The Effects of Superstition on Stress Levels and the Relationship between Superstition and Religion

Siobhan Maire Roddy

Assessment Code: J23726

MSc Psychology (Conversion)

PS7112 Research Dissertation

2015/2016

University of Chester

The Effects of Superstition on Stress and the Relationship between Superstition and Religion.

Word Count: 11,017

**Declaration**

This work is original and has not been submitted in relation to any other degree or qualification.

This research received ethical approval from the Department of Psychology Ethics Committee on30/03/2016*,*DOPEC code: SRNL030516

Signed:

Date:

**With sincere thanks to my supervisor, Nicola Lasikiewicz, for her support and guidance throughout this process.**

****

**Department of Psychology**

**Research Module Meeting Log 2015/2016**

NAME: Siobhan Maire Roddy

SUPERVISOR: Dr. Nicola Lasikiewicz

**Date Discussion topics**

26/01/16 Met to discuss the focus and direction of dissertation.

3/02/16 Set up group ‘Dropbox’ to enable sharing of relevant files throughout the course of the project.

10/02/16 Met to catch up and discuss the direction of research and submission of Ethics proposal.

24/02/16 Catch up to discuss individual contribution to the experiment and discussion of Ethics application process.

3/03/16 Discussed draft of protocol for Ethics application, literature review and decided on which measures would be used throughout the experiment.

16/03/16 Discussed progress and experimental procedure.

19/04/16 Discussed changes needed for the Ethics Amendment form.

25/05/16 Ran a practice run-through of the experimental procedure with a test participant. Organised the recruitment and designed posters.

22/06/16 Met after conducting an experiment, set up data files.

29/06/16 Catch up to discuss how the experiments were proceeding.

20/07/16 Discussed and organised a full day of experiments on a weekend.

15/08/16 Planned weekend recruitment, and relayed how the experiments were going.

27/08/16 Met during the day of weekend experiment. Decided it was the final day of conducting experiments and organised a meeting to discuss analysis of results and writing up the dissertation. #

31/08/16 Discussed which analyses to run and conducted a preliminary data analysis and planned the deadline for the first draft.

7/09/16 Continued to run analysis and which results needed completing before draft deadline.

19/09/16 Met up for final questions before draft submission.

**Date Discussion topics**

28/09/16 Met up for feedback on first draft.

05/10/16 Met to discuss final queries of content.

07/10/16 Final queries about submission of dissertation and supervision log.

SIGNED

STUDENT \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE: \_\_\_\_\_\_\_\_\_\_\_

SUPERVISOR \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE: \_\_\_\_\_\_\_\_\_\_\_

Table of contents

Title Page 2

Declaration 3

Acknowledgements 4

Supervision Log 5

Table of Contents 7

List of Tables and Figures 8

**Abstract** 9

**Introduction** 10

**Methodology** 20

Participants 20

Design and Statistical Analysis 20

Materials 21

Experimental Manipulation 22

Procedure 23

**Results** 26

Psychological and Physiological Responses to Stress/No-Stress and Lucky Pen/No Lucky Pen 26

Change in Superstition over Time 29

Effects of Religion on Superstitious Beliefs and Stress Levels 30

**Discussion** 31

**Conclusion** 44

References 45

Appendices 50

Appendix A: Demographics Questionnaire 50

Appendix B: Superstition Questionnaire 53

Appendix C: State Trait Anxiety Inventory Questionnaire 56

Appendix D: Centrality of Religiosity Questionnaire 57

Appendix E: Debrief Questionnaire 60

Appendix F: Information Sheet 63

Appendix G: Consent Form 65

Appendix H: Job Description 66

Appendix I: Debrief Information Sheet – Stress Condition 67

Appendix J: Debrief Information Sheet – No-stress Condition 68

Appendix K: CRS ANCOVA Table of Values 69

List of Tables and Figures:

Tables

**Table 1**: Reliability of CRS, STAI and SQ Measures 26

**Table 2:** CRS ANCOVA Table of Values 69

Figures

**Figure 1:** Interaction between the means HR of stress conditions 27

(stress/no-stress) and superstition conditions (luck pen/no lucky pen)

**Figure 2**: Interaction between the means Diastolic BP of stress conditions 28

(stress/no-stress) and superstition conditions (luck pen/no lucky pen)

**Abstract**

Beliefs in paranormal phenomena have often been divided into various subcategories, with superstition and religion being the two subcategories to be scientifically studied. Current research on superstition has shown that there is an important relationship between stress and superstition. Research has led to conclusions that superstitious beliefs increase in times of stress, enhance performance and even help reduce feelings of stress (Keinan, 1994; Keinan, 2002, Langer, 197; Teo & Lasikiewicz, 2015). Additionally, many studies have suggested there is an important relationship between religion and superstition, indicating both positive and negative relationships. To gain more insight into these relationships, 28 participants between the ages of 18 and 71 with an average age of 35 took part in a cognitive experiment. They were placed into four conditions with 7 participants in each. The experiment utilised a Trier Social Stress Test (TSST) and five self-report questionnaires. The results investigating superstition and stress found two significant results. One showed that there was an increase in state anxiety (STAI) over time during the experiment, and the second revealed that participants in the no-stress condition with a lucky pen had significantly higher heart rates (HR) than those in the no-stress condition without the lucky pen. Additionally the results revealed no significant correlations between religion and superstition. Although the results found no conclusive evidence to support the hypotheses, the significant results suggest there may be a relationship between stress and superstition, and the results of religion and superstition highlight how experimental improvements may be required in further research.

**Introduction**

Paranormal beliefs are understood as those which cannot be explained by current science (Hergovich, Schott & Arendasy, 2005). There are many different subcategories of paranormal beliefs, which extend from beliefs in Telepathy, witchcraft and UFOs, to more commonly held beliefs such as superstitions, ghosts, life after death and even some traditional religious beliefs (Irwin, 2009). What defines these subcategories as ‘paranormal’ is that they have yet to be scientifically validated. This introduction will centre on the paranormal subcategory ‘superstitious’ beliefs, as this dissertation studies superstition in relation to stress and religion.

The first subcategory of paranormal beliefs to be scientifically studied was superstitious beliefs, which were studied by Minot (1887) and Dressler (1907) who attempted to understand the construct of superstitious beliefs which were initially perceived to be irrational and ignorant (Irwin, 2007). Superstitions are widely and commonly held paranormal beliefs that have existed for millennia, and continue to be prevalent in modern societies (Jahoda, 1969). Superstitious beliefs are considered to be inconsistent with the known laws of nature and science, or that which is considered rational or true in society (Kramer & Block, 2008). Traditionally a superstition is a belief that a particular action or event can cause or foretell an unrelated event, usually prevent bad luck or create good luck (Williams, 2005). This often relates to omens of good or bad luck, such as finding a four-leaf clover, breaking a mirror, knocking on wood or lucky charms (Irwin, 2009). Positive superstitions are an attempt to bring good luck and positive events, whereas negative superstitions are an attempt to evade undesirable incidents (Zebb & Moore, 2003). Other superstitious beliefs include prediction of events, whether in the near or far future, such as a cow lying down predicting rain, or a shiver meaning someone has walked over your grave (Irwin, 2009).

Lucky charms are a common practice of positive superstitions; traditional superstitions (such as carrying a rabbit’s foot or a horseshoe) and personal superstitions (such as lucky socks) are used to provoke good fortune. Superstitions have been found to be prevalent amoungst students or athletes; this luck is usually believed because of a cause and effect event that the believer has experienced, such as wearing a specific necklace to a successful exam or wearing a particular pair of socks to a winning sporting event (Damish, Stoberock & Mussweiler, 2010). Consequently, in such situations, personal objects become lucky because the object and the event are thought to be connected, with the object being deemed responsible for the success. Thus, the object becomes an item of superstition and is used in similar situations in the future, helping overcome fears by providing some form of control and security to the believer (Williams, 2005).

This concept, that superstitious beliefs exist because of a causal relationship between two things with no evidence of any such relationship is was suggested to occur from conditioning over time. Operant conditioning is where people have become accustomed to believe that a particular behaviour has an effect on their environment, with the belief being strengthened through reinforcement (Skinner, 1948). B. F. Skinner (1948) began research into the psychology of superstition, with results suggesting that superstition exists through operant conditioning and occurs through on-trial learning (Hood, Hill & Pilka, 2009). Skinner conducted experiments on pigeons in early studies on superstition, finding that ritualistic behaviours were found in these pigeons that had derived from cause and effect conditioning (Skinner, 1948; Skinner et al., 1998). Skinner’s research was the foundation of further research which supported the finding that superstitions were psychological behaviours created through causal events. Conditioning as a cause of superstition was further supported by Hood, Hill & Pilka (2009) who argued that when a strong emotion (such as a threat, stress or pain) is resolved, then associated (and sometimes irrelevant) objects, stimuli or events become meaningful.

Although it has been argued that conditioning is the process through which superstitions are created, psychologists progressed to research the reasons why superstitions are needed or created. One explanation for why people hold superstitious beliefs is that they feel a lack of control over a situation (Darke & Freedman, 1997a). In an attempt to regain control, many people turn to superstitions to prevent something bad from occurring or to aid a positive outcome. Consequently, these superstitions that are created through regaining control then give an illusion of control over similar situations in the future (Langer, 1975). Therefore, past luck may leave expectations for luck in the future (giving a sense of control over luck) and the superstitious objects/actions are attempts in which to control luck. In an experiment by Langer (1975) on the illusion of control, it was found that participants believed they could control chance-related tasks through practice, despite there being no related advantage. These participants had an illusion of control which gave them unfitting confidence, highlighting how people believe that they can control the uncontrollable. This illusion of control helps comprehend superstitious beliefs; superstitious people believe they are able to control luck in the same way Langer’s participants believed they were able to control chance situations.

A common cause of people feeling a lack of control is stress, with stressful situations causing people to search for any form of control (Irwin, 2009). Fisher (1986) argued that evidence suggests that stress undermines an individual’s sense of control. Grounded on the consensus in research that superstitious beliefs stem from a desire for control, and that the need for control occurs in stressful situations, it is proposed that superstitions could be related to times of high stress and be activated or more prevalent in challenging situations (Keinan, 2002).

­­­In more recent years, it has been suggested that stress might cause the emergence or growth of superstitious beliefs during difficult times, specifically when under psychological stress or danger (Kienan, 1994; 2002). Padgett and Jorgenson (1982) researched stress and superstition, finding that the threat variables concerning economic threat in post-war Germany (1918 – 1940) significantly predicted levels of superstition. Specifically, this research found that higher levels of stress and threat would predict higher superstitious and paranormal beliefs (such as mysticism and astrology). This indicated that in other stressful situations people are more likely to be superstitious or have an increase in suspicious beliefs. A number of studies have proposed that by exposing people to conditions of stress or danger, superstitious beliefs increase. Keinan (1994) studied superstitious beliefs of Israeli citizens during the Gulf war, finding that superstitious beliefs and practices are more prevalent in regions exposed to missile attacks (high-stress), in comparison to regions that were not exposed to such attacks (low-stress).

An explanation of why the frequency of superstitious behaviour increases when stress occurs is provided by Keinan (2002) who suggested that when stressed, superstition provides the illusion of control that is desired. Keinan’s (2002) experiment manipulated superstition by asking questions designed to provoke the traditional superstition of ‘knocking on wood’ (when a person knocks on something wooden in order to prevent bad luck). Keinan (2002) found that those in high-stress conditions knocked on wood a significantly higher number of times than those in low-stress conditions, and those with a high-desire for control knocked more than those with a low-desire for control. These results remaining consistent with previous studies which indicate that higher superstition exists when psychological stress occurs.

