Application of Terror Management Theory in a Pandemic

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Statement of Contributions of Others

The contributions displayed in the table below were essential for the completion of this thesis.

Nature of Assistance	Contributions	Details of Contributions
Supervision	Guidance Intellectual input Editorial help	Dr Peter Chew Adj. Prof. Nerina Caltabiano
University Support	Minimum Resources Fund	James Cook University
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List of Publications Relevant to Thesis

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Leung, H. T., Chew, P. K., & Caltabiano, N. J. (2023). Being a good citizen in pandemics–compliance to social distancing and prosociality following death reminders. *Current Psychology*, 1-14.

Abstract

The Terror Management Health Model (TMHM) provided an alternative explanation to behaviours observed in the COVID-19 pandemic. These include breaching social distancing measures, behaviours such as stockpiling, and rejection of COVID-19 vaccinations. Nevertheless, prosocial behaviours, such as giving free food, and making monetary and reusable mask donations during the COVID-19 pandemic, were also observed. The purpose of this thesis is to apply the Terror Management Theory, in the form of the TMHM, to pandemic behaviours. This thesis begins with the conceptual application of the TMHM to understand the behaviours observed in Singapore during the COVID-19 pandemic (Chapter 2), followed by a systematic literature review which examined the effects of mortality salience of critical incidents, including pandemics, on the tripartite anxiety buffers (i.e., worldview, self-esteem, close relationships), individual wellbeing, prosocial behaviours, and organizational performance (Chapter 3). It ends with four empirical studies investigating the mortality salience effects of pandemics on death cognitions (Chapter 4, two studies) and on compliance to social distancing measures and prosociality (Chapter 5, two studies), while controlling for health anxiety in the statistical analysis. Self-construal reminders were included in the empirical studies in Chapter 5, to explore if such reminders can assist to guide communities to behave in an adaptive manner. Overall, Chapter 4 found partial support for the mortality salience effects of pandemics. Chapter 5 found that compliance to social distancing measures significantly increased following pandemic salience, regardless of self-construal and delay (Study 1, $n = 207$). It also found that individuals were more inclined to help others immediately after pandemic salience regardless of self-construal. They also endorsed more empathy and caring actions immediately after pandemic salience, but only if they had been primed with the collectivism self-construal (Study 2, $n = 203$). The TMHM

presents a new perspective to understand pandemic behaviours and a model to guide corresponding interventions to build resilient communities.

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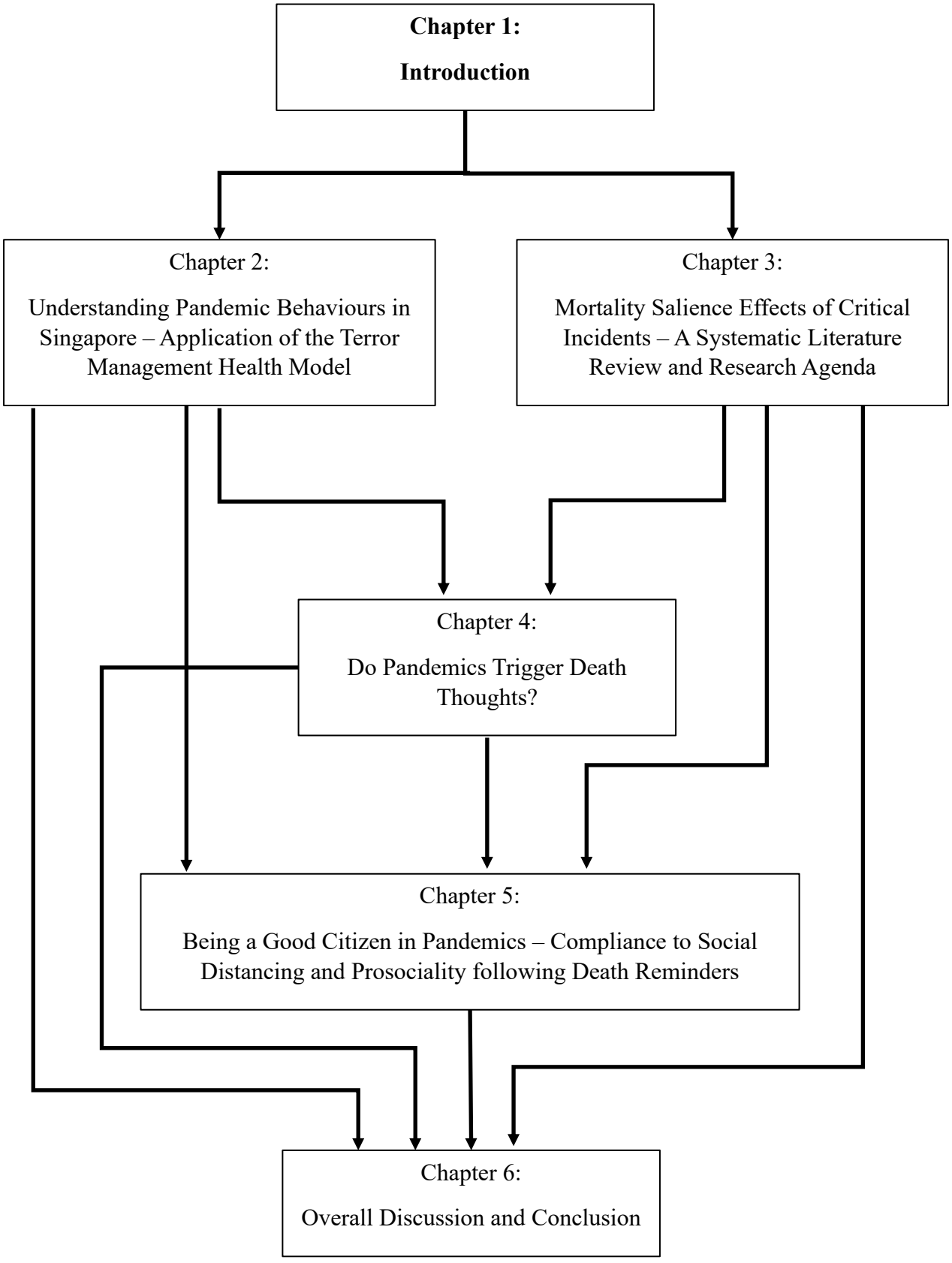
MS	Mortality Salience
TMHM	Terror Management Health Model
TMT	Terror Management Theory

Chapter 1 – Introduction



1.1 Introduction

The year 2020 put the global population to challenge when the Coronavirus, also known as COVID-19, started to spread around the world like wildfire. Without any vaccines or cures during the early stage, the world watched in horror as infection rates and deaths skyrocketed and scrambled to adopt all possible measures to keep individuals safe.

Research into nonpharmaceutical interventions found that wearing surgical masks and social distancing were some of the most effective measures to protect individuals from infectious diseases and to curb their spread (Haug et al., 2020; Pozo-Martin et al., 2021). However, these demanded a drastic change in individuals' hygiene and lifestyle practices. During the harshest period, strict social distancing measures were implemented, where cross border travel was stopped, lockdowns were implemented, schools, malls, shops, and most workplaces were closed, family and friends not living together were prohibited to meet each other in person, all of which were done to curb the spread of the transmissible COVID-19.

Although most were cognizant of the need to comply with strict nonpharmaceutical interventions, many were unable to adhere to them consistently. Reports about breaching such measures, and outright violations of these measures, were frequently observed. Some rationalized these compliances as infringing on their valued freedom, while others reported feeling lonely as a result of isolation from social distancing measures. Some even challenged the authorities and health systems by intentionally getting together during the lockdown periods. Others demonstrated behaviours such as stockpiling when lockdowns were first announced, intentionally avoiding disclosure with individuals who were infected with COVID-19, and rejecting COVID-19 vaccinations. Nevertheless, amidst the psychological reactance and anxiety, helpful behaviours during the COVID-19 pandemic were observed. There were reports and empirical evidence highlighting prosocial and selfless behaviours,

such as sending COVID-19 infected individuals to seek medical help, giving free food and making monetary and reusable mask donations.

While many researchers applied health models and theories to make sense of the abovementioned behaviours, their validity was criticized due to the poor operationalization of factors and exclusion of other factors which had demonstrated significant contribution to the behaviours. As detailed by Abraham and Sheeran (2014), the factors in the Health Belief Model were poorly defined and operationalized, which undermined the validity of the model. The Theory of Planned Behaviour, which was updated with other factors to enhance its predictive validity, faced challenges such as not being able to explain 'inclined abstainers', that is, individuals with intentions to act but failed to do so (Orbell & Sheeran, 1998; Sniehotta et al., 2014). Further, Armitage and Conner (1999) had shown empirical evidence that other factors such as self-identity and moral norms made additional contribution to the behavioural outcomes in addition to the Theory of Planned Behaviour factors. Recent studies examining responses to COVID-19 highlighted other factors not included in these health models.

One such study, conducted by a group of Danish researchers, examined the relationship between empathy and social distancing behaviours in individuals from UK, US and Germany, and noted a positive relationship between empathy and social distancing practices (Pfattheichera et al., 2020). The researchers further observed that compliance to social distancing measures increased when empathy was evoked in the participants in an experimental condition. In another study involving over 600 American adolescents, Oosterhoff et al. (2020) found that more than 70% of the sampled youths practiced social distancing during the COVID-19 period primarily due to the worldview of being socially responsible rather than personal anxiety or fear of contracting COVID-19. Similarly, Fairlamb and Courtney (2022) found that the more individuals internalised adherence to

social distancing as a cultural value, the more likely they were to report adherence to social distancing measures and fine individuals who breached the measures in the face of mortality salience triggered by the COVID-19 pandemic. These empirical findings suggest that factors outside of those described in the health models and theories, could be at work.

The Terror Management Health Model (TMHM; Courtney et al., 2020) provided a more encompassing alternative explanation to these behaviours observed in the COVID-19 pandemic. In view of the high death rates and the lack of cure and protection during the early phase in COVID-19, it is possible that pandemics like COVID-19 can trigger death thoughts and anxiety. These suggest that pandemics, when fatalities and perceived harm to self are severe enough, may activate behaviours and attitudes aimed at alleviating death thoughts and death anxiety.

Hence, the purpose of this thesis is to apply the Terror Management Theory, in the form of the TMHM, to pandemic behaviours. Through observations and news reports, Chapter 2 applied the TMHM conceptually to understand the behaviours observed in Singapore during the COVID-19 pandemic.

Chapter 3 is a systematic literature review which examined the effects of mortality salience (MS) of critical incidents, including pandemics, on the tripartite anxiety buffers (i.e., worldview, self-esteem, close relationships), individual wellbeing, prosocial behaviours and organizational performance. Suggestions on crisis interventions and new research agenda involving cross discipline research on critical incidents and TMT were proposed.

Following the literature background and research agenda established by Chapters 2 and 3, Chapter 4 investigated the MS effects of pandemics on death cognitions. Also, taking into consideration that pandemics are health-related crises, which can also trigger similar behaviours and attitudes, Chapter 4 isolated the effect of mortality salience triggered by pandemics by controlling health anxiety in the statistical analysis.

Findings from Chapter 4 indicated that there were no significant effects of MS and delay on death thought accessibility as assessed by the death word fragment task (Study 1, *n* = 203). However, response time towards death and positive words on the lexical-decision task was significantly faster than in standard MS and dental conditions (Study 2, *n* = 163). There was no significant effect of MS on threat words on the lexical-decision task. These provided partial support for the MS effect of pandemics.

After establishing the MS effects of pandemics, Chapter 5 studied the MS effects of pandemics on compliance to social distancing measures and prosociality as part of the efforts to improve community resilience during pandemics. As recommended in Chapter 3 to explore the role of moderators, such as a common identity, in mitigating undesirable behaviours and attitudes during critical incidents, self-construal reminders (i.e., collectivist/individualist) were included in the empirical studies in Chapter 5. This allowed for the exploration of whether such reminders can assist to guide communities to behave in an adaptive manner.

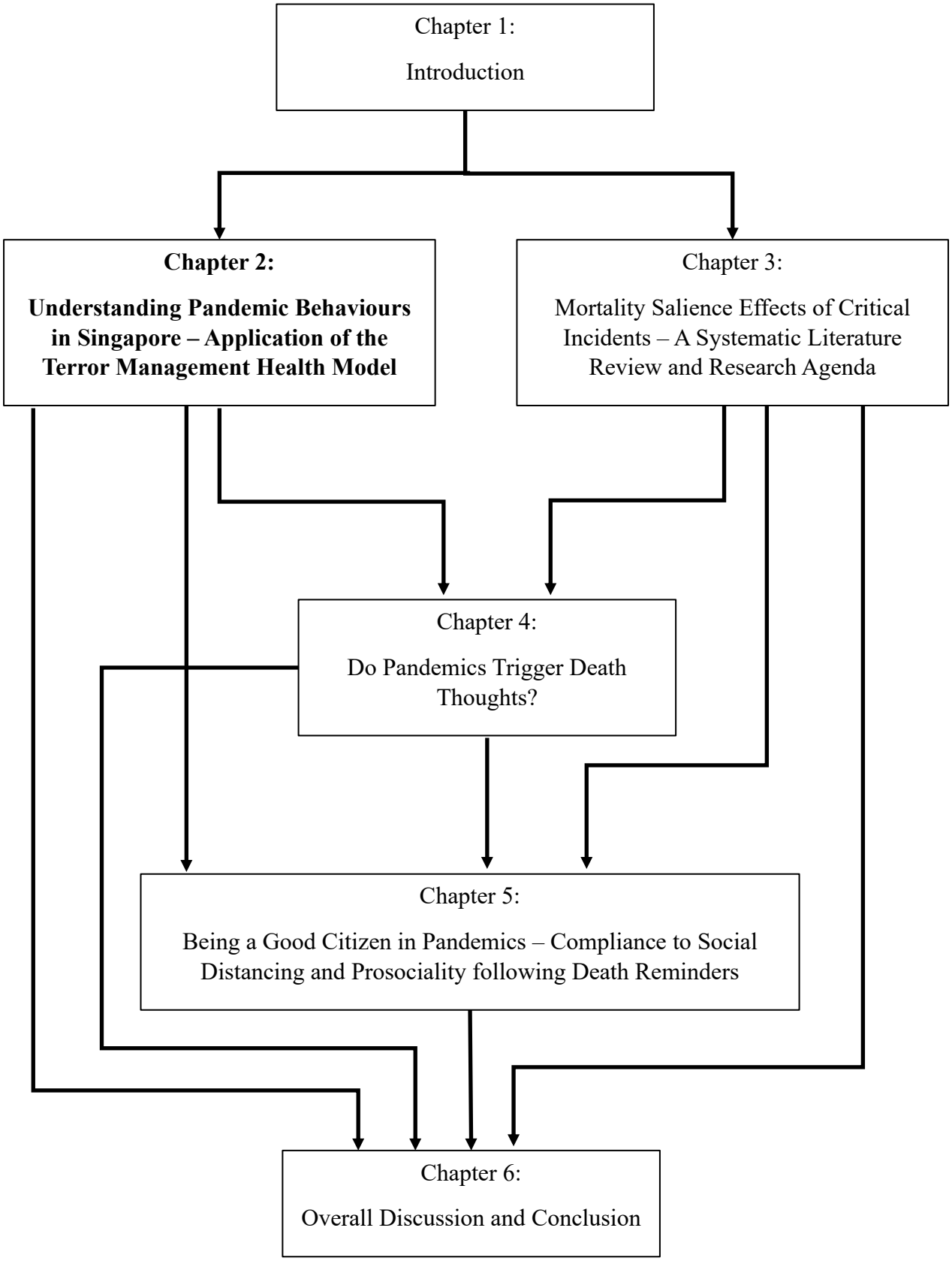
Results from Chapter 5 found a significant effect of pandemic salience (PS) on compliance to social distancing measures (Study 1, *n* = 207). Study 2 (*n* = 203) also found a two-way interaction effect of PS and delay for helping actions, and a three-way interaction effect of PS, delay, and self-construal for caring actions and empathy. Specifically, individuals were more inclined to help others immediately after PS regardless of self-construal. They also endorsed more caring actions and empathy immediately after PS, only if they had been primed with collectivism self-construal.

