility Scale. For example, inducing motivation-states within participants (e.g., need to belong) and examining if this increases their likelihood to believe a false article on ways to be more popular or gain more friends by performing an implausible and unrelated task. Therefore, participants' scores on the Gullibility Scale could be compared with the behavioural measure to provide evidence for criterion validity.

Conclusion

In conclusion, this study aimed to create a valid and reliable self-report measure of gullibility. A reliable 24-item gullibility scale, comprising of three factors, was created. The three factors of Persuadable, Unassertive, and Unsuspecting, were moderately to strongly intercorrelated, and the scale did not correlate with social desirability. Social intelligence had a moderate and negative relationship to gullibility, providing preliminary evidence for construct validity. Future research will have to determine the Gullibility Scale's predictive ability, as well as to validate it alongside other measures. However, the first step to understanding this construct in a new and comprehensive way has been taken. Hopefully, this tool will be used to inspire much needed research into gullibility in the future, potentially enabling us to one day decrease the large numbers of people who fall victim to various scams.

References

- Akaike, H. (1974). A new look at the statistical model identification. *IEEE Transactions on Automatic Control*, 19(6), 716–723. <http://doi.org/10.1109/TAC.1974.1100705>
- Australian Competition & Consumer Commission. (2014a). Money transfer requests ('Nigerian' scams). Retrieved August 19, 2014, from <http://www.scamwatch.gov.au/content/index.phtml/tag/moneytransferrequests>
- Australian Competition & Consumer Commission. (2014b). *Targeting scams: Report of the ACCC on scam activity 2014*. Retrieved from <http://www.accc.gov.au/publications/targeting-scams-report-on-scam-activity/targeting-scams-report-of-the-accc-on-scam-activity-2014>
- Barnes, M. L., & Sternberg, R. J. (1989). Social intelligence and decoding of nonverbal cues. *Intelligence*, 13(3), 263–287. [http://doi.org/10.1016/0160-2896\(89\)90022-6](http://doi.org/10.1016/0160-2896(89)90022-6)
- Baron-Cohen, S. (2001). Theory of Mind in normal development and Autism. *Prisme*, 34, 174–183. Retrieved from <http://www.autism-community.com/wp-content/uploads/2010/11/TOM-in-TD-and-ASD.pdf>
- Baron-Cohen, S., Ring, H. A., Wheelwright, S., Bullmore, E. T., Brammer, M. J., Simmons, A., & Williams, S. C. R. (1999). Social intelligence in the normal and autistic brain: An fMRI study. *European Journal of Neuroscience*, 11(6), 1891–1898. <http://doi.org/10.1046/j.1460-9568.1999.00621.x>
- Baron-Cohen, S., Wheelwright, S., Skinner, R., Martin, J., & Clubley, E. (2001). The Autism-Spectrum Quotient (AQ): Evidence from Asperger Syndrome/High-Functioning Autism, males and females, scientists and mathematicians. *Journal of Autism and Developmental Disorders*, 31(1), 5–17. <http://doi.org/10.1023/A:1005653411471>
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal

- attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497–529. <http://doi.org/10.1037/0033-2909.117.3.497>
- BBC News. (2006). Britons report “psychic powers.” Retrieved July 20, 2015, from http://news.bbc.co.uk/2/hi/uk_news/5017910.stm
- Bègue, L., Beauvois, J.-L., Courbet, D., Oberlé, D., Lepage, J., & Duke, A. A. (2014). Personality predicts obedience in a Milgram paradigm. *Journal of Personality*, 1–8. <http://doi.org/10.1111/jopy.12104>
- Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, 88(3), 588–606. <http://doi.org/10.1037/0033-2909.88.3.588>
- Bond, C. F., & DePaulo, B. M. (2006). Accuracy of deception judgments. *Personality and Social Psychology Review : An Official Journal of the Society for Personality and Social Psychology, Inc*, 10(3), 214–2134. http://doi.org/10.1207/s15327957pspr1003_2
- Bracchi, P. (2011). The village ruined by the most gullible man in Britain: Incredible story of the chartered surveyor, an email pledging a £3m lotto win and the neighbours impoverished in a web of sheer greed. Retrieved August 3, 2015, from <http://www.dailymail.co.uk/news/article-2078292/The-village-ruined-gullible-man-Britain-Incredible-story-chartered-surveyor-email-pledging-3m-lotto-win-neighbours-impoverished-web-sheer-greed.html>
- Brown, L. T., & Anthony, R. G. (1990). Continuing the search for social intelligence. *Personality and Individual Differences*, 11(5), 463–470. [http://doi.org/10.1016/0191-8869\(90\)90059-Z](http://doi.org/10.1016/0191-8869(90)90059-Z)
- Carrier, N. A. (1963). Need correlates of “gullibility.” *The Journal of Abnormal and Social Psychology*, 66(1), 84–86. <http://doi.org/10.1037/h0041316>

- Carter, N. L., & Weber, J. M. (2010). Not Pollyannas: Higher generalized trust predicts lie detection ability. *Social Psychological and Personality Science*, 1(3), 274–279.
<http://doi.org/10.1177/1948550609360261>
- Case, T. I., Fitness, J., Cairns, D. R., & Stevenson, R. J. (2004). Coping with uncertainty: Superstitious strategies and secondary control. *Journal of Applied Social Psychology*, 34(4), 848–871. <http://doi.org/10.1111/j.1559-1816.2004.tb02574.x>
- Christie, R., & Geis, F. L. (1970). *Studies in Machiavellianism*. New York: Academic Press.
- Christman, S. D., Henning, B. R., Geers, A. L., Propper, R. E., & Niebauer, C. L. (2008). Mixed-handed persons are more easily persuaded and are more gullible: Interhemispheric interaction and belief updating. *Laterality*, 13(5), 403–426.
<http://doi.org/10.1080/13576500802079646>
- Cialdini, R. B. (2001). *Influence: Science and practice* (4th ed.). Boston MA: Allyn and Bacon.
- Cooper, A., & Petrides, K. V. (2010). A psychometric analysis of the Trait Emotional Intelligence Questionnaire-Short Form (TEIQue-SF) using item response theory. *Journal of Personality Assessment*, 92(5), 449–57. <http://doi.org/10.1080/00223891.2010.497426>
- Cosgrove-Mather, B. (2002). Poll: Most believe in psychic phenomena. Retrieved July 20, 2015, from <http://www.cbsnews.com/news/poll-most-believe-in-psychic-phenomena/>
- Cosmides, L., Barrett, H. C., & Tooby, J. (2010). Adaptive specializations, social exchange, and the evolution of human intelligence. *Proceedings of the National Academy of Sciences*, 107(Supplement 2), 9007–9014. <http://doi.org/10.1073/pnas.0914623107>
- Cosmides, L., & Tooby, J. (2005). Neurocognitive adaptations designed for social exchange. In D. M. Buss (Ed.), *The Handbook of Evolutionary Psychology* (pp. 584–627). Hoboken, New Jersey: John Wiley & Sons. Retrieved from

<http://www.psych.ucsb.edu/research/cep/papers/20finalbusssosexweb.pdf>

Crowne, D. P., & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology*, 24, 349–354.

<http://doi.org/10.1037/h0047358>

Dahling, J. J., Whitaker, B. G., & Levy, P. E. (2008). The development and validation of a new Machiavellianism scale. *Journal of Management*, 35(2), 219–257.

<http://doi.org/10.1177/0149206308318618>

Danziger, S., Levav, J., & Avnaim-Pesso, L. (2011). Extraneous factors in judicial decisions.

Proceedings of the National Academy of Sciences of the United States of America,

108(17), 6889–6892. <http://doi.org/10.1073/pnas.1112190108>

Dickson, D. H., & Kelly, I. W. (1985). The “Barnum Effect” in personality assessment: A review of the literature. *Psychological Reports*, 57(2), 367–382.

<http://doi.org/10.2466/pr0.1985.57.2.367>

Driskell, J. E. (2012). Effectiveness of deception detection training: A meta-analysis.

Psychology, Crime & Law, 18(March 2015), 713–731.

<http://doi.org/10.1080/1068316X.2010.535820>

Dudley, R. T. (2002). Order effects in research on paranormal belief. *Psychological Reports*,

90(2), 665–666. <http://doi.org/10.2466/pr0.2002.90.2.665>

Ekman, P. (1992). *Telling lies: Clues to deceit in the marketplace, politics, and marriage*.

London: W.W. Norton & Company.

Emme, E. E. (1940). Modification and origin of certain beliefs in superstition among 96 college students. *The Journal of Psychology*, 10(2), 279–291.

<http://doi.org/10.1080/00223980.1940.9917004>

Epley, N., & Gilovich, T. (2006). The anchoring-and-adjustment heuristic: Why the

adjustments are insufficient. *Psychological Science*, 17(4), 311–318.

<http://doi.org/10.1111/j.1467-9280.2006.01704.x>

Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, 4(3), 272–299. <http://doi.org/10.1037/1082-989X.4.3.272>

Federal Bureau of Investigation Internet Crime Complaint Center. (2014). *2014 Internet Crime Report*. Retrieved from https://www.fbi.gov/news/news_blog/2014-ic3-annual-report

Fiddick, L., Cosmides, L., & Tooby, J. (2000). No interpretation without representation: The role of domain-specific representations and inferences in the Wason selection task. *Cognition*, 77(1), 1–79. [http://doi.org/10.1016/S0010-0277\(00\)00085-8](http://doi.org/10.1016/S0010-0277(00)00085-8)

Field, A. (2013). *Discovering statistics using IBM SPSS statistics : (and sex and drugs and rock “n” roll)* (4th ed.). Los Angeles: Sage.

Fischer, P., Lea, S. E. G., & Evans, K. M. (2013). Why do individuals respond to fraudulent scam communications and lose money? The psychological determinants of scam compliance. *Journal of Applied Social Psychology*, 43, 2060–2072. <http://doi.org/10.1111/jasp.12158>

Ford, M. E., & Tisak, M. S. (1983). A further search for social intelligence. *Journal of Educational Psychology*, 75(2), 196–206. <http://doi.org/10.1037/0022-0663.75.2.196>

Forer, B. R. (1949). The fallacy of personal validation: A classroom demonstration of gullibility. *The Journal of Abnormal and Social Psychology*, 44(1), 118–123. <http://doi.org/10.1037/h0059240>

Frank, M. G., & Feeley, T. H. (2003). To catch a liar: Challenges for research in lie detection training. *Journal of Applied Communication Research*, 31(1), 58–75.