Interestingly, there is very little known of potential consequences and benefits of superstitions. One observable benefit of heightened superstition for individuals was investigated by Bandura (1997), who found that the more people believe they will succeed, the better they actually perform. Badura suggested that this is caused by the increase in self-efficacy and confidence that superstition provides. Performance enhancing benefits of superstition could explain why they are found so commonly in athletes and students, who are in high-emotion, performance based situations (Damisch et al., 2010). Performance levels in relation to superstitions were also studied by Dudley (1999) who found that students who were exposed to unsolvable puzzles had higher superstitious beliefs than those completing solvable puzzles. Furthermore, when all students were given solvable anagrams, those with higher superstitious beliefs performed better by solving more than those with lower superstitious beliefs. Dudley’s (1999) experiment highlighted how superstitious beliefs can both increase under stress, and have performance benefits. More recently, Damisch, Stoberock & Mussweiler (2010) found that participants for whom a superstition was activated (using lucky charms, the superstition of keeping ‘fingers crossed’ and being told an object was lucky) performed better in motor and cognitive tasks when compared with those for whom no superstition was activated. The increase in confidence and self-efficacy superstition provides could explain why people turn to superstitions when in stressful and performance based situations (Bandura, 1997).

Whether superstitious beliefs can be a health and mental well-being benefit was investigated by Day and Maltby (2003) through the examination of belief in good luck and its relationship with anxiety and depression. They found that belief in good luck was positively related to optimism, and negatively associated with anxiety (Day & Maltby, 2003). Belief in good luck may, therefore, engender optimistic traits and less anxious lives. Keinan (2002) suggested that because superstition is considered to increase in stressful situations, superstition could therefore reduce stress.

Following this, research into whether superstitious beliefs have the ability to heighten feelings of safety and act as a coping mechanism during stress was carried out by Teo and Lasikiewicz (2015). They investigated whether a person’s stress-levels could be manipulated through the use of a ‘lucky’ pen. Teo and Lasikiewicz (2015) explored the influence of a psychological stressor with the manipulation of a ‘lucky-pen’ to study whether superstitious beliefs would influence psychological and physiological responses to stress, and whether superstitious beliefs would increase after exposure to superstition in a stressful condition. Teo and Lasikiewicz (2015) found that those who were exposed to superstition and stress experienced less anxiety than those who were not exposed to superstition, but experienced stress (Teo & Lasikiewicz, 2015). These results supported the concept that superstition can act as a coping mechanism in reducing stress level, suggesting that superstitions could have health and performance benefits. However, they did not find any increase in superstitious beliefs over time, contrasting with previous studies (Keinan, 1994, 2002; Malinowski, 1954; Padgett and Jorgenson, 1982).

Within the subcategories of paranormal beliefs, religious beliefs are found to be closely related to superstition, with religious beliefs being frequently argued to have the same psychological basis as superstition. Irwin’s (2009) research into the psychology of paranormal beliefs argued that eastern religious beliefs, and Judeo-Christian beliefs are all considered as paranormal beliefs. Irwin (2009) acknowledges that calling religion ‘paranormal beliefs’ is controversial, but justifies the categorisation because some religious beliefs, such as beliefs in angels, the devil, miracles etc., appear to be superficially related to paranormal beliefs. However, this has been disputed by scholars such as Hergovich, Schott and Arendasy (2008) and Fitzpatrick and Shook (1994) who argue that religion cannot be the same as paranormal and superstitious beliefs on philosophical grounds. This argument over whether religious and superstitious beliefs are psychologically entwined and if so to what extent, has been widely debated (Phillips, 1993; Goode, 2000; del Campo Rios) and has encouraged further research into the complex relationship.

An early study of this relationship was conducted by Malinowski (1954). Malinowski found that in the Melansesian islands, the islanders engaged in magical, superstitious and religious rituals when sailing in open sea and exposed to danger; yet, the islanders did not exhibit the same behaviour when fishing in safe lagoons. Finding that both superstitious and religious beliefs/practices functioned similarly in situations of emotional stress, Malinowski (1954) argued that this was because they both open up escapes from situations where they there is no control or empirical solution. Religion and superstition offer a similar form of security, as they are both existent in the ‘atmosphere of the miraculous’ (Malinowski, 1954, 67). This interrelation between the two paranormal beliefs have caused scholars, such as Wuthnow (1978), to argue that if a person subscribes to one, they are more likely to subscribe to the other. The reason being that both superstition and religion believe in the existence of properties outside the physical world.

Religion and superstition are thought to be similar in terms of the psychological and well-being impacts they both have. Both phenomena have been associated with advantages at behavioural and cognitive levels, such as their aid in stressful situations and giving an illusion of control (Aarnio & Lindeman, 2007). Both religion and superstition are seen to reduce anxiety during crises and threatening situations, with research showing that religious beliefs have mental health benefits through acting as a coping mechanism, reducing stress through life, and even alleviating the physical manifestations of stress (Ellison, 1991; Koenig et al., 2001). Ellison and Levin (1998) suggested that the multiple mental health benefits and reduced stress found in religious believers could be due to the believer placing their faith in God, relieving the burden of worrying over issues that are out of their control. This reflects the stress-reducing consequences of superstition; placing responsibility on something beyond personal control relieves stress resulting from feeling of lack of control.

These similarities have encouraged researchers to explore the possibility of a significant link between religious beliefs and superstitious beliefs. Studies such as Burhrmann and Zaugg (1983) reported that they found a significant positive relationship between high church attendance, and the occurrence of superstitious beliefs in athletes. Other studies (Rudski, 2003) support this positive correlation between those with religious beliefs and those with superstitious beliefs. Rudski (2003) suggested that high levels of religious beliefs equate to high levels of paranormal and superstitious beliefs, despite the fact that participants did not consider religious beliefs as being a form of superstitious belief. Additionally, Hergovich, et al. (2005) found positive correlations between paranormal beliefs (including superstition) and religiosity in their research. However, they acknowledged that positive results (such as theirs) encourages further study, and cannot be generalised because other studies have shown conflicting results, regarding the relationship between religion and superstition (Hergovich, Schott & Arendasy, 2005).

Despite this evidence, not all research into religion and superstition has shown positive correlations between the two phenomena. Aarnio and Lindeman (2007) suggest that in contrast there is an opposing line of research that argues religious and paranormal beliefs are negatively connected, with many suggesting paranormal beliefs fill a religious void (Goode, 2000; Emmons & Sobal, 1981). Good (2002) argued there may be paranormal elements in religious beliefs, and it is because of this there are negative correlations which suggest that religion and superstition could practice as alternatives for one-another. These studies contrast with Irwin’s (2009) categorisation of religion being within paranormal beliefs, and questioning whether the paranormal and religion are as similar as suggested. Emmons and Sobal (1981) found that fundamental religious beliefs are distinct and negatively correlated with paranormal and superstitious beliefs, with non-religious people having higher tendency to believe in superstitions. Based on these negative correlations, it has been suggested that superstitious beliefs act as a functional alternative to religious beliefs, indicating that if there is a relationship between religion and superstition, it will not only be seen through positive correlations (Williams, 2005). Hood, Hill and Spilka (2009) wrote that if there is a relationship between religion and superstition, and they hold the same psychological processes, studies should expect to find either a positive correlation (because they are so similar and therefore people who are one are likely to be the other) or a negative correlation (because one acts as a functional alternative to the other).

Although there has been research indicating that there is a significant relationship between religion and superstition (seen through negative or positive correlations), research has been too inconclusive to definitely suggest a relationship (Hergovich et al., 2005). Many studies have also found no relationship between the two. Rice (2003) found very few significant correlations between religion and superstition and argued that the relationship is more complex than questionnaires and correlations can reveal. Likewise, Stanke (2004) studied religiosity, superstition and control, and found no links between religion and superstition, and consequently multiple inconsistent results suggest that further research is needed. Most recently, Schofield, Baker, Staples and Sheffield (2016) found that there are inconsistent results in how supernatural beliefs are defined, particularly concerning religion. These inconsistent results specifically questioned the practice of placing religion within paranormal beliefs as Irwin (2009) and many others had done, suggesting that it cannot be assumed there is a relationship between religion and superstition (Schofield et al., 2016).

The current evidence into stress and superstition, as discussed above, suggests that not only has superstition been seen to increase under influence of stress, but also that superstition can benefit the believer by helping to cope with stress, and consequently reducing stress levels and improving performance. Conversely, current research on religion and superstition has generated results of positive, negative, and sometimes no correlations whatsoever. However, the majority of the research suggests that there is a relationship between the two, whether negative or positive.

Based on the state of current research in stress, superstition and religion, this study will attempt to replicate the Teo and Lasikiewicz (2015) experiment with an additional religious measure. This experiment will investigate whether a psychological stressor and the manipulation of superstition (a lucky pen) will influence the psychological and physiological stress responses and whether superstitious beliefs increase after exposure to stress. In addition, a religiosity questionnaire will be added in order to study the relationship between religion and superstition in an attempt to see whether religion and superstition have similar psychological responses.

There are multiple hypotheses in this experiment. There are 2 hypotheses concerning stress and superstition, which will examine whether there is a difference between the 4 conditions used (stress/no-stress/lucky pen/no-lucky pen):

1) A difference in the stress levels between those with the lucky pen and those without the lucky pen, hypotheses that those with the lucky pen will have a reduction in stress compared with those without the lucky pen; and

2) An increase in superstitious beliefs over time after exposure to superstitious manipulation in comparison with those without the superstitious manipulation.

The two hypotheses concerning religion and superstition are:

1) There will be a significant correlation (negative or positive); and

2) Religion as a covariate will influence the outcome of the ANOVA over superstition and stress.

**Methodology**

*Participants*

This study recruited 28 participants, with 7 participants in each of the four conditions of the experiment (luck pen/no-lucky pen/stress/no-stress). The participant group consisted of 13 males (46%) and 15 females (54%). The participants were between the ages of 18 and 71 (M = 34.5, SD = 16.4) with two participants choosing not to state their age. The participants had a mix of religious affiliations, with the majority (54%) as Christian, 21% Atheist, 14% Agnostic, 4% Muslim, 4% Sikh and 4% specified that they were United Reform. The majority of the participant’s ethnicity was White British 89%, with 4% identifying as Mixed (White and Asian), 4% as Asian British (Indian) and 4% as Asian British (Pakistani). Ethical approval was given by the University of Chester Psychology Department Ethics Committee and participants were treated in accordance with the ethical guidelines of the British Psychological Society and gave full consent.

*Design and Statistical Analysis*

The data was analysed using IBM SPSS, version 22. The stress condition (stress or no stress) and superstition condition (lucky pen or no lucky pen) were included as between subjects factors. Time was a within subjects factor with 3 different time points (Baseline, post-speech preparation and post-stressor).

This study utilised a 2 (stress/ no-stress) x2 (lucky pen/ no lucky pen) x3 (time; baseline/ post-speech preparation/ post-stressor) mixed between-within subjects Analysis of Variance (ANOVA) to measure perceived anxiety (STAI). Further, a 2 (stress/no-stress) x2 (lucky pen/no lucky pen) x2 (time; pre-stressor/ post-stressor) between-within subjects design was used to explore any change in superstitious belief. The physiological measures Heart Rate (HR) and Blood Pressure (BP) were included in a 2 (stress/no-stress) x2 (lucky pen/no lucky pen) x4 (time; baseline/post-speech preparation/ post-stressor/ post-experiment). The dependent variables (DVs) were time, HR, BP and perceived anxiety (STAI), to monitor any changes in stress. The independent variables (IVs) were the stress manipulations (stress or no-stress) and superstition manipulations (lucky pen or no lucky pen). In addition to this, the test was ran a second time with religion included as a covariate using an ANCOVA. A Pearson correlation coefficient was also used to analyse the relationship between religion and superstition.

