

The Effect of Superstitious Thinking on Psychosocial Stress Responses and Perceived Task
Performance

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Keywords: *superstitious thinking; psychosocial stress; anxiety; appraisal; performance; belief*

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Abstract

Previous research on superstition, a subset of paranormal belief, suggests that people tend to invoke luck-related superstitions in stressful situations as an attempt to gain an illusion of control over outcomes. Based on this, the current study examined whether luck-related superstition, in the form of a 'lucky' pen, could influence the psychological response to a psychosocial stressor. Participants ($N = 114$) aged between 17 and 59 years ($M = 22.98$, $SD = 4.57$) from James Cook University Singapore, were randomly assigned to one of four conditions: (1) no-stress with no 'lucky' pen; (2) no-stress with a 'lucky' pen; (3) stress with no 'lucky' pen; (4) stress with a 'lucky' pen. The results revealed that participants provided with a "lucky" pen experienced lower state anxiety when exposed to the stressor. Further, participants provided with a 'lucky' pen perceived their performance to be better than those without it. However, superstitious belief did not significantly change following exposure to stress. Taken together, the present findings add some support to the suggestion that belief in transferable luck may facilitate coping with a stressor. However, further research is needed to fully understand the mechanisms behind the potential benefits of superstitious belief.

Keywords: superstitious thinking; psychosocial stress; anxiety; appraisal; performance; belief

Introduction

Paranormal belief can be described as belief in “*a proposition which has not been empirically attested to the satisfaction of the scientific establishment but generated within the non-scientific community and extensively endorsed by people to might normally be expected by their society to be capable of rational thought and reality testing*” (Irwin, 2009, pp. 16-17). Superstitious thinking refers to a subset of paranormal belief, which suggests that there is a causal link between action and outcome when no such causation exists (Matute, Yarritu, & Vadillo, 2011; Thalbourne, 1997). Superstitious rituals in sport are often observed among athletes in preparation for sporting events (Neil, 1980). Interestingly, superstitious rituals often emerge more so when a team appears to be losing, and not when a team holds a comfortable lead (Rudski & Edwards, 2007; Todd & Brown, 2003). Based on observations such as these, it has been suggested that superstitious thinking may become more common in times of challenge, stress and uncertainty (Burger & Lynn, 2005; Keinan, 1994, 2002). Consequently, paranormal beliefs may be needs-serving and reflect a form of coping to alleviate psychological distress (Irwin, 2009).

Keinan (1994) found that Israeli residents with high perceived anxiety and low tolerance of ambiguity exhibited greater superstitious and magical thinking when living in regions susceptible to missile attack. Further, undergraduates with a high desire for control, interviewed half an hour before an examination were more likely to “knock on wood” than undergraduates who were interviewed on a regular study day (Keinan, 2002). It has been suggested that paranormal belief may alleviate distress in challenging situations by enhancing the illusion of control (Langer, 1975). Stress may, therefore, serve to activate latent beliefs in an attempt to gain control over seemingly uncontrollable events (Irwin, 2009). Indeed, Case, Fitness, Cairns, and Stevenson (2004) found that participants relied more on superstition in the form of a ‘psychic’ when perceived control decreased, triggered by an increase in task difficulty. An attempt to further reduce perceived control and elevate perceived stress was introduced by telling participants that poor performance would result in an interview task. The

manipulation, however, did not influence participant reliance on superstition. It is possible that stress, in this instance, was less effective since it took the form of a *threat* of an interview task, and did not result in actual participation, which could have induced greater superstitious thinking.

If paranormal belief, and specifically superstition, facilitates an enhanced sense of control over a situation, then it is also possible that this may lead to an increased sense of mastery over task outcomes. When participants were exposed to a series of unsolvable anagrams, Dudley (1999) found that superstitious belief increased, and more so than following exposure to solvable anagrams. Further, and interestingly, those who held more superstitious beliefs performed better by solving more anagrams. The apparent improvement in performance has been attributed to changes in self-efficacy. Although historically, superstitious thinking was associated with *lower* self-efficacy (Tobacyk & Shrader, 1991), more recent research suggests the opposite, specifically with regards to ‘luck’ related superstition. Damisch, Stoberock, and Mussweiler (2010) told some of their participants that a golf ball used in a golf putting challenge was ‘lucky’, whilst others were told nothing about its properties. Participants who were told that the ball was ‘lucky’ performed significantly better than participants who were told nothing. Similarly, when the researcher told participants “*I’ll keep my fingers crossed*” prior to a motor dexterity task, completion speed increased (Damisch et al., 2010). In another task, participants who were given a ‘lucky’ charm performed significantly better than who were not. Participants who were exposed to the concept of ‘luck’ reported higher perceived self-efficacy indicating that participants believed in their ability to succeed on the tasks. Participants also showed greater persistence than participants without it (Damisch et al., 2010). Ultimately, both can lead to improved performance.

Although previous research suggests that stress may increase the propensity for paranormal or superstitious belief and may lead to enhanced performance, gaps in our knowledge remain. Some researchers have tried to replicate the findings of Damisch et al. (2010) but without success. Calin-Jageman and Caldwell (2014) attempted to precisely replicate the tasks reported by Damisch et al.