<http://doi.org/10.1080/00909880305377>

- Frank, M. G., & Svetieva, E. (2013). Deception. In D. Matsumoto, M. G. Frank, & H. S. Hwang (Eds.), *Nonverbal Communication: Science and Applications* (pp. 121–144). Sage.
- Furnham, A. (1989). Personality and the acceptance of diagnostic feedback. *Personality and Individual Differences*, 10(11), 1121–1133. [http://doi.org/10.1016/0191-8869\(89\)90075-5](http://doi.org/10.1016/0191-8869(89)90075-5)
- Furnham, A., & Schofield, S. (1987). Accepting personality test feedback: A review of the Barnum effect. *Current Psychology*, 6(2), 162–178. <http://doi.org/10.1007/BF02686623>
- Garrett, H. E., & Fisher, T. R. (1926). The prevalence of certain popular misconceptions. *Journal of Applied Psychology*, 10(4), 411–420. <http://doi.org/10.1037/h0074058>
- Gilbert, D. T., Pelham, B. W., & Krull, D. S. (1988). On cognitive busyness: When person perceivers meet persons perceived. *Journal of Personality and Social Psychology*, 54(5), 733–740. <http://doi.org/10.1037/0022-3514.54.5.733>
- Gilovich, T. (1983). Biased evaluation and persistence in gambling. *Journal of Personality and Social Psychology*, 44(6), 1110–1126. <http://doi.org/10.1037/0022-3514.44.6.1110>
- Gilovich, T., Vallone, R., & Tversky, A. (1985). The hot hand in basketball: On the misperception of random sequences. *Cognitive Psychology*, 17, 295–314. [http://doi.org/10.1016/0010-0285\(85\)90010-6](http://doi.org/10.1016/0010-0285(85)90010-6)
- Goldberg, L. R., Johnson, J. A., Eber, H. W., Hogan, R., Ashton, M. C., Cloninger, C. R., & Gough, H. G. (2006). The international personality item pool and the future of public-domain personality measures. *Journal of Research in Personality*, 40(1), 84–96. <http://doi.org/10.1016/j.jrp.2005.08.007>
- Greenspan, S. (2009a). *Annals of gullibility: Why we get duped and how to avoid it*. Westport,

Connecticut: Praeger Publishers.

Greenspan, S. (2009b). Foolish action in adults with intellectual disabilities: The forgotten problem of risk-unawareness. In L. M Glidden (Ed.), *International review of Research in Mental Retardation* (vol. 36, pp. 145–194). New York, Elsevier.
[http://doi.org/10.1016/S0074-7750\(08\)00005-0](http://doi.org/10.1016/S0074-7750(08)00005-0)

Greenspan, S., & Black, R. S. (2001). Credulity and gullibility in people with developmental disorders : A framework for future research. *International Review of Research in Mental Retardation*, 24, 101–135. [http://doi.org/10.1016/S0074-7750\(01\)80007-0](http://doi.org/10.1016/S0074-7750(01)80007-0)

Greenspan, S., Loughlin, G., & Black, R. (2001). Credulity and gullibility in people with developmental disorders: A framework for future research. *International Review of Research in Mental Retardation*, 24, 101–135. [http://doi.org/10.1016/S0074-7750\(01\)80007-0](http://doi.org/10.1016/S0074-7750(01)80007-0)

Greenspan, S., Switzky, H. N., & Woods, G. W. (2011). Intelligence involves risk-awareness and intellectual disability involves risk-unawareness: Implications of a theory of common sense. *Journal of Intellectual and Developmental Disability*, 36(December), 246–257. <http://doi.org/10.3109/13668250.2011.626759>

Grieve, R., & Mahar, D. (2013). Can social intelligence be measured? Psychometric properties of the Tromsø Social Intelligence Scale – English Version. *The Irish Journal of Psychology*, 34(1), 1–12. <http://doi.org/10.1080/03033910.2012.737758>

Grimmer, M. R., & White, K. D. (1990). The structure of paranormal beliefs among Australian psychology students. *The Journal of Psychology*, 124(4), 357–370.
<http://doi.org/10.1080/00223980.1990.10543231>

Grimmer, M. R., & White, K. D. (1992). Nonconventional beliefs among Australian science and nonscience students. *The Journal of Psychology*, 126(5), 521–528.

<http://doi.org/10.1080/00223980.1992.10543385>

Gurtman, M. B. (1992). Trust, distrust, and interpersonal problems: A circumplex analysis. *Journal of Personality and Social Psychology*, 62(6), 989–1002.

<http://doi.org/10.1037/0022-3514.62.6.989>

Hall, H. (2009). Alternative medicine: Top ten things you should know about alternative medicine. *Skeptic*. Retrieved from

http://www.skeptic.com/downloads/Alternative_Medicine_by_Harriet_Hall.pdf

Hardin, R. (2001). Conceptions and explanations of trust. In K. Cook (Ed.), *Trust in Society* (p. 432). New York: Russell Sage Foundation.

Hartwig, M., & Bond, C. F. (2011). Why do lie-catchers fail? A lens model meta-analysis of human lie judgments. *Psychological Bulletin*, 137(4), 643–659.

<http://doi.org/10.1037/a0023589>

Hartwig, M., & Bond, C. F. (2014). Lie detection from multiple cues: A meta-analysis.

Applied Cognitive Psychology, 676(July), 661–676. <http://doi.org/10.1002/acp.3052>

Herley, C. (2012). Why do Nigerian scammers say they are from Nigeria? *Workshop on the Economics of Information Security (WEIS)*. Retrieved from

ftp://ftp.fixme.ch/free_for_all/Ebook/Nigerian_Scammers.pdf

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure

analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55. <http://doi.org/10.1080/10705519909540118>

IPIP. (2015). International Personality Item Pool. Retrieved from <http://ipip.ori.org/>

Jeong, S. H., & Hwang, Y. (2012). Does multitasking increase or decrease persuasion?

Effects of multitasking on comprehension and counterarguing. *Journal of*

Communication, 62(4), 571–587. <http://doi.org/10.1111/j.1460-2466.2012.01659.x>

- Jonason, P. K., & Krause, L. (2013). The emotional deficits associated with the Dark Triad traits: Cognitive empathy, affective empathy, and alexithymia. *Personality and Individual Differences*, 55(5), 532–537. <http://doi.org/10.1016/j.paid.2013.04.027>
- Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, 39(1), 31–36. <http://doi.org/10.1007/BF02291575>
- Klein, W. M., & Kunda, Z. (1992). Motivated person perception: Constructing justifications for desired beliefs. *Journal of Experimental Social Psychology*, 28, 145–168. [http://doi.org/10.1016/0022-1031\(92\)90036-J](http://doi.org/10.1016/0022-1031(92)90036-J)
- Kosmitzki, C., & John, O. P. (1993). The implicit use of explicit conceptions of social intelligence. *Personality and Individual Differences*, 15(1), 11–23. [http://doi.org/10.1016/0191-8869\(93\)90037-4](http://doi.org/10.1016/0191-8869(93)90037-4)
- Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin*, 108(3), 480–498. <http://doi.org/10.1037/0033-2909.108.3.480>
- Langenderfer, J., & Shimp, T. A. (2001). Consumer vulnerability to scams, swindles, and fraud: A new theory of visceral influences on persuasion. *Psychology and Marketing*, 18(7), 763–783. <http://doi.org/10.1002/mar.1029>
- Layne, C. (1979). The Barnum effect: Rationality versus gullibility? *Journal of Consulting and Clinical Psychology*, 47(1), 219–221. <http://doi.org/10.1037//0022-006X.47.1.219>
- Levine, T. R., Feeley, T. H., McCornack, S. A., Hughes, M., & Harms, C. M. (2005). Testing the effects of nonverbal behavior training on accuracy in deception detection with the inclusion of a bogus training control group. *Western Journal of Communication*, 69(3), 203–217. <http://doi.org/10.1080/10570310500202355>
- Loewenstein, G. (1996). Out of control: Visceral influences on behavior. *Organizational Behavior and Human Decision Processes*, 65(3), 272–292.

<http://doi.org/10.1006/obhd.1996.0028>

MacCann, C., & Roberts, R. D. (2008). New paradigms for assessing emotional intelligence: Theory and data. *Emotion (Washington, D.C.)*, 8(4), 540–51.

<http://doi.org/10.1037/a0012746>

MacKenzie, S. B., Podsakoff, P. M., & Jarvis, C. B. (2005). The problem of measurement model misspecification in behavioral and organizational research and some recommended solutions. *Journal of Applied Psychology*, 90(4), 710–730.

<http://doi.org/10.1037/0021-9010.90.4.710>

Maniaci, M. R., & Rogge, R. D. (2014). Caring about carelessness: Participant inattention and its effects on research. *Journal of Research in Personality*, 48, 61–83.

<http://doi.org/10.1016/j.jrp.2013.09.008>

Mayer, J. D., Salovey, P., Caruso, D. R., & Sitarenios, G. (2003). Measuring emotional intelligence with the MSCEIT V2.0. *Emotion*, 3(1), 97–105. <http://doi.org/10.1037/1528-3542.3.1.97>

McIlwain, D. (2003). Bypassing empathy: A Machiavellian theory of mind and sneaky power. In B. Repacholi & V. Slaughter (Eds.), *Individual differences in Theory of Mind: Implications for typical and atypical development* (pp. 39–66). New York: Psychology Press.

McQueen, R. A., & Knussen, C. (2006). *Introduction to research methods and statistics in psychology*. Essex, England: Pearson Education.

Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*, 126(2), 247–259.

<http://doi.org/10.1037/0033-2909.126.2.247>

Muraven, M., Tice, D. M., & Baumeister, R. F. (1998). Self-control as a limited resource:

Regulatory depletion patterns. *Journal of Personality and Social Psychology*, 74(3), 774–789. <http://doi.org/10.1037/0022-3514.74.3.774>

Obermiller, C., & Spangenberg, E. R. (1998). Development of a scale to measure consumer skepticism toward advertising. *Journal of Consumer Psychology*, 7, 159–186. http://doi.org/10.1207/s15327663jcp0702_03

OED Online. (2015a). gull, v.3. Retrieved March 23, 2015, from <http://www.oed.com/view/Entry/82451?rskey=6cMe9Q&result=10&isAdvanced=false#eid>

OED Online. (2015b). gullibility, n. Retrieved March 23, 2015, from <http://www.oed.com/view/Entry/82466?redirectedFrom=gullibility#eid>

OED Online. (2015c). gullible, adj. Retrieved March 23, 2015, from <http://www.oed.com/view/Entry/82467?redirectedFrom=gullible#eid>

Petrides, K. V., Mason, M., & Sevdalis, N. (2011). Preliminary validation of the construct of trait social intelligence. *Personality and Individual Differences*, 50(6), 874–877. <http://doi.org/10.1016/j.paid.2010.12.029>

Petty, R. E., & Cacioppo, J. T. (1986). *Communication and persuasion: Central and peripheral routes to attitude change*. New York: Springer.