*Materials*

*Psychological*

A demographics questionnaire (Appendix A) was used to determine participants’ sex/gender, ethnicity, education, occupation and religion.

A participant’s superstition levels were identified using the Superstitiousness Questionnaire (SQ; Zebb & Moore, 2003). This questionnaire was originally created by Leonard, Goldberger, Rapoport, Cheslow and Swedo (1990). The SQ (see appendix B) comprises of 18 self-report items in an attempt to gage how superstitious a participant was, by looking at how many superstitious beliefs and behaviours a participant has. The questionnaire calculates this using a 6-point Likert scale (strongly agree to strongly disagree). Although there is little psychometric evaluation on Zebb and Moore’s (2003) SQ, there has been little testing on any modern superstition questionnaires (such as Killen, Wildman & Wildman, 1974). This SQ was used as it tests cognitive and behavioural aspects of superstition, such as “I believe that opening an umbrella inside in bad luck”, and “I avoid opening and umbrella inside”. It has also been used in related studies such as Teo and Lasikiewicz (2015) and Stanke (2004).

The state component of the State Trait Anxiety Inventory (STAI) questionnaire (Appendix C) was administered to understand whether there were psychological responses to the stressor. The STAI (created by Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) comprises of 20 statements which investigate any brief feelings of anxiety. The questions in the STAI offer statements such as “I am calm”, and their intensity of emotionality is measured using a 4-point Likert scale (1 = not at all, to 4 = very much so). STAI has been shown to be reliable through good internal consistency (Barnes, Harpe & Jung, 2002).

A Centrality of Religiosity Scale (CRS; Appendix D) was used to understand how religious/spiritual each participant was. The CRS is a measure of how central, important and prominent religion is in a person’s personality and has been shown to be reliable measure having been used in over 100 studies across 25 countries (Huber & Huber, 2012). The CRS measures religiosity well because it considers a person’s religious intellect, ideology, public practice, private practice and experience of religious events. The questionnaire comprised of 15 questions, with four sub-questions specifically for those who identify as Muslim. The CRS calculates the religiosity by using a Likert scale, which comprised of a 5 point response scale for some questions and a 7 point response for others.

An in-house Debrief Questionnaire (see appendix E) was used containing 9 questions using a 100mm visual analogue scale (VAS) which asked participant to mark how well they felt they had performed in the interview and the mental arithmetic test. The questions looked at how they felt they had performed, how easy it had been, how stressful they had found it and how much the pen aided their performance. The final question, ‘Do you have a lucky item?’ was an open response.

*Physiological*

The HR of the participants was measure during 4 separate time points throughout the experiment using a Polar HR monitor. The BP of participants was also recorded at the same time points as HR using an Omron BP monitor.

*Experimental Manipulation*

*Stress*

Stress was induced using the Trier Social Stress Test (TSST) which was developed from Kirschbaum et al., (1993). This socially evaluated interview is performed in front of a panel of two judges and includes a mental arithmetic test. Participants are given a ten-minute preparation followed by a five-minute interview. The arithmetic test included a five-minute serial subtraction task (participants were asked to continuously minus 13 from the number of 1022). Any mistakes made or long pauses and the participant was asked to start again. Those in the non-stress test were given an informal interview, with a basic written arithmetic test of 10 questions. The TSST has shown to be a reliable way of manipulating stress and is the most frequently used psychological protocol in stress research (von Dawans, Kirschbaum & Hendrichs, 2010).

*Superstition*

The influence of the luck-related superstition was assessed by attributing ‘luck’ to a pen that participants were invited to use in the ten-minute preparation before the interview task. Participants were told that past participants had found the pen lucky. They were handed the pen with a statement along the lines of: *“Here is a pen you can use to prepare for the speech. So far it has turned out to be a very lucky pen. Other participants who used this pen performed exceedingly well for the task required in this experiment”.* This method was modified from Damisch et al. (2010). Those in the non-lucky pen condition were not told that the pen was lucky.

*Procedure*

The researcher explained to participants that they should read the information sheet (Appendix F) and participants were asked to provide informed consent prior to the experiment (Appendix G). The participant was reminded of their right to withdraw at any point throughout the experiment. All participants were ensured that their data would remain anonymous. Next, a collection of the participant’s baseline measures were taken (BP and HR). In order to take these measures, the participant was instructed how to put on the HR monitor around their chest and the researcher attached the HR wrist monitor and the BP monitor to the participant’s wrists.

Once baseline measures were taken, the participant was asked to fill out four questionnaires. First, demographics questionnaire (Appendix A); secondly, Superstitious questionnaire (Appendix B); thirdly the STAI (Appendix C) and finally the Centrality of Religiosity Scale (CRS, Appendix D). Once all the questionnaires were completed, participants in the stress condition were informed that two panellists would enter to explain the first task. The panellists informed the participant they had ten-minutes to prepare for their 5 minute speaking task. In the non-stress condition, participants were told by the researcher that they have ten-minutes to prepare for an informal speaking task. Participants in the non-stress condition were given the job description (Appendix H) and paper to prepare for the interview task. Those in the no-stress could keep notes throughout the task, whereas those in the stress condition were told they could not.

Half of the participants in each condition were told that the pen they were given to prepare with had so far turned out to be ‘lucky’, the other participants were told nothing. At the end of the ten-minute preparation, all participants had their BP and HR recorded for a second time. The participant then completed the STAI questionnaire (time 2). Next, in the stress condition, the panellists returned to begin the speaking task. In the non-stress condition, the researcher began the informal interview task. Following the speaking task in the stress condition, the researcher measured BP and HR for a third time. Then, participant in the stress condition were told that the panellists would conduct the final task; the panellists explained the mental arithmetic task and began. In the non-stress condition, once the informal interview had finished and secondary BP and HR rates were measured, the participant took part in a mental arithmetic task.

Following the completion of the arithmetic test in both conditions, the researcher recorded the BP and HR for a final time. Then, the participant was asked the complete the STAI (time 3) and the SQ (time 2) questionnaires. Finally, the participant was told that the experiment had finished and there was a debrief questionnaire to complete (Appendix E). Once the debrief questionnaire was completed, the participant was given a debrief information sheet specific to stress (Appendix I) or non-stress condition (Appendix J). Then the participant was told they could ask any questions about the experiment they had just been through. Once the participant was fully debriefed, a final BP and HR check was taken to ensure that the participant was safe before they left.

**Results**

Before the analysis was carried out, normality was checked and no consistent outliers were found. Out of the 28 participants, 100% were translated into data. A two-way mixed between-within subjects ANOVA with stress condition and superstition condition as between subjects variables, and time as the within subject variable was used to analyse HR, diastolic BP, systolic BP and STAI.

The reliability of the measures used were checked to ensure internal consistency. All measures were found to have acceptable reliability. Table 1 shows the Cronbach’s Alpha for each measure.

Table 1: *Reliability of CRS, STAI and SQ measures.*

|  |  |
| --- | --- |
| Measure | Cronbach’s Alpha |
| CRS | 0.77 |
| STAI Time 1 | 0.71 |
| STAI Time 2 | 0.92 |
| STAI Time 3 | 0.91 |
| Superstition Time 1 | 0.92 |
| Superstition Time 2 | 0.94 |

Psychological and Physiological Response to Stress/No-Stress and ‘Lucky-Pen/No Lucky-pen

*Heart Rate*

The analysis revealed a significant Super\_Condition\*Stress\_Condition interaction, *F*(1, 24) = 5.63, *p* = .026). Bonferroni corrected independent samples t-tests were carried out. The results of the t-test revealed a significant difference in the no-stress condition between HR and the superstitious variable (lucky-pen/no lucky-pen). The results of the t-test show that those with the lucky-pen in the no-stress condition had significantly higher HR than those without the lucky-pen in the no-stress condition; *t*(12) = -4.78, *p* = 0.000 < 0.025. However, the second t-test showed no significant difference between lucky-pen and no lucky-pen with HR in the stress condition; *t*(12) = 0.73. *p* = 0.479 > 0.025.

*Figure 1.* The interaction between the mean Heart Rate of stress conditions (stress or no-stress) and superstition condition (lucky pen or no-lucky pen).

The main effect of Super\_Condition, *F*(1, 24) = 1.02, *p* = 0.32, and Stress\_Condition *F*(1, 24) = 1.94, *p* = 0.18, did not reach any significance. No significant main effects of time were found, (*F*(3, 72) = 0.80, *p* = 0.50). No interactions were found for time\*Super\_Condition, *F*(3,72) = 1.94,  *p* = 0.13) or time\*Super\_Condition\*Stress\_Condition, *F*(3,72) = 1.84, *p* = 0.15.

*Diastolic Blood Pressure*

The analysis revealed a significant Stress\_Condition\*Super\_Condition interaction, *F*(1,24) = 4.30, *p* = .049. Post-hoc Bonferroni corrected independent samples t-tests were carried out. The results of the first t-test show no significant difference in Diastolic BP in the stress condition between lucky-pen and no lucky-pen, *t*(12) = 1.40, *p* = 0.19. The second t-test also showed no significant difference in Diastolic BP in the no-stress condition, *t*(12) = 1.40, *p* = 0.19.

*Figure 2.* The interaction between the mean Diastolic Blood Pressure of stress conditions (stress or no-stress) and superstition condition (lucky pen or no-lucky pen).

The main effects of Super\_Condition, *F*(1, 24) = 0.30, *p* = 0.59 and Stress\_Condition, *F*(1, 24) = 4.30, *p* = 0.71 did not reach any significance. However, a main effect of time was found within Diastolic BP, *F*(3, 72) = 3.32, *p* = 0.025. This effect shows that the Diastolic BP increased throughout the experiment, as expected. Therefore a Pairwise Comparisons were checked, showing no significance between any time points (Time 1 and 2, *p* = 0.76. Time 2 and 3, *p* = 1.0. Time 3 and 4, *p* = 1.0). Therefore, no further tests were carried out. There were no other significant effect of time with Diastolic BP; time\*Super\_Condition, *F*(3, 72) = 0.08, *p* = 0.97, time\*Stress\_Condition, *F*(3, 72) = 2.05, *p* = 0.11, or time\*Super\_Condition\*Stress\_Condition, F(3, 72) = 0.43, *p* = 0.73.

*Systolic Blood Pressure*

Mauchly’s Sphericity was significant (*p* = 0.004), therefore Greenhouse-Geisser (p = 0.67) values were used to check for significance. The analysis revealed no significant main effects of Super\_Condition, *F*(1, 24) = 1.83, *p* = 0.19, Stress\_Condition, *F*(1, 24) = 0.00, p = 0.99 and no interactions between Super\_Condition\*Stress\_Condition were found, *F*(1, 24) = 2.65, *p* = 0.12. No significant main effects of time were found, *F*(3, 72) = 0.79, *p* = 0.46. No interactions were found for time\*Super\_Condition, *F*(3, 72) = 0.09, p = 0.91, time\*Stress\_Condition *F*(3, 72) = 0.48, *p* = 0.62, or time\*Super\_Condition\*Stress\_Condition, *F*(3,72) = 1.43, *p* = 0.25.