(2010) but failed to find an effect of superstition on performance. Similarly, Aruguete, Goodboy, Jenkins, Mansson & McCutcheon, (2012) failed to find an effect of religious faith on perceived self-efficacy, task perseverance and, most importantly, performance on a critical thinking test. The mixed results suggest that more research is required to fully elucidate the potential effects of superstitious thinking on task performance. It is possible that the effect of superstitious thinking centre on the *perception* of performance rather than on actual performance. Further, the influence of superstitious thinking on responses to an acute psychosocial stressor has not been explored. The use of a psychosocial stressor, particularly one with uncontrollability and socio-evaluative threat, is a more reliable means of inducing a mild stress response (Dickerson & Kemeny, 2004) and is also more reflective of the daily stressors individuals face. Psychosocial stressors play a significant role in the emergence of stress related disorders and health-related concerns (McEwen, 1998). In using a psychosocial stressor, it would be possible to more accurately test for possible increases in superstitious belief following exposure to stress.

The current study, therefore, aimed to explore whether belief in a ‘lucky’ pen would influence the psychological response to stress using the Trier Social Stress Test (TSST) versus an equivalent no-stress control task (NSC) and whether endorsement of superstitious belief would increase following stress exposure. Further, the impact of superstitious belief on perceived task performance was assessed. A ‘lucky’ pen was selected to fit the context of the current research, in which participants were required to prepare for a speech task in the form of an interview and would, therefore, need a pen to use. Therefore, the ‘lucky’ pen would not seem to be out of place and could, consequently, facilitate performance.

Method

Participants

One hundred and fourteen Singaporean psychology undergraduates (36 (31%) male and 78 (68%) female) aged between 17 and 59 years ($M = 22.98$, $SD = 4.57$) participated in the study. The majority of the participants were Chinese (72.8%), with 14% Indian, 4.4% Malay and 2.6% Caucasian. Participants were predominantly Christian (50%) with some Muslim (9.6%), Buddhist (9.6%) and Hindu (7.9%) participants. 20.2% did not hold any religious belief. The study received ethical approval via the Human Research Ethics Committee at James Cook University, Singapore. All participants gave informed consent and were reminded that they could withdraw from the study at any time without giving reason. Due to the nature of the stressor task (specifically the TSST), individuals with heart conditions, high blood pressure, or anxiety disorders such as social phobias were asked to refrain from participation.

Design

Participants were randomly assigned to either a stress inducing (TSST) task or an equivalent no-stress control task (NSC). To complete each task participants were either handed a pen labelled as 'lucky' ('lucky' pen) or were given a pen but told nothing about its properties during preparation (no 'lucky' pen). A mixed design was utilised with stress (TSST versus NSC) and superstition ('lucky' pen versus no 'lucky' pen) as between-subjects factors. Time was included as a within-subjects factor with three time points (i) baseline, (ii) post-preparation, and (iii) post-session to assess change in state anxiety (a dependent variable) across the experimental sessions. A second dependent variable, superstitious thinking was assessed using the same design but at two time points (i) pre and (ii) post TSST/NSC.

Finally, a between-subjects design with stress (TSST versus NSC) and superstition ('lucky' pen versus no 'lucky' pen) as between-subjects factors was used to explore participant appraisal of their performance during the experimental sessions, retrospectively, at the end of the session. Performance was assessed in terms of (i) how well participants felt they performed, and (ii) how easy

it was to perform each element of the TSST or NSC task (preparation, speech task (interview) and mental arithmetic), with or without the 'lucky' pen.

Experimental Manipulation

The Trier Social Stress Test (TSST) (Kirschbaum, Pirke, & Hellhammer, 1993) is a well validated stressor paradigm (Dickerson & Kemeny, 2004) which consists of a socially evaluated interview and a mental arithmetic task performed in front of a panel of two judges. The procedure for the TSST in the current study conformed to previous applications (Kirschbaum et al., 1993). A panel of two judges was used. Participants were allocated 10 min preparation time before completing a speech (interview) task (5 min) (a pitch in response to a job advertisement of 'Management Trainee'), and a mental arithmetic (5 min) (serial subtraction) task. Participants assigned to the no-stress control (NSC) task were asked to follow the same procedure as the TSST, in that they were asked to prepare (10min) for a speech (interview) task (5 min) and complete a mental arithmetic (5 min) task. However, to ensure a comparable yet less pressurised task for participants, the speech task was conducted in front of the researcher only, and was more of an informal discussion. Similarly, the mental arithmetic task was replaced with a one page, pen and paper set of basic mathematical questions (the procedure for the NSC task is adapted from Domes et al., 2002 and reported previously in Lasikiewicz, Hendrickx, Talbot, & Dye, 2013).