Pinsker, D. M. (2011). Clinical application of the Social Vulnerability Scale: Three illustrative case reports of patients with dementia. *Clinical Psychologist*, 15, 33–43. <http://doi.org/10.1111/j.1742-9552.2011.00003.x>

Pinsker, D. M., & McFarland, K. (2010). Exploitation in older adults: Personal competence correlates of social vulnerability. *Neuropsychology, Development, and Cognition. Section B, Aging, Neuropsychology and Cognition*, 17(July 2015), 673–708. <http://doi.org/10.1080/13825585.2010.501403>

- Pinsker, D. M., McFarland, K., & Stone, V. E. (2011). The Social Vulnerability Scale for older adults: An exploratory and confirmatory factor analytic study. *Journal of Elder Abuse & Neglect*, 23(3), 246–272. <http://doi.org/10.1080/08946566.2011.584049>
- Pinsker, D. M., Stone, V., Pachana, N., & Greenspan, S. (2006). Social Vulnerability Scale for older adults: Validation study*. *Clinical Psychologist*, 10(3), 109–119. <http://doi.org/10.1080/13284200600939918>
- Piper-Terry, M. L., & Downey, J. L. (1998). Sex, gullibility, and the Barnum Effect. *Psychological Reports*, 82(2), 571–576. <http://doi.org/10.2466/pr0.1998.82.2.571>
- Preece, P. F. W., & Baxter, J. H. (2000). Scepticism and gullibility: The superstitious and pseudo-scientific beliefs of secondary school students. *International Journal of Science Education*, 22(11), 1147–1156. <http://doi.org/10.1080/09500690050166724>
- Riggio, R. E., Messamer, J., & Throckmorton, B. (1991). Social and academic intelligence: Conceptually distinct but overlapping constructs. *Personality and Individual Differences*, 12(7), 695–702. [http://doi.org/10.1016/0191-8869\(91\)90225-Z](http://doi.org/10.1016/0191-8869(91)90225-Z)
- Rosenberg, M. (1957). Misanthropy and attitudes toward international affairs. *Journal of Conflict Resolution*, 1, 340–345. <http://doi.org/10.1177/002200275700100403>
- Rotter, J. B. (1967). A new scale for the measurement of interpersonal trust. *Journal of Personality*, 35(4), 651–665. <http://doi.org/10.1111/j.1467-6494.1967.tb01454.x>
- Rotter, J. B. (1980). Interpersonal trust, trustworthiness, and gullibility. *American Psychologist*, 35(1), 1–7. <http://doi.org/10.1037//0003-066X.35.1.1>
- Scambusters.org. (2015). How Crooks Use Distraction Scams to Trick and Rob You.html. Retrieved October 2, 2015, from <http://www.scambusters.org/distraction.html>
- Scamwatch. (2015). Australians lose over \$80 million to scams in 2014. Retrieved July 27, 2015, from <https://www.scamwatch.gov.au/news/australians-lose-over-80-million-to->

scams-in-2014

- Silvera, D., Martinussen, M., & Dahl, T. I. (2001). The Tromso Social Intelligence Scale, a self-report measure of social intelligence. *Scandinavian Journal of Psychology*, 42(4), 313–319. <http://doi.org/10.1111/1467-9450.00242>
- Simon, H. A. (1956). Rational choice and the structure of the environment. *Psychological Review*, 63(2), 129–138. <http://doi.org/10.1037/h0042769>
- Sivaramakrishnan, S., & Manchanda, R. V. (2003). The effect of cognitive busyness on consumers' perception of product value. *Journal of Product & Brand Management*, 12(5), 335–345. <http://doi.org/10.1108/10610420310491693>
- Snyder, C. R., & Clair, M. S. (1977). Does insecurity breed acceptance? Effects of trait and situational insecurity on acceptance of positive and negative diagnostic feedback. *Journal of Consulting and Clinical Psychology*, 45(5), 843–850. <http://doi.org/10.1037//0022-006X.45.5.843>
- Snyder, C. R., & Shenkel, R. J. (1976). Effects of “favorability,” modality, and relevance on acceptance of general personality interpretations prior to and after receiving diagnostic feedback. *Journal of Consulting and Clinical Psychology*, 44(1), 34–41. <http://doi.org/10.1037/0022-006X.44.1.34>
- Socha, A., Cooper, C. A., & Mccord, D. M. (2010). Confirmatory factor analysis of the M5-50 : An implementation of the International Personality Item Pool item set. *Psychological Assessment*, 22(1), 43–49. <http://doi.org/10.1037/a0017371>
- Sofronoff, K., Dark, E., & Stone, V. (2011). Social vulnerability and bullying in children with Asperger syndrome. *Autism : The International Journal of Research and Practice*, 15, 355–372. <http://doi.org/10.1177/1362361310365070>
- Stajano, F., & Wilson, P. (2011). Understanding scam victims. *Communications of the ACM*,

54(3), 70. <http://doi.org/10.1145/1897852.1897872>

Standing, L., & Huber, H. (2003). Do psychology courses reduce belief in psychological myths? *Social Behavior and Personality: An International Journal*, 31(6), 585–592.

<http://doi.org/10.2224/sbp.2003.31.6.585>

Standing, L., & Keays, G. (1987). Do the Barnum Effect and paranormal belief involve a general gullibility factor? *Psychological Reports*, 61(2), 435–438.

<http://doi.org/10.2466/pr0.1987.61.2.435>

Stucke, T. S., & Baumeister, R. F. (2006). Ego depletion and aggressive behavior: Is the inhibition of aggression a limited resource? *European Journal of Social Psychology*,

36(1), 1–13. <http://doi.org/10.1002/ejsp.285>

Sturgis, P., Read, S., & Allum, N. (2010). Does intelligence foster generalized trust? An empirical test using the UK birth cohort studies. *Intelligence*, 38(1), 45–54.

<http://doi.org/10.1016/j.intell.2009.11.006>

Tabachnick, B. G., & Fidell, L. S. (2007). *Using Multivariate Statistics* (5th ed.). Boston: Pearson/Allyn & Bacon.

Taylor, L. E., Swerdfeger, A. L., & Eslick, G. D. (2014). Vaccines are not associated with autism: An evidence-based meta-analysis of case-control and cohort studies. *Vaccine*,

32(29), 3623–3629. <http://doi.org/10.1016/j.vaccine.2014.04.085>

Taylor, S. E. (1981). The interface of cognitive and social psychology. In *Cognition, Social Behavior, and the Environment* (pp. 189–211). Hillsdale, New Jersey: Lawrence

Erlbaum Associates.

Thompson, H. (2011). Do you believe in psychics? Retrieved July 20, 2015, from

<https://yougov.co.uk/news/2011/10/05/do-you-believe-psychics/>

Thorndike, E. L. (1920). Intelligence and its uses. *The Harpers Monthly*, 227–235. Retrieved

from <http://harpers.org/archive/1920/01/intelligence-and-its-uses/>

- Tobacyk, J., & Milford, G. (1983). Belief in paranormal phenomena: Assessment instrument development and implications for personality functioning. *Journal of Personality and Social Psychology*, 44(5), 1029–1037. <http://doi.org/10.1037/0022-3514.44.5.1029>
- Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science (New York)*, 185(4157), 1124–1131. <http://doi.org/10.1126/science.185.4157.1124>
- Vail, K. E., Arndt, J., & Abdollahi, A. (2012). Exploring the existential function of religion and supernatural agent beliefs among Christians, Muslims, atheists, and agnostics. *Personality & Social Psychology Bulletin*, 38(10), 1288–300. <http://doi.org/10.1177/0146167212449361>
- Vohs, K. D., Baumeister, R. F., & Chin, J. (2007). Feeling duped: Emotional, motivational, and cognitive aspects of being exploited by others. *Review of General Psychology*, 11(2), 127–141. <http://doi.org/10.1037/1089-2680.11.2.127>
- Vrij, A., Leal, S., Mann, S., Vernham, Z., & Brankaert, F. (2015). Translating theory into practice: Evaluating a cognitive lie detection training workshop. *Journal of Applied Research in Memory and Cognition*, 1–11. <http://doi.org/10.1016/j.jarmac.2015.02.002>
- Vrij, A., Mann, S. A., Fisher, R. P., Leal, S., Milne, R., & Bull, R. (2008). Increasing cognitive load to facilitate lie detection: The benefit of recalling an event in reverse order. *Law and Human Behavior*, 32(3), 253–65. <http://doi.org/10.1007/s10979-007-9103-y>
- Wagner, M. W., & Ratzeburg, F. H. (1987). Hypnotic suggestibility and paranormal belief. *Psychological Reports*, 60(3 Pt 2), 1069–70. <http://doi.org/10.2466/pr0.1987.60.3c.1069>
- Walker, T. (2014). Belief in link between autism and vaccines persists despite studies.

- Retrieved from <http://formularyjournal.modernmedicine.com/formulary-journal/news/proper-education-can-help-patients-weigh-risks-benefits-vaccines?page=full>
- Webster, D. M., Richter, L., & Kruglanski, A. W. (1996). On leaping to conclusions when feeling tired: Mental fatigue effects on impressional primacy. *Journal of Experimental Social Psychology*, 32(2), 181–195. <http://doi.org/10.1006/jesp.1996.0009>
- Weis, S., & Süß, H. M. (2007). Reviving the search for social intelligence - A multitrait-multimethod study of its structure and construct validity. *Personality and Individual Differences*, 42, 3–14. <http://doi.org/10.1016/j.paid.2006.04.027>
- Wheaton, B., Muthen, B., Alwin, D. F., & Summers, G. F. (1977). Assessing reliability and stability in panel models. *Sociological Methodology*, 8(1977), 84. <http://doi.org/10.2307/270754>
- Williams, K. D. (1997). Social ostracism. In R. M. Kowalski (Ed.), *Aversive Interpersonal Behaviors* (pp. 133–170). New York: Plenum Press.
- Williams, K. D., & Nida, S. A. (2011). Ostracism: Consequences and coping. *Current Directions in Psychological Science*, 20, 71–75. <http://doi.org/10.1177/0963721411402480>
- Yamagishi, T. (2001). Trust as a form of social intelligence. In K. Cook (Ed.), *Trust in society. Russell Sage foundation series on trust, vol. 2* (pp. 121–147). New York: Russell Sage Foundation.
- Yamagishi, T., Kikuchi, M., & Kosugi, M. (1999). Trust, gullibility, and social intelligence. *Asian Journal of Social Psychology*, 2(1), 145–161. <http://doi.org/10.1111/1467-839X.00030>
- Young, S. G., Slepian, M. L., & Sacco, D. F. (2015). Sensitivity to perceived facial

trustworthiness is increased by activating self-protection motives. *Social Psychological and Personality Science*, 6(6), 607–613. <http://doi.org/10.1177/1948550615573329>

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Appendix A

List of Online Forums

1. Online Social Psychology Studies (<http://www.socialpsychology.org/expts.htm>)
2. Psychological Research on the Net (<http://psych.hanover.edu/Research/exponnet.html>)
3. The Inquisitive Mind (<http://www.in-mind.org/content/online-research>)
4. Online Psychology Research (<http://www.onlinepsychresearch.co.uk/researchers/>)
5. Reddit – Research (<http://www.reddit.com/r/research/>)
6. Psychology Participants & Researchers
(https://www.facebook.com/PsychologyParticipantsResearchers/info?tab=page_info)

Advertisement to Participate in Research for Study 1

Researchers at Macquarie University are investigating the relationship between personal reactions, behaviours, beliefs and their influence on personality. The benefit of this research is that a better understanding of certain vulnerable personality styles would be developed. If you are aged 18(+) you are eligible to participate. You can participate here: [insert link]

Advertisement to Participate in Research for Study 2

Researchers at Macquarie University are developing a scale measuring social perceptions and the tendency to trust people. If you decide to participate, you will be asked to complete demographic information and an anonymous online questionnaire which should take approximately 20-30 minutes to complete. If you are aged 18(+) you are eligible to participate. You can participate here: [insert link]

Appendix B

Participant Information and Consent Forms



MACQUARIE
University

INFORMATION PAGE [the community sample]

Project Name: *Personal Reactions, Behaviour and Beliefs.*

What is the study about?