*STAI*

The two-way between-within subject ANOVA with STAI revealed no significant main effects of Super\_Condition, *F*(1, 23) = 0.03, *p* = 0.85, Stress\_Condition, *F*(1,23) = 0.00, *p* = 0.97 and no interaction between Super\_Condition\*Stress\_Condition were found, *F*(1, 23) = 1.99, *p* = 0.17. However, there was a significant main effect of time found, *F*(2, 46) = 4.76, *p* = 0.013. . As there was a main effect of time, Pairwise Comparisons were checked. A significant difference between Time 1 and Time 2 was found, *p* = 0.013. However, no significance between Time 2 and Time 3 were found, *p* = 0.104, or Time 1 and Time 3, *p* = 1. These results show that between Time 1 and Time 2, self-reported anxiety increased significantly. No other significant effects of time were found between time\*Super\_Condition, *F*(2, 46) = 1.54, *p* = 0.23, time\*Stress\_Condition, *F*(2, 46) = 1.72, *p* = 0.19, or time\*Super\_Condition\*Stress\_Condition, *F*(2, 46) = 0.94, *p* = 0.40

*Change in Superstition over Time*

The two-way mixed between-within subjects ANOVA revealed a main effect of Super\_Cond, *F*(1, 23) = 4.34, *p* = 0.05. This revealed a significant difference in superstition between those in the lucky pen condition (M = 32.78, SD =5.56) and those not in the lucky pen condition (M = 16.71, SD = 5.34). This result shows that those in the lucky-pen condition had a higher superstition score than those in the no lucky-pen condition.

No significant main effects of Stress\_Condition *F*(1, 23) = 0.19, *p* = 0.67. No significant main effects of time were found, *F*(1, 23), = 3.11, *p* = 0.1 and no significant interactions between time\*Super\_Condition, *F*(1, 23) = 0.16, *p* = 0.69, time\*Stress­\_Condition, *F*(1, 23) = 0.47, *p* = 0.50, or time\*Super­\_Condition\*Stress\_Condition, *F*(1, 23) = 0.91, *p* = 0.35.

*Effects of Religion on Superstitious Beliefs and Stress Levels*

The relationship of the religiosity (measured by CRS) and superstitious levels (measured by SQ) was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. There were no significant correlations found between Total CRS Score and Total Superstitious Time 1 [*r* = 0.12, n = 28, *p* = 0.55]. There were also no correlations between Total CRS Score and Total Superstitious Score Time 1, [*r* = 0.19, n= 27, *p* = 0.34].

A second analysis was carried out with the addition of the total CRS score as a covariate in an attempt to find if there were any effects of religion on superstition or stress. A 2x2 between-within groups analysis of covariance was conducted to assess the effect the religion (measured through CRS) has an effect on or interaction with superstition, and stress. No significant results were found for CRS as a covariate (see appendix K for values of CRS as covariate).

**Discussion**

The aim of this experiment was to test four hypotheses. Two concerning the relationship between superstition and stress; firstly that superstition would reduce the perception of stress, and secondly, that superstition would increase over time. The two hypotheses concerning religion and superstition were that firstly, there would be a significant correlation between the two, and secondly that religion would have influence on the outcome of the results when testing superstition and stress.

The study did not support any of the hypotheses set out, with superstition not reducing anxiety in the stress condition or no-stress condition. This result contrasts highly with past studies that have supported the theory that superstition can reduce stress levels (Teo & Lasikiewicz, 2015; Keinan, 2002) and act as a coping mechanism offering an illusion of control (Langer, 1975; Irwin, 2009). There was also no significant increase in the superstition levels of participants who were exposed to stress, which contrasts with past studies by Keinan (1994), Malinowski (1954) and Dudley (1999). However, this result is consistent with Teo and Lasikiewicz (2015) which is the only study to date to have directly tested for an increase in superstition after stress exposure.

Although these findings result in the rejection of the first two hypotheses, there were two significant results. There was one main effect of time within the STAI results. However, this effect was an increase in anxiety between time one and time two of the experiment, which was as anticipated because anxiety is expected to increase from baseline measures during and being informed of/preparing for the tasks. The second significant result was an interaction between superstition and stress. This interaction was interesting as it showed that there was a significant difference in the no-stress condition between those with the lucky pen and those without the lucky pen. Yet, this result was unexpected as it showed those with the lucky pen had higher HR than those without the lucky pen, a result which contrasts with prior research that has shown superstition to have de-stressing effects rather than increasing stress.

In terms of the relationship between religion and superstition, there were no correlations found, and religion was not found to have any significant influence over superstition and stress as a covariate. Therefore the two hypotheses concerning religion are rejected.

The unexpected interaction between the high HR in the no-stress/lucky pen condition when compared to the no-stress/no lucky pen, could be explained by the effects anticipation can have on a person’s stress levels. The difference between these two conditions is the presence of a superstitious object, the lucky pen. This suggests that the lucky pen is having an effect on the participant’s stress levels; it could be that the presence of the lucky pen created a sense of anticipation and consequently caused higher stress and HR levels. One explanation for these results is that the lucky pen caused the higher HR because through providing the lucky pen to the participant, it was insinuated that they would need luck due to an imminent, stressful event. The information sheet informed all participants they were taking part in a “cognitively challenging” task (Appendix F), perhaps the addition of a lucky object implied that the task would be so stressful they would need luck. Anticipation as the cause of high HR and stress is a reasonable suggestion, with studies such as Preston, Buchanan, Stansfield and Bechara’s (2007) finding that anticipation is a very effective stressor, and anticipation of an event causes great elevation in stress levels.

However, there is no significant interaction between lucky pen/no lucky pen within the stress condition, indicating that the lucky-pen did not have an effect on HR in isolation, or the same effect would have been seen in the stress condition. This brings into question whether the lucky pen could have provoked such anticipation if it is not seen in both lucky pen conditions. However, if the lucky pen did cause anticipation, it could be that the difference in the stress manipulation could have prevented the effect of anticipation from the lucky pen in the stress condition. Those in the stress/lucky-pen condition were informed of the details of their stressor task before they were given the pen, therefore, they knew what stress to expect. In comparison, the no-stress condition were not told of any stressful event and did not partake in a stressful task. Although not taking part in a stressful task would suggest that participants should be less stressed, they did not have any release of anticipation. A study by Monat, Averill and Lazarus (1972) found that despite the type of anticipation (*whether* the event would/would not happen, or *when* the anticipated event would occur) the anticipation of not knowing when or whether it would happen caused extremely high stress levels. This could explain why the stress condition were not affected if the lucky-pen did aggravate anticipation, and why those in the non-stress/lucky-pen had high HR. They were in a state of anticipation of not knowing how, when or whether the anticipated event would occur.

Therefore, it is possible that the lucky pen caused anticipation in the no-stress condition. If this is the case, this indicates that there was a response to superstition through stress; however, the stress was activated by using a lucky pen, rather than the lucky pen reducing stress levels. Although an unusual result, the finding does suggest that there is a relationship between stress and superstition, but that there were perhaps methodological aspects that caused the results to occur in an unusual form.

Following this, Skinner’s concept of operant conditioning could explain why the lucky pen may have caused people’s anticipation and to believe a stressful event would occur. Operant conditioning suggests that superstition is created because of the causal relationship between two things that usually involves the resolution of a strong emotion (Hood et al., 2009) and has been shown to occur particularly with stress (Damish et al.,). Operant conditioning implies that if a superstition is created because of a relation to stressful event, then stress and superstition will be cognitively linked (Skinner, 1948). Therefore, although people turn to superstition as a coping mechanism when stressed, it is possible that because stress and superstition are so closely associated when superstition exists without stress, superstitious people are conditioned to feel stress. This would mean that superstition could prime a stress response, which would explain why those in the lucky-pen/no-stress condition had higher HR. Priming is how behaviour and judgement can be stimulated without intention or knowledge of the recipient (Wheeler, DeMaree & Petty, 2014). Due to priming working from “associative memories”, priming and conditioning could explain why superstition may cause stress when previous studies have suggested the opposite effect (Eiser, 2012). It has been acknowledged that negative superstitions (such as Friday 13th) can increase state anxiety (Irwin, 2009). However, it has not yet been suggested that positive superstitions may cause anxiety because of their association with stress. Although the increase in HR in the no-stress/lucky pen condition initially seems like a conflicting result, it could be argued that superstitions may cause both a reduction and an increase in stress, depending on whether superstition exists as a reaction to stress or when there is no existent stress.

With this result in mind, the study did not successfully replicate the findings of Teo and Lasikiewicz (2015), and other previsious studies (Keinan, 2002; Langer, 1975) that superstition would provide an illusion of control and reduce the stress experienced by the participant. It is a fair consideration that the results could be due to the difference in culture of participants. Teo and Lasikiewicz (2015) conducted the original study in the Eastern, Asian culture of Singapore, whereas this study was carried out with participants from a western, British culture. Research has supported the theory that culture can have a significant effect upon differences in basic psychological phenomena (Henrich, Heine, & Norenzayan, 2010), so perhaps the vast difference in culture between the two studies had such differing effects when regarding superstition. Therefore, the participant’s culture is important when considering superstition and with 73% of Teo and Lasikiewicz’s participants identifying as Chinese when compared with 83% of participants of this study identifying as ‘white British’, it is reasonable to suggest that the culture may have had an effect on the study.

Further, with Singaporean culture being heavily influenced by China, and with such a high percentage of Teo and Lasikiewicz’s (2015) participants identifying as Chinese, Chinese culture would have had a strong influence over the participant’s lives. It has been shown through multiple studies that Chinese culture binds superstitious beliefs to many aspects of their lives. Tsang (2004) found that superstition plays a vital role in Chinese business decision-making because they find an alleviation of anxiety and a sense of control. This not only supports previous research, but highlights that superstition as a coping mechanism is prevalent in Chinese society. Furthermore, the Chinese tradition of *Feng Shui* has incredible influence over almost every aspect of Chinese life (including business, communication, socialising and architecture) and is widely considered to be a superstitious practice (Chen, 2007). According to Opie and Opie (1959) people have their beliefs formed in their cultural context as children. Therefore it is reasonable to believe that British participants in this experiment would have had very different cultural superstitious beliefs than the Singaporean participants in Teo and Lasikiewicz’s study (2015). This critical distinction between the two studies could be the reason for such different results, and cultural differences could have an important impact on responses to superstitious beliefs.

This also points towards the concept that ‘superstitious’ beliefs cannot be universalised or generalised. This is because superstitious beliefs may have significantly different impacts on people’s lives culturally because different cultures breed different superstitions and different levels of not only belief, but practice. However, there is not yet any research into which cultures foster the most superstitious beliefs comparatively (to the researcher’s knowledge), and therefore Western and Eastern cultures cannot be compared. This would be important research for superstition and stress research, and would also an interesting aspect of superstition research to further study.

Undoubtedly, this study contrasts with the plethora of evidence to suggest both that superstition can reduce stress levels, and that superstition and religion are critically linked. However, it must be considered that although most studies provide positive/significant results it may be because only significant results have been published; this does not mean they are the only findings to exist. These inconsistent results compared with previous evidence could be explained by the ‘file-drawer’ problem (publication bias). This concern is that failed replications or failed studies are much less likely to be published than significant studies, consequently skewing perceptions and conclusions made about the body of research (Rosenthal, 1979). Journals are filled with the small percentage of studies with significant results, yet this does not mean they are an accurate representation of overall research (Rosenthal, 1979). Therefore, these somewhat inconclusive results could be explained by this degree of bias.