To assess the influence of a luck-related superstition, the concept of good luck was linked to a pen that participants were invited to use to prepare for the speech (interview) task. Those in the 'lucky' pen condition were handed a pen with the instruction: "*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*". Those in the no 'lucky' pen condition were given a pen with the instruction: "*Here is a pen you can use to prepare for the speech*". This approach is an adaptation of the method used in Damisch et al. (2010).

Measures

The state component of the State Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) was administered to infer psychological response to the TSST or NSC task. The STAI comprises 20 statements exploring the transitory feelings of anxiety with statements such as “*I am tense*”. The intensity of their emotionality is measured using a 4-point Likert scale (1 = not at all to 4 = very much so). The STAI has good internal consistency (average $\alpha > .89$), temporal stability ($r = .70$) and has been shown to be sensitive to the TSST procedure (Barnes, Harp, & Jung, 2002; Rimmel, Zellweger, Marti, Seiler, Mohiyeddini, Ehlert, & Heinrichs, 2007). The STAI was administered at three time points across the experimental sessions (i) baseline, (ii) post-preparation, and (iii) post-session.

Superstitious thinking was assessed using the Superstitiousness Questionnaire (SQ) (Zebb & Moore, 2003), derived from the Superstition Questionnaire originally formulated by Leonard, Goldberger, Rapoport, Cheslow, and Swedo (1990). The scale comprises 18 items utilising a six point Likert scale (strongly agree to strongly disagree) to assess superstitious belief and behaviours, for example, “*I do something special to bring good luck*”. Superstitious thinking was assessed twice, (i) pre and (ii) post TSST/NSC.

A Debrief Questionnaire containing six items was administered at the end of the study to assess the subjective appraisal of task performance (retrospectively) on the TSST or NSC task using a 100mm visual analog scale. Three items explored the perception of performance (“*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*”) during (i) preparation, (ii) speech (interview) task and (iii) mental arithmetic (VAS; 0 = *very well*, to 100 = *not very well*), and three items explored perceived ease of task completion (“*Please indicate using the scale below how easy/difficult you felt it was to complete each of the following*

aspects”) for each element (i) preparation, (ii) speech (interview) task and (iii) mental arithmetic task (VAS; 0 = *Easy*, to 100 = *Difficult*).

Procedure

Following informed consent and collection of baseline measures (STAI, SQ) participants were randomly allocated to either the stress (TSST) or no-stress control task (NSC) with ‘lucky’ pen or without the ‘lucky’ pen. Those allocated to the stress (TSST) task were led to a room (Room A) where the TSST procedure commenced. Two panellists (a male and a female confederate) explained the speech (interview) task to the participant. The participant was then led to a separate room (Room B) and given 10 minutes to prepare. Those in the ‘lucky’ pen condition were handed a pen labelled as ‘lucky’, whereas those in the no ‘lucky’ pen condition were given a pen with no comment on its ‘lucky’ properties. At the end of the 10-minute speech preparation phase, the STAI was administered for a second time. Participants then returned to Room A to complete the 5-minute speech (interview) task followed by a 5-minute mental arithmetic task. Upon completion, participants, again, completed the STAI, in addition to the SQ and Debrief Questionnaire.

Participants allocated to the NSC task followed the same procedure but remained in Room B and did not face the panel, completing the speech (interview) in front of the researcher. Participants then completed a simple pen and paper arithmetic task. The TSST and NSC procedures were matched for time, and measures (STAI, SQ and Debrief Questionnaire) were collected at the same time points.

Statistical Analysis

All analyses were conducted using SPSS 21 (IBM, 2012). A 2 (TSST vs. NSC) x 2 (‘lucky’ pen vs. no ‘lucky’ pen) x 3 (time; baseline, post-preparation, post-session) mixed ANOVA was used to explore the influence of stress (TSST versus NSC) and superstition (‘lucky’ pen vs. no ‘lucky’ pen) on state anxiety. To explore potential interactions in more detail, the pattern of change in state anxiety

across the experimental sessions was assessed using a series of one-way repeated measures ANOVAs with time as the within-subjects variable (i) baseline, (ii) post-preparation, and (iii) post-session. Data were then analysed using, a series of 2 (TSST vs. NSC) x 2 ('lucky' pen vs. no 'lucky' pen) between-subjects ANOVAs were conducted at each time point (baseline, post-preparation, post-session).

Further, a 2 (TSST vs. NSC) x 2 ('lucky' pen vs. no 'lucky' pen) x 2 (time; pre and post-session) mixed ANOVA was used to explore change in superstitious thinking following exposure to the TSST or NSC task.

Finally, a 2 (TSST vs. NSC) x 2 ('lucky' pen vs. no 'lucky' pen) between-subjects MANOVA was used to explore perceived task performance, in terms of how well the participant felt they performed and how easy it was to complete each element of the TSST or NSC tasks. Each element (preparation, speech (interview) task and mental arithmetic task) was assessed separately to explore the potential differential effects of superstition on the different types of task.