Thank you for your interest in our study. You need to be 18 or older to participate. The purpose of this study is to develop a scale measuring social perceptions and the tendency to trust people.

Who is conducting the study?

This study is being conducted Ms Alessandra Teunisse (alessandra.teunisse@students.mq.edu.au) as part of her Master of Research project, under the supervision of Dr Trevor Case, from the Department of Psychology at Macquarie University (trevor.case@mq.edu.au +61 2 9850 7736).

What does the study involve?

If you decide to participate, you will be asked to complete demographic information and an anonymous questionnaire online, which should take approximately 15-25 minutes to complete. As a participant, you are obligated to answer all questions accurately and honestly. Answering fictitiously or haphazardly jeopardises the quality of the research.

It is not anticipated that completing the questions will cause you any distress. However, there are some questions concerning negative experiences. If by answering any of the questions you feel concern or discomfort, you are free to withdraw from the study. Please contact Dr Case if you have concerns about the study. If you would like to discuss any personal issues, you are encouraged to contact the Mental Health Information Service (Australia only) for information about your nearest free service (phone: 02 9816 5688) or contact a local health service in your country.

Who will have access to my details?

As this is an anonymous questionnaire, no individual can be identified in any publication of the results. Apart from the researchers named above, the data may be made available to other researchers who request it. Please send an email to alessandra.teunisse@students.mq.edu.au if you would like a summary of the results, which will be available in November 2015.

Can I withdraw from the study?

Participation in this study is entirely voluntary: you are not obliged to participate and if you decide to participate, you are free to withdraw at any time without having to give a reason and without consequence.

Please print a copy of this Information Page for your reference.

I have read and understood the information above. Please indicate if you agree or decline to participate in the study by following the appropriate link below.

I Agree

I Decline

The ethical aspects of this study have been approved by the Macquarie University Human Research Ethics Committee. If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Director, Research Ethics (telephone (02) 9850 7854; email ethics@mq.edu.au). Any complaint you make will be treated in confidence and investigated, and you will be informed of the outcome.



MACQUARIE
University

INFORMATION PAGE [the student sample]

Project Name: *Personal Reactions, Behaviour and Beliefs*.

What is the study about?

You are invited to participate in a questionnaire study as part of PSY234 (relevant to your tutorial for week 8/9). The purpose of this study is to develop a scale measuring social perceptions and the tendency to trust people. You will be asked at the end of the questionnaire if you agree to allow the researchers to use your data for the purposes of research.

Who is conducting the study?

This study is being conducted Ms Alessandra Teunisse (alessandra.teunisse@students.mq.edu.au) as part of her Master of Research project, under the supervision of Dr Trevor Case, from the Department of Psychology at Macquarie University (trevor.case@mq.edu.au 02 9850 7736).

What does the study involve?

If you decide to participate, you will be asked to complete demographic information and an anonymous questionnaire online, which should take approximately 15-25 minutes to complete. As a participant, you are obligated to answer all questions accurately and honestly. Answering fictitiously or haphazardly jeopardises the quality of the research.

It is not anticipated that completing the questions will cause you any distress. However, there are questions concerning negative experiences. If by answering any of the questions you feel concern or discomfort, you are free to withdraw from the study. Please contact Dr Case if you have concerns about the study. If you would like to discuss any personal issues, you are encouraged to contact the University Counselling Service (Macquarie students phone: 02 9850 7497) or to contact the Mental Health Information Service for information about your nearest free service (phone: 02 9816 5688).

Who will have access to my details?

As this is an anonymous questionnaire, no individual can be identified in any publication of the results. Apart from the researchers named above, the data may be made available to other researchers who request it. A summary of the results will be discussed in tutorial classes in Week 8/9.

Can I withdraw from the study?

Participation in this study is entirely voluntary: you are not obliged to participate and if you decide to participate, you are free to withdraw at any time without having to give a reason and without consequence.

Please print a copy of this information form for your reference.

I have read and understood the information above. Please indicate if you agree or decline to participate in the study by following the appropriate link below.

☐ I Agree☐ I Decline

The ethical aspects of this study have been approved by the Macquarie University Human Research Ethics Committee. If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Director, Research Ethics (telephone (02) 9850 7854; email ethics@mq.edu.au). Any complaint you make will be treated in confidence and investigated, and you will be informed of the outcome.

Appendix C**(Marlowe and Crowne Social Desirability Scale)**

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is **true** or **false** as it pertains to you personally.

1. Before voting I thoroughly investigate the qualifications of all the candidates. (T)
2. I never hesitate to go out of my way to help someone in trouble. (T)
3. It is sometimes hard for me to go on with my work if I am not encouraged. (F)
4. I have never intensely disliked anyone. (T)
5. On occasion I have had doubts about my ability to succeed in life. (F)
6. I sometimes feel resentful when I don't get my way. (F)
7. I am always careful about my manner of dress. (T)
8. My table manners at home are as good as when I eat out in a restaurant. (T)
9. If I could get into a movie without paying and be sure I was not seen I would probably do it. (F)
10. On a few occasions, I have given up doing something because I thought too little of my ability. (F)
11. I like to gossip at times. (F)
12. There have been times when I felt like rebelling against people in authority even though I knew they were right. (F) ,
13. No matter who I'm talking to, I'm always a good listener. (T)
14. I can remember "playing sick" to get out of something. (F)
15. There have been occasions when I took advantage of someone. (F)
16. I'm always willing to admit it when I make a mistake. (T)
17. I always try to practice what I preach. (T)
18. I don't find it particularly difficult to get along with loud mouthed, obnoxious people. (T)
19. I sometimes try to get even rather than forgive and forget. (F)
20. When I don't know something I don't at all mind admitting it. (T)
21. I am always courteous, even to people who are disagreeable. (T)
22. At times I have really insisted on having things my own way. (F)
23. There have been occasions when I felt like smashing things. (F)
24. I would never think of letting someone else be punished for my wrong- doings. (T)

- 25. I never resent being asked to return a favour. (T)
- 26. I have never been irked when people expressed ideas very different from my own. (T)
- 27. I never make a long trip without checking the safety of my car. (T)
- 28. There have been times when I was quite jealous of the good fortune of others. (F)
- 29. I have almost never felt the urge to tell someone off. (T)
- 30. I am sometimes irritated by people who ask favours of me. (F)
- 31. I have never felt that I was punished without cause. (T)
- 32. I sometimes think when people have a misfortune they only got what they deserved.
(F)
- 33. I have never deliberately said something that hurt someone's feelings. (T)

Appendix D

(Gullibility Item Pool)

Please complete the following questionnaire on your beliefs and behaviours. Do not think too long about your responses. Read each carefully and indicate how true these statements are of you on a scale of 1 (*Strongly Disagree*) to 7 (*Strongly Agree*).

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

1. I guess I am more gullible than the average person
2. If anyone is likely to fall for a scam, it's me
3. I have been tricked by someone, even though my friends or family warned me
4. I have been taken in repeatedly by a person's lies
5. I'm easily persuaded to buy things I don't need
6. Please answer 2 to this question
7. I have invested money in ventures that seemed too good to be true
8. I have been persuaded to make donations to charities when I couldn't really afford it
9. I have supplied my bank account details to a stranger
10. I am often put in a situation where I have to pay for others
11. I usually offer to pay for others, even when I don't have much money
12. People often take advantage of my generosity
13. I have been persuaded to subscribe to unwanted books/magazines/periodicals
14. I often end up doing other people's work
15. It makes me angry to know that I have been tricked or made a fool of*
16. When someone takes advantage of me, I just try to put it behind me and move on
17. I feel stupid when I think about occasions where I was tricked or duped*
18. I'm pretty good at working out when someone is trying to fool me*
19. People almost always say what they mean
20. I'm not that good at reading the signs that someone is trying to manipulate me
21. If you are reading this question, please answer 7
22. I am often surprised when people are untrustworthy
23. I'm pretty poor at working out if someone is tricking me
24. I rarely suspect people of trying to manipulate me
25. I often feel it is difficult to understand why others are trying to dupe me

26. I begin by assuming that all people have dishonest intentions*
27. I usually think about a person's possible hidden motivations before deciding to believe them*
28. I rarely take a person at face value*
29. It usually takes me a while to 'catch on' when someone is deceiving me
30. I often fall for things when I should know better.
31. If my best friends told me that my partner was cheating, I would believe them over my partner
32. I'm usually quick to notice when someone is trying to cheat me*
33. I often take people too literally
34. I quickly realise when someone is pulling my leg*
35. I am probably a little too quick to believe others
36. I believe things that most others think are untrue
37. In general, the news is reported objectively in the media
38. I am pretty good at working out if a story/rumour is actually an urban myth*
39. Answer this question with a 1
40. If something sounds too good to be true, it probably isn't true*
41. My friends think I'm easily fooled
42. My family think I am an easy target for scammers
43. My friends often play tricks on me
44. My work colleagues think I tend to make foolish decisions
45. My friends think I'm too trusting
46. My family think I'm overly cynical about people*
47. People say I'm overly optimistic
48. People think I'm a little naïve
49. My family thinks I am easily led
50. People say I will agree to anything
51. I trust what people say
52. I believe most people are honest
53. I assume others will have my best intentions at heart
54. When dealing with strangers, it is better to wait until they have proved themselves trustworthy*
55. Most people only look out for themselves*
56. If you are not careful, people will try to take advantage of you*

57. People are usually honest in the various aspects of their lives
58. I believe most people can be relied upon to keep their word
59. Most people have good intentions
60. Most people are kind
61. Completely trusting someone is asking for trouble*
62. Usually people don't try to take advantage of others
63. When people compliment me, it is because they want something from me*
64. Overall, I'm pretty easily manipulated
65. I believe people are sincere when they flatter me
66. If you are reading this question, please answer 4
67. People often use me to get what they want
68. When debating an idea, I am easily convinced of another person's point of view
69. I believe salespeople are generally truthful*
70. My opinions don't change easily*

Appendix E

Demographic Questions for Study 1

1. What is your age?
2. What is your gender?
 - Male
 - Female
3. What country were you born in? _____
4. What is your ethnicity? _____
5. What country do you currently reside in? _____ (for non-student sample)

Questions for Australian respondents only (using skip logic)

6. What is your postcode? _____
7. Do you know your Grade Point Average (GPA)?
 - Yes
 - No
8. What is your GPA?
9. Do you know your Australian Tertiary Admission Rank (ATAR)/University Admittance Index (UAI)?
 - Yes
 - No
10. What was your ATAR/UAI?