An explanation for why superstitious beliefs did not increase over time and why superstition did not reduce state anxiety, could be because the lucky pen has no important meaning to participants regarding superstition. These results correspond with the research that has suggested luck works on a cause and effect basis (Skinner, 1948). Foster and Koko (2009) argued that superstitious beliefs arise through the “incorrect assignment of cause and effect” (p. 31). They found that superstitions are an inevitable feature of evolutionary adoptive behaviour, due to this cause and effect mechanism that organisms place onto situations. This concept of conditioning could explain why there were no significant results of the lucky pen decreasing stress levels, because the pen had no evidence or past history of being lucky through cause and effect to the participant. Therefore, although the participant was told that the pen had been found to be lucky (indicating a cause and effect event), the participant had no experience of the pen being lucky itself and has no personal significance to the participant; thus, the participant has no reason to believe in the superstition. This cause and effect is the reason people have lucky underwear or a lucky number, because their lucky object has some personal cause and effect meaning to them. In this experiment, the lucky pen had no such meaning, and therefore, according to research, it would be unlikely for the pen to have the superstitious effects that were expected. Beck and Forstmeier (2007) found that prior experience weighs heavily on whether a current relationship is deemed to be true or false in superstition. This suggests that because participants have had no prior experience of the pen being lucky, it would be unlikely they would believe that the pen has lucky qualities or aid them through a stressful situation.

Yet, not all superstitions that people believe concern personal objects or have been personally conditioned; there are ‘traditional’ superstitions (such as carrying a rabbit’s foot or not walking under a ladder). There is still a belief of cause and effect, however this cause and effect has been passed through decades, centuries or even millennia of other people’s conditioned responses to the items. Although not all superstitions need a personal experience, a ‘lucky pen’ is not a traditionally lucky object, and does not have any form of traditional meaning of luck behind it. Therefore, although there are traditional superstitions that are more likely to have a general effect on people that are superstitiously inclined, a lucky pen is not one of these. Thus, one explanation for not finding the results expected is that the manipulation was not high impact enough, because this ‘lucky’ pen had no personal significance and was not a traditionally superstitious object/event. A suggestion for further research would be for participants to bring in a personal superstitious item, or to utilise a traditional superstition, as seen in Keinan (2002) who used knocking on wood and Damisch et al. (2010) who used the crossing of fingers. Perhaps, if further research uses an item like the lucky pen, it would be beneficial to have people believe they have experienced a form of luck prior to introducing the lucky object to facilitate the conditioning effect (Darke & Freedman, 1992).

However, if there was a limitation in the superstitious object and participants had no reason to believe the pen held any lucky properties, this would have been seen throughout the results. Consequently, this brings into question the significant finding which suggests that presence of the pen increased stress. This can be justified, because even if the pen itself has no calming effect Idue to no conditioned or traditional significance), the researcher indicating that the participant may need luck could have primed participants to believe they would need luck and consequently became stressed.

The absence of any increase in superstitious beliefs over time showed that the stress manipulation had no impact on increasing a person’s superstitious beliefs. This result was consistent with the finding of Teo and Lasikiewicz (2015), however it contrasts with the previous evidence suggesting that there should be an increase in superstition when high-stress is experienced (Keinan 1994; Malinowski, 1954). Due to both unexpected results involving stress, it is reasonable to propose that the lack in increase of superstitious beliefs may be because the TSST stressor was too weak, or because participants were aware that the situation they were in was a simulation with no real consequences. It was suggested by Teo and Lasikiewicz (2015) that because participants were knowingly taking part in a simulated, and in this case a university, experiment they knew that there would be no real threat, danger or consequential impact on their lives. Furthermore, in the studies that have suggested that superstition increases stress, the situations have involved life threatening situations (Kienan, 1994; Malinowski, 1954) or severe economic threat (Padgett and Jorgenson, 1982). The level of stress in these situations, when paralleled to the simulated speaking and arithmetic tasks are incomparable, particularly when considering the real-life consequences. Irwin (2009) highlighted that different levels of stress elicit different responses and therefore different levels of superstitious beliefs, which could certainly explain the why there was no increase in superstition when comparing this study with previous research. Despite the TSST being shown to be both an effective and popular method of inducing stress, perhaps further research in this area should consider the level of stress being administered, because in this instance it seems a stronger stressor was required to create enough stress for people to turn to magical or religious beliefs.

Interestingly, although the results did not show any increase in superstition after stress, there was a significant result which showed that those in the lucky pen condition were more superstitious overall, in comparison with those in the no lucky pen condition. The scores of those in the lucky pen condition were almost twice as high as those in the no lucky pen condition. Initially, it would seem that the presence of the pen had primed those in the lucky pen condition to generate such a difference in results. However, the lucky pen itself had no impact on these superstitious scores because it was the mean score throughout the experiment, including the scores before the pen was introduced. In addition to this, there were no significant score indicating that there was an increase in superstition scores after the pen was introduced, thus it could not be the results of a priming effect. Perhaps the significant result was merely a coincidence, and participants with more superstitious tendencies were placed in the lucky pen condition by chance. It could be suggested that there was researcher bias involved, with researchers consciously or subconsciously placing people they knew to be superstitious into the lucky pen category in order to encourage specific outcomes (Pannucci & Wilkins, 2011). However, this was prevented through random allocation, which suggests it was likely to be due to chance that those who were more superstitious were placed into the lucky pen category. This may have had an impact on other results throughout the experiment; therefore, future research could attempt to combat this issue by testing superstition before allocating their conditions, to ensure that there is not such uneven distribution of superstition levels.

The results found on the relationship between superstition and religion contrast with the majority of research which suggested that some form of relationship (whether negative or positive) would be found. There were no significant correlations between religion and superstition which contrast with studies that both found positive correlations suggesting that the two were similar (Burhmann & Zaugg, 1983; Rudski, 2003; Hergovich et al., 2005) and those who found negative correlations which indicated that one replaced the other (Aarnio & Lindeman, 2007; Emmons & Sobal, 1981, Goode, 2000).

One reason for finding no significant results between superstition and religion could be because religion and non-religious people were not specifically targeted for participants, meaning the sample was extremely limited. With over half of the participants identifying as Christian and only having one Sikh and one Muslim participant meant that there was little diversity in the sample. Furthermore, Goode (2000) noted that national and regional cultural differences may explain inconsistent results in religion and superstition, as both are significantly linked to society. Hergovich et al. (2005) also suggested that these inconsistent results could be due to differing cultures and consequently different religions and different types/levels of religiosity. Not only is difference in religion important, but the different denominations within these religions and further, the different types of practices and beliefs within the denominations. Hergovich et al. (2005) suggested that considering religions and different beliefs and practices from all over the world would create a more reliable data set. Although this is extremely difficult to accomplish, future research should consider selecting participants from multiple religions in order to make the results more generalizable.

Furthermore, it was highlighted by Stanke (2004), who also found no links between religiosity and superstition that this lack of relationship could be due to the difference between beliefs and practices not being accounted for in experiments. There is a significant difference between those who identify as religious and those who really believe in the religion and also those who are practising religion. People may have beliefs but they may not be strong enough beliefs to be carried over to practice and conversely people may practice traditionally, yet not have strong beliefs. Other studies (Emmons & Sobal, 1981) have differentiated between different types of religious beliefs (fundamentally religious/liberals ect.) and consequently looking further than simple religious identification. Further studies may take this into consideration, concurrently with the importance of different religions and cultures. This was reiterated by Duncan et al., (1992) who found that within Christianity there was a difference in paranormal/superstitious beliefs between Catholics and Protestants.

Another explanation for the results of both correlation and covariate not being significant could be because there was no manipulation of religion. Perhaps in a similar fashion to the superstition beliefs, to really understand whether religion is similar to superstition, we must also prime religious beliefs. However, past studies that have found correlations between religion and superstition did not manipulate religion or superstition, they were measured using a questionnaire (Hergovich et al., 2005).

Although the findings for religion and superstition did not coincide with the majority of the results, which suggested there would be a correlation between the two, these results can be explained by research that has suggested that although a relationship between the two is probable, the relationship is too complex to see in correlative studies. Hergovich et al. (2005) highlighted that the inconclusive results (Rice, 2003; Stanke, 2004; Schofield et al., 2016) and negative/positive correlations suggest that future research must consider alternative methods of analysing any potential relationship in case correlations are too simplistic to identify the complex the relationship between religion and superstition. In addition to this, the influence that culture and religious traditions have on a person’s religious beliefs creates additional complexities for finding any relationship through correlations. Rice (2003) concluded after inconclusive findings, that the relationship is far too complex in comparison with what researchers initially thought, and that questionnaires and correlations may not be rigorous enough. The use of a covariate was an attempt to combat this complexity in an attempt to see if religion was an influencing factor over superstition during the experiment. Yet, the non-significant results in this experiment suggest that future research would benefit from finding alternative and perhaps more intricate ways of testing for a religious and superstitious relationship.

However, the inconsistent results could be explained by Schofield et al. (2016) who suggested that perhaps the basis for believing that religion and superstition are similar through their definition and categorisations, ('paranormal’ or ‘supernatural’) could be incorrect. Schofield et al., (2016) acknowledges that inconsistent results could highlight the need to be cautious when defining and categorising these concepts, particularly considering religion, and questions whether these definition/categories need to be reconsidered. This brings into question central studies such as Irwin (2009) who categorised religion and superstition within paranormal beliefs, forming the basis for many studies.

Furthermore, our results of both the correlation and covariate are in line with the concept that the relationship does not consistently produce linear results or correlations. Bainbridge’s (2004) study found that different aspects of religions have different relationships to paranormal beliefs, including superstition and highlighting how these relationships may not be clear through simple correlation, because both negative and positive processes occur depending on the details of the religions belief and tradition. Del Campo Rios (2014) highlights the complexity of the relationship and argues religion and superstition must be seen as independent multifaceted and multidimensional constructs, that are somewhat related. This complexity could be what has created so many inconsistent results in the study of religion and superstition, which suggests that although the results within this study were not completely out of line with past research, future studies must take this possible complexity into account and be cautious when creating further ways in which to study them.

There were some methodological limitations that must be considered when discussing how the results may have been impacted. Participant numbers were extremely low in comparison to past studies, which creates an issues with the ability to generalise the results and may have also meant there was not enough data to find any significant results or correlations. The sample size is extremely small for an experiment of four conditions, meaning that there were only seven participants in each condition, a noteworthy problem concerning validity.

Social desirability is a weakness of self-report methods that must also be acknowledged, particularly in reference to religion and superstition because both concepts are linked to societal beliefs (Goode, 2000; Hergovich et al., 2005). Social desirability bias is the concept that “respondents generally want to look good in the eyes of others” (Trochim, 2001, pp. 112) and people respond in ways they deem most appropriate. In this case, people may have believed it was not desirable to be highly superstitious, particularly as superstitions have often been perceived to be ‘irrational’ (Irwin, 2007). This could suggest that people see themselves differently to how they really are, and that they react how they want to be seen as opposed to how they actually are, highlighting how self-reporting are at a high risk of bias which must be taken into consideration (Adams et al., 1999).

Future studies on superstition and stress may benefit from investigating the possible negative effects superstition may have on stress levels and consequently performance levels. With the significant result indicating that superstition may have elicited a stress response when there was not a stressor for the superstition to aid. As mentioned above, it could be advantageous for further study to utilise a superstitious object or action that has previous superstitious meaning to participants to ensure the superstitious manipulation has as much of an impact as possible. With regard to religion and superstition, future studies may profit from recruiting a specifically religious sample and incorporating as many different religions as possible for the study to ensure the results as generalizable as possible and to make advances to the testing/experiments used to investigate the relationship, as linear studies have so far been inconclusive.