Overall, this thesis has laid the foundation to examine the MS effects of critical incidents in a pandemic. Through the conceptual application of TMHM to observed pandemic behaviours, systematic literature review and a series of empirical studies, pandemics have demonstrated their MS effects on behavioural and attitudinal outcomes, which are in line with the principles of the TMHM. The TMHM presents a new perspective to understand health

behaviours in pandemics and a model to guide corresponding interventions to build resilient communities.

These objectives echoed Asmundson and Taylor's (2020) concluding remarks in their editorial ‘Coronaphobia: Fear and the 2019-nCoV outbreak’, which encouraged better understanding and management of health behaviours in pandemics, so that society can prepare and take corrective actions in subsequent pandemics. As many virologists have pointed out (Binnicker, 2020), COVID-19 will not be the last pandemic the human race will encounter. In the face of the inevitable, there is a need to be prepared for future pandemics by learning and studying current experiences, how individuals respond and cope with the prolonged crises so that maladaptive behaviours can be addressed or adaptive behaviours can be facilitated in an evidence-based manner.

Chapter 2 - Understanding Pandemic Behaviours in Singapore – Application of the Terror Management Health Model



2.1 Chapter Overview

Chapter 2 applied the terror management health model (TMHM) to the behaviours observed in Singapore during the early phase of the COVID-19 pandemic.

2.2 Publication Status

An earlier version has been published at the time of submission.

Leung, H. T., Chew, P. K., & Caltabiano, N. J. (2022). Understanding pandemic behaviours in Singapore–Application of the Terror Management Health Model. *Australasian Journal of Disaster and Trauma Studies*, *26*, 131-140.

2.3 Manuscript

2.3.1 Abstract

The novel coronavirus, now known as COVID-19, was first reported in China in December 2019 and became a global crisis by March 2020. Both adaptive and maladaptive behaviours were observed in response to aspects of the crisis, some of which appeared to be contradictory to coping and curbing the threat of COVID-19. For instance, the purchase and use of surgical masks and sanitisers could be understood as logical health-oriented behaviours relevant to coping with the COVID-19 pandemic. The breaching of social distancing measures and forwarding unverified news, however, might have done more harm than good. In applying the proximal and distal defences proposed within the Terror Management Health Model (TMHM), this article aims to explain these behaviours as individuals' attempts to alleviate anxiety arising from reminders of their mortality. Information from local newspapers and media are used to highlight and identify common behaviours observed in the pandemic, and the TMHM was applied to explain these behaviours. This paper briefly concludes with a call for empirical validation of the TMHM for the behaviours observed in COVID-19, and for the use of TMHM conceptualisations to develop countermeasures to reduce maladaptive behaviours in the current, and future, pandemics in Singapore.

Keywords*:* TMHM, COVID-19, health behaviours, Singapore, empirical validation

2.3.2 Introduction

The first cluster of the novel coronavirus was reported in Wuhan, China, in December 2019. By March 2021, this coronavirus, now known as COVID-19, had escalated to a global pandemic, infecting more than 110 million and killing 2.5 million worldwide (WHO, 2023). Based on the Pandemic Influenza Severity Assessment (PISA), edited by the World Health Organisation (WHO, 2017), COVID-19 is a severe pandemic based on its transmissibility, symptom severity, and economic impact. This paper aims to explain behaviours observed in Singapore during the COVID-19 pandemic by applying the Terror Management Health Model (TMHM; Arndt & Goldenberg, 2017) to understand individual differences in responding to this prolonged crisis. This paper also hopes to encourage empirical research that applies TMHM to the behaviours observed during COVID-19 in Singapore. These findings can potentially feed back into strategies and policies to support the Singaporean community in continuing to cope in an evidence-based manner, both during these difficult times and in preparation for the next pandemic.

2.3.2.1 Terror Management Theory

Terror Management Theory (TMT) was first developed by Greenberg et al. (1986) by applying an existential perspective in understanding variants of social behaviours. Philosophical knowledge and feedback from in vivo observations and experimental data have contributed to the evolution of the theory and its current definition. Essentially, TMT posits that humans, being born with advanced cognitive capabilities, recognize that their lives are finite. This recognition that our mortality is limited triggers death thoughts which conflict with our need for self-preservation, thereby inducing anxiety. Individuals would then alleviate this anxiety by extending their mortality in a literal or symbolic manner, represented

by attempts to avoid or minimize threats, defend worldviews, enhance self-esteem, and seek close relationships (Plusnin et al., 2018).

The worldview defence and self-esteem pathways in reducing death thoughts following reminders of death have been widely researched and established in both Asian and non-Asian cultures (Heine et al., 2002). Multiple studies have shown that following mortality salience, individuals are more likely to defend their worldview by reporting less favourable opinions of those who represent or uphold a different worldview to themselves (Halloran & Kashima, 2004), as well as providing fewer resources (Tam et al., 2007), or meting out harsher punishment (Rosenblatt et al., 1989). People are also more likely to behave and make decisions that would bolster their self-esteem after reminders of death, for example by purchasing items reflective of higher status (Heine et al., 2002) or reporting higher positive regard from significant others (Cox & Arndt, 2012). Seeking close relationships has also been found to alleviate death thoughts following mortality salience. As summarized by Plusnin and colleagues (2018), individuals were more likely to initiate social contact (Taubman-Ben-Ari et al., 2002), seek out sexual intimacy (Birnbaum et al., 2011), and show more commitment to romantic relationships (Florian et al., 2002) after being reminded of their inevitable deaths.

2.3.2.2 Proximal and Distal Defences

From the perspective of TMT, individuals are likely to take actions and decisions to extend their mortality in a literal or symbolic manner after being reminded of their deaths. These actions and decisions may or may not be logical and relevant to the threats at hand. The determination of particular actions or decisions is based on the prominence of death thoughts in the individuals' focal attention, giving rise to the dual process model in TMT (Pyszczynski et al., 1999).

The dual process model suggests that if death thoughts are prominent in the individual's awareness, those individuals are more likely to engage in *proximal* defences.

When individuals apply these defences, they are more likely to make responses seen as rational and relevant to the threats at hand, thereby regulating the anxiety triggered. These actions and decisions can be health-oriented responses that reduce the perceived threat by promoting good health, or threat-avoidant responses which deny vulnerability to or distract from life threatening conditions. However, as death thoughts recede into the background or hover at the periphery of consciousness after a delay, individuals will adopt *distal* defences. Distal defences are actions and decisions that may appear illogical and contradictory to the current threats, but are consistent with the individuals' worldview, self-esteem, or relational needs (Kosloff et al., 2019). Pyszczynski et al. (1999) and Kosloff et al. (2019) provide comprehensive evidence and discussions on the dual process model and its role in TMT.

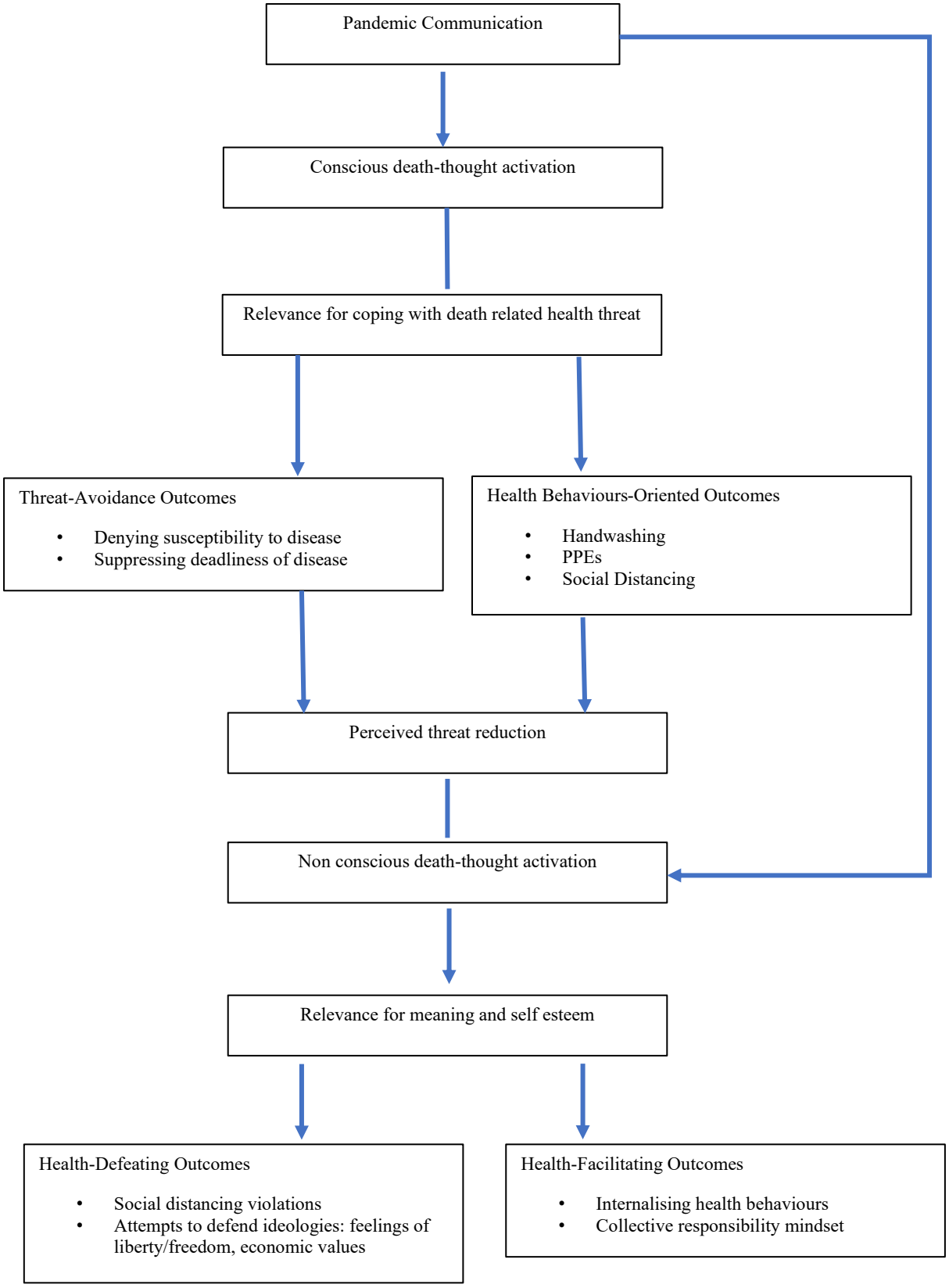
This dual process system of TMT was applied to health behaviours (Arndt & Goldenberg, 2017), which gave rise to the Terror Management Health Model (TMHM). A classic example to introduce the dual process model and the TMHM is the series of studies conducted by Routledge et al. (2004). The researchers applied TMHM to attitudes towards suntanning and sun protection. In their studies, they employed female participants who valued being tanned and divided them into two groups. One group wrote about their deaths while the other wrote about dental pain (control condition). These groups were further divided into two, where half of each group was asked to indicate interest in purchasing sunscreens with a different sun protective factor immediately after writing about their death or dental pain, or to indicate their preference after a time delay. Logically, when reminded of one's death, we would expect individuals to make rational decisions such as expressing more interest in sunscreens with better protective properties (i.e., higher sunscreen protection factor) regardless of the delay between the mortality salience induction and their interest in sun protection. As predicted, individuals in the mortality salience non-delay group did indicate significantly higher interest in sunscreens with higher sunscreen protection factor

(i.e., proximal defence). However, those in the mortality salience delay condition did not show such a preference. This difference in interest in sunscreen products was not apparent in the dental pain control condition. This pattern of results suggested that individuals who valued being tanned adopted the distal defence by expressing significantly less interest in sunscreen products, as death thoughts recede into the background after a time delay. This discrepancy in attitude towards health decisions illustrated the dual process model of TMT in the TMHM, where individuals tend to adopt rational health-oriented responses immediately after death thoughts are triggered but this effect changed when there was a time delay between death reminders and responses. Instead, individuals are more likely to respond in ways consistent with their self-esteem, in this case being tanned, which seemed to contradict positive health outcomes when death thoughts faded after a time delay.