All respondents complete these remaining demographic questions

11. What is your occupation?
 - Blue collar /service
 - Clerical
 - Self-employed
 - Professional or managerial
 - Other (e.g., student, homemaker, unemployed) _____
12. What is the highest level of education you have completed?
 - Primary school
 - High school
 - Trade qualification or Certificate (e.g., carpentry, hairdressing)
 - Diploma

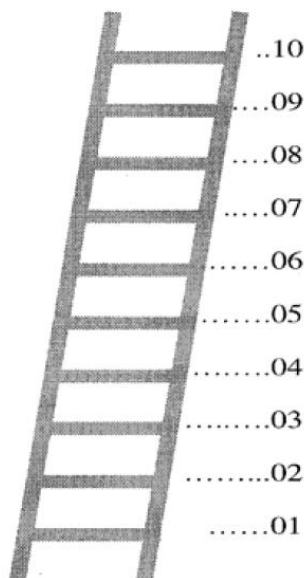
- Some university
- Bachelor degree
- Postgraduate degree

13. What is your total household income (before tax is taken out)?

- Under 50,000
- 50,001 – 80,000
- 80,001 – 110,000
- 110,001 - 140,000
- 140,001 – 170,000
- Over 170,000

14. Think of this ladder as representing where people stand in our society. At the top of the ladder are the people who are the best off; those who have the most money, the most education and the most respected jobs. At the bottom are the people who are the worst off: those who have the least money, least education, and the least respected jobs or no job. The higher up you are on this ladder, the closer you are to the people at the very top. The lower you are, the closer you are to the people at the very bottom.

Where would you place yourself on the ladder?

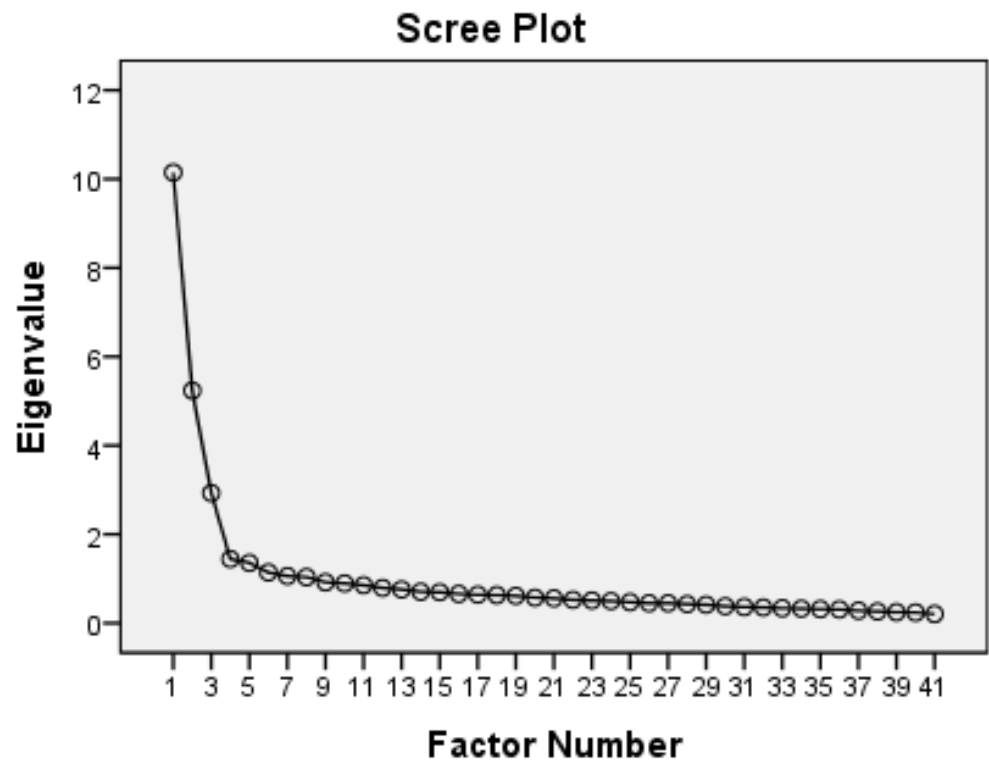


Thank You

We appreciate the time you took to complete this survey.

Do you have any comments on the study? _____

Appendix F
Scree plot of Eigenvalues



Appendix G**(Gullibility Scale - Reduced)**

Please complete the following questionnaire on your beliefs and behaviours. Do not think too long about your responses. Read each question carefully and indicate how true these statements are of you on a scale of 1 (*Strongly Disagree*) to 7 (*Strongly Agree*).

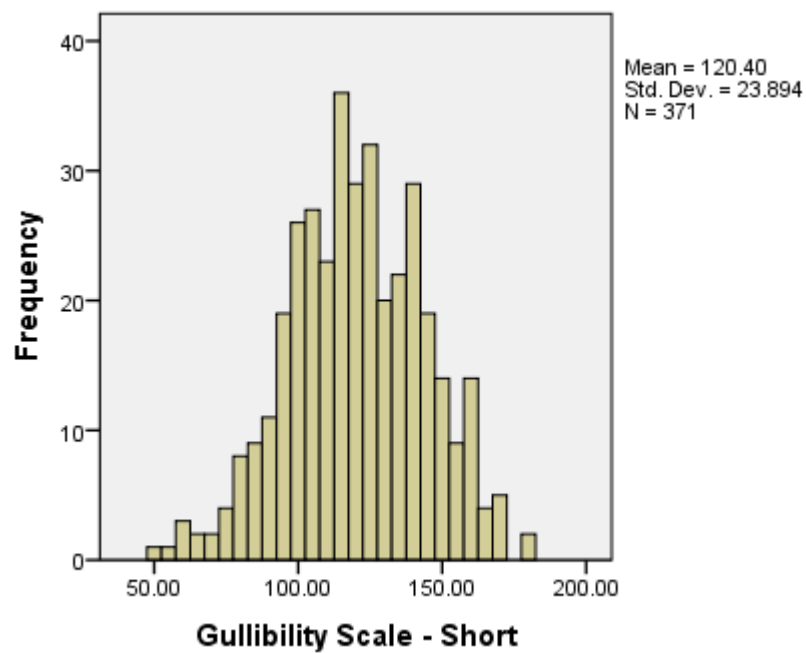
Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

1. I guess I am more gullible than the average person
2. If anyone is likely to fall for a scam, it's me
3. I have been persuaded to make donations to charities when I couldn't really afford it
4. I am often put in a situation where I have to pay for others
5. I usually offer to pay for others, even when I don't have much money
6. People often take advantage of my generosity
7. I often end up doing other people's work
8. Please answer 2 to this question
9. I'm pretty good at working out when someone is trying to fool me*
10. I'm not that good at reading the signs that someone is trying to manipulate me
11. I am often surprised when people are untrustworthy
12. I'm pretty poor at working out if someone is tricking me
13. It usually takes me a while to 'catch on' when someone is deceiving me
14. I often fall for things when I should know better
15. I'm usually quick to notice when someone is trying to cheat me*
16. If you are reading this question, please answer 6
17. I quickly realise when someone is pulling my leg*
18. I am probably a little too quick to believe others
19. My friends think I'm easily fooled
20. My family think I am an easy target for scammers
21. My friends think I'm too trusting
22. People think I'm a little naïve
23. My family thinks I am easily led
24. Answer this question with a 3
25. People say I will agree to anything

26. I trust what people say
27. I believe most people are honest
28. Most people only look out for themselves*
29. If you are not careful, people will try to take advantage of you*
30. People are usually honest in all aspects of their lives
31. I believe most people can be relied upon to keep their word
32. If you are reading this question, please answer 5
33. Completely trusting someone is asking for trouble*
34. Usually people don't try to take advantage of others
35. When people compliment me, it is because they want something from me*
36. Overall, I'm pretty easily manipulated
37. I believe people are sincere when they flatter me
38. People often use me to get what they want
39. When debating an idea, I am easily convinced of another person's point of view

Appendix H

Tests of Normality for the Reduced Gullibility Scale

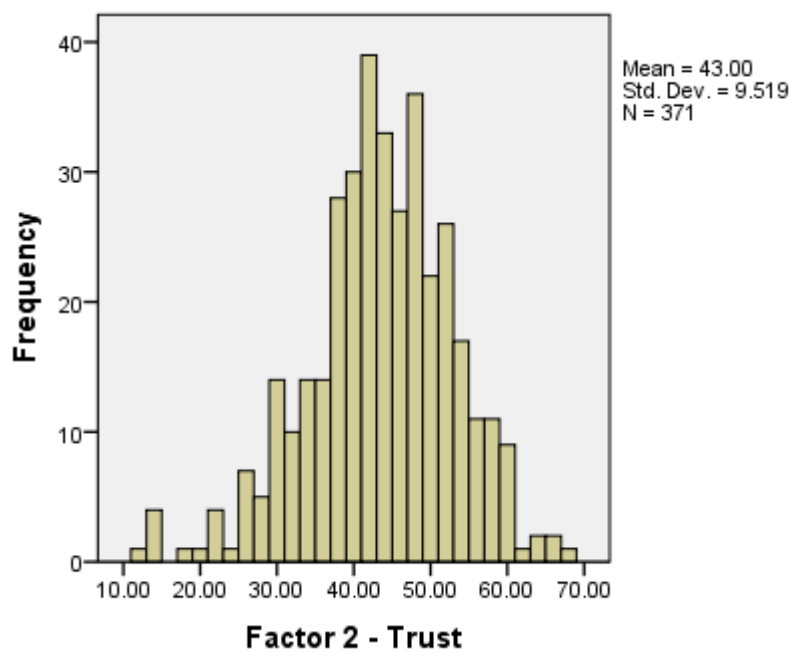
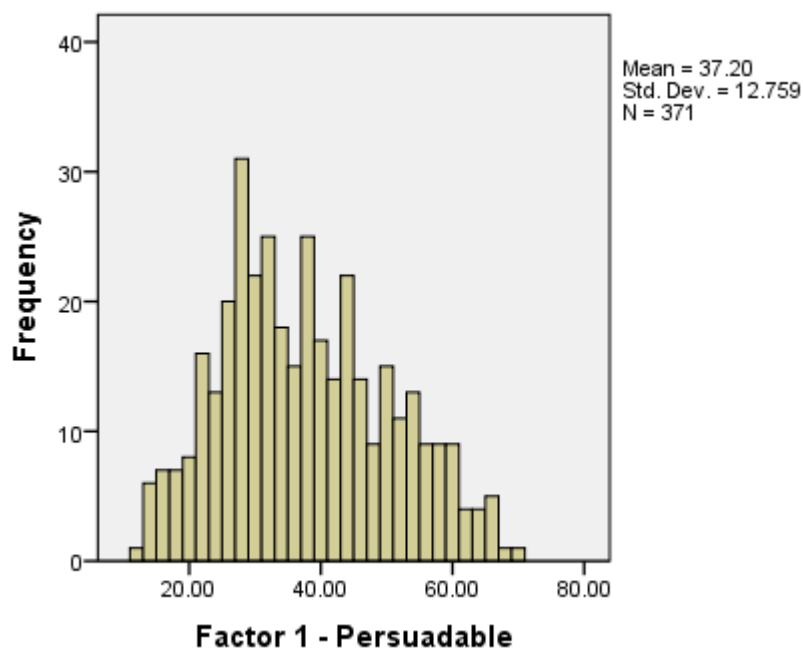