Results

Stress, Superstition and State Anxiety

A 2 (TSST vs. NSC) x 2 ('lucky' pen vs. no 'lucky' pen) x 3 (time; baseline, post-preparation, post-session) mixed ANOVA revealed a significant interaction between time, stress and superstition ($F(2, 220) = 4.987, p = .008, \eta^2 = .04$) on state anxiety. To explore this further, the pattern of change in state anxiety was assessed across the experimental sessions (baseline, post-preparation, post-session) for each of the four groups (those exposed to the TSST or NSC task, with or without the 'lucky' pen) using a series of one-way repeated measures ANOVAs. A significant main effect of time was observed for change in state anxiety in each of the four groups (i) those exposed to the TSST and given the 'lucky' pen ($F(2, 56) = 12.156, p < .001, \eta^2 = .30$), (ii) those exposed to the TSST but not given the 'lucky' pen ($F(2, 58) = 39.820, p < .001, \eta^2 = .58$), (iii) those exposed to the NSC task and

given the ‘lucky’ pen ($F(2, 54) = 8.706, p = .001, \eta^2 = .24$), and (iv) those exposed to the NSC task but not given the ‘lucky’ pen ($F(2, 52) = 13.596, p < .001, \eta^2 = .34$) (Figure 1).

Figure 1 here

In groups exposed to the TSST, with and without the ‘lucky’ pen, a significant increase in state anxiety was observed from baseline to post-preparation ($p = .002$ and $p < .001$ respectively) but not from post-preparation to post-session ($p = .462$ and $p = .188$ respectively). Although anxiety did not increase from post-preparation to post-session it remained higher than at baseline ($p = .001$ and $p < .001$ respectively). The pattern of change in state anxiety differed for those exposed to the NSC task. In both groups, both with and without the ‘lucky’ pen, a significant increase in state anxiety was observed from baseline to post-preparation (both $p < .001$). However, state anxiety subsequently decreased from post-preparation to post-session ($p = .006$ and $p < .001$ respectively). Because of this decrease, anxiety post-session did not differ from baseline (both $p = 1.00$).

To explore between-subject differences in state anxiety at each time point (baseline, post-preparation, post-session) in terms of stress and superstition, a series of 2 (TSST vs. no-stress control task) x 2 (‘lucky’ pen vs. no ‘lucky’ pen) between-subjects ANOVAs were conducted. As expected, at baseline, no significant differences in state anxiety between those exposed to the TSST versus NSC task, with or without the ‘lucky’ pen emerged ($F(1, 110) = .452, p = .503, \eta^2 = .00$). Further, state anxiety did not differ by stress ($F(1, 110) = .652, p = .421, \eta^2 = .00$) or superstition ($F(1, 110) = .116, p = .735, \eta^2 = .00$). Post-preparation, differences between those exposed to the TSST versus NSC task, with and without the ‘lucky’ pen began to emerge. A significant stress by superstition interaction was observed ($F(1, 110) = 6.477, p = .012, \eta^2 = .06$). Bonferroni-corrected post hoc independent samples t-tests revealed that state anxiety was lower in participants who were given the ‘lucky’ pen and exposed to the TSST, compared to those without the ‘lucky’ pen and exposed to the TSST ($p = .001$). State

anxiety was also greater in those exposed to the TSST without the ‘lucky’ pen compared to those exposed to the no-stress control task without the ‘lucky’ pen ($p = .001$). A significant main effect of stress ($F(1, 110) = 9.828, p = .002, \eta^2 = .08$) and superstition ($F(1, 110) = 9.833, p = .002, \eta^2 = .08$) further supported the observation that state anxiety was higher in those exposed to the TSST (compared to the NSC task) and in those not given the ‘lucky’ pen. Post-session, differences between those exposed to the TSST versus NSC task, with and without the ‘lucky’ pen disappeared. The stress by superstition interaction was not significant ($F(1, 110) = .284, p = .595, \eta^2 = .00$). Further, there was no difference in state anxiety between those given the ‘lucky’ pen and those not ($F(1, 110) = 1.791, p = .184, \eta^2 = .02$). However, those who were exposed to the TSST still reported greater state anxiety compared to those exposed to the NSC task ($F(1, 110) = 22.353, p < .001, \eta^2 = .17$).

A significant time by superstition interaction ($F(2, 220) = 4.272, p = .015, \eta^2 = .04$), time by stress interaction ($F(2, 220) = 22.552, p < .001, \eta^2 = .17$), and main effect of time ($F(2, 220) = 51.462, p < .001, \eta^2 = .32$) further confirmed these observations. In addition, a between-subjects main effect of stress revealed greater average state anxiety in those exposed to the TSST compared to the NSC task ($F(1, 110) = 10.626, p = .001, \eta^2 = .09$). A trend was also observed for participants without the ‘lucky’ pen to report greater average state anxiety than participants who were given the ‘lucky’ pen ($F(1, 110) = 3.861, p = .052, \eta^2 = .03$). However, the stress by superstition interaction was not significant ($F(1, 110) = 1.077; p = .302, \eta^2 = .01$).