Similarly, McCabe et al. (2014) demonstrated that individuals were more willing to pay more for bottled water and drank more water endorsed by medical doctors immediately after being reminded of their deaths while those who responded after a time delay preferred celebrity-endorsed bottled water. This suggested a differentiation of proximal and distal defences within the TMHM, where individuals were more likely to adopt health-oriented behaviours immediately after mortality salience cues. In this case, individuals purchase or use products advocated by medical professionals after being reminded about their deaths, which implied direct positive impacts on their health. However, they would make choices which enhance self-esteem such as demonstrating a preference for celebrity-endorsed products which make them look and feel good after a time delay. These results have been replicated with other health behaviours such as exercise (Morris et al., 2019) and sexual behaviours (Bessarabova & Massey, 2020).

Figure 2.1

Terror Management Health Model in a Pandemic



Note. Reproduced with permission from Courtney et al. (2020).

More recently, Courtney et al. (2020) published a concept paper on the application of the TMHM to attitudes and behaviours observed during the COVID-19 pandemic (Figure 2.1). Shortly after, Pyszczynski et al. (2020) also published on the application of the dual process model in TMT to understand pandemic-related behaviours and attitudes in the United States (U.S.). These concept papers addressed motivations and meanings of the attitudes and behaviours including minimizing COVID-19 earlier on in the pandemic, blaming the Chinese for the virus, and breaching social distancing measures. These conceptualisations also kickstarted empirical studies exploring potential interventions, such as examining the effect of MS inductions and moderators, to encourage adoption of adaptive health behaviours such as social distancing, mask wearing and taking up vaccination so as to curb the spread of infection (Courtney et al., 2021).

Before turning to examine how the TMHM is applied to attitudes and behaviours observed in the COVID-19 pandemic in Singapore, it is important to note that while proximal and distal defences can be easily distinguished in experimental settings, this differentiation can be tricky in the real world. Firstly, the time delay before distal defences are triggered has not been quantified. Although Burke et al. (2010) have found that experimentally, distal defences could be triggered with delays between 2 to 20 minutes (see also Cox et al., 2019), the time lapse is likely to be significantly longer between mortality salience and decision making and actions in the real world. Furthermore, one cannot control the exposure to other mortality threats following the initial exposure to death threats, especially with a long delay between initial exposure and eventual behavioural outcomes or decision-making, thereby complicating the process of differentiating proximal and distal defences. As a start, this paper attempts to overcome these challenges by examining the underlying motivations for these behaviours and decisions, based on the Terror Management Health Model in a pandemic.

2.3.3 Applying Terror Management Theory During COVID-19 in Singapore

Singapore reported its first confirmed COVID-19 case of a 66-year-old Chinese national on the 23rd of January 2020. Subsequently, the country experienced the first COVID-19 deaths of a 75-year-old Singaporean woman and a 64-year-old Indonesian man on the 21st of March 2020 (Yong, 2021). As the pandemic evolved, the Singapore government started mandating individuals to wear masks and implemented the drastic month-long lockdown, known as the "Circuit Breaker", on the 7th of April 2020 (Goh, 2020b). The country also saw a spike in cases in April 2020, with more than 1,000 new cases in a single day. Cases tapered to less than 20 a day by December 2020. At the time of writing (November 2021), 1690 COVID-related deaths have been documented, and mass vaccination has been completed, with over 90% of the Singapore population having received the full vaccination regime (Hirschmann, 2022).

Since December 2019, there has been daily news on COVID-19, covering the nature of the virus, transmission, lethality, as well as government policies related to the pandemic. Daily, individuals in Singapore have been inundated with information on COVID-19 via newsfeeds and social media. Thus, COVID-19 and its death threat have been constantly in individuals' awareness. As the Internet and social media gained popularity in the digital era, individuals have had access to news on how COVID-19 has affected other countries and their daily death counts. Indeed, there was an increase in the proportion of Singaporean population expressing the fear of contracting COVID-19 between 20th February 2020 to April 2020 (Statista, 2024). This sharp increase from 5% to 73% coincided with the time when the first death from COVID-19 in Singapore was reported on 21st March 2020. A big data analysis with Google Search terms in Singapore revealed a significant increase in mortality salience, as demonstrated by a surge in the Google searches about death, following the first COVID-19

case in Singapore (Chew, 2022). These pointed to the heightened perceived risk of COVID-19 in Singaporeans.

The perceived risk of COVID-19 further increased for vulnerable populations, defined as individuals aged 60 and above and/or with health conditions involving the lungs or heart, as well as chronic conditions such as diabetes or immunity related conditions (WHO, 2023). Consistent with these vulnerabilities, an analysis by the Ministry of Health Singapore (2022) suggested that the spike in deaths could be attributable to undiagnosed COVID-19 or due to underlying medical conditions, which were aggravated by COVID-19 infections such as heart attacks and stroke. Hence, the Ministry of Health Singapore continued to advise and encourage these groups of individuals to practice infection control measures such as practicing social distancing, staying home and wearing masks if they need to go out and appealed to their family and friends to minimise social interactions with these vulnerable individuals if they are unwell and to reduce socialising to prevent bringing the virus to them (Tan, 2021).

2.3.3.1 Proximal Defence

The knowledge that there had been local deaths in Singapore likely heightened the threat of COVID-19 for those living there. From the TMT perspective, the threat of COVID-19 on our mortality is in the spotlight of awareness. This then triggers proximal defences, which serve to alleviate anxiety through both health-oriented behaviours and threat avoidance behaviours to create a sense of safety from COVID-19.

Health-oriented behaviours. A health-oriented behaviour proximal defence was demonstrated by the creation of two petitions on Change.org, two days after the announcement of the first COVID-19 case in Singapore, to urge the government to ban travellers from China entering Singapore, in an attempt to protect the community from being exposed to potential virus hosts (Kim, 2020). There was also an increase in the number of

people wearing surgical masks in public. This was despite earlier government statements to wear masks only for those who exhibited flu-like symptoms (Goh, 2020). The demand for face masks and sanitizers rose sharply a day after the first confirmed case of COVID-19 was announced, resulting in a heavy shortage of surgical masks within Singapore (Abu Baker, 2020). Many flocked to the pharmacies and supermarkets to purchase multiple boxes of surgical masks, sanitizers, and antibacterial wet wipes to protect themselves from the virus. There was also significantly more traffic in shops where these items were sold, as people lingered in the hope that stocks would be replenished and long queues observed where face masks and sanitizers were in supply. These behaviours appear to reflect attempts to reduce death anxiety by having access to and wearing personal protective equipment.

As shortages occurred with sanitizers and face masks, individuals focused their attention on vitamin C supplements (Koe, 2020), presumably hoping to assuage their anxiety related to the COVID-19. Even though experts clarified that there was limited to no evidence regarding the protective strength of supplements such as vitamin C against COVID-19 (Ansorge, 2020; Cheng, 2020), demand for vitamin C increased five times over 2 weeks as the Singapore government escalated the risk level of COVID-19 (Koe, 2020). Some individuals coped by minimizing expert opinions and scientific data on the efficacy of vitamin C as a protective measure against COVID-19 and continued to purchase this item as a way to keep themselves safe from COVID-19. This overestimation of the efficacy of vitamin C, and purchase of vitamin C, possibly helped them restore some sense of safety from the death threat posed by COVID-19.

Proximal defence was also apparent in individual choices towards vaccinations. From early 2021 (Ang, 2020), the Singapore government planned a vaccination schedule, aiming to inoculate the population by the third quarter of 2021 (Lai, 2021). According to two studies, the take up rate for vaccinations, if proven safe and effective, was expected to be between

48% (Teo, 2020) to 67.9% (Lazarus et al., 2020). The most common motivation for taking up the vaccine was protection from COVID-19, which directly facilitates health outcomes. However, there was a significant portion of the Singaporean population preferring to delay or decline the vaccination. They cited worries about the safety of the vaccination or uncertainties about the effectiveness of the vaccines (Teo, 2020). Given that unsafe and ineffective vaccinations would predispose them to severe or fatal side effects, and risk of contracting COVID-19, these decisions to delay or decline the COVID-19 vaccines may represent proximal defences that serve to allay anxiety from impending death.

Threat avoidance behaviours. Stockpiling could be construed as a threat avoidance behaviour. When the Singapore government announced a lockdown starting from the 7th of April 2020, the country went into a frenzy and started stockpiling. Long queues and empty shelves were common sights in grocery stores and supermarkets, and major supermarket chains had to put a limit on the quantity that could be purchased for certain commodities. Apart from herd instincts (Yap & Chen, 2020) and scarcity heuristics (Norberg & Rucker, 2020), findings elucidated in Khan's study (2020b), which are in line with TMHM, could also account for stockpiling behaviours. Khan (2020b) found a relationship between threat perception of COVID-19 and attitudes towards stockpiling. Specifically, Bangladeshis who perceived COVID-19 as more dangerous to their lives were more likely to endorse purchasing and reserving food. Similarly, Singaporeans' anxiety was likely raised when the government implemented the lockdown in April, as it implied an escalation of risk and threat of the COVID-19 situation. This increased fear in the Singapore community regarding their health and mortality, thus motivating them to engage in stockpiling so that they could minimize the need to go out and therefore avoid exposure to the virus.

As Singapore slowly emerged from the lockdown period, many were still cautious about being outdoors and visiting crowded places such as shopping malls; the proportion of

the Singapore community avoiding crowded places increased from 44% to 69% between February 2020 to January 2021 (Hirschmann, 2021a). Upward trends were observed after high numbers of new COVID-19 cases were reported and as of January 2021, 23% of those who participated in the survey expressed that they would avoid returning to work during the COVID-19 outbreak, up from 11% in February 2020 (Hirschmann, 2021b). Apart from the economic repercussions of COVID-19 (e.g., retrenchment) and potential recession (Heng, 2020), some individuals continued to express worries about being exposed to COVID-19 and preferred to stay home to keep themselves safe (Kok & Yip, 2020; Tee, 2020).

2.3.3.2 Distal Defences

As COVID-19 continues to exist in the public conscience and remind people of the finite nature of their lives, individuals will likely continue to alleviate their anxiety by finding ways to extend their mortality in symbolic ways. As the distal defence pathway in TMHM proposes when death thoughts fade into the background but are still accessible, individuals will respond in ways that are consistent with seeking close relationships, reinstating values and worldview, and bolstering self-esteem (Plusnin et al., 2018).

Seeking close relationships. As summarised by Teo and Tan (2020), several individuals had breached quarantine measures to meet loved ones or seek sexual intimacy. These behaviours are consistent with research examining mortality salience and intimate relationships (Birnbaum et al., 2011; Florian et al., 2002). In a series of studies, Birnbaum et al. (2011) found that, regardless of gender, individuals expressed more desire for romantic sex when reminded of their mortality. From the terror management perspective, Singaporeans could be coping with their heightened anxiety by seeking close relationships and sexual intimacy during the lockdown (Lam, 2021b; Tang, 2020) and when serving quarantine orders (Alkhatib, 2021; Tang, 2020).

Indeed, it was reported that there had been more than 360 breaches of quarantine measures, known as stay-home-notice (SHN), in Singapore since the beginning of the COVID-19 pandemic (Ang, 2021). While some of these breaches were clearly a result of mischiefs and irresponsibility (Lam, 2021), some breached quarantine measures to seek out meaningful and intimate relationships to reduce loneliness, thereby alleviating anxiety triggered by mortality salience (Plusnin et al., 2018). Being placed on quarantine implied a risk of contracting COVID-19 as individuals were deemed to have had a reasonable chance of exposure to the COVID-19 virus. This inevitably heightened death thoughts, which were amplified by the daily reports of infection numbers and death rates in Singapore and other countries. In the context of TMT, it is understandable for some of these individuals to breach social distancing measures and stay-home-notice, such as a British man breaching stay-home-notice to meet with his fiancée in the hotel in which he was quarantined (Alkhatib, 2021). Such quarantine breaches to seek out close relationships offer an anxiety buffer from mortality salience prompted by COVID-19, particularly as the 14 days of quarantine wore on and the death thoughts receded from awareness.

Besides seeking contact with close and loved ones, the sharing of unverified COVID-19 information with family and friends can be construed as a type of anxiety buffering measure when faced with mortality salience. The sharing of information, even before official verification, could be a means to stay connected with loved ones. At the same time, it also possibly served as an attempt to extend symbolic mortality as sharing information in crisis could enhance survival of other in-group members.

Worldview and self-esteem. One way through which individuals protect in-group members appeared to be the sharing of information in crisis, even before its verification. Misinformation related to COVID-19 circulated in the community from February to April 2020 (Gov.sg, 2020a). This information was related to the nature of the COVID-19 virus,

government guidelines on public service provision and utilisation, and social distancing measures. This is in line with the findings reported in studies by the National Centre of Infectious Diseases (NCID), Wee Kim Wee School of Communication and Information of the Nanyang Technological University, and the Saw Swee Hock School of Public Health of National University of Singapore, which examined the Singapore community's knowledge, perception, and behaviour during the COVID-19 pandemic (Chew, 2020).

These studies found a significant amount of unverified information circulating on messaging and social media platforms and reported that as many as 78% of their respondents forwarded information on messaging platforms to family and friends. Out of this 78% of respondents, about 14% would circulate information received on messaging platforms before verification (Oh, 2020). Individuals who tended to forward information on social media were more likely to endorse stockpiling, suggesting that forwarding information and behaviours during pandemics serve common functions when death thoughts are accessible in individuals' minds. Such circulation of information, regardless of the authenticity of the information, are consistent with a symbolic extension of individuals' mortality by ensuring the survival of family and friends through information sharing. Such information sharing was seen as providing family and friends with the ability to enact timely actions for self-preservation.

Besides bias towards in-group members, there has been a rise in negative attitudes among Singaporeans towards certain groups of non-Singaporeans. There has been an intensification of xenophobic sentiments as exemplified by a commentary published in the national Chinese newspaper scapegoating foreign workers for the ongoing pandemic in Singapore, attributing the high number of cases to their lack of personal hygiene (Mahmud, 2020). Singaporeans also criticized expatriates who congregated and flouted social distance measures as being "selfish" and called for the government not to apply "double standards"

towards these expats (Tai, 2020). Anger was also directed at Indian nationals for pandemic-induced job losses suffered by Singaporeans (Khan, 2020).