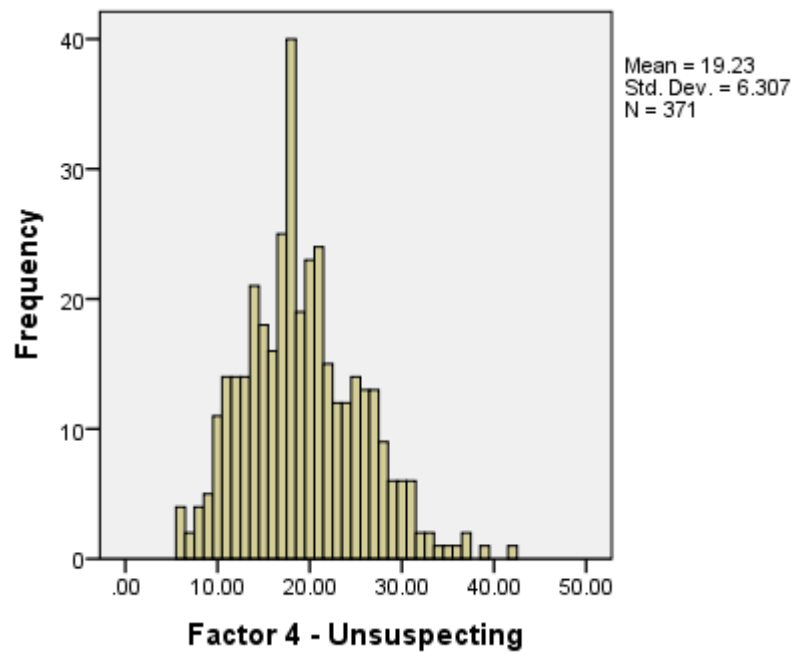
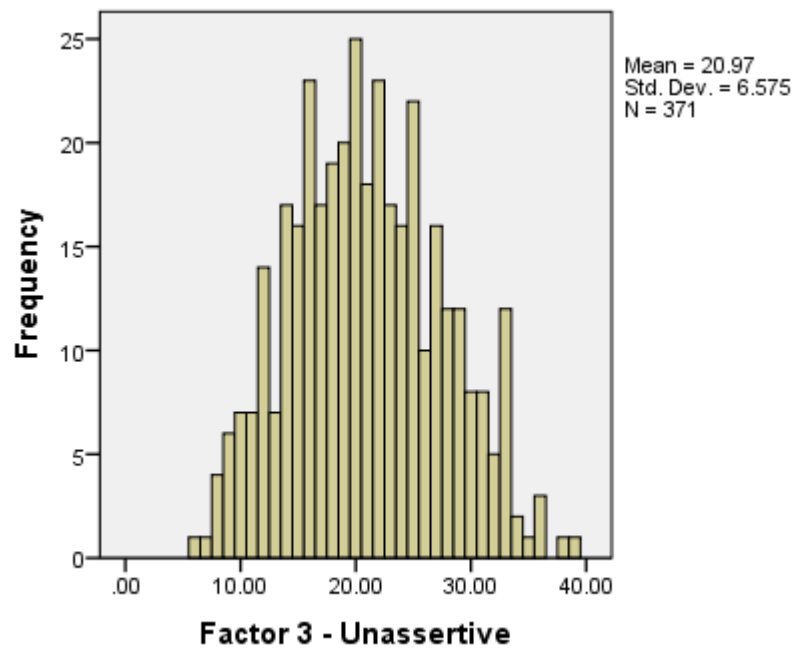
Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
gull_short Gullibility Scale - Short	.031	371	.200 [*]	.996	371	.538

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction





Appendix I

Participant Information and Consent Forms



MACQUARIE
University

INFORMATION PAGE [the student sample]

Project Name: *Social Perceptions and Trust*

What is the study about?

You are invited to participate in a questionnaire study. The purpose of this study is to develop a scale measuring social perceptions and the tendency to trust people. We ask that you complete the questionnaire however, you will be given the opportunity to opt out of having your data used for research purposes at the end of the survey.

Who is conducting the study?

This study is being conducted Ms Alessandra Teunisse (alessandra.teunisse@students.mq.edu.au) as part of her Master of Research project, under the supervision of Dr Trevor Case, from the Department of Psychology at Macquarie University (trevor.case@mq.edu.au 02 9850 7736).

What does the study involve?

If you decide to participate, you will be asked to complete demographic information and an anonymous questionnaire online, which should take approximately 20-30 minutes to complete and earn you one point of course credit. As a participant, *you are obligated to answer all questions accurately and honestly*. Answering fictitiously or haphazardly jeopardises the quality of the research.

It is not anticipated that completing the questions will cause you any distress. However, there are questions concerning negative experiences. If by answering any of the questions you feel concern or discomfort, you are free to withdraw from the study. Please contact Dr Case if you have concerns about the study. If you would like to discuss any personal issues, you are encouraged to contact the University Counselling Service (Macquarie students phone: 02 9850 7497) or to contact the Mental Health Information Service for information about your nearest free service (phone: 02 9816 5688).

Who will have access to my details?

As this is an anonymous questionnaire, no individual can be identified in any publication of the results. Apart from the researchers named above, the data may be made available to other researchers who request it. . Please send an email to alessandra.teunisse@students.mq.edu.au if you would like a summary of the results, which will be available in November 2015.

Can I withdraw from the study?

Participation in this study is entirely voluntary: you are not obliged to participate and if you decide to participate, you are free to withdraw at any time without having to give a reason and without consequence.

Please print a copy of this information form for your reference.

I have read and understood the information above. Please indicate if you agree or decline to participate in the study by following the appropriate link below.

The ethical aspects of this study have been approved by the Macquarie University Human Research Ethics Committee. If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Director, Research Ethics (telephone (02) 9850 7854; email ethics@mq.edu.au). Any complaint you make will be treated in confidence and investigated, and you will be informed of the outcome.



INFORMATION PAGE [the community sample]

Project Name: *Social Perceptions and Trust*.

What is the study about?

You are invited to participate in a questionnaire study. The purpose of this study is to develop a scale measuring social perceptions and the tendency to trust people. We ask that you complete the questionnaire however, you will be given the opportunity to opt out of having your data used for research purposes at the end of the survey.

Who is conducting the study?

This study is being conducted Ms Alessandra Teunisse (alessandra.teunisse@students.mq.edu.au) as part of her Master of Research project, under the supervision of Dr Trevor Case, from the Department of Psychology at Macquarie University (trevor.case@mq.edu.au 02 9850 7736).

What does the study involve?

If you decide to participate, you will be asked to complete demographic information and an anonymous questionnaire online, which should take approximately 20-30 minutes to complete. As a participant, *you are obligated to answer all questions accurately and honestly*. Answering fictitiously or haphazardly jeopardises the quality of the research.

It is not anticipated that completing the questions will cause you any distress. However, there are some questions concerning negative experiences. If by answering any of the questions you feel concern or discomfort, you are free to withdraw from the study. Please contact Dr Case if you have concerns about the study. If you would like to discuss any personal issues, you are encouraged to contact the Mental Health Information Service (Australia only) for information about your nearest free service (phone: 02 9816 5688) or contact a local health service in your country.

Who will have access to my details?

As this is an anonymous questionnaire, no individual can be identified in any publication of the results. Apart from the researchers named above, the data may be made available to other researchers who request it. . Please send an email to alessandra.teunisse@students.mq.edu.au if you would like a summary of the results, which will be available in November 2015.

Can I withdraw from the study?

Participation in this study is entirely voluntary: you are not obliged to participate and if you decide to participate, you are free to withdraw at any time without having to give a reason and without consequence.

Please print a copy of this information form for your reference.

I have read and understood the information above. Please indicate if you agree or decline to participate in the study by following the appropriate link below.

I Agree

I Decline

The ethical aspects of this study have been approved by the Macquarie University Human Research Ethics Committee. If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Director, Research Ethics (telephone (02) 9850 7854; email ethics@mq.edu.au). Any complaint you make will be treated in confidence and investigated, and you will be informed of the outcome.

Appendix J

(Interpersonal Trust Scale)

Directions: Indicate the degree to which you agree or disagree with each statement by using the following scale:

1 = strongly agree

2 = mildly agree

3 = agree and disagree equally

4 = mildly disagree

5 = strongly disagree

Strongly Agree	1	2	3	4	5	Strongly Disagree
-----------------------	----------	----------	----------	----------	----------	--------------------------

1. Hypocrisy is on the increase in our society*
2. In dealing with strangers one is better off to be cautious until they have provided evidence that they are trustworthy*
3. This country has a dark future unless we can attract better people into politics*
4. Fear and social disgrace or punishment rather than conscience prevents most people from breaking the law*
5. Using the honour system of not having a teacher present exams would probably result in increased cheating*
6. Parents usually can be relied on to keep their promises
7. The United Nations will never be an effective force in keeping world peace*
8. The judiciary is a place where we can all get unbiased treatment
9. Most people would be horrified if they knew how much news that the public hear and sees is distorted*
10. It is safe to believe that in spite of what people say most people are primarily interested in their own welfare*
11. Even though we have reports in newspapers, radio, and T.V., it is hard to get objective accounts of public events*
12. The future seems very promising
13. If we really knew what was going on in international politics, the public would have reason to be more frightened than they now seem to be*
14. Most elected officials are really sincere in their campaign promises

15. Many major national sports contests are fixed in one way or another*
16. Most experts can be relied upon to tell the truth about the limits of their knowledge
17. Most parents can be relied upon to carry out their threats of punishments
18. Most people can be counted on to do what they say they will do
19. In these competitive times one has to be alert or someone is likely to take advantage of you*
20. Most idealists are sincere and usually practice what they preach
21. Most salesmen are honest in describing their products
22. Most students in school would *not* cheat even if they were sure of getting away with it
23. Most repairmen will not overcharge even if they think you are ignorant of their speciality
24. A large share of accident claims filed against insurance companies are phony*
25. Most people answer public opinion polls honestly

Appendix K
(Agreeableness Scale)

Please complete the following questionnaire. Do not think too long about your responses.
Read each question carefully and indicate how true these statements are of you on a scale of 1
(*Strongly Disagree*) to 5 (*Strongly Agree*).