Conclusion

In conclusion, although there was a rejection of the hypotheses, the significant interaction between the superstition and stress (HR) indicated that there may be a relationship between superstition and stress and also points towards superstition having a negative impact on a person’s stress and anxiety levels. The results contrast with previous research on stress and superstition, and encourage further research into the negative effects of superstition on stress through priming effects. Although the results did not find that superstition increases under stress, there has not been much research on this aspect of superstition and stress, and further study is encouraged to consider alterations to how stressful the manipulation must be to increase superstition. It must also be concluded that due to no results supporting the hypothesis of negative or positive correlations between religion and superstition, it cannot be assumed that there is any relationship between the two disciplines. However, these results could be due to both methodological issues and the relationship being more complex than linear correlations can illustrate. With the alterations suggested (targeting specifically religious people) future research could enhance past studies and enrich the current knowledge of this fascinating interaction of belief sets.

References

Aarnio, K., & Lindeman, M. (2007). Religious People and Paranormal believers: Alike or Different. *Journal of Individual Differences*, *28*(1), 1–9. doi: 10.1027/1614-0001.28.1.

Adams, A. S., Soumerai, A. B., Lomas, L., & Ross-Degnan, D. (1999). Evidence of self-report bias in assessing adherence to guidelines. *International Journal for Quality in Health Care*, *11*(3), 187-192.

Bainbridge, W. S. (2004). After the new age. Journal for the Scientific Study of Religion, *43*(3), 381-394.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191–215.

Barnes, L.L.B., Harp, D., & Jung, W.S. (2002). Reliability Generalization of Scores on the Spielberger State-Trait Anxiety Inventory. *Educational and Psychological Measurement, 62*(4), 603–618*.*

Beck, J., & Forstmeier, W. (2007). Superstition and belief as inevitable by-products of an adaptive learning strategy. *Human Nature*. *18*(1), 35–46. (doi:10.1007/BF02820845).

Boyer. P., (2003). *Religious thought and behaviour as by-products of brain function*. *Trends in Cognitive Sciences*, *7*(3), 119-124.

Burhrmann & Zaugg (1983). Religion and superstition in the sport of basketball. *Journal of Sport and Behaviour*, *6*(3), 146-157.

Calin-Jageman, R. J., & Caldwell, T. L. (2014). *Social Psychology* 45, pp. 239-245. Doi: 10.1027/1864-9335/a000190

Chen, G. (2007). The impact of *Feng Shui* on Chinese communication. *China Media Research*, *3*(4), 102-109.

Damisch, L., Stoberock, B., & Mussweiler, T. (2010). Keep your fingers crossed! How superstition improves performance. *Psychological Science*, *21*(7), 1014-1020.

Darke, P. R., & Freedman, J. L. (1997a). The Belief in Good Luck Scale*. Journal of Research in Personality*, 31, 486–511.

Darke, P. R., & Freedman, J. L. (1997b). Lucky events and beliefs in luck: Paradoxical effects on confidence and risk taking. *Personal and Social Psychology Bulletin.**23*(4), 378-388.

Day, L., & Maltby, J. (2003) Belief in Good Luck and Psychological Well-Being: The Mediating Role of Optimism and Irrational Beliefs. *The Journal of Psychology*, *137*(1, 99-120).

Del Campo Rios J. M. (2014). Religion and superstition through a cognitive perspective: examining the relationship of religious and superstitious beliefs to cognitive processes. *Doctoral dissertation, School of Psychology*.

Dresslar, F. B. (1907). Superstition and education. University of California Publications: Education, 5, 1-239.

Dudley, R.T. (1999). The Effect of Superstitious Belief on Performance Following an Unsolvable Problem. Personality and Individual Differences, 26(6), 1057-1064. doi: 10.1016/S0191-8869(98)00209-8

Duncan, D. F., Donnelly, J. W., & Nicholson, T. (1992). Belief in the paranormal and religious belief among American college students. *Psychology Reports*, *70*(1), 15-18.

Ellison, C. G. (1991). Religious involvement and Subjective well-being. *Journal of Health and Social Behaviour*, *32*(1), 80-99.

Ellison, C. G., & Levin, J. S. (1998). The religion health connection: Evidence, theory, and future directions. *Health Education & Behavior*, *25*, 700–720.

Emmons, C. F., & Sobal, J. (1981) Paranormal Beliefs: Functional Alternatives to Mainstream Religion? *Review of Religious Research*, *22*(4) (1981), 301-312.

Fisher, S. (1986). *Stress and strategy*. Hillsdale, NJ: Lawrence Erlbaum.

Foster, K. R., & Kokko, H. (2009). The evolution of superstitious and superstition-like behaviour. *Proceedings of the Royal Society Bulletin*, 276, 31–37.

Francis, L,. Robbins, M., & Williams, E. (2006). Believing and Implicit Religion beyond the Churches: Religion, Superstition, Luck and Fear among 13-15 Year-old Girls in Wales. *Implicit Religion*, *9*(1), 74-89.

Goode, E. (2000). *Paranormal beliefs. A sociological introduction*. Prospect Heights, IL: Waveland Press.

Hufford, D. J. (2003). The Adequacy of Freudian Psychoanalytic Theory. *Journal of Folklore Research*, *40*(1), 99-109.

Hood Jr. R. W., Hill, P. C., Spilka, B. (2009). *The Psychology of Religion, Fourth Edition: An Empirical Approach*. Guildford Press.

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *The Behavioral and Brain Sciences*, *33*, 61–63. doi: 10.1017/S0140525X0999152X

Hergovich, A., Schott, R., & Arendasy, M. (2005). Paranormal Belief and Religiosity. ***The Journal of Parapsychology,*** *69*(2), 293-303.

Huber, S., & Huber. O. W. (2012). The Centrality of Religiosity Scale. *Religions*, *3*(3), 710-724.

Irwin, H. J. (2007). The measurement of superstitiousness as a component of paranormal belief – some critical reflections. *European Journal of Parapsychology*, *22*(2), 95-120.

Irwin, H. J. (2009). *The Psychology of Paranormal Belief: A Researcher's Handbook*. Hertfordshire, UK: University of Hertfordshire Press.

Jahoda, G. (1969). *The Psychology of Superstition*. London: Allen Lane/Penguin Press.

Keinan, G. (2002) The Effects of Stress and Desire for Control on Superstitious behaviour. *Personality and Social Psychology Bulletin*. *28*(1), 102-108.

Keinan, G. (1994). Effects of stress and tolerance of ambiguity on magical thinking. *Journal of Personality and Social Psychology*, 67, 48-55.

Kirschbaum, C., Pirke, K.M., & Hellhammer, D.H. (1993). The ‘Trier Social Stress Test’ A Tool for Investigating Psychobiological Stress Responses in a Laboratory Setting. Neuropsychobiology, *28*(1-2), 76-81.

Koenig, H. G., McCullough, M. E., & Larson, D. B. (2001). *Handbook of Religion and Health*, Oxford University Press, New York, NY.

Kramer, T., & Block, L. (2008). Conscious and nonconscious components of superstitious beliefs in judgment and decision making. *Journal of Consumer Research*, *34*(6), 783-793.

Kutcher, E. J., Braggwe, J. D., Rodriguez-Srednicki, O., & Masco, J. L. (2010). The Role of Religiosity in Stress, Job Attitudes, and Organizational Citizenship Behavior. *Journal of Business Ethics*, *95*(2), 319-337.

Langer, E.J. (1975). The Illusion of Control. Journal of Personality and Social Psychology, 32(2), 311-328. doi:10.1037/0022-3514.32.2.311.

Leonard, H.L., Goldberger, E.L., Rapoport, J.L., Cheslow, D.L., & Swedo, S.E. (1990). Childhood Rituals: Normal Development or Obsessive-Compulsive Symptoms? Journal of the American Academy of Child & Adolescent Psychiatry, 29(1), 17-23.

MacDonald, D. A. (2005). Spirituality: Description, measurement, and relation to the five factor model of personality. *Journal of Personality*, *68*(1), 153 - 197.

Malinowski. (1954). *Magic, Science and Religion and Other Essays*. Garden City, NY: Doubleday.

Maller, J. B., & Lundeen, G, E. (1933). Sources of Superstitious Belief. *The Journal of Educational Research*, *26*(5), 321-343.

Minot, C. S. (1887). First report of the Committee on Experimental Psychology. Proceedings of the American Society for Psychical Research, 1, 218-223.

Monat, A., Averill, J R., & Lazarus, R. S., (1972). Anticipatory stress and coping reactions under various conditions of uncertainty. *Journal of Personality and Social Psychology*, *24*(2), 237-253.

Morse, W. H. & Skinner, B. F. (1957). A second type of superstition in the pigeon. *American Journal of Psychology.* 70, 308–311. (doi:10.2307/1419345).

Nooney, J. G. (2005). Religion, Stress, and Mental Health in Adolescence: Findings from Add Health. *Review of Religious Research*, *46*(4), 341-354.

Opie & Opie (1959). The Love and Language of Schoolchildren, Oxford; Oxford University Press.

Orenstein, A. (2002). Religion and paranormal belief. *Journal for the Scientific Study of Religion*, 41, 301-311.

Padgett, V. R. & Jorgenson, D. O. (1982). Superstition and Economic Threat: Germany, 1918-1940. Personality and Social Psychology Bulletin. 8, 736-741.

Pannucci, C. J. & Wilkins, E. G. (2011). Identifying and avoiding bias in research. *Plastic and Reconstructive Surgery*, *126*(2), 619-625. doi:10.1097/PRS.0b013e3181de24bc.

Park, C. L. (2006). Religiousness and religious coping as determinants or stress-related growth. *Archive for the Psychology of Religion*, 28, 287-302. Published by Brill.

Preston, S. D., Stanfield, R. B., Buchanan, T. W., & Bechara, A. (2007). Effects of Anticipatory Stress on Decision Making in a Gambling Task. *Behavioural Neuroscience*, *121*(2), 257-263.

Religion, Science, and Superstition. (1925). *The British Medical Journal*, *2*(3370), 219.

Rice, T.W. (2003). Believe it or not: Religious and other paranormal beliefs in the United States. *Journal for the Scientific Study of Religion*, *42*(1), 95–106.

Rosenthal, R. (1979). The “file drawer problem” and tolerance for null results. *Psychological Bulletin, 86*(3), 638-641.

Rudski, J. (2003). What Does a “Superstitious” Person Believe? Impressions of Participants. *The Journal of General Psychology*, *130*(4), 431-445. doi: 10.1080/00221300309601168.

Rudski, J.M., & Edwards, A. (2007). Malinowski Goes to College: Factors Influencing Students’ Use of Ritual and Superstition. *The Journal of General Psychology*, *134*(4), 389–403. doi:10.3200/GENP.134.4.389-404.

Schofield, M. B., Baker, I. S., & Sheffield, D. (2016). Mental representation of the supernatural: A cluster analysis of religiosity, spirituality and paranormal belief. Personality and Individual Difference, 101, 419-424.

Skinner, B. F. (1948). Superstition in the pigeon. *Journal of Experimental Psychology.* 38, 168–172. (doi:10.1037/h0055873).

Spielberger, C.D., Gorsuch, R.C., Lushene, R.E., Vagg, P.R., & Jacobs, G.A. (1983). *Manual for the State-Trait Anxiety Inventory*. Palo Alto: Consulting Psychologists Press.

Stanke, A. (2004). Religiosity, Locus of Control and Superstitious Belief. *UW-L Journal of Undergraduate Research,* Vol. VII.