Apart from the intensifying ingroup-outgroup split, another example of how individuals regulated their anxiety arising from mortality salience from COVID-19 was demonstrated by Paramjeet Kaur. As was widely covered by the media, Paramjeet Kaur expressed and upheld strong beliefs that she is "we the people" and "sovereign" (Alkhatib, 2020). While upholding her worldview as a "sovereign", Kaur violated the COVID-19 rules of Singapore and adopted health-defeating behaviours including not wearing a mask on at least two occasions in public areas and eating at an eatery during the lockdown, when individuals were banned from eating outside of their homes (Alkhatib, 2020). Her behaviour possibly illustrated a distal defence, in which she upheld her worldview to regulate her anxiety arising from mortality salience even though this led her to adopt health-defeating behaviours.

Distal defences can also be adaptive and selfless. As the country coped with and adjusted to COVID-19, the Singaporean community also exhibited prosocial behaviours. The collective spirit, where looking out for each other and family orientation are important, is still common in the Singapore community even though the country is multicultural (Hofstede Insight, 2020).

With death thoughts likely prevalent in the Singaporean community during the COVID-19 pandemic, individuals showed kindness during the difficult times. As face masks and sanitisers ran out, there was news about and praise for kind and generous individuals who placed bottles of sanitisers and face masks in lifts for public consumption (Lee, 2020; Wong, 2020). Others decided to donate their personal pay-out from the Singapore government (the

Solidarity Payment[1]) to non-profit organisations, and started campaigns encouraging others to donate their Solidarity Payment to charities to help those whose livelihoods were affected by COVID-19 (Yuen, 2020). Some set up online platforms for people to share resources, such as face masks (Wong, 2020), while others dedicated efforts to help low-income families by providing food and sewing and donating reusable face masks (Gov.sg, 2020b; Toh, 2020), demonstrating social responsibility to keep the community, which represent part of our collective mortality, safe. The empathy and generosity of these behaviours represent important values and worldviews; behaving in ways consistent with these values improve sense of self and reinforce self-esteem. Such altruistic behaviours as seen in Singapore in the early stages of the pandemic fit with the proposed mechanisms of TMHM to reduce anxiety from mortality salience.

2.3.4 Conclusion: Reflecting on a Terror Management Health Perspective of COVID-19 in Singapore

As reviewed in this paper, the TMHM can facilitate our understanding of health behaviours observed in Singapore during the COVID-19 pandemic, particularly in the early stages. While behaviours such as stockpiling, forwarding unverified news, and breaching of social distancing measures and quarantine orders occurred, kindness and generosity were also seen as individuals behaved in ways that were consistent with their worldviews. These behaviours are consistent with the TMHM, where they serve as proximal and distal defences against the anxiety triggered by death thoughts.

Nevertheless, one may question the generalisability of the TMHM as not everyone who is exposed to similar levels of COVID-19 risk responded in the same way. Hayes et al.

[1] Solidarity Payment is a once off sum of $600 given to all Singapore citizens aged 21 years and above to alleviate the impact of the COVID-19 pandemic. More details can be found at https://www.singaporebudget.gov.sg/budget_2020/budget-measures/solidarity-payment#:~:text=Details%20on%20the%20Solidarity%20Payment,-How%20much%20in&text=All%20adult%20Singaporeans%20(aged%2021,No%20application%20is%20needed.

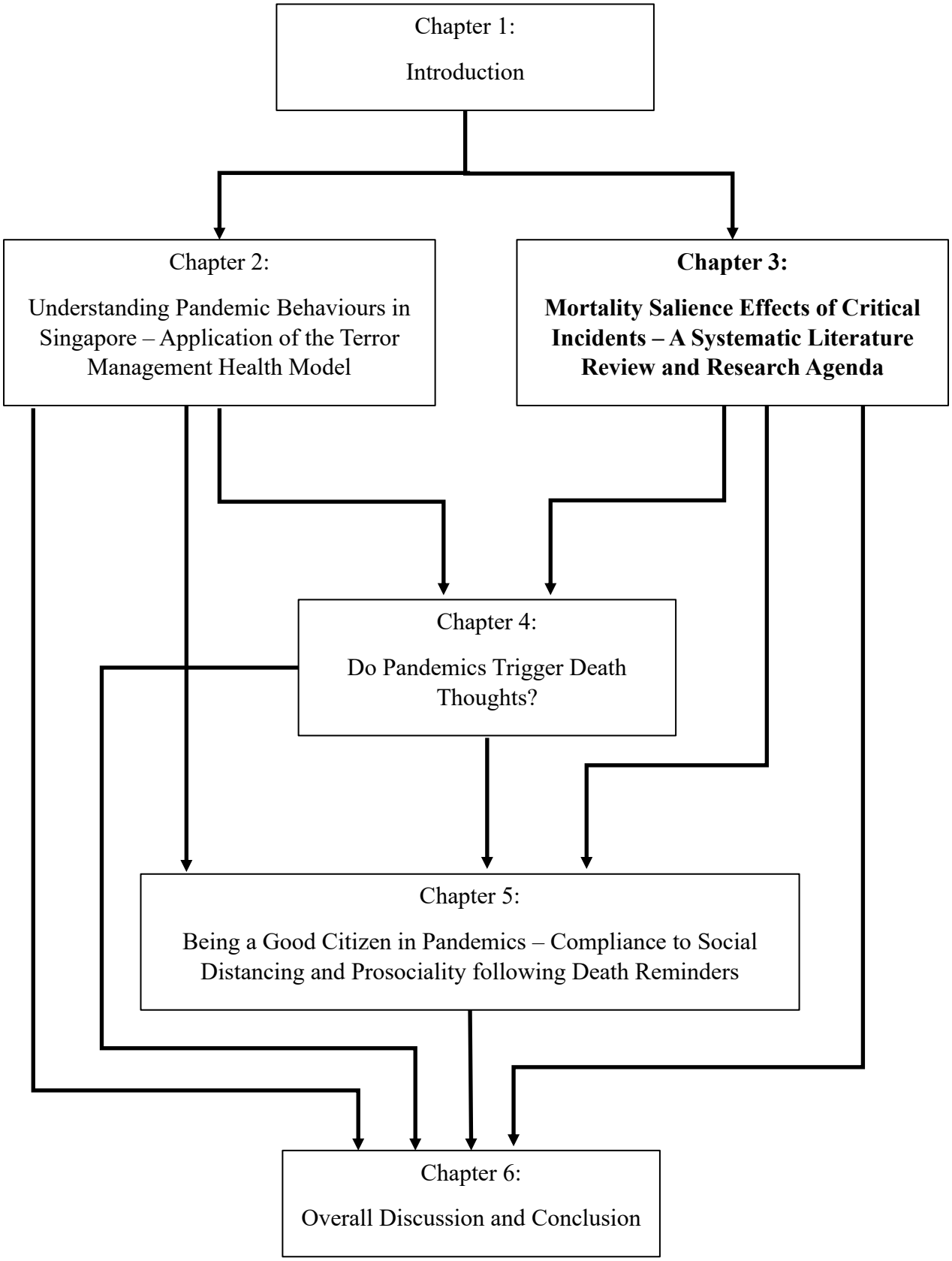
(2010) provided an explanation to address this discrepancy. Their review highlights that other personal variables could have influenced individual responses following death reminders. For instance, individuals who were psychologically stable, religious, or reported a secure attachment style were less likely to defend their worldviews when reminded of their mortality, despite reporting an increase in death thoughts (Hayes et al., 2010). Also, as highlighted earlier in this discussion, the differentiation of proximal and distal defences was challenging in the real world as it is not possible to control one's exposure to other mortality threats following the initial exposure but before behavioural outcomes or decision making are assessed. Hence, we have focused on examining the underlying motivations for these behaviours and decisions in an attempt to overcome this challenge of clearly demarcating proximal and distal defences.

Understanding the types of behaviours discussed here from the TMHM perspective would allow for anticipation and planning for countermeasures. For instance, if the intent of forwarding unverified news is to symbolically extend mortality by ensuring the survival of the in-group, it could be highlighted how forwarding authentic official news can promote self-preservation. Similarly, public messaging could also appeal to the social responsibility and altruistic spirit of the collective Singapore community to regulate behaviours and encourage adherence to social distancing and quarantine measures. Considerations could also be made to allow safe face-to-face meetings during quarantine measures so that individuals can turn to close relationships to cope with the anxiety arising from mortality salience but in a controlled way which does not increase risk.

The TMHM offers a novel perspective to make sense of individual behaviours in a pandemic. Nevertheless, these are only observations and have not been rigorously and empirically studied in the Singapore context. This paper therefore serves as a starting point to encourage research into studying and validating the TMHM in a pandemic in Singapore. With

new scientific evidence and understanding, Singapore will be able to cope with the next pandemic in a more evidence-based and effective manner. To facilitate the conceptualisation of empirical studies on TMHM, pandemics, and pandemic behaviours, the current thesis conducted a systematic literature review to examine the mortality salience effects of critical incidents, including pandemics.

Chapter 3 - Mortality Salience Effects of Critical Incidents – A Systematic Literature Review and Research Agenda



3.1 Chapter Overview

Chapter 3 aims to examine the mortality salience effects of critical incidents, including pandemics, through a systematic literature review. Recommendations on crisis intervention and a new research agenda involving cross discipline research on critical incidents and TMT are also proposed.

3.2 Publication Status

The bulk of Chapter 3 has been published, more materials have been added into this paper at the time of submission.

Leung, H. T., Chew, P. K., & Caltabiano, N. J. (2022). Mortality Salience Effects of Critical Incidents–A Systematic Literature Review and Research Agenda. *OMEGA-Journal of Death and Dying*, 00302228221098890.

3.3 Manuscript

3.3.1 Abstract

Critical incidents trigger acute stress reactions and psychological trauma because of direct or vicarious exposure. These events include natural disasters, wars, terrorist attacks and pandemics, and usually result in deaths and serious physical injuries. Their life-threatening nature makes them reasonable candidates to induce mortality salience (MS). The current review aims to consolidate Terror Management Theory (TMT) research using critical incidents as MS. A systematic literature review was conducted. Overall, 128 articles with 181 studies were included. Through this review, strong support for MS effects of critical incidents has been found. Consistent with TMT, critical incidents tend to trigger worldview defence, self-esteem enhancement and relationship seeking. Critical incidents have also been found to impact negatively on individual well-being and organisational health. Recommendations specific to crisis interventions and well-being will be discussed. The review concludes with

potential future research directions to strengthen and expand empirical knowledge in critical incident salience.

Keywords: Critical incidents, Crisis interventions, Mortality salience, Terror Management Theory, Research agenda, Systematic literature review

3.3.2 Introduction

Terror Management Theory (TMT) posits that human beings are born with the advanced cognitive capabilities to recognize that our lives are limited. This recognition triggers death cognitions, which conflict with our need for self-preservation, thereby inducing anxiety. This anxiety is buffered through defending our worldview, enhancing self-esteem (Greenberg et al., 1986; Routledge & Vess, 2018), and seeking close relationships (Plusnin et al., 2018).

The anxiety buffering functions of the worldview defence and self-esteem enhancement after death reminders have been widely researched and established in different cultures including Japan, India, China, Malaysia, Israel and South Korea (Banerjee et al., 2019; Goodwin et al., 2011; Heine et al., 2002; Hirschberger et al., 2016; Pei et al., 2020). Multiple studies have shown that after writing about their thoughts and feelings about their own deaths, individuals were more likely to defend their worldview by reporting poorer opinions (Routledge et al., 2010), providing less resources (Tam et al., 2007) or meting out harsher punishment (Florian et al., 2001; Rosenblatt et al., 1989) to those perceived as different. They are also more likely to bolster self-esteem, such as purchasing items reflective of higher status (Heine et al., 2002; Fransenz et al., 2019) or reporting higher positive regard from significant others (Cox & Arndt, 2012) after reminders of death. Seeking close relationships has also been found to buffer death anxiety following mortality salience (MS). Individuals were more likely to initiate social contact (Suzuki et al., 2020; Taubmzan-Ben-Ari et al., 2002), seek out sexual intimacy (Birnbaum et al., 2011) and show more

commitment to romantic relationships (Florian et al., 2002; Hoppe et al., 2018) when reminded of their deaths.

3.3.2.1 Critical Incidents and Mortality Salience

Critical incidents are defined as "sudden, unexpected, often life-threatening time-limited events that may overwhelm an individual's capacity to respond adaptively" (Flannery & Everly, 2000, p.119). Critical incidents trigger acute stress reactions and psychological trauma resulting from direct or vicarious exposure (Chopko et al., 2018). Events such as earthquakes, tsunamis, fire accidents, wars and terrorist attacks can be unexpected and sudden, while the current COVID-19 pandemic has a prolonged duration.

Critical incidents are life threatening as they usually involve actual deaths and serious physical injuries. According to a 2018 report by Munich Re, a German reinsurer, natural disasters globally claimed more than 10 000 lives and incurred more than US$160 billion worth of damages. Deaths from terrorism were recorded at 13,826 in 2019 alone (Munich Re, 2019). Infectious diseases and pandemics also contribute to death counts, with 11,310 deaths recorded between 2014 and 2016 due to Ebola in Guinea, Liberia, and Sierra Leone. The ongoing COVID-19 pandemic has accumulated more than three million deaths worldwide since December 2019. This association with deaths makes Critical incidents reasonable MS induction stimuli.

The ubiquity and popularity of technology has also made critical incident information highly accessible. Surveys conducted by Nielsen reported that on average, the global population spent more than four hours per day on television (Covey, 2010). Research by Statisca concurs with the increasing trend in media use, and has shown that the average global consumption of information from social media has increased from 90 to 149 minutes per day since 2012 (Tankovska, 2021). News consumption has also increased, especially during the initial phase of the COVID-19 period (Newman et al., 2020). The high information

penetration rate has blurred geographical boundaries and exposure to reminders of our limited mortality through casualties and fatalities of critical incidents trigger our anxiety (Bacharach et al., 2008; Chrisman & Dougherty, 2014). In return, attempts to regulate anxiety by seeking more critical incident information soared. Unconsciously, this information-seeking behaviour was responsible for triggering further anxiety (Cheng et al., 2021; Zheng & Tandoc, 2020).