Strongly Disagree 1 2 3 4 5 Strongly Agree

1. Have a good word for everyone
2. Believe that others have good intentions
3. Respect others
4. Accept people as they are
5. Make people feel at ease
6. Have a sharp tongue*
7. Cut others to pieces*
8. Suspect hidden motives in others*
9. Get back at others*
10. Insult people*

Appendix L**(Machiavellian Personality Scale)**

Please complete the following questionnaire. Do not think too long about your responses.

Read each question carefully and indicate how true these statements are of you on a scale of 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Strongly Disagree 1 2 3 4 5 Strongly Agree

1. I am willing to be unethical if I believe it will help me succeed
2. I am willing to sabotage the efforts of other people if they threaten my own goals
3. I would cheat if there was a low chance of getting caught
4. I believe that lying is necessary to maintain a competitive advantage over others
5. The only good reason to talk to others is to get information that I can use to my benefit
6. I like to give the orders in interpersonal situations
7. I enjoy being able to control the situation
8. I enjoy having control over other people
9. Status is a good sign of success in life
10. Accumulating wealth is an important goal for me
11. I want to be rich and powerful someday
12. People are only motivated by personal gain
13. I dislike committing to groups because I don't trust others
14. Team members backstab each other all the time to get ahead
15. If I show any weakness at work, other people will take advantage of it
16. Other people are always planning ways to take advantage of the situation at my expense

Appendix M

(Tromsø Social Intelligence Scale)

Please complete the following questionnaire. Do not think too long about your responses.

Read each question carefully and indicate how true these statements are of you on a scale of 1 (*Describes me poorly*) to 7 (*Describes me well*).

Describes me poorly 1 2 3 4 5 6 7 Describes me well

1. I can predict other peoples' behaviour
2. I often feel that it is difficult to understand others' choices
3. I know how my actions will make others feel
4. I often feel uncertain around new people who I don't know
5. People often surprise me with the things they do
6. I understand other peoples' feelings
7. I fit in easily in social situations
8. Other people become angry with me without me being able to explain why
9. I understand others wishes
10. I am good at entering new situations and meeting people for the first time
11. It seems as though people are often angry or irritated with me when I say what I think
12. I have a hard time getting along with other people
13. I find people unpredictable
14. I can often understand what others are trying to accomplish without the need for them to say anything
15. It takes a long time for me to get to know others well
16. I have often hurt others without realizing it
17. I can predict how others will react to my behaviour
18. I am good at getting on good terms with new people
19. I can often understand what others really mean through their expression, body language etc.
20. I frequently have problems finding good conversation topics
21. I am often surprised by others' reactions to what I do

Appendix N

Demographic Questions for Study 2

1. What is your age?
2. What is your gender?
 - Male
 - Female
3. What is your ethnicity? _____
4. What country do you currently reside in? _____ (for non-student sample)

Questions for Australian respondents only (using skip logic)

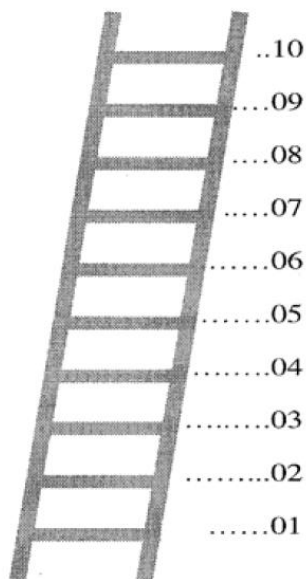
5. Do you know your Australian Tertiary Admission Rank (ATAR)/University Admittance Index (UAI)?
 - Yes
 - No
6. What was your ATAR/UAI?

All respondents complete these remaining demographic questions

7. What is your occupation?
 - Blue collar /service
 - Clerical
 - Self-employed
 - Professional or managerial
 - Other (e.g., student, homemaker, unemployed) _____
8. What is the highest level of education you have completed?
 - Primary school
 - High school
 - Trade qualification or Certificate (e.g., carpentry, hairdressing)
 - Diploma
 - Some university
 - Bachelor degree
 - Postgraduate degree
9. What is your total household income (to the closest 1,000) in your local currency?
10. What is your local currency?

11. Think of this ladder as representing where people stand in our society. At the top of the ladder are the people who are the best off; those who have the most money, the most education and the most respected jobs. At the bottom are the people who are the worst off: those who have the least money, least education, and the least respected jobs or no job. The higher up you are on this ladder, the closer you are to the people at the very top. The lower you are, the closer you are to the people at the very bottom.

Where would you place yourself on the ladder?



Thank You

We appreciate the time you took to complete this survey.

Do you have any comments on the study? _____

- I give permission for my anonymous data to be used for the purposes of research
- I DO NOT give permission for my anonymous data to be used for the purposes of research

Appendix O

Standardised Regression Weights for Models

Table 9

Standardised Regression Weights for the Four Factor Model

			Estimate	p-value
G18	<---	Persuadable	.672	*
G25	<---	Persuadable	.619	*
G20	<---	Persuadable	.747	*
G14	<---	Persuadable	.678	*
G19	<---	Persuadable	.835	*
G2	<---	Persuadable	.740	*
G23	<---	Persuadable	.732	*
G36	<---	Persuadable	.793	*
G21	<---	Persuadable	.604	*
G39	<---	Persuadable	.430	*
G22	<---	Persuadable	.740	*
G1	<---	Persuadable	.782	*
G15r	<---	Unsuspecting	-.564	*
G12	<---	Unsuspecting	-.738	*
G10	<---	Unsuspecting	-.658	*
G9r	<---	Unsuspecting	-.590	*
G17	<---	Unsuspecting	.586	*
G13	<---	Unsuspecting	-.819	*
G11	<---	Trust	.434	*
G30	<---	Trust	.588	*
G28r	<---	Trust	.628	*
G35r	<---	Trust	.490	*
G37	<---	Trust	.481	*
G29r	<---	Trust	.574	*
G34	<---	Trust	.743	*
G26	<---	Trust	.656	*
G31	<---	Trust	.787	*
G27	<---	Trust	.770	*
G33r	<---	Trust	.493	*
G4	<---	Unassertive	.585	*
G6	<---	Unassertive	.685	*
G5	<---	Unassertive	.446	*
G7	<---	Unassertive	.482	*
G38	<---	Unassertive	.706	*
G3	<---	Unassertive	.286	*

Note. * $p < .0001$

Table 10

Standardized Regression Weights for the Hierarchical Model

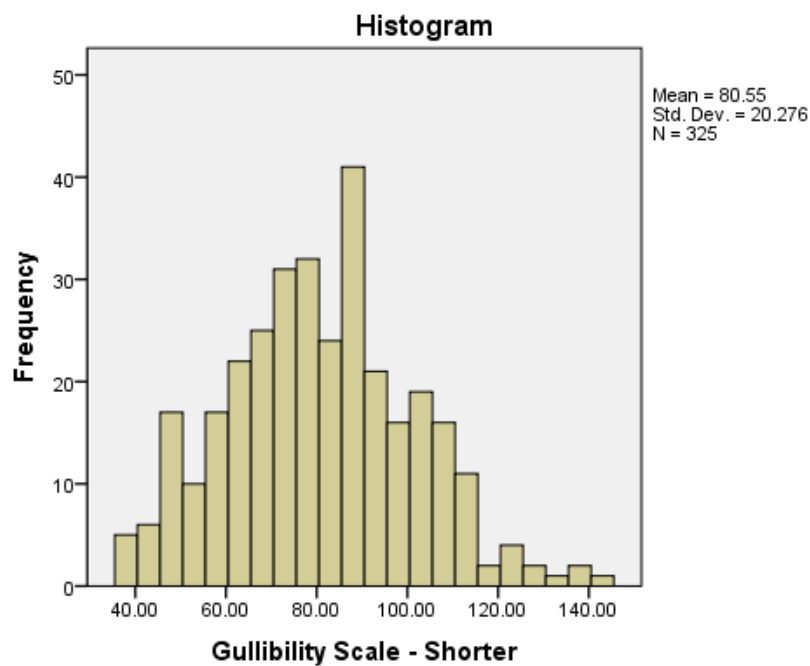
			Estimate	p-value
Trust	<---	Gullibility	.073	.152
Unsuspecting	<---	Gullibility	.716	*
Unassertive	<---	Gullibility	.496	*
Persuadable	<---	Gullibility	1.174	*
G27	<---	Trust	.773	*
G31	<---	Trust	.789	*
G26	<---	Trust	.662	*
G34	<---	Trust	.742	*
G29r	<---	Trust	.568	*
G33r	<---	Trust	.491	*
G37	<---	Trust	.482	*
G35r	<---	Trust	.480	*
G28r	<---	Trust	.620	*
G30	<---	Trust	.591	*
G11	<---	Trust	.439	*
G12	<---	Unsuspecting	.738	*
G13	<---	Unsuspecting	.818	*
G10	<---	Unsuspecting	.658	*
G17r	<---	Unsuspecting	.586	*
G15r	<---	Unsuspecting	.564	*
G9r	<---	Unsuspecting	.590	*
G5	<---	Unassertive	.474	*
G38	<---	Unassertive	.675	*
G6	<---	Unassertive	.668	*
G4	<---	Unassertive	.604	*
G3	<---	Unassertive	.298	*
G7	<---	Unassertive	.505	*
G36	<---	Persuadable	.793	*
G21	<---	Persuadable	.603	*
G19	<---	Persuadable	.836	*
G39	<---	Persuadable	.430	*
G25	<---	Persuadable	.619	*
G20	<---	Persuadable	.748	*
G14	<---	Persuadable	.679	*
G1	<---	Persuadable	.782	*
G18	<---	Persuadable	.671	*
G2	<---	Persuadable	.740	*