Change in Superstitious Thinking Following TSST/NSC Task Exposure

A 2 (TSST vs. NSC) x 2 (‘lucky’ pen vs. no ‘lucky’ pen) x 2 (time; pre and post-session) mixed ANOVA was used to explore change in superstitious thinking following exposure to the TSST or NSC task. The time by stress by superstition interaction did not reach significance ($F(1, 110) = 1.386; p = .242, \eta^2 = .01$). The time by superstition interaction, was also not significant ($F(1, 110) = 3.259; p = .074, \eta^2 = .03$) despite a trend for superstitious thinking to increase in those who were told the pen was

'lucky' (pre: $M = 28.00$, $SD = 15.99$, to post: $M = 30.23$, $SD = 18.06$ respectively) compared to those without the 'lucky' pen (pre: $M = 20.53$, $SD = 17.26$, to post: $M = 20.57$, $SD = 17.80$), whose belief did not change. Further, the time by stress interaction was not significant ($F(1, 110) = .405$; $p = .526$, $\eta^2 = .004$). Finally, although a trend for superstitious thinking to increase from baseline to after stress/no-stress exposure was observed (pre: $M = 24.26$, $SD = 16.98$, to post: $M = 25.40$, $SD = 18.50$) the main effect of time was not significant ($F(1, 110) = 3.159$, $p = .078$, $\eta^2 = .03$).

Stress, Superstition and Perceived Performance

A 2 (TSST vs. NSC) x 2 ('lucky' pen vs. no 'lucky' pen) between-subjects MANOVA was used to explore perceived task performance, in terms of how well the participant felt they performed and how easy it was to complete each element of the TSST/NSC tasks. A significant multivariate interaction between stress and superstition on the combined dependent variables was observed ($F(6, 105) = 9.752$, $p < .001$, $\eta^2 = .36$). Given the significance of the multivariate interaction, univariate interactions were examined. Significant univariate stress by superstition interactions were observed for how well the participant felt they performed in the preparation for the speech (interview) task ($F(1, 110) = 8.189$, $p = .005$, $\eta^2 = .07$), the completion of the speech (interview) task ($F(1, 110) = 24.186$, $p < .001$, $\eta^2 = .18$), and the completion of the mental arithmetic task ($F(1, 110) = 8.583$, $p = .004$, $\eta^2 = .07$). Follow up Bonferroni-corrected independent samples t-tests comparing those given the 'lucky' pen and those who were not on each DV (how well the participant felt they performed and how easy it was to complete the tasks) were performed for (i) those exposed to the TSST, and (ii) those exposed to the NSC task. In those exposed to the TSST, perceived performance was significantly better in those given the 'lucky' pen when preparing for the speech (interview) task ($p < .001$), completing the speech (interview) task ($p < .001$), and completing the mental arithmetic task ($p = .001$).

Significant univariate stress by superstition interactions were also observed for how easy participants found the preparation for the speech (interview) task ($F(1, 110) = 38.248$, $p < .001$, $\eta^2 =$

.26), and completion of the speech (interview) task ($F(1, 110) = 26.269, p < .001, \eta^2 = .19$). But not for the mental arithmetic task ($F(1, 110) = .233, p = .630, \eta^2 = .00$). Again, follow up Bonferroni-corrected independent samples t-tests revealed that participants exposed to the TSST and given the 'lucky' pen found the preparation ($p < .001$), and completion of the speech (interview) task ($p < .001$) easier but not the mental arithmetic task ($p = .215$). No significant differences were observed in the NSC task (Table 1).

Table 1 here

A significant multivariate main effect of stress was observed ($F(6, 105) = 50.755, p < .001, \eta^2 = .74$). Exploration of univariate main effects showed significant main effects of stress on how well the participant felt they performed in preparation for the speech (interview) task ($F(1, 110) = 20.968, p < .001, \eta^2 = .16$), the completion of the speech (interview) task ($F(1, 110) = 40.076, p < .001, \eta^2 = .30$), and the completion of the mental arithmetic task ($F(1, 110) = 219.009, p < .001, \eta^2 = .67$). Significant univariate main effects of stress were observed on how easy participants found the preparation for the speech (interview) task ($F(1, 110) = 12.426, p = .001, \eta^2 = .10$), the completion of the speech (interview) task ($F(1, 110) = 36.820, p < .001, \eta^2 = .25$), and the completion of the mental arithmetic task ($F(1, 110) = 260.036, p < .001, \eta^2 = .70$). In all instances, participants in the NSC task perceived their performance to be consistently better than those exposed to the TSST.

Finally, a significant multivariate main effect of superstition was observed ($F(6, 105) = 7.308, p < .001, \eta^2 = .30$). Significant univariate main effects of superstition on how well the participant felt they performed in preparation for the speech (interview) task ($F(1, 110) = 26.598, p < .001, \eta^2 = .20$), the completion of the speech (interview) task ($F(1, 110) = 24.510, p < .001, \eta^2 = .18$), and the completion of the mental arithmetic task ($F(1, 110) = 10.297, p = .002, \eta^2 = .09$) were observed. Significant univariate main effects of stress were also observed for how easy participants found the preparation of the task ($F(1, 110) = 26.338, p < .001, \eta^2 = .19$), and the completion of the speech

(interview) task ($F(1, 110) = 14.633, p < .001, \eta^2 = .12$), but not the mental arithmetic task ($F(1, 110) = 2.611, p = .109, \eta^2 = .02$). Participants given the 'lucky' pen perceived their performance to be consistently better than those without the 'lucky' pen.