The association of critical incidents with death, and the critical incident information accessibility, have made MS effects of critical incidents worthy of research. Nonetheless, to the best of the authors' knowledge, there have not been any systematic reviews done since the conceptualization of TMT on the use of critical incidents as MS induction. Therefore, the current review hopes to consolidate TMT research using critical incidents as MS by adopting the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines. This review also aims to integrate empirical findings of critical incidentsalient research, to make recommendations for clinical practice and policies to enhance crises management, and to propose future research directions. In summary the research questions for this review are:

1. What are the different types of critical incidents used for MS research?
2. What are the common outcomes studied in CI salience research?
3. How can the knowledge from critical incident salience studies inform crisis management and interventions?
4. What are the future research directions?

A formal protocol was not prepared but the search strategies were mapped out during the supervision meetings by the three authors.

3.3.3 Method

3.3.3.1 Eligibility Criteria

All peer-reviewed full text articles using critical incidents defined as pandemics, disasters, terrorism, and war as MS induction were considered in this review. These studies also have to meet the following criteria for inclusion (i) use TMT to conceptualise empirical studies or explain findings, (ii) written in English, and (iii) for articles with multiple studies, at least one study must use critical incidents as MS induction.

Studies which (i) are review papers (including systematic review, meta-analysis, commentaries), (ii) use standard MS as MS induction (i.e., writing about dying) and (iii) not empirical in nature will be excluded from the review. Peer-reviewed articles and dissertations with full-text inaccessible or not available in the university's library or Google Scholar, will also be excluded.

3.3.3.2 Information Sources and Search Strategies

A systematic literature search was conducted using five databases, namely PsychINFO, PsychARTICLES, SCOPUS, Web of Science, and PubMed. The search was limited to the period between 1986, which was the year TMT was established, to 31st December 2022. The search strategies are presented in Appendix 1.

Keywords related to TMT, crisis, pandemics, disasters, and terrorism were collated. A search for related or similar keywords was done using the databases' thesaurus to identify new keywords, which were then included in the final round of the literature search. After going through the five databases, search terms 'Existential Anxiet*', 'Death Anxiet*', 'Death Attitude', 'Mortality salien*' were used for terror management; 'Terrorist attack', 'Bioterrorism', 'Hostage' and 'War' for terrorism; 'Natural disaster', 'Accident' and 'Crises' for disasters, and 'epidemic', 'Communicable disease', 'Disease transmission', 'Infectious disorder', 'Viral disorder', 'Influenza', 'Respiratory Tract disorder', 'COVID',

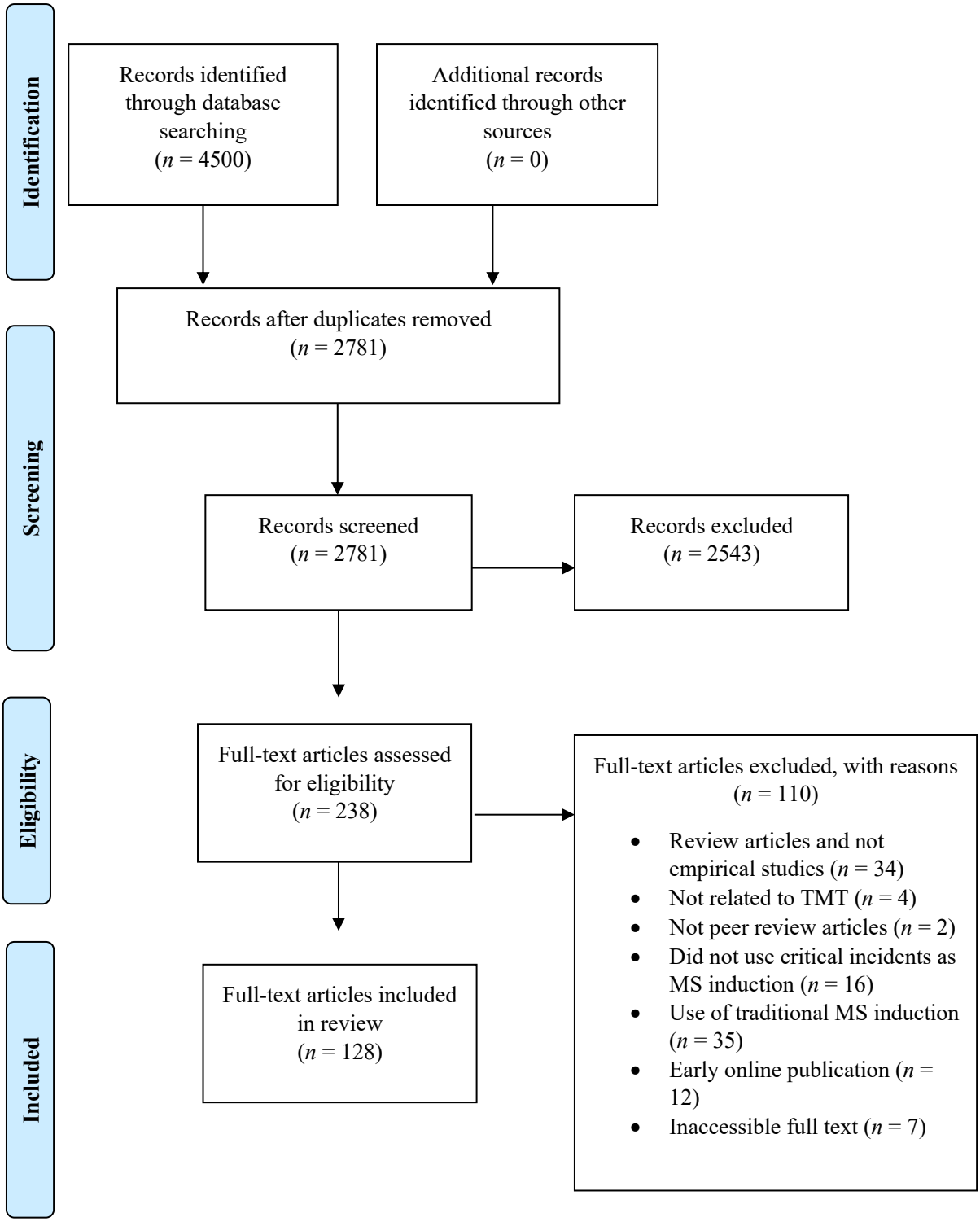
‘Coronavirus’, ‘SARS’, ‘Severe Acute Respiratory Syndrome’, ‘H1N1’, ‘Swine Flu’, ‘MERS’ and ‘Middle East Respiratory Syndrome’ were used for pandemics.

3.3.3.3 Study Selection and Data Collection

The title and abstract of each study were screened by the first author after the initial literature search. Studies which were potentially relevant were further assessed for eligibility. Studies which were ambivalent were compiled into a list for further assessment by the two co-authors. Studies which received concurrence from at least one co-author were included in the final review. Figure 3.1 shows the PRISMA flow chart of the systematic review process.

Figure 3.1

PRISMA Flow Chart for Search Strategies and Results



3.3.4 Results

3.3.4.1 Study Selection

A total of 4500 articles were identified. After removal of duplicates and screening, 238 articles were left for eligibility screening. One hundred and ten articles were further excluded based on reasons cited in Figure 1. At the end of this process, 128 articles remained and were included into the final review.

3.3.4.2 Study Risk of Bias Assessment

Due to the nature of the research questions, all 128 articles were included in this review. Nevertheless, selection, detection and attrition biases were assessed at the study selection and data collection stage in accordance to the checklists for randomised control tests and quasi-experiments of the Joanna Briggs Institute (2020). The results from this bias assessment are presented in Table 3.1.

Table 3.1

Risk of Bias Assessment

	Authors	MS Induction	Sample	Risk of Bias
1	Abulof & Po, 2021	PS	11.8 billion words of data from The NOW (News on the Web) corpus newspapers and magazines from 2010 to the present time and Google Trends	Unable to determine selection and attrition biases as information was insufficient
2	Arcieri, 2022	PS	156 mTurk participants	Selection bias as utilised online sample only
3	Arrowood et al., 2017	Study 1 - PS	55 university students	Selection bias as utilised student sample only
		Study 2 - PS	117 university students	Selection bias as utilised student sample only
4	Asbrock & Fritsche, 2013	Study 1 - TS	144 university students	Selection bias as utilised student sample only
		Study 2 - TS	99 university students	Selection bias as utilised student sample only
5	Barnes, 2021	PS	125,218 English Tweets	Detection bias as utilised one social media platform only
6	Bélanger et al., 2013	PS	68 adults	Selection bias as utilised student sample only
7	Bodner et al., 2022	PS	381 Jewish Israelis via various social platforms	Selection bias as utilised online sample only
8	Brophy et al., 2021	PS	522 mTurk participants	Selection bias as utilised online sample only
9	Brouard et al., 2018	TS	At least 1500 survey data gathered in France by the 'Policy Priority Barometer' and 'Local Elections' project	Attrition bias as no comparison was conducted for those who did not complete survey
10	Campos et al., 2021	Study 1 – PS	546 adult social media users	Selection bias as utilised social media users only Attrition bias as no comparison was conducted for outliers who were excluded from analysis
		Study 2 – PS	40 respondents	Unable to determine selection and detection biases as information was insufficient
11	Castanho Silva, 2018	Study 1 - TS	Interviews in 11 European countries	Attrition bias as no comparison was conducted for those who did not complete survey

		Study 2 - TS	7,000 adults in the treatment group, and 19,000 in the control	Attrition bias as no comparison was conducted for those who did not complete survey
12	Chamberlain, 2009	Study 2 - TS	203 university students	Selection bias as utilised student sample only
13	Chartard et al., 2011	WS	235 university students	Selection bias as utilised student sample only
14	Chartard et al., 2012	Study 1 - WS	105 university students	Selection bias as utilised student sample only
		Study 2 - WS	191 university students	Selection bias as utilised student sample only
15	Chen et al., 2021	PS	729 healthcare workers	Selection bias as utilised healthcare sample only
16	Chew, 2022	PS	Data from 130 days before and after first COVID-19 case in SG	Detection bias as utilised one search engine only
17	Courtney et al., 2021	Study 1 – PS	220 university students	Selection bias as utilised student sample only
18	Cox et al., 2021	PS	238 students and mTurk participants	Selection bias as utilised student and online sample
19	Cozzolino, 2004	Study 1- DS	48 university students	Selection bias as utilised student sample only Detection bias as only single item was used as final DV
		Study 2 - DS	56 university students	Selection bias as utilised student sample only Detection bias as only single item was used as final DV
20	Das et al., 2009	Study 1 - TS	100 adults	Unable to determine selection and detection biases as information was insufficient
		Study 2 - TS	101 adults	Selection bias as utilised online sample only
		Study 3 - TS	179 adults	Unable to determine selection and detection biases as information was insufficient
21	De Zavala et al., 2010	Study 1 - WS	120 university students	Selection bias as utilised student sample only
		Study 2 - TS	187 university students	Selection bias as utilised student sample only
22	Dewa et al., 2014	TS	189 adults	Unable to determine selection and detection biases as information was insufficient
23	Du & Chi, 2016	WS	86272 adults	Detection bias as used single item was to measure DV
24	Dunkel, 2002	Study 2 - TS	109 university students	Selection bias as utilised student sample only
25	Ein-Dor & Hirschberger, 2013	Study 1 - WS	174 university students	Selection bias as utilised student sample only
		Study 2 - WS	270 adults	Detection bias due to lack of double-blind allocation

26	Erol., 2022	Study 1 - TS	505 adults	Selection bias as utilised online sample only Detection bias as used single item was to measure DV
		Study 2 - TS	658 adults	Selection bias as utilised online sample only Detection bias as used single item was to measure DV
		Study 3 - TS	410 adults	Selection bias as utilised online sample only Detection bias as used single item was to measure DV
27	Fa & Kugihara, 2022	DS	115 University students	Selection bias as utilised student sample only
28	Fairlamb, 2022	PS	233 participants	Unable to determine selection bias as information was insufficient
29	Fairlamb & Cinnirella, 2020	Study 1- TS	149 adults	Selection bias as utilised online sample only
30	Fairlamb & Courtney, 2022	Study 1 – PS	86 mTurk participants	Selection bias as utilised online sample only
		Study 2 – PS	211 mTurk participants	Selection bias as utilised online sample only
		Study 3 – PS	112 mTurk participants	Selection bias as utilised online sample only Detection bias as used single item was to measure one of the DVs
31	Fischer-Preßler et al., 2019	TS	51,256 tweets	Detection bias as utilised one social media platform only
32	Franchina et al., 2022	PS	287 adults from online platform	Selection bias as utilised online sample only
33	Fritsche et al., 2009	Study 1 - PS	30 adults	Detection bias due to lack of double-blind allocation
34	Goodwin et al., 2011	PS	120 pig farmers and handlers	Attrition bias as no comparison was conducted for those who did not complete survey
35	Gordijn & Stapel, 2008	Study 1 - TS	39 university students	Selection bias as utilised student sample only
		Study 4 - TS	351 university students	Selection bias as utilised student sample only
36	Goren & Neter, 2016	WS	263 adolescents	Selection bias as utilised adolescent sample only
37	Gurari et al., 2009	TS	52 adults	Detection bias due to lack of double-blind allocation
38	Gut et al., 2021	PS	295 Polish citizens	Selection bias as utilised online sample only