			Estimate	p-value
G23	<---	Persuadable	.732	*
G22	<---	Persuadable	.741	*

Note. * $p < .0001$

Appendix P

Tests of Normality for the final Gullibility Scale and Three Factors

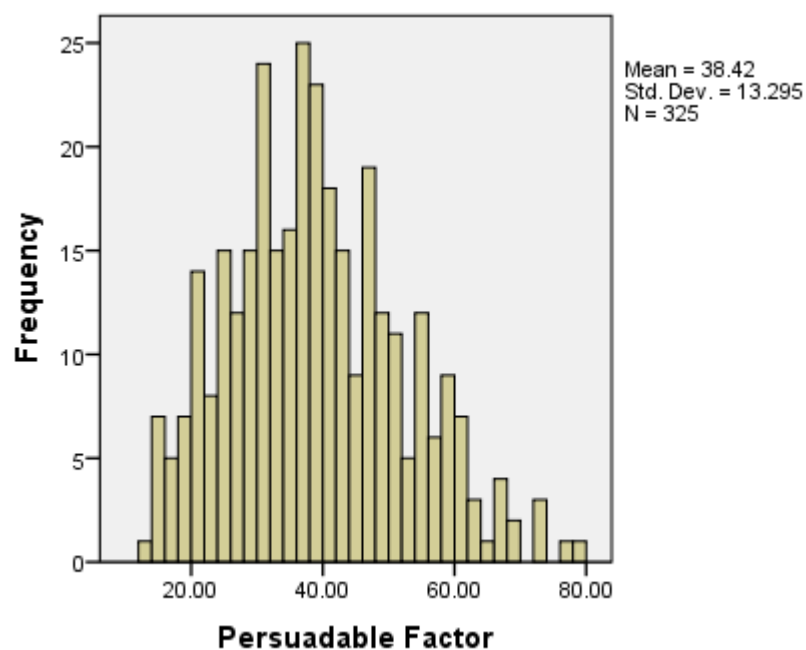


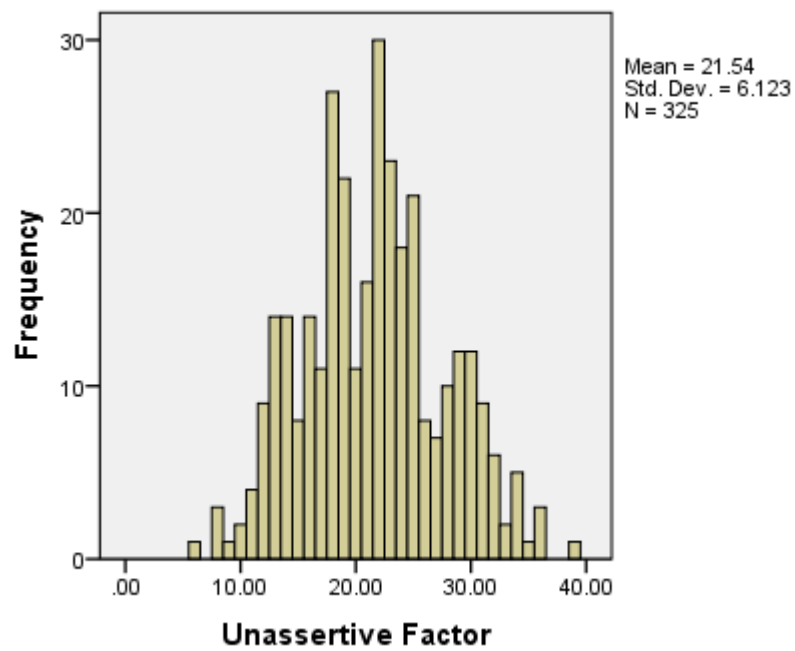
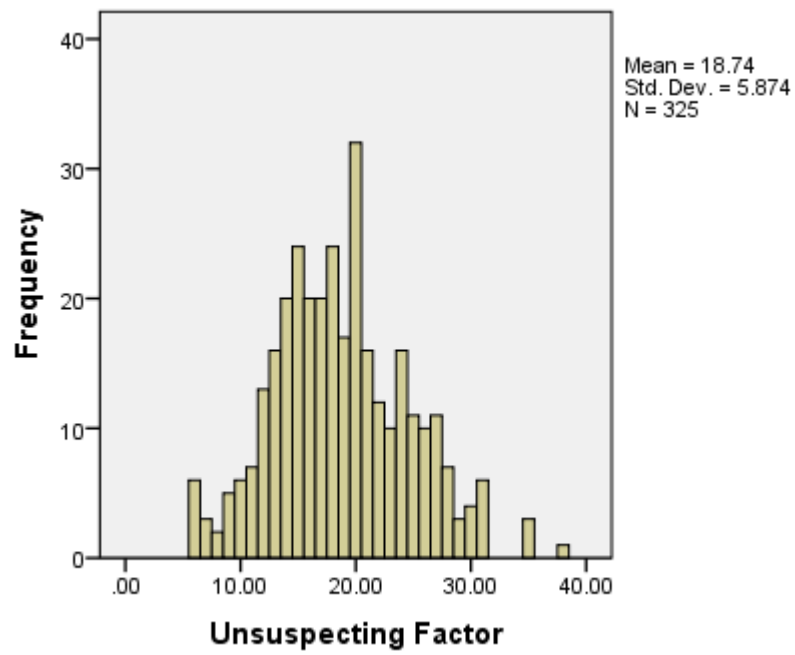
Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Gullibility Scale - Shorter	.037	325	.200 [*]	.992	325	.068

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction





Appendix Q

Ethics Approval Letters

OFFICE OF THE DEPUTY VICE-CHANCELLOR
(RESEARCH)

Research Office

CsC East Research HUB, Level 3



MACQUARIE
University
SYDNEY · AUSTRALIA

1 October 2015

Dr Trevor Case
Department of Psychology
Faculty of Human Sciences
Macquarie University NSW 2109

Reference: 5201500219

Dear Dr Case,

FINAL APPROVAL

Title of project: Personal Reactions, Behaviour and Beliefs

Thank you for your recent correspondence. Your response has addressed the issues raised by the Faculty of Human Sciences Human Research Ethics Sub-Committee. Approval of the above application is granted, **effective 1st April 2015** and you may now commence your research.

This research meets the requirements of the National Statement on Ethical Conduct in Human Research (2007). The National Statement is available at the following web site:

<http://www.nhmrc.gov.au/book/national-statement-ethical-conduct-human-research>

The following personnel are authorised to conduct this research:

Chief Investigator: Dr Trevor Case
Co-Investigator: Ms Alessandra Kiri Teunisse

Please note the following standard requirements of approval:

1. The approval of this project is conditional upon your continuing compliance with the National Statement on Ethical Conduct in Human Research (2007).
2. Approval will be for a period of five (5) years subject to the provision of annual reports.

Progress Report 1 Due: 1st April 2016
Progress Report 2 Due: 1st April 2017
Progress Report 3 Due: 1st April 2018
Progress Report 4 Due: 1st April 2019
Final Report Due: 1st April 2020

NB. If you complete the work earlier than you had planned you must submit a Final Report as soon as the work is completed. If the project has been discontinued or not commenced for any reason, you are also required to submit a Final Report for the project.

Progress reports and Final Reports are available at the following website:

http://www.research.mq.edu.au/current_research_staff/human_research_ethics/application_resources

OFFICE OF THE DEPUTY VICE-CHANCELLOR
(RESEARCH)
Research Office
CgC East Research HUB, Level 3



3. If the project has run for more than five (5) years you cannot renew approval for the project. You will need to complete and submit a Final Report and submit a new application for the project. (The five year limit on renewal of approvals allows the Committee to fully re-review research in an environment where legislation, guidelines and requirements are continually changing, for example, new child protection and privacy laws).

4. All amendments to the project must be reviewed and approved by the Committee before implementation. Please complete and submit a Request for Amendment Form available at the following website:

http://www.research.mq.edu.au/current_research_staff/human_research_ethics/application_resources

5. Please notify the Committee immediately in the event of any adverse effects on participants or of any unforeseen events that affect the continued ethical acceptability of the project.

6. At all times you are responsible for the ethical conduct of your research in accordance with the guidelines established by the University. This information is available at the following websites:

<http://www.mq.edu.au/policy/>

http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics/policy

If you will be applying for or have applied for internal or external funding for the above project it is your responsibility to provide Macquarie University's Research Grants Officer with a copy of this letter as soon as possible. The Research Grants Officer will not inform external funding agencies that you have final approval for your project and funds will not be released until the Research Grants Officer has received a copy of this final approval letter.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Dr. Anthony Miller", written over the printed name.

Dr Anthony Miller
Chair
Faculty of Human Sciences Ethics Review Sub-Committee
Human Research Ethics Committee

Office of the Deputy Vice-Chancellor
(Research)

Research Office
Research Hub, Building C5C East
Macquarie University
NSW 2109 Australia
T: +61 (2) 9850 4459
<http://www.research.mq.edu.au/>
ABN 90 952 801 237



10 August 2015

Dr Trevor Case
Department of Psychology
Faculty of Human Sciences
Macquarie University
NSW 2109

Dear Dr Case

Reference No: 5201500596

Title: *Social Perceptions and Trust*

Thank you for submitting the above application for ethical and scientific review. Your application was considered by the Macquarie University Human Research Ethics Committee (HREC (Human Sciences & Humanities)) at its meeting on 31 July 2015 at which further information was requested to be reviewed by the Ethics Secretariat.

The requested information was received with correspondence on 5 August 2015.

I am pleased to advise that ethical and scientific approval has been granted for this project to be conducted at:

- Macquarie University

This research meets the requirements set out in the *National Statement on Ethical Conduct in Human Research* (2007 – Updated March 2014) (the *National Statement*).

This letter constitutes ethical and scientific approval only.

Standard Conditions of Approval:

1. Continuing compliance with the requirements of the *National Statement*, which is available at the following website:

<http://www.nhmrc.gov.au/book/national-statement-ethical-conduct-human-research>

2. This approval is valid for five (5) years, subject to the submission of annual reports. Please submit your reports on the anniversary of the approval for this protocol.

3. All adverse events, including events which might affect the continued ethical and scientific acceptability of the project, must be reported to the HREC within 72 hours.

4. Proposed changes to the protocol must be submitted to the Committee for approval before implementation.

It is the responsibility of the Chief investigator to retain a copy of all documentation related to this project and to forward a copy of this approval letter to all personnel listed on the project.

Should you have any queries regarding your project, please contact the Ethics Secretariat on 9850 4194 or by email ethics.secretariat@mq.edu.au

The HREC (Human Sciences and Humanities) Terms of Reference and Standard Operating Procedures are available from the Research Office website at:

http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics

The HREC (Human Sciences and Humanities) wishes you every success in your research.

Yours sincerely



Dr Karolyn White

Director, Research Ethics & Integrity,

Chair, Human Research Ethics Committee (Human Sciences and Humanities)

This HREC is constituted and operates in accordance with the National Health and Medical Research Council's (NHMRC) *National Statement on Ethical Conduct in Human Research* (2007) and the *CPMP/ICH Note for Guidance on Good Clinical Practice*.

Details of this approval are as follows:**Approval Date:** 10 August 2015

The following documentation has been reviewed and approved by the HREC (Human Sciences & Humanities):

Documents reviewed	Version no.	Date
Macquarie University Ethics Application Form	2.3	July 2013
Correspondence from Dr Case responding to the issues raised by the HREC (Human Sciences and Humanities)		Received 5/08/2015
MQ Participant Information and Consent Form (PICF) PSY 105 students		05/08/2015
MQ Participant Information and Consent Form (PICF) non-PSY 105 students		05/08/2015
List of online forums		03/07/2015
Request to advertise the study for online forums		03/07/2015
Advertisement (formal) to participate in research		03/07/2015
Advertisement (informal) to participate in research		03/07/2015
Facebook advertisement		03/07/2015
Participant questionnaire		03/07/2015