Teo, W. Y., & Lasikiewicz, N. ((2015). The effect of superstitious thinking on psychological stress responses and perceived task performance. *The Parapsychological Association Convention.*

Tilley, T. W. (2000).The Philosophy of Religion and the Concept of Religion: D. Z. Phillips on Religion and Superstition. *Journal of the American Academy of Religion*, *68*(2), 345- 356.

Trochim, W. M. K. (2001). The research methods knowledge base. Cincinnati, OH: Atomic Dog Publishing.

Tsang, E. W. K. (2004). Toward a scientific inquiry into superstitious business decision-making. Organization Studies, *25*(6), 923-946.

Von Dawans, B., A , Kirschbaum, C., & Heinrichs, M. (2011). The Trier Social Stress Test for Groups (TSST-G): A new research tool for controlled simultaneous social stress exposure in a group format. *Psychoneuroendocrinology*, 36, 514-522.

Williams, X. (2005). *World Religions, True Beliefs and New Age Spirituality: A New Age Study on How Economic Tides and Parental Conditioning Mold Our World of Ethics, Religions, Beliefs, Sex And Relationships.* NewYork; iUniverse Inc.

Wuthnow, R. (1978). *Experimentation in American Religion*. Berkeley, CA: University of California Press.

Zebb, B. J., & Moore, M. C. (2003). Superstitiousness and perceived anxiety control as predictors of psychological distress. *Journal of Anxiety Disorders*, *17*(1), 115-130.

Appendices

Appendix A: Demographics Questionnaire

**Demographic Questions**

Participant ID: \_\_\_\_\_\_

1. How old are you?

\_ \_ years

1. At birth were you described as:

|  |  |
| --- | --- |
| Male |  |
| Female |  |
| Intersex |  |
| Prefer not to answer |  |

1. Which of the following describes how you think of yourself?

|  |  |
| --- | --- |
| Male |  |
| Female |  |
| In another way (please indicate: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) |  |

1. Please indicate your ethnicity:

|  |  |
| --- | --- |
| White British |  |
| White Other |  |
| Mixed (White and Black Caribbean) |  |
| Mixed (White and Black African) |  |
| Mixed (White and Asian) |  |
| Mixed Other. **Please specify:** |  |
| Asian/Asian British (Indian) |  |
| Asian/Asian British (Pakistani) |  |
| Asian/Asian British (Bangladeshi) |  |
| Asian/Asian British Other. **Please specify:** |  |
| Black/Black British (Caribbean) |  |
| Black/Black British (African) |  |
| Black/Black British Other. **Please specify:** |  |
| Chinese |  |
| Other Ethnic Group. **Please Specify:** |  |

1. Please indicate your religion:

|  |  |
| --- | --- |
| Christianity |  |
| Buddhism |  |
| Islam |  |
| Hinduism |  |
| Sikhism |  |
| Judaism |  |
| Atheist (*i.e. no religion*) |  |
| Agnostic (*i.e. do not claim to know*) |  |
| Other. **Please specify:** |  |

1. Please indicate your employment status:

|  |  |
| --- | --- |
| Employed – Full Time |  |
| Employed – Part Time |  |
| Unemployed |  |
| Student |  |
| Homemaker |  |
| Retired |  |

1. Please state your current or most recent occupation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. If you are a student, which course are you currently enrolled in? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Please tick your highest level of education attained from the list below:

|  |  |
| --- | --- |
| PhD/Doctorate |  |
| Masters Degree (MA/MSc) |  |
| Honours Degree/Bachelors Degree/Ordinary |  |
| Diploma of Higher Education |  |
| Certificate of Higher Education |  |
| Foundation Degree |  |
| A/AS Level |  |
| HND |  |
| HNC |  |
| GNVQ |  |
| NVQ |  |
| BTEC |  |
| AVCE |  |
| Access to HE Course |  |
| Apprenticeship |  |
| Professional Courses |  |
| GCSE/O’Level |  |
| No Qualifications |  |
| Other (please specify): |  |
|  | |

Appendix B: Superstitiousness Questionnaire (SQ)

Ppt ID: \_ \_ \_ Time: \_ \_:\_ \_ Date: \_ \_ / \_ \_ / \_ \_

Listed below are a number of statements. Please read each statement carefully and, on the 0-5 scale given, circle the number that indicates how much you think each statement applies to you.

0– Strongly disagree

1- Moderately disagree

2– Slightly disagree

3 – Slightly agree

4 – Moderately agree

5 – Strongly agree

1. I have a lucky number.

0 1 2 3 4 5

2. I believe that seeing a black cat brings bad luck.

0 1 2 3 4 5

3. I believe that walking under ladders will bring bad luck.

0 1 2 3 4 5

4. I avoid walking under ladders.

0 1 2 3 4 5

5. I believe that the number 13 is unlucky.

0 1 2 3 4 5

6. I believe that opening an umbrella inside is bad luck.

0 1 2 3 4 5

7. I avoid opening an umbrella inside.

0 1 2 3 4 5

8. I avoid stepping on the cracks in the sidewalk for fear of bringing bad luck.

0 1 2 3 4 5

9. I believe that finding a four leaf clover brings good luck.

0 1 2 3 4 5

1. I believe that picking up a penny brings good luck.

0 1 2 3 4 5

1. I believe that wishes made in a well or while tossing coins in a fountain will come true.

0 1 2 3 4 5

12. I believe that knocking on wood will prevent the undoing of something good I just said.

0 1 2 3 4 5

13. I knock on wood to prevent the undoing of something good I just said.

0 1 2 3 4 5

14. I believe that fortune tellers can predict the future.

0 1 2 3 4 5

15. If I went to a fortune teller and that person predicted something, it would come true for me.

0 1 2 3 4 5

16. I do something special to bring good luck.

0 1 2 3 4 5

17. I do something special to prevent bad luck.

0 1 2 3 4 5

18. I have a superstition not listed here.

0 1 2 3 4 5

Appendix C: State Trait Anxiety Inventory (STAI) State Component.

Ppt ID: \_ \_ \_ Time: \_ \_:\_ \_ Date: \_ \_ / \_ \_ / \_ \_

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel right now, that is, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

Not Some- Moderately Very

at all what so much so

1. I feel calm 1 2 3 4
2. I feel secure 1 2 3 4
3. I am tense 1 2 3 4
4. I feel strained 1 2 3 4
5. I feel at ease 1 2 3 4
6. I feel upset 1 2 3 4
7. I am presently worried over

possible misfortunes 1 2 3 4

1. I feel satisfied 1 2 3 4
2. I feel frightened 1 2 3 4
3. I feel comfortable 1 2 3 4
4. I feel self-confident 1 2 3 4
5. I feel nervous 1 2 3 4
6. I am jittery 1 2 3 4
7. I feel indecisive 1 2 3 4
8. I am relaxed 1 2 3 4
9. I feel content 1 2 3 4
10. I am worried 1 2 3 4
11. I feel confused 1 2 3 4
12. I feel steady 1 2 3 4
13. I feel pleasant 1 2 3 4

Appendix D: Revised Centrality of Religiosity Scale – English version

Ppt ID: \_ \_ \_ Time: \_ \_:\_ \_ Date: \_ \_ / \_ \_ / \_ \_

1. How often do you think about religious issues?

Never Rarely Sometimes Often Very often

1. To what extent do you believe that God or deities or something divine exists?

Not at all Not very much Moderately Quite a bit Very much so

1. How often do you take part in religious services?

More than once a week Once a week One or three times a week

A few times a year Less often Never

1. How often do you pray or meditate?

Several times a day Once a day More than once a week Once a week One or three times a month A few times a year Less often Never

For Muslim participants only (If does not apply please go to question 5):

1. How often do you engage in obligatory pray (Salat)?

Several times a day Once a day More than once a week Once a week One or three times a month A few times a year Less often Never

1. How often do you engage in private pray (Du’a)?

Several times a day Once a day More than once a week Once a week

One or three times a month A few times a year Less often Never

1. How often do you experience situations in which you have the feeling that God or deities or something divine intervenes or allows for an intervention in your life?

Never Rarely Sometimes Often Very often

1. How interested are you in learning more about religious topics?

Not at all Not very much Moderately Quite a bit Very much so

1. To what extend do you believe in an afterlife – e.g. immortality of the soul, resurrection of the dead or reincarnation?

Not at all Not very much Moderately Quite a bit Very much so

1. How important is to take part in religious services?

Not at all Not very much Moderately Quite a bit Very much so

1. How important is personal prayer or meditation for you?

Not at all Not very much Moderately Quite a bit Very much so

For Muslim participants only (If does not apply please go to question 10):

1. How important is obligatory pray (Salat)?

Not at all Not very much Moderately Quite a bit Very much so

1. How important is private pray (Du’a)?

Not at all Not very much Moderately Quite a bit Very much so

1. How often do you experience situations in which you have the feeling that God or deities or something divine wants to communicate or reveal something, or lets something to be communicated or revealed to you, or feel touched by a divine power?

Never Rarely Sometimes Often Very often

1. How often do you keep yourself informed about religious questions through radio, television, Internet, newspapers, or books?

Never Rarely Sometimes Often Very often

1. In your opinion, how probable is it that a higher power exists?

Not at all Not very much Moderately Quite a bit Very much so

1. How important is it for you to be connected to a religious community?

Not at all Not very much Moderately Quite a bit Very much so

1. How often do you pray or connect to the divine spontaneously when inspired by daily situations?

Never Rarely Sometimes Often Very often

1. How often do you experience situations in which you have the feeling that God or deities or something divine is present?

Never Rarely Sometimes Often Very often

Appendix E: Debrief Questionnaire

Participant ID: \_\_\_\_\_\_\_\_\_\_\_\_ Time: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Please answer the following questions about the experiment you have just taken part in. Thank you.

1. Please indicates using a tick on the box below have you experienced this procedure before?

* Yes
* No

2. Please indicate using a vertical line on the scale below how well you feel you did in the interview task for each of the following aspects:

(a) Preparation

Very well not very well

(b) In the interview itself

Very well not very well

(c) In the mental arithmetic task

Very well not very well

3. Please indicate using the scale below how easy/difficult you felt it was to complete each of the following aspects:

(a) Preparation

Easy Difficult

(b) In the interview itself

Easy Difficult

(c) In the mental arithmetic task

Easy Difficult

4. Please indicate using the scale below how stressful you felt each of the following aspects was for you:

(a) Preparation

Very not at all

stressful stressful

(b) the interview (including the mental arithmetic task)

Very not at all

stressful stressful

5. Did the pen the researcher gave you help you in the preparation of the interview task?

Not at all Very much so

6. Did having the pen the researcher gave you, help you in the interview task?

Not at all Very much so

7. Did having the pen with you, in the mental arithmetic task help you?

Not at all Very much so

8. In your opinion was the pen you were given today lucky?

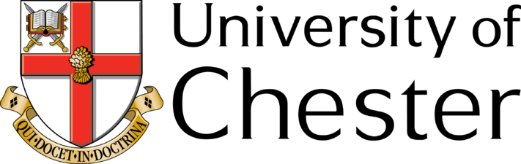
Not at all Very much so

9. Do you feel the pen affected your level of performance today?

Not at all Very much so

Do you have a lucky item?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Appendix F: Information Sheet

**INFORMATION SHEET**

**PROJECT: Belief and Cognitive Performance**

You are invited to take part in a research project designed to assess belief and psychological and physiological responses to cognitively challenging tasks. The Principal Investigator and Supervisor of this project is Dr. Nicola Lasikiewicz. The co-investigators are Miss Siobhan Maire Roddy, Jody Anne Hawthorne and Mr Alex Michael Ward and the findings from the project will contribute to their Masters Conversion in Psychology thesis.