39	Hall et al., 2009	TS	1136 phone surveys (47% M, 54% F)	Attrition bias as no comparison was conducted for those who did not complete survey
40	Higgins et al., 2020	DS	149 university students	Selection bias as utilised student sample only
41	Herzenstein et al., 2015	Exploratory study - TS	27 adults	Selection bias as utilised snowballing sampling
		Study 1 - TS	62 university students	Selection bias as utilised snowballing sampling and student sample
		Study 2 - TS	202 university students	Selection bias as utilised student sample only
		Study 2 - WS	180 university students	Selection bias as utilised student sample only
42	Hirschberger et al., 2016	Study 3 - WS	339 university students	Selection bias as utilised student sample only
		Study 4 - WS	90 adults	Selection bias as utilised online sample only
43	Hu et al, 2020	Study 1 - PS	163 adults	Attrition bias as no comparison was conducted for those who did not complete survey
		Study 2 - PS	345 adults	Selection bias as utilised online sample only
		Study 3 - PS	210 adults	Selection bias as utilised online sample only
44	Huang et al., 2022	PS	1167 Chinese from online platform	Selection bias as utilised online sample only
45	Huet et al., 2019	TS	120 virtual populations of agents	Unable to determine selection and attrition biases as information was insufficient
46	Jiménez et al., 2020	WS	27 adults	Selection bias as utilised snowballing sampling
47	Jin et al., 2022	DS, PS	150 mTurk participants	Selection bias as utilised online sample only
48	Jin & Ryu, 2021	Study 1 – PS	624 mTurk participants	Selection bias as utilised online sample only
		Study 2 – PS	487 mTurk participants	Selection bias as utilised online sample only Detection bias as used single item was to measure Moderators
49	Jonas & Fisher, 2006	Study 1 - TS	78 adults	Detection bias due to lack of double-blind allocation
50	Juhl & Routledge, 2014.	TS	55 university students	Selection bias as utilised student sample only
51	Jutzi et al, 2020	Study 1 - PS	358 adults	Selection bias as utilised online sample only
		Study 2 - PS	348 adults	Selection bias as utilised online sample only

52	Kastenmüller et al., 2011	Study 1 - TS	77 adults	Unable to determine selection and detection biases as information was insufficient
		Study 2 - TS	96 adults	Selection bias as utilised student sample only
53	Kastenmüller et al., 2013	Study 1 - TS/DS	68 university students	Selection bias as utilised student sample only Detection bias due to lack of double-blind allocation
		Study 2 - TS	34 university students	Selection bias as utilised student sample only Detection bias due to lack of double-blind allocation
54	Kastenmüller, et al., 2014	TS	82 adults	Detection bias due to lack of double-blind allocation
55	Kim, 2020	Study 1 - PS	100 adults	Selection bias as utilised online sample only
		Study 2 - PS	197 adults	Selection bias as utilised online sample only
		Study 3 - PS	226 adults	Selection bias as utilised online sample only
56	Koch & Nicholson, 2016	WS	Survey data from 23 democracies over a 50-year period	Unable to determine selection and attrition biases as information was insufficient
57	Kumagai & Ohbuchi, 2003	TS	98 adults	Detection bias as used unvalidated tools
58	Kwon & Park, 2022	PS	Tweets collected from US, UK and India (March 14, 2020 to Aug 18, 2020)	Detection bias as utilised one social media platform only
59	Landau et al., 2004	Study 2 - TS	52 university students	Selection bias as utilised student sample only
		Study 3 - TS	74 university students	Selection bias as utilised student sample only
60	Lee & Kim, 2021	TS	200 adults	Unable to determine selection and detection biases as information was insufficient
61	Li et al., 2021	PS	356 CEOs	Unable to determine selection bias as information was insufficient
62	Li et al., 2022	PS	972 Chinese citizens	Selection bias as utilised online sample only
63	Liu et al., 2021	Study 1 – PS	271 participants from Sojump.com	Selection bias as utilised online sample only Attrition bias as no comparison was conducted for those who did not complete survey
		Study 2 – PS	176 participants from Sojump.com	Selection bias as utilised online sample only. Participants were also selected based on familiarity with mobile devices.
64	Liu et al., 2022	Study 1 – PS	Study 1:	Selection bias as utilised online sample only.

			(a) 215 participants (b) 141 (c) 92 American and 101 Chinese participants	
		Study 3 – PS	200 University students	Selection bias as utilised student sample only. Detection bias as used single item was to measure DV
65	Lopes & Jaspal, 2015	Study 1 - TS	53 university students	Selection bias as utilised student sample only
		Study 2 - TS	94 university students	Selection bias as utilised student sample only
66	Lu et al., 2021	PS	2542 Chinese through WeChat	Unable to determine selection bias as information was insufficient
67	Luke & Hartwig, 2014	TS	112 participants	Selection bias as utilised online sample only
68	Lyall & Thorsteinsson, 2007	TS	238 public servants	Attrition bias as unable to compare participants who did not return surveys
69	Lykins et al., 2007	Study 1 - DS	74 employees	Selection bias as recruited from one disaster site only
		Study 2 - TS	92 university students	Selection bias as utilised student sample only
		Study 3 - DS	103 university students	Selection bias as utilised student sample only Detection bias due to lack of double-blind allocation
70	Ma et al., 2022	Study 1 – PS	94 college students	Selection bias as utilised student sample only Detection bias as used single item was to measure DV
		Study 2 – PS	153 college students	Selection bias as utilised student sample only
		Study 3 – PS	112 college students	Selection bias as utilised student sample only
71	Mahat-Shamir et al., 2021	PS	302 adult users of social media	Selection bias as utilised online sample only Detection bias as used single item was to measure two of the mediators
72	Mahat-Shamir & Kagan, 2022	PS	237 memes distributed on social media platforms	Unable to determine selection and detection biases as information was insufficient
73	Măirean & Havârneanu, 2021	DS	170 drivers	Selection bias as utilised driver sample only Detection bias as used single item was to measure DV
74	Maki et al., 2019	DS	644 participants before and 1389 after the 2010 Chile earthquake	Attrition bias as no comparison was conducted for those who did not complete

				survey. Detection bias due to lack of double-blind allocation
75	Mayer & Vanderheiden, 2022	PS	16 adult women	Selection bias as utilised women sample only
76	Minton et al., 2022	Study 3 – PS	718 Prolific participants	Selection bias as utilised online sample only
77	Mishra et al., 2022	PS	326 working adults	Selection bias as utilised working adult sample only
78	Moskalenko et al., 2006	TS	610 university students	Selection bias as utilised student sample only
79	Muralidharan et al., 2022	PS	138 Qualtrics users	Selection bias as utilised online sample only
80	Nakonezny et al., 2004	TS	Divorce response between 1985 to 2000 for all 77 counties in Oklahoma	Detection bias use single item as DV
81	Nanni & Ulqinaku, 2020	PS	296 adults	Selection bias as utilised online sample only
82	Naveh-Kedem & Sverdlik, 2019	Study 1 - WS	105 university students	Selection bias as utilised student sample only
83	Nkrumah et al., 2022	PS	646 frontline employees	Selection bias as utilised airport employees only
84	Nugier et al., 2016	TS	149 university students	Selection bias as utilised student sample only
85	Okazaki et al., 2019	DS	720 consumers	Detection bias as only single item was used as final DV
86	Osborn et al., 2006	TS	410 participants	Detection bias due to lack of double-blind allocation
87	Partouche-Sebban et al., 2021	PS	721 mTurk participants	Selection bias as utilised online sample only Attrition bias as no comparison was conducted for those who were excluded
88	Paul & Vasudevan., 2021	PS	20 out of 103 adults were invited for interviewd; only 6 consented for the interview	Attrition bias as no comparison was conducted for those who did not participate in structured interview
89	Pompele et al., 2022	PS	23 parents	Unable to determine selection bias as information was insufficient
90	Pradel & Sattler, 2020.	TS	487 adults	Selection bias as utilised online sample only
91	Prayag et al., 2021	DS	37 residents	Selection bias as recruited from one disaster site only

92	Prusova & Gulevich, 2021	Study 1 – TS	120 students	Selection bias as utilised student sample only
		Study 2 – TS	122 students	Selection bias as utilised student sample only
93	Pyszczynski et al., 2006	Study 2 - TS	127 university students	Selection bias as utilised student sample only
94	Pyszczynski & Kesebir, 2011	Study 1 - DS	180 university students	Selection bias as utilised student sample only
		Study 2 - DS	172 university students	Selection bias as utilised student sample only
95	Quirin et al., 2014	Study 1 - TS	96 university students	Selection bias as utilised student sample only
		Study 2 - TS	88 university students	Selection bias as utilised student sample only
96	Raja et al., 2020	Study 1 - TS	160 employees	Attrition bias as no comparison was conducted for those who did not complete survey
		Study 2 - TS	350 employees	Attrition bias as no comparison was conducted for those who did not complete survey
97	Ratiu et al., 2022	PS	253 healthcare professionals and 189 employees from other domains	Unable to determine selection bias as there was insufficient information Detection bias as only one item was used to measure one of the DV
98	Routledge et al., 2010	Study 1 - TS	50 university students	Selection bias as utilised student sample only
		Study 2 - TS	43 university students	Selection bias as utilised student sample only
99	Ruvio et al., 2013	TS	139 adults	Attrition bias as no comparison was conducted for those who did not complete survey
100	Sajid et al., 2022	PS	432 from online survey	Selection bias as utilised online sample only
101	Shao et al., 2021	Study 1 – PS	278 full-time employees	Selection bias as utilised online sample only
		Study 2 – PS	382 full-time employees	Selection bias as utilised online sample only
102	Sharma et al., 2022	PS	588 students	Selection bias as utilised student sample only
103	Shechory-Bitton & Cohen-Louck, 2020	TS	507 adults	Unable to determine selection and attrition biases as information was insufficient
104	Shilo-Levin & Bergman, 2022	PS	450 working adults	Selection bias as utilised working sample only
105	Silva et al., 2021	PS	352 Brazilians from general population	Selection bias as utilised online sample only
106	Singla et al., 2021	PS	573 residents across India	Unable to determine selection and detection biases as information was insufficient

107	Solomon et al., 2021	PS	141 articles comprising 48,524 words over two time periods	Selection bias as utilised on brand of newspaper only
108	Song et al, 2020	PS	1453 adults	Selection bias as utilised online sample only Attrition bias as no comparison was conducted for those who did not complete survey
109	Sonmez, 2021	PS	167 university students	Selection bias as utilised student sample only
110	Soomro et al., 2020	TS	268 working adults	Attrition bias as no comparison was conducted for those who did not return survey
111	Stein et al., 2010	Study 1 - TS Study 2 - TS	956 105 cases	Detection bias as single item was used as DV Detection bias use single item as DV
112	Stoppa et al., 2011	TS	972 parents	Attrition bias as no comparison was conducted for those who did not complete survey
113	Struckmeyer et al., 2021	WS & DS	154 centenarians	Detection bias as single item was used as DV
114	Su & Shen, 2020	PS	1211 adults	Unable to determine attrition bias as response rate was not reported
115	Suzuki et al., 2020	Study 1 - DS	278 participants	Selection bias as utilised technology savvy sample only Detection bias as only one item was used as final DV
		Study 2 - DS	838 participants	Selection bias as utilised student sample only Detection bias as only single item was used as final DV
116	Testoni et al., 2021	PS	38 students	Selection bias as utilised student sample only
117	Thomas 2003	TS	192 adults	Selection bias as utilised female sample only
118	Tomaszek & Muchacka-Cymerman, 2020	PS	199 university students	Selection bias as utilised student sample only
119	Ullrich & Cohrs 2007	Study 1 - TS	81 adults	Detection bias due to lack of double-blind allocation
		Study 2 - TS	151 adults	Detection bias due to lack of double-blind allocation
		Study 3 - TS	62 university students	Selection bias as utilised student sample only
		Study 4 - TS	50 participants	Detection bias due to lack of double-blind allocation

120	Ulqinaku et al., 2020.	Study 1 - TS	154,390 tweets	Detection bias as utilised one social media platform only
		Study 3 - PS	192 adults	Selection bias as utilised online sample only
121	Vail et al., 2012	Study 1 - TS/WS/DS	50 university students	Selection bias as utilised student sample only
		Study 2 - DS	49 university students	Selection bias as utilised student sample only
		Study 3 - DS	61 university students	Selection bias as utilised student sample only
		Study 4 - DS	26 university students	Selection bias as utilised student sample only
122	Van Assche & Dierckx, 2019	Study 1a - TS	86 students	Selection bias as utilised student sample only
		Study 1b - TS	38 adults	Selection bias as utilised online sample only
123	V€ASTFJ€ALL et al., 2014	DS	733 adults	Attrition bias as unable to compare participants who did not return surveys
124	Wong & Yang, 2020	PS	320 adults	Selection bias as utilised online sample only Attrition bias as unable to compare participants who did not return surveys
125	Xia et al., 2021	Study 1 – PS	459 Cloudresearch.com platform	Selection bias as utilised online sample only
		Study 2 – PS	247 participants from Study 1	Selection bias as utilised online sample only Attrition bias as unable to compare participants who declined participation in Study 2
126	Yousaf, 2022	PS	214 Muslim travellers	Selection bias as utilised Muslim sample only
127	Yum & Schenck-hamlin, 2005	TS	121 university students	Selection bias as utilised student sample only
128	Zu et al., 2021	Study 1 – PS	41 from social networks	Selection bias as utilised online sample only
		Study 2 – PS	82 online	Selection bias as utilised online sample only

Notes: PS = Pandemic salience, include COVID-19, Swine Flu and Ebola; TS = Terrorism salience, includes 9/11, 7/7 bombing, Madrid train bombing, Attacks at Charlie Hebdo, Nice Bastille Day, Stade de France, November shooting, Oklahoma City bombing; WS = War salience; DS = Disaster salience, includes earthquakes, fire, Asian tsunami; DV = Dependent Variable

3.3.4.3 Study Characteristics

Table 3.2 shows the articles and studies reviewed in this paper. General study characteristics are also documented in Table 2. These characteristics include countries the studies were conducted in and information about control groups and mediators/moderators.