Discussion

The aim of the current study was to explore the possibility that superstitious thinking could alter the appraisal of psychological stress and whether endorsement of superstitious belief would further increase as a result of stress exposure. Further, the impact of superstitious thinking on perceived task performance was assessed. The findings of the current study indicate that, when asked to prepare for the completion of a stressful task, those who were told that the pen they could use was 'lucky' experienced less state anxiety than those who were given a pen but told nothing about its properties. Indeed, those given the 'lucky' pen reported less state anxiety throughout the experimental session than those without a 'lucky' pen.

The finding that the presence of the 'lucky' pen was associated with less state anxiety is consistent with previous research. Paranormal belief, or in this instance superstitious thinking, may be activated in times of challenge and may provide the illusion of control over perceived uncontrollable outcomes (Langer, 1975). Indeed, those who cope using superstitious strategies often do so as they view their life as more uncontrollable (Ciborowski, 1997; Keinan, 2002). Further, paranormal belief often increases in times of stress (Keinan, 1994; 2002). By this reasoning, the indication that the pen was 'lucky' may have activated superstitious thinking, which, in turn, facilitated coping with stressful situations (Irwin, 2009), thus reducing state anxiety.

To explore this further, the current study assessed change in superstitious belief before and after stress (versus no stress control) exposure. Given previous research findings, it was expected that superstitious belief would increase in those exposed to stress and, more so, in those given the 'lucky' pen. This would then offer support to the suggestion that stress exposure increases superstitious belief

and that this, in turn, facilitate coping. Dudley (1999) found that superstitious belief increased among psychology undergraduates after exposure to an unsolvable puzzle. Whilst at the other extreme, magical thinking increased in Israeli residents living in areas susceptible to missile attacks (Keinan, 1994). Therefore, it was reasonable to predict that exposure to a psychosocial stressor would be sufficient to elevate superstitious belief. Although in the expected direction, only a trend for an increase in superstitious belief was observed.

The fact that only a trend towards an increase in superstitious belief was observed may suggest that different stressors may activate different levels of superstitious beliefs (Irwin, 2009). Case et al. (2004) suggested that superstitious thinking may serve as an attempt at secondary control when primary control in a stressful situation, fails. In the face of challenge, a person will attempt to change outcomes to alleviate distress (primary). However, a person may resort to other strategies, such as luck or higher, more powerful others, when it is not possible to control the outcomes of a situation which is deemed secondary control (Case et al., 2004; Rothbaum, Weisz, & Snyder, 1982). Superstitious thinking may be a form of secondary control. Indeed, the illusion of control, as proposed by Langer (1975), is a form of secondary control (Rothbaum et al., 1982). In light of this, it is possible that the stressor utilised in the current study may not have been severe enough to warrant participants to adopt secondary control strategies. The TSST, however, has an excellent track record in inducing psychological and physiological stress responses (Dickerson & Kemeny, 2004). It also appeared to be effective in the current study as there was a noted increase in state anxiety following exposure to the TSST procedure compared to the no stress condition. The lack of change in superstitious belief could, alternatively, be explained by the perceived threat of the experience. In other words, participants were aware that the experimental setup was a simulation and consequently, a bad performance would, in reality, be devoid of any negative outcomes. This could have altered the perceived stressfulness of the task. However, since this is the first study to explore change in belief following exposure to a

psychosocial stressor, more research is needed to investigate the extent of the influence of different stressors on the endorsement of superstitious thinking and paranormal belief.

It must also be acknowledged that the lack of change in superstitious thinking may be due to a lack of sensitivity in the measure used to detect it. The Superstitiousness Questionnaire (SQ) (Zebb & Moore, 2003) was utilised due to its inclusion of both positive and negative superstitions to produce a more holistic view of superstitious belief, something that many other measures of superstition fail to do (Irwin, 2007; Wiseman & Watt, 2004). Although a valid measure, the SQ has not been adequately tested in terms of its psychometric properties. Further, it is a measure based on Western and not South East Asian superstitions. However, in the current study, the internal consistency of the measure at both time points was acceptable (Cronbach's Alpha of .91 and .92 pre and post stressor respectively). It is likely that although the measure assesses perceptions of items such as four leaf clovers (which cannot be found in Singapore), Singaporean respondents were still aware of the perception that four leaf clovers are associated with luck or "hsun tsao". This, however, highlights the need for the development of a more specific, and more sensitive superstition measure for South East Asia which can be used in future research.

It is possible that a marginal *increase* in superstitious thinking reflects social desirability bias. Although the term 'superstition' was not used specifically, participants were informed that the study explored unusual beliefs. This combined with the use of the 'lucky' pen and the use of the SQ (with superstition-related items) could have elevated awareness and the potential for bias. This is particularly pertinent in the current sample as superstitions are more culturally acceptable and previous research has observed greater paranormal belief in Singaporean samples compared to selected Western samples (for example, Otis & Kuo, 1984). However, since social desirability was not assessed, this remains speculative. It is also possible that the marginal effects observed in the current findings could be attributed to a small sample size. Future research should, therefore, strive to replicate the current findings in larger sample sizes and control for potential bias.