In the experimental session, you will be asked to complete a number of cognitively challenging tasks, which may require you to think on your feet. Whilst completing these tasks you will be asked to complete a small number of questionnaires to assess your wellbeing during the task. You will also have some physiological measurements taken. You will have your heart rate and blood pressure monitored in intervals throughout the study using a wrist blood pressure monitor and a heart rate monitor (with chest strap). A video camera will also be used during the study. To maintain the accuracy of the samples, we ask that you refrain from strenuous physical activities for at least one hour before the experiment. The experimental session will take approximately 60mins to complete.

Taking part in this study is completely voluntary and you can stop taking part at any time without explanation or prejudice. You may also request the researcher to withdraw any unprocessed data from the study, though you are unable to do this once you have left the study as information is held anonymously.

It is possible that participation in this study may cause mild distress or discomfort. If you do feel upset or distressed in any way following your participation you may wish to speak with someone in confidence. You may wish to use the 24hr Crisis Hotline (Samaritans) on 116 123 or visit [www.samaritans.org](http://www.samaritans.org). Alternatively you may wish to speak with your GP. Students of the University of Chester may wish to contact Student Support and Guidance (SSG) on 01244 511548 or visit <http://www.chester.ac.uk/induction/ssg>.

If you smoke, have previously/currently been diagnosed with any cardiovascular, psychological or neurological disorders or illnesses, or are taking any form of prescribed medication, you **SHOULD NOT** take part in this study. Your responses and contact details will be strictly confidential. The data from the study will be used in research publications and conference presentation and also in Masters thesis. You will not be identified in any way in these works.

If you know of others that might be interested in this study, do pass on the researchers details (see below) so they may contact us to volunteer for the study. If you have any questions about the study, please contact\_\_\_\_\_\_\_\_\_\_ or the **Supervisor/Principal Investigator \_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

Researcher: \_\_\_\_\_\_\_\_\_\_\_\_\_- University of Chester. Email: [\_\_\_\_\_\_\_\_\_\_@chester.ac.uk](mailto:__________@chester.ac.uk)

Researcher: \_\_\_\_\_\_\_\_\_\_\_ University of Chester. Email: [\_\_\_\_\_\_\_\_\_\_@chester.ac.uk](mailto:__________@chester.ac.uk)

Researcher: \_\_\_\_\_\_\_ University of Chester. Email: [\_\_\_\_\_\_\_@chester.ac.uk](mailto:_______@chester.ac.uk)

PI/Supervisor: Dr. \_\_\_\_\_\_\_\_\_\_ University of Chester. Email: [\_\_\_\_\_\_\_\_@chester.ac.uk](mailto:________@chester.ac.uk)

Appendix G: Consent Form

**CONSENT FORM**

I understand the aim of this research study is to assess belief and psychological and physiological responses to cognitively challenging tasks. I consent to participate in this project, the details of which have been explained to me, and I have been provided with a written information sheet to keep.

I understand that my participation will involve answering a series of questionnaires, cognitively challenging tasks and the measurement of my blood pressure and heart rate. I agree that the researcher may use the results as described in the information sheet.

I acknowledge that:

- taking part in this study is voluntary and I am aware that I can stop taking part in it at any time without explanation or prejudice and to withdraw any unprocessed data I have provided;

- that any information I give will be kept strictly confidential and that no names will be used to identify me with this study without my approval;

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *(Please tick to indicate consent)* | | | | |
| **I consent to complete a series of questionnaire** |  | **Yes** |  | **No** |
| **I consent to the measurement of my blood pressure and heart rate** |  | **Yes** |  | **No** |
| **I consent to complete a series of cognitively challenging tasks** |  | **Yes** |  | **No** |

|  |  |
| --- | --- |
| **Name:***(printed)* | |
| **Signature:** | **Date:** |

Appendix H: Job Description

# Synergistic

## An international information management consultancy requires a

# Management Trainee

**Job Duties**

* to handle customers in a polite and friendly way
* to liaise with suppliers

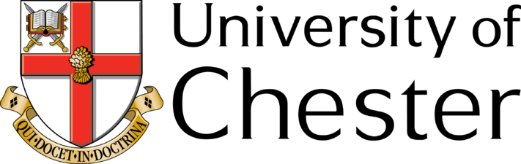
**Requirements and Benefits**

* University Graduate preferred
* experience preferred but not essential
* good communication, interpersonal, presentation and negotiation skills
* able to work under pressure and deal with customers in a polite and friendly way
* good written English
* assertive, independent, out-going personality and hardworking
* competitive salary
* education allowance and medical scheme

Applicants please send your application letter, curriculum vitae and expected salary to Ms Tunbridge at:

Synergistic   
P.O. Box 1234  
Managerial Row   
Business Town  
Chester

Information received will be used for recruitment purposes only.

Appendix I: Debrief Information Sheet – Stress Condition

Participation Debrief Sheet (Stress Condition)

Thank you for taking part in this research. Now that the experiment is complete, we would like to provide with some information about the study and the types of task you have completed and what they were for.

This study was an examination of whether superstitious belief (in the form of a lucky pen) can influence your response to a psychosocial stressor and the perceived success of your performance.

You were placed in the ‘stress’ condition. The interview scenario which you took part in is a version of what is known as the Trier Social Stress Test (TSST). This is a widely used standardised laboratory stress induction tool pioneered by researchers at the University of Trier in Germany. This served as a stressor in the form of a public speaking task in an attempt to effectively induce a mild stress “response”. **Your task performance was not recorded.** The video camera is placed in the room to help initiate a stress response. Once a response was initiated, it was then possible to examine whether superstitious belief (in the form of a lucky pen) under stressful condition can function as a buffer to reduce psychological and physiological response to stressor. If the researcher told you that the pen you could use was ‘lucky’ then you were in the superstition activation condition. It is not known whether the pen is actually lucky, this was merely suggested by the researcher in an attempt to activate potential superstitious beliefs.

By conducting this research, it is hopeful that an insight will be gained into understanding why people are motivated to use superstitious strategies when their sense of control over outcome is undermined.

Should you have any questions or comments, please contact us using the details below. Thank you.

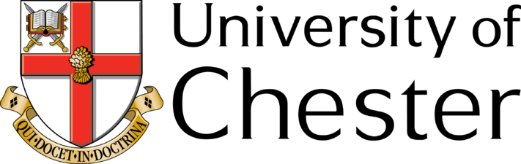
Researcher: \_\_\_\_\_\_\_\_\_ University of Chester. Email: [\_\_\_\_\_\_\_\_\_\_@chester.ac.uk](mailto:__________@chester.ac.uk)

Researcher: \_\_\_\_\_\_\_\_\_\_ University of Chester. Email: [\_\_\_\_\_\_\_\_\_@chester.ac.uk](mailto:_________@chester.ac.uk)

Researcher: \_\_\_\_\_\_\_\_\_\_\_ University of Chester. [\_\_\_\_\_\_\_\_\_\_\_\_\_@chester.ac.uk](mailto:_____________@chester.ac.uk)

PI/Supervisor: Dr. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ University of Chester. Email: [\_\_\_\_\_\_\_\_\_\_\_@chester.ac.uk](mailto:___________@chester.ac.uk)

Appendix J: Debrief Information Sheet – No-Stress Condition



Participation Debrief Sheet (No Stress Condition)

Thank you for taking part in this research. Now that the experiment is complete, we would like to provide with some information about the study and the types of task you have completed and what they were for.

This study was an examination of whether superstitious belief (in the form of a lucky pen) can influence your response to a psychosocial stressor and the perceived success of your performance.

You were placed in the ‘no stress’ condition. The interview scenario which you took part in is a control version to compare with a stress induction procedure known as the Trier Social Stress Test (TSST). This is a widely used standardised laboratory stress induction tool pioneered by researchers at the University of Trier in Germany. If the researcher told you that the pen you could use was ‘lucky’ then you were in the superstition activation condition. It is not known whether the pen is actually lucky, this was merely suggested by the researcher in an attempt to activate potential superstitious beliefs.

By conducting this research, it is hopeful that an insight will be gained into understanding why people are motivated to use superstitious strategies when their sense of control over outcome is undermined.

Should you have any questions or comments, please contact us using the details below. Thank you.

Researcher: \_\_\_\_\_\_\_\_\_\_ University of Chester. Email: [\_\_\_\_\_\_\_@chester.ac.uk](mailto:_______@chester.ac.uk)

Researcher: \_\_\_\_\_\_\_\_\_\_ University of Chester. Email:[\_\_\_\_\_\_\_\_\_@chester.ac.uk](mailto:_________@chester.ac.uk)

Researcher: \_\_\_\_\_\_\_ University of Chester. [\_\_\_\_\_\_\_\_\_\_@chester.ac.uk](mailto:__________@chester.ac.uk)

PI/Supervisor: Dr. Nicola Lasikiewicz University of Chester. Email: [\_\_\_\_\_\_\_\_@chester.ac.uk](mailto:________@chester.ac.uk)

Appendix K: CRS ANCOVA Table of Values

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Dependent Variable | Source | DF1\* | DF2\*\* | F Value | Sig. |
| BPSYS | Time | 3 | 69 | 0.22 | 0.89 |
| Time\*CRS | 3 | 69 | 0.21 | 0.89 |
| Time\*Super\_Condition | 3 | 69 | 0.13 | 0.94 |
| Time\*Stress\_Condition | 3 | 69 | 0.23 | 0.88 |
| Time\*Super\_Condition\*Stress\_Condition | 3 | 69 | 1.01 | 0.4 |
| CRS | 1 | 23 | 0.67 | 0.42 |
| Super\_Condition | 1 | 23 | 2.1 | 0.09 |
| Stress\_Condition | 1 | 23 | 0.15 | 0.7 |
| Super\_Condition\*Stress\_Condition | 1 | 23 | 3.22 | 0.09 |
| STAI | Time | 2 | 44 | 0.67 | 0.52 |
| Time\*CRS | 2 | 44 | 0.73 | 0.49 |
| Time\*Super\_Condition | 2 | 44 | 1.61 | 0.21 |
| Time\*Stress\_Condition | 2 | 44 | 2.4 | 0.11 |
| Time\*Super\_Condition\*Stress\_Condition | 2 | 44 | 1.32 | 0.23 |
| CRS | 1 | 22 | 0 | 1 |
| Super\_Condition | 1 | 22 | 0.03 | 0.86 |
| Stress\_Condition | 1 | 22 | 0 | 0.98 |
| Super\_Condition\*Stress\_Condition | 1 | 22 | 1.7 | 0.2 |
| HR | Time | 3 | 69 | 0.2 | 0.9 |
| Time\*CRS | 3 | 69 | 0.16 | 0.92 |
| Time\*Super\_Condition | 3 | 69 | 0.29 | 0.84 |
| Time\*Stress\_Condition | 3 | 69 | 1.3 | 0.29 |
| Time\*Super\_Condition\*Stress\_Condition | 3 | 69 | 1.8 | 0.16 |
| CRS | 1 | 23 | 2.73 | 0.11 |
| Super\_Condition | 1 | 23 | 0.56 | 0.46 |
| Stress\_Condition | 1 | 23 | 0.28 | 0.6 |
| Super\_Condition\*Stress\_Condition | 1 | 23 | 3.2 | 0.09 |

\*DF1=Number of Independent Variables minus 1

\*\*DF2=Number of Observations minus Number of independent variables plus 1