Table 3.2

Details of Individual Articles using Critical Incident Salience

	Authors	MS Induction	Measurement of Death Cognitions	DV	Location	Sample	Control group	Mediator (Med)/ Moderator (Mod)	Delay
1	Abulof et al., 2021	PS	Public discourse through The NOW (News on the Web) corpus, containing 11.8 billion words of data from print media and Google Trends from 2010		China and Israel, Sweden and Germany and the USA				
2	Arcieri, 2022	PS		Ageism and ableism attitudes		156 mTurk participants			
3	Arrowood et al., 2017	Study 1 - PS	Word fragment completion	DTA	US	55 university students	TV		
		Study 2 - PS		Religious fundamentalism scale	US	117 university students	Dental pain	Med: DTA	

4	Asbrock & Fritsche, 2013	Study 1 - TS		Approval of torture	Germany	144 university students	Think of bad weather	Med: Right wing authoritarianism	PANAS and questionnaire on sleeping pattern
		Study 2 - TS		Approval of torture Ingroup bias	Germany	99 university students	Dental pain	Med: Right wing authoritarianism Mod: National identification	Delay questionnaire
5	Barnes, 2021	PS	Mentions of Anxiety and Death	Dictionary mentions of anxiety and death TMT defence mechanisms Pattern of latent death anxiety or 'terror' states of Twitter users	UK	125,218 English			
6	Bélanger et al., 2013	PS	Number of death related words in essay	Patriotic Scale	US	68 adults	Dental disease		
7	Bodner et al., 2022	PS		COVID-19 vaccination anxiety	Israel	381 Jewish Israelis via various social platforms		Mod: Levels of death anxiety	

8	Brophy et al., 2021	PS	Death Anxiety	Intention to share end of life wishes	US	522 mTurk participants		Med: Death Anxiety
9	Brouard et al., 2018	TS		Preference change on the issue of security concerns preferences toward immigration General shift: socio-economic issues & opinion change on moral issues	France	At least 1500 survey data gathered in France by the 'Policy Priority Barometer' and 'Local Elections' project	Before attacks	Mod: Political ideology
10	Campos et al., 2022	Study 1 – PS		Ability to prepare food Intention to consume healthy foods	Brazil	546 adult social media users		Med: Safety seeking
		Study 2 – PS		Consumers' perceptions why people started consuming healthy foods in the pandemic	Brazil	40 respondents		

				Xenophobia and Anti-Muslim attitudes				
11	Castanho Silva, 2018	Study 1 - TS		Realistic and symbolic threat Opinion change in immigration and refugee policy	Europe	Interviews in 11 European countries	Before attacks	
		Study 2 - TS		Perception of immigrants Preferences on refugee policy	Europe	7,000 adults in the treatment group, and 19,000 in the control	Before attacks	
12	Chamberlain, 2009	Study 2 - TS		Support for gay rights	US	203 university students	Dental pain	
13	Chatard et al., 2011	WS		Rosenberg's self-esteem scale • Government and army support	Ivory Coast	235 university students	Student life	
14	Chatard et al., 2012	Study 1 - WS	Word fragment completion	DTA	Ivory Coast	105 university students	Difficult exam	Mod: PTSD levels
		Study 2 - WS		PTSD symptoms (PCL-C)	Ivory Coast	191 university students	Student life	Mod: Levels of war exposure
15	Chen et al., 2021	PS		Satisfaction with close relationship	China	729 healthcare workers	Before MS	Mod: Perceived social support, Subjective vulnerability to COVID-19

16	Chew, 2022	PS	Number of 'death' words	Mortality salience Intergroup conflict Prosocial behaviour Materialism Anxiety	Singapore (SG)	Data from 130 days before and after first COVID-19 case in SG			
17	Courtney et al., 2021	Study 1 – PS		Intentions to engage in CDC recommended health behaviours	US	220 university students	Dental pain		PANAS
18	Cox et al., 2021	PS		Center for Epidemiologic Studies Depression scale (CESD-10) Satisfaction With Life Scale (SWLS) 7-item subjective vitality measure Single-Item Self-Esteem Scale General Self-Efficacy Scale Revised Life Orientation Test Connor-Davidson Resilience Scale	US	238 students and mTurk participants		Med: Death anxiety, Benefit finding	PANAS

19	Cozzolino et al., 2004	Study 1- DS		Greed - number of raffle tickets taken by participants in a limited-resource task	US	48 university students	”no death” control condition imagined waking up in the same apartment to “the sound of a clock radio and the pleasant smell of coffee.”	
		Study 2 - DS		Greed - number of raffle tickets taken by participants in a limited-resource task	US	56 university students	”no death” control condition imagined waking up in the same apartment to “the sound of a clock radio and the pleasant smell of coffee.”	
20	Das et al., 2009	Study 1 - TS	Word fragment completion	DTA Prejudice attitudes towards Arab	Netherlands	100 adults	News on the Olympic Games	Mod: DTA
		Study 2 - TS	Implicit Association Task	DTA Prejudice attitudes towards Arab	Netherlands	101 adults	Animal abuse	Mod: DTA, Self-esteem
		Study 3 - TS	Implicit Association Task	DTA Prejudice attitudes towards Arab	Netherlands	179 adults	Animal abuse	

21	De Zavala et al., 2010	Study 1 - WS	Aggressive actions in conflicts	Poland	120 university students	Perception of low probability of terrorist attacks in Poland	Mod: Political orientation, Need for cognitive closure	
		Study 2 - TS	Anti-Arab and anti-Muslim hostility	Poland	187 university students		Mod: Political orientation, High need for cognitive closure	
22	Dewa et al., 2014	TS	Worldview defence	UK	189 adults	TV, MS	Mod: Self-esteem	PANAS-X
23	Du & Chi, 2016	WS	Religiousness	International	86272 adults		Med: Worries about war	
24	Dunkel, 2002	Study 2 - TS	Identity Commitment (EIPQ) Affect Adjective Check List Self-esteem (Rosenberg Self-Esteem Scale)	US	109 university students	Vignette concerned basketball player Michael Jordan's return to professional basketball	Mod: Identity exploration	Opinion questions about a new abstract sculpture on campus
25	Ein-Dor & Hirschberger, 2013	Study 1 - WS	Support of a violent response	Israel	174 university students		Mod: Perceived strength of enemy	
		Study 2 - WS	Support of a violent response	Israel	270 adults	Neutral description of Lebanon	Med: In-group identification and commitment, Degree of superiority and deference Mod: Perceived strength of enemy	

		Study 1 - TS		Conservative self-identification	Facebook and Instagram advertisements targeting the Turkish population	505 adults	Group with no reminder of death	Med: Terrorism mortality fear	Big Five Inventory (BFI)
26	Erol, 2022	Study 2 - TS		Conservative self-identification	Facebook and Instagram advertisements targeting the Turkish population	658 adults	Group with no reminder of death	Med: Terrorism mortality fear	BFI
		Study 3 - TS		Conservative self-identification	Facebook and Instagram advertisements targeting the Turkish population	410 adults	Group with no reminder of death	Med: Terrorism mortality fear	BFI Openness Trait
27	Fa & Kugihara, 2022	DS		Ingroup-outgroup bias	Japan	115 University students	Dental pain	Mod: Collective Japan Identity	Japanese PANAS and word-searching task
28	Fairlamb, 2022	PS	Word fragment completion	DTA using a 33-item word stem task DASS-21	UK	233 participants		Med: DTA Mod: Self-Esteem	

				Feelings towards Muslims					
29	Fairlamb & Cinnirella, 2020	Study 1- TS		Support for Muslim Rights Contact intentions towards Muslims	UK	149 adults	Wimbledon Championship, MS	Mod: Tolerance prime	
		Study 1 – PS	Word fragment completion	33-item word-stem DTA task	US	86 mTurk participants	Dental pain		
30	Fairlamb & Courtney, 2022	Study 2 – PS	Word fragment completion	Closeness Social distancing intentions	US	211 mTurk participants	Dental pain	Mod: Attachment style	PANAS Social desirability scale
		Study 3 – PS	Word fragment completion	Social distancing-based worldview defence	US	112 mTurk participants	Dental pain	Med: perception of social distancing as culturally valued Mod: Attachment style	PANAS Social desirability scale Rating the emotions of 8 faces
31	Fischer-Preßler et al., 2019	TS		TMT related content of tweets after terrorist attacks	Germany	51,256 tweets			

32	Franchina et al., 2022	PS		Vaccine hesitancy Vaccine resistance	Italy	287 adults from online platform		Med: negative attitudes toward COVID-19 vaccines	
33	Fritsche et al., 2009	Study 1 - PS		Judgment of Muslims who were engaged in activity opposing Islamist terrorism Judgment of Muslims who were supporting Islamist terrorism	Germany	30 adults	Dental pain		PANAS and questionnaire on sleep and wakening pattern
34	Goodwin et al., 2011	PS	Self-report of increase in death thoughts during swine flu period	Frequency of thinking about own death Avoidance behaviours	Malaysia	120 pig farmers and handlers			
35	Gordijn & Stapel, 2008	Study 1 - TS		People's need for vision	Netherlands	39 university students	Dental pain or headache		
		Study 4 - TS		Support for controversial charismatic leader whose counter-attitudinal message also contained pro-attitudinal statements	Netherlands	351 university students	TV, MS	Mod: Leaders' charisma; Nature of message	
36	Goren & Neter, 2016	WS		PTSD symptoms (CPTS-RI)	Israel	263 adolescents	Low exposure to war	Med: Stereotypical thinking; Self-esteem	

37	Gurari et al., 2009	TS	Implicit self-evaluation	Israel	52 adults	Visits to terrorist sites prior to attacks	
38	Gut et al., 2021	PS	Carpe Diem Scale	Poland	295 Polish citizens		Med: Centrality of Religiosity Scale, Self-esteem, Expectation of solidarity due to the COVID-19 pandemic
39	Hall et al., 2009	TS	PTSD symptoms (PSS-I) Threat perception of PCI Attitudes towards ethnic exclusion of PCI	Israel	1136 phone surveys (47% M, 54% F)		Mod: PTSD levels Med: Benefit finding

		Exploratory study - TS	Changes in behaviours (qualitative)	Israel	27 adults			
40	Herzenstein et al., 2015	Study 1 - TS	Desirability of Control Scale	Israel	62 university students	MS		
		Study 2 - TS	Avoidant behaviours	US	202 university students		Mod: Controllability	
41	Higgins et al., 2020	DS	Negative affect Financial reward for pro-social behaviour National ranking Importance of children	Canada	149 university students	Dental pain, sad song, MS		
42	Hirschberger et al., 2016	Study 2 - WS	Support for an armed struggle against Israel	Israel	180 university students	Severe physical pain	Mod: Justice concerns, Utility mindsets	Word search
		Study 3 - WS	Support for an armed struggle against Israel	Israel	339 university students	Severe physical pain	Mod: Justice concerns, Utility mindsets	Word search
		Study 4 - WS	Support for retribution against North Korea	South Korea	90 adults	Severe physical pain	Mod: Justice concerns, Utility mindsets	Word search

		Study 1 - PS		Job engagement Prosocial behaviour	China	163 adults		Med: State anxiety Mod: Servant leadership
43	Hu et al., 2020	Study 2 - PS		Job engagement Contributions to communities facing hunger	US	345 adults		Med: State anxiety Mod: Servant leadership
		Study 3 - PS		Job engagement Contributions to communities facing hunger	US	210 adults		Med: State death anxiety Mod: Servant leadership
44	Huang et al., 2022	PS	Death anxiety scale	Death anxiety	China	1167 Chinese from online platform		Med: Presence of meaning
45	Huet et al., 2019	TS		Attitude toward Muslims	France	120 virtual populations of agents		Mod: Muslims differentiating themselves from terrorists' extreme cultural identities
46	Jiménez et al., 2021	WS		Proximal defences Consumption-related coping strategies	Mexico	27 adults		
47	Jin et al., 2022	DS/ PS		Identity fragmentation Online dating intentions Social distancing intentions	US	150 mTurk participants	Mental Health	

		Study 1 – PS	Word fragment completion	Donations of money and time	US	624 mTurk participants			
48	Jin & Ryu, 2022	Study 2 – PS	Word fragment completion	Donations of money and time	US	487 mTurk participants		Med: Powerlessness Mod: Selfishness, Narcissism, Greed, Materialism, and System justification	
49	Jonas & Fischer, 2006	Study 1 - TS		Worldview defence	Germany	78 adults		Mod: Intrinsic religiousness	
50	Juhl & Routledge, 2014	Study 1 – TS		Willingness to make personal sacrifices for England Passive party support	UK	55 university students	Public speaking	Mod: Self-esteem	Word search
51	Jutzi et al., 2020	Study 1 - PS		Control restoration motivation In-group bias In-group entitativity Out-group derogation	United States-based MTurk sample	358 adults		Med: Behavioural inhibition system	

		Study 2 - PS		Behavioural inhibition scale In-group bias System Justification Scale Belief in conspiratorial ideas	a United States based MTurk workers sample	348 adults	Answer questions regarding information completely unrelated to COVID-19 (i.e., bathtub)	Med: Behavioural inhibition system	
52	Kastenmüller et al., 2011	Study 1 - TS	Word fragment completion	Prejudice against Muslims	Germany	77 adults	Control – basket or spoon	Med: DTA Mod: Belief in literal immortality	
		Study 2 - TS	Word fragment completion	Prejudice against immigrants	Germany	96 adults	Control – basket or spoon	Med: DTA	
53	Kastenmüller et al., 2013	Study 1 - TS/DS		Justice sensitivity scale	UK	68 university students	Control – basket or spoon, MS		PANAS
		Study 2 - TS		Justice sensitivity	UK	34 university students	Low probability of terrorist attack	Med: Death terror anxiety	PANAS
54	Kastenmüller et al., 2014	TS		Levels of initiative	Germany	82 adults	Physical distance from attacks	Med: Job satisfaction	
55	Kim, 2020	Study 1 - PS		Variety- seeking	US	100 adults		Mod: Type of choice task	
		Study 2 - PS		Choice variety	US	197 adults		Mod: Type of choice task	
		Study 3 - PS		Variety- seeking	US	226 adults		Mod: Type of choice task	

56	Koch & Nicholson, 2016	WS		Turnout of voters	US/UK	Survey data from 23 democracies over a 50-year period		Mod: Political interest	
				Group Identification					
57	Kumagai & Ohbuchi, 2003	TS		Cognition of conformity pressure	US	98 adults		Mod: Group identification	
				Prosocial Behaviour					
58	Kwon & Park, 2022	PS		Proximal defences and distal defences	US, UK and India	Tweets collected from three countries (March 14, 2020 to Aug 18, 2020)			
59	Landau et al., 2004	Study 2 - TS	Word fragment completion	DTA	US	52 university students	Control prime - area code of Columbia, Missouri '573'		Read a passage
		Study 3 - TS		Support for President Bush	US	74 university students	Intense physical pain, MS	Mod: Political ideology	Read a passage
60	Lee & Kim, 2021	TS		Level polarization regarding undocumented immigrants	US	200 adults	Preparing for an exam	Med: Negative emotions towards terrorism and information avoidance	Write daily schedules
61	Li et al., 2021	PS		Firms' likelihood of making community donations	US	356 CEOs		Med: Other- and Self-Orientations Mod: Regulatory focus	