Previous research has indicated that superstitious thinking, or belief in transferable luck may be beneficial when faced with challenging situations. This is both in terms of psychological wellbeing i.e. reduced anxiety and distress but also in terms of performance. Despite this suggestion, previous research has yielded inconsistent findings in terms of the potential for superstitious thinking to improve actual task performance (Aruguete et al., 2012; Calin-Jageman & Caldwell, 2014; Case et al., 2004; Damisch et al., 2010). For this reason, the current study focussed on the potential for superstition to influence the perception of performance, in other words, whether participants reported easier task completion and better task performance when provided with a ‘lucky’ item (in this instance, the pen). The results indicate that those given a ‘lucky’ pen were more positive in their self-appraisal of performance during the speech preparation and interview task compared to those who did not receive the ‘lucky’ pen. This supports the suggestion that superstitious beliefs may enhance the perception of a sense of mastery over challenging situations. This suggests that participants certainly felt better about their performance but it is not known whether they actually *did* perform better. Further research is needed to fully elucidate the possibility that superstition can facilitate both the perception of performance and actual performance.

As previously discussed, increases in superstitious belief in times of challenge may reflect a form of coping with stressful situations. Callaghan and Irwin (2003) found that subsets of paranormal belief correlated positively with emotion-focussed coping. It is possible, therefore, that the paranormal believer is less likely to problem-solve and is more likely to focus on managing the emotional reaction to a stressful event. Therefore, superstitious thinking may have been beneficial when facing a psychosocial stressor such as the TSST, whose effectiveness is dependent on socio-evaluative threat (Dickerson & Kemeny, 2004; Kudielka et al., 2007). It was noted, however, that the ‘lucky’ pen did not reduce the perception of task difficulty for the mental arithmetic task. This suggests that the benefits may be selective and vary dependent on the difficulty of the task. More research is required to elucidate this possibility. It is also possible that belief in transferable luck was more pertinent for

the interview task because there was greater ambiguity surrounding the requirements of the task. This is comparison to the mental arithmetic task, which was, arguably, a more straightforward task to complete. This possibility is consistent with findings from Keinan (1994) who found that magical thinking increased in times of stress for those with a low tolerance of ambiguity. Unfortunately, tolerance of ambiguity and perceived ambiguity of the task were not assessed in the current study. It is also important to note that the pen was used to prepare, specifically, for the interview and not the mental arithmetic task. It would, therefore, be interesting in future studies to explore how helpful participants perceived the 'lucky' item to be, to help elucidate the possibility that the 'lucky' pen was more effective for the interview task because it could be directly linked to completion of the task.

Further, it must be acknowledged that participant perception of performance was assessed upon completion of the experimental session and, hence, was a retrospective measure. This is arguably a less sensitive measure than one taken at the time of task completion. However, the nature and timing of the TSST leaves little room for inclusion of additional measures without disrupting the effectiveness of the paradigm. That said, future studies should address the need for balance between the requirements of a stress induction procedure such as the TSST and accurate assessment of perceived performance, in light of the possibility that participant perceptions could have been altered by later events in the experimental session.

One of ways in which superstition may enhance the perception of performance is via an increase in self efficacy, or belief in the ability to succeed in task completion, which was observed in Damisch et al. (2010). However, since self-efficacy was not measured in the current study, this remains speculative. An alternative explanation for the effect of the 'lucky' pen could be that the instructions, which accompanied the delivery of the pen, served as verbal encouragement. Although not assessed in this context, previous research has found verbal encouragement to be an effective facilitator of performance, particularly on physical endurance tasks. Bickers, (1993) found that when participants were told 'You can do it!' they performed better on a leg holding task compared to a control group

who were told nothing. It is possible that the difference in instructions provided in the current study, between those with the 'lucky' pen and those without led to differences in perceived performance, as they did not adequately control for encouragement. The instructions provided with the 'lucky' pen made reference to the performance of others (and how well they performed) but the instructions for those not given the 'lucky' pen did not. This may have influenced participant confidence or motivation to perform well. This is an important consideration for future research as, because of this observation, it cannot be determined for sure, whether superstition or encouragement was the cause of the effect.

Superstition emerges from a need to have control in a world that the believer sees as uncontrollable. However, little research has directly investigated the consequences of believing in a luck-related superstition when exposed to a psychosocial stressor, a form of stress more reflective of the stress of daily life. The findings of the current study suggest that giving participants a 'lucky' pen was beneficial in terms of reducing state anxiety in response to a stressor and was associated with a more positive self-appraisal of performance. But the study failed to find consistent increases in superstitious belief following stress exposure. As such, it is not clear whether superstitious beliefs are solely responsible for the effects observed. Despite this, the present findings do add some support to the suggestion that belief in transferable luck may facilitate coping with a stressor. This may mean that luck-related superstition is a unique coping strategy that could be beneficial in challenging situations. However, further research is needed to more adequately control for potential confounds to allow research to isolate and fully understand the mechanisms behind the potential benefits of superstitious belief.

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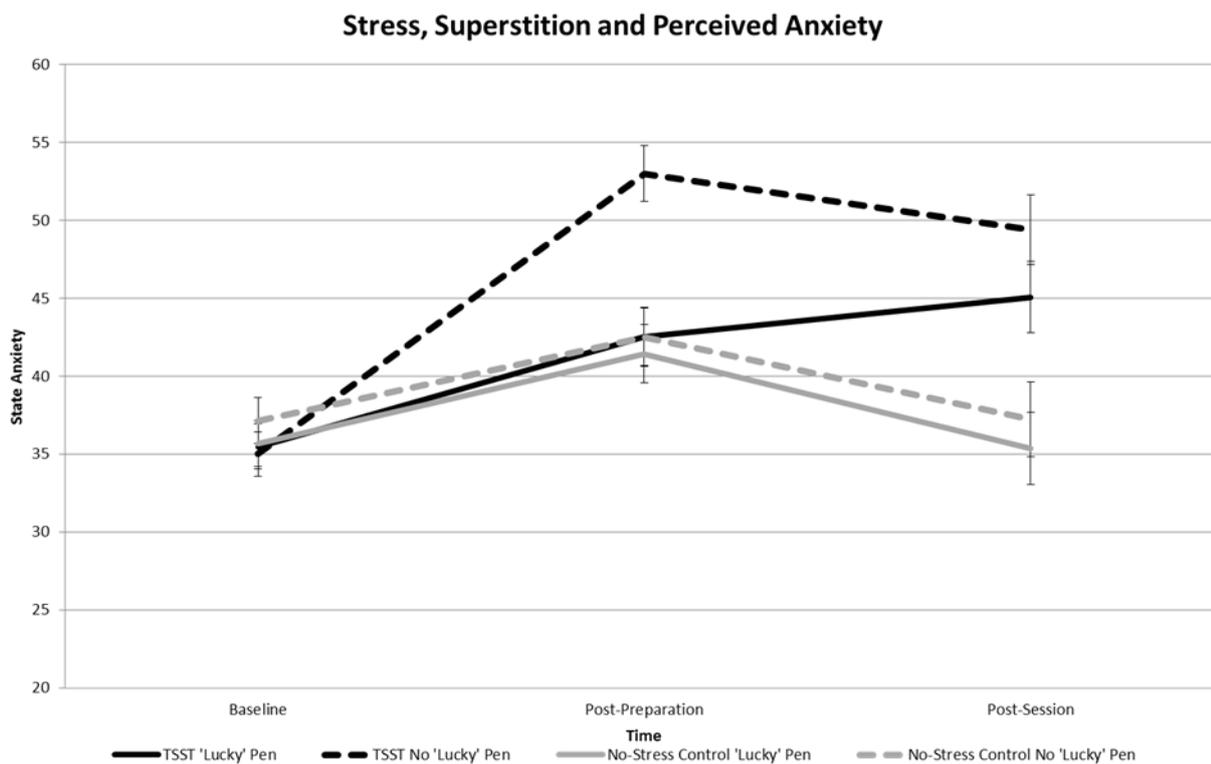


Figure 1. Change in state anxiety across the experimental session in the TSST/no-stress control (NSC) tasks with and without the 'lucky' pen

Table 1

Means and standard deviations for perceived performance in participants exposed to the TSST/No-Stress Control Task with and without the 'lucky' pen

| Aspect of Performance | TSST 'Lucky' Pen | TSST No 'Lucky' Pen | No-Stress Control 'Lucky' Pen | No-Stress Control No 'Lucky' Pen |
|--|-----------------------------|--------------------------------|--|---|
| <i>How Well Do You Think You Performed?</i> | | | | |
| Preparation | 35.98 ± 17.90 | 65.50 ± 20.86 | 29.66 ± 16.87 | 38.11 ± 22.47 |
| Speech (Interview) Task | 43.07 ± 20.56 | 79.15 ± 19.32 | 36.23 ± 20.66 | 36.35 ± 17.16 |
| Mental Arithmetic Task | 57.69 ± 24.35 | 79.42 ± 21.64 | 15.68 ± 12.99 | 16.67 ± 13.11 |
| <i>How easy/difficult was it to complete?</i> | | | | |
| Preparation | 23.62 ± 14.20 | 61.63 ± 22.23 | 32.55 ± 17.61 | 29.02 ± 16.38 |
| Speech (Interview) Task | 41.90 ± 22.36 | 75.33 ± 19.81 | 38.38 ± 21.20 | 33.52 ± 15.41 |
| Mental Arithmetic Task | 66.40 ± 19.03 | 73.27 ± 22.84 | 15.18 ± 13.01 | 18.90 ± 11.97 |

Note: a lower score indicates better perceived performance/ease of performance