62	Li et al., 2022	PS	Panic buying	China	972 Chinese citizens		Mod: Social media use, Connection with close others to panic buying
63	Liu et al., 2021	Study 1 – PS	Quantified self	China	271 participants from Sojump.com		Med: Perceived control Mod: Perceived social distance
		Study 2 – PS	Quantified self	China	176 participants from Sojump.com		Med: Perceived control Mod: Perceived social distance
64	Liu et al., 2022	Study 1 – PS	Preference for the humanoid service robot		Study 1: (a) 215 participants (47% F) (b) 141 (40.4% F) (c) 92 (47.8% F) American participants from MTurk and 101 (50.5% F) China online	Post-pandemic situations	
		Study 3 – PS	Preference for the humanoid service robot	Hong Kong	200 University students	Covid-19 vaccine in development	Mod: Temporal distance
65	Lopes & Jaspal, 2015	Study 1 - TS	Death Anxiety Cultural Mistrust Inventory Islamophobia Scale	UK	53 Non-Muslims university students	News broadcast of the effects of technology on children's sleeping patterns	Med: State Social Paranoia Scale

			State Social Paranoia Scale General Paranoia Scale Perceptions About the Competing Player Questionnaire			Positive Islamic portrayal and a neutral portrayal		
66	Lu et al., 2022	PS	Disclosure of close contact with COVID-19	China	2542 Chinese through WeChat		Med: Defensive impression management Mod: Inclusive social climate	
67	Luke & Hartwig, 2014	TS	Perception of effectiveness and acceptability of interrogation techniques	Internet	112 participants	Dental pain, MS		
68	Lyall & Thorsteinsson, 2007	TS	Attitudes to the war with Iraq Mandatory detention of asylum	Australia	238 public servants	Voting or no intervention, MS	Mod: RWA, Social dominance orientation, Education	Personality questionnaire
69	Lykins et al., 2007	Study 1 - DS	Changes in Goal Value	US	74 employees			
		Study 2 - TS	Goal shifting	US	92 university students			
		Study 3 - DS	Goal shifting	US	103 university students	Dental pain, MS		
70	Ma et al., 2022	Study 1 – PS	Food safety behaviour	China	94 college students	Video showing that COVID-19 can be prevented and becomes endemic		

		Study 2 – PS		Food safety behaviour	China	153 college students	Video showing that COVID-19 can be prevented and becomes endemic	Med Self-protective motivation, Prosocial motivation	
		Study 3 – PS		Food safety behaviour	China	112 college students	Video showing that COVID-19 can be prevented and becomes endemic	Med Self-protective motivation, Prosocial motivation	
71	Mahat-Shamir et al., 2021	PS	Death anxiety	Symptoms of adjustment disorder	Israel	302 adult users of social media		Mod: Self construal Med: Exposure to information, Fear of contagion and symptoms of hypochondriasis	
72	Mahat-Shamir & Kagan, 2022	PS		Humor as an anxiety buffer	Israel	Number of memes distributed on WhatsApp and Facebook			
73	Măirean & Havârneanu, 2021	DS		Speeding Drunk-driving	Romania	170 drivers	TV, MS	Mod: Driving as self-esteem	PANAS
74	Maki et al., 2019	DS		Helping motivations Prosocial behaviours	Chile	644 participants before and 1389 after the 2010 Chile earthquake	Before disaster	Mod: National identification, Prosocial values	

			Experience of COVID-19 pandemic				
75	Mayer & Vanderheiden, 2022	PS	Coping strategies to deal with COVID-19 experiences Growth from COVID-19 experiences	10 different nationalities	16 adult women		
76	Minton et al., 2022	Study 3 – PS	Product attitudes Purchase intentions	US & South Korea	718 Prolific participants	Non deadly COVID-19 glove advertisement	Med: Perceived product need attitude and purchase intention Mod: Country; Religious commitment
77	Mishra et al., 2022	PS	Sharing behaviours Hoarding behaviours Regular buying	India	326 working adults		Mod: Materialism, Attitude towards COVID-19

78	Moskalenko et al., 2006	TS	Identification with country Importance ratings of membership groups Self-esteem and group identification Gender and group identification	US	610 university students		Mod: Time from terrorist attack
79	Muralidharan et al., 2022	PS	Subjective wellbeing	Israel	138 Qualtrics users		Med: Religiosity spirituality
80	Nakonezny et al., 2004	TS	Divorce rate	US	Divorce response between 1985 to 2000 for all 77 counties in Oklahoma to examine the divorce response to the Oklahoma City bombing, which occurred on April 19, 1995.	Pre Oklahoma City Bombing	
81	Nanni & Ulqinaku, 2021	PS	Willingness to pay for a Virtual Tour Willingness to donate Intention to visit	US	296 adults		Mod: Importance of technology for self-esteem

82	Naveh-Kedem & Sverdlik, 2019	Study 1 - WS		Change in benevolence and universalism	Israel	105 university students	Before war	Mod: Political orientation	
83	Nkrumah et al., 2022	PS	Death Anxiety	Work performance	Ghana	646 frontline employees		Med: Anxiety (Dysphoria, fear of death, death intrusion)	
84	Nugier et al., 2016	TS		Group threats - overall perception that immigrants are threatening Ingroup bias - their feeling towards 18 target groups	France	149 university students		Mod: Colour blind equality priming	
85	Okazaki et al., 2019	DS		Global brand purchase intention	Japan	720 consumers	Dental pain	Mod: MS	Story about the biological features of dogs
86	Osborn et al., 2006	TS		Perception of social consensus	US	410 participants	Not interviewed in front of Ground Zero on 9/11 anniversary	Mod: Overt vs covert TS reminders; Minority belief; Time from 9/11 anniversary Med: Trust in institutions	
87	Partouche-Sebban et al., 2021	PS	Death Anxiety	Brief COPE measure - avoidant coping	Algeria, France, Iran, Italy and Turkey	721 mTurk participants		Mod: Spirituality National identity, Lockdown	

88	Paul & Vasudevan, 2021	PS		Multidimensional Mortality Awareness Measure	India	103 emerging adults; 6 for semi structured interview			
89	Pompele et al., 2022	PS		Children's understanding of death and coping with the pandemic How the parents felt when supporting children	Italy	23 parents			
90	Pradel & Sattler, 2020	TS	Word fragment completion	DTA Alcohol-related attitudes Participants' description of the site	Germany	487 adults	Dental pain	Mod: Alcohol based esteem	PANAS
91	Prayag et al., 2021	DS		Motives for visitation personal meaning of the site(s) Feelings and thoughts the site(s) provoked	Christchurch	37 residents			
92	Prusova & Gulevich, 2021	Study 1 – TS	Word fragment completion	Attitudes toward individuals from countries of varying animosity	Russia	120 students	Video about dental treatment		20-item Russian version of the Positive and Negative Affect Schedule (PANAS)

		Study 2 – TS	Word fragment completion	Attitude towards countries perceived as more or less threatening	Russia	122 students	Video about dental treatment		20-item Russian version of the Positive and Negative Affect Schedule (PANAS)
93	Pyszczynski et al., 2006	Study 2 - TS		Support for extreme military interventions by US Support for Patriot Act	US	127 university students	Intense physical pain, MS	Mod: Political orientation	Short passage
94	Pyszczynski & Kesebir, 2011	Study 1 - DS		Attitudes toward foreign aid	Iran	180 university students	Dental pain, MS	Mod: Levels of peri-trauma dissociation	Word search task
		Study 2 - DS		Attitudes toward foreign aid Attitudes toward a strict Islamic dress code for women	Iran	172 university students	Dental pain, MS	Mod: Levels of PTSD symptoms	Word search task
95	Quirin et al., 2014	Study 1 - TS		Implicit and explicit prejudiced attitudes toward Muslims	Germany	96 university students	Dental pain/ TV	Mod: Threat-related action orientation	Prisoner's dilemma type coin distribution task
		Study 2 - TS		Implicit and explicit prejudiced attitudes toward Muslims	Germany	88 university students	Dental pain/ TV	Mod: Threat-related action orientation	Implicit and an explicit affect questionnaire
96	Raja et al., 2020	Study 1 - TS		Job performance Warwick-Edinburgh's Mental Well-Being Scale (WEMWBS)	Pakistan	160 employees	Low on Fear of Terrorism scale	Mod: Negative affectivity	

				Job performance Individually directed citizenship behaviours					
		Study 2 - TS		Job Stress Emotional Exhaustion Maslach Burnout Inventory	Pakistan	350 employees	Perceived low threat of terrorism	Mod: Psychological capacity	
97	Ratiu et al., 2022	PS	Death Anxiety	Job satisfaction Counterproductive work behaviours	Eastern European country	253 healthcare professionals and 189 employees from other domains		Med: Mortality threat Mod: Death reflection, Organizational identification, Supervisor support	
98	Routledge et al., 2010	Study 1 - TS		Worldview defence	UK	50 university students	Public speaking	Mod: Personal Need for Structure (PNS)	PANAS & word search task
		Study 2 - TS		Worldview defence	US	43 university students	Intense pain	Mod: PNS	PANAS & word search task
99	Ruvio et al., 2014	TS		Compulsive consumption Impulsive buying	Israel	139 adults	Lives 60 km from the Gaza strip	Mod: Materialism	
100	Sajid et al., 2022	PS		Green purchase behaviour	Pakistan	432 from online survey		Med: Pandemic salience, psychological distress	

								Med: Death anxiety Mod: Corporate Social Responsibility Practices, Internal and external corporate social responsibility (CSR)
101	Shao et al., 2021	Study 1 – PS	Death Anxiety	Work withdrawal Helping behaviours	Canada	278 full-time employees		
		Study 2 – PS	Death Anxiety	Internal and external corporate social responsibility (CSR) Work withdrawal Helping behaviours	UK	382 full-time employees		Med: Death anxiety Mod: Corporate Social Responsibility Practices, Internal and external CSR
102	Sharma et al., 2022	PS		Intention to engage in Online Luxury Brand self-narrative	India	588 students		
103	Shechory-Bitton & Cohen-Louck, 2020	TS		Behavioural responses to potential crime or terrorism	Israel	507 adults	Low exposure to terrorism	Med: Neighbourhood disorder, Social integration
104	Shilo-Levin & Bergman, 2022	PS		Psychological distress (PHQ-4)	Israel	450 working adults		Mod: Belonging, Meaning in work

105	Silva et al., 2021	PS		Psychological well-being - General Questionnaire for Reduced Psychological Well-Being	Brazil	352 Brazilians from general population	Non MS – non-fatality related information on COVID-19	Med: COVID-19 anxiety
106	Singla et al., 2021	PS		Prosocial behaviour	India	573 residents across India		Mod: Conscious state expansion, Gender
107	Solomon et al., 2021	PS	Number of death/dead words from articles on Corriere della Sera, the most widely read newspaper in Italy	Most utilised words and meanings linked to COVID-19	Italy	141 articles comprising 48,524 words over two time periods		
108	Song et al., 2022	PS		Information conformity consumer behaviour	China	1453 adults		Mod: Perceived social support Med: Need to belong, Materialism
109	Sonmez, 2021	PS	Word fragment completion task	Delay discounting	Turkey	167 university students	World film industry and film awards	
110	Soomro et al., 2020	TS		Employee organizational commitment	Pakistan	268 working adults		Mod: Perceived organisation support Med: Rumination
111	Stein et al., 2011	Study 1 - TS		Total Prison Sentence Imposed	US	956 105 cases	Pre 9/11 sentencing	

		Study 2 - TS		Total Prison Sentence Imposed	US		Pre OKB sentencing	
112	Stoppa et al., 2011	TS		Topics parents communicate to children after 9.11	US	972 parents		
113	Struckmeyer et al., 2021	WS/DS		Loneliness	US	154 centenarians		
114	Su & Shen, 2020	PS		Support for international travel ban	US	1211 adults		Med: Political ideology
115	Suzuki et al., 2020	Study 1 - DS		Number of outgoing mobile voice calls to close ones	Japan	278 participants	Before disaster	
		Study 2 - DS		Number of outgoing mobile voice calls to close ones	Japan	838 participants	Watch TV, MS	
116	Testoni et al., 2021	PS			Italy	38 students		
117	Thomas, 2003	TS		Worldview activated by 9/11	US	192 adults		
118	Tomaszek & Muchacka-Cymerman, 2020	PS	Existential Anxiety and Fear Scale--short version	Satisfaction with life scale (SWLS) Impact Event Scale-Revised Scale (IES-R) Post-traumatic growth inventory (PTGI)	Poland	199 university students		Med: Death anxiety, Life satisfaction Mod: Severity of PTSD symptoms

119	Ullrich & Cohrs, 2007	Study 1 - TS		System-justifying	Germany	81 adults	Food, discount airlines and society; mad cow disease		
		Study 2 - TS		System-justifying	Germany	151 adults	Internet use		
		Study 3 - TS	Word fragment completion	DTA System-justifying	Germany	62 university students	Internet use		Personality questionnaire
		Study 4 - TS		System-justifying	Germany	50 participants			
120	Ulqinaku et al., 2020	Study 1 - TS	Frequency of words in each tweet classified as related to death	frequency of words in each tweet classified as related to death	Turkey, Israel, and Germany	154,390 tweets		Mod: Hero reminders Med: Perception of personal power	
		Study 3 - PS		Intentions to engage in unhealthy compensatory consumption	US	192 adults		Mod: Hero reminders Med: Perception of personal power	
121	Vail et al., 2012	Study 1 - TS/WS/DS	Word fragment completion	DTA	US	50 university students	Intact building		PANAS and word search distraction task
		Study 2 - DS		Dogmatic beliefs	US	49 university students	Construction site	Mod: Political orientation	PANAS
		Study 3 - DS		Military action against Iran	US	61 university students	Construction site	Mod: Political orientation	PANAS
		Study 4 - DS	Lexical decision task	DTA	US	26 university students	Construction site	Med: DTA	PANAS

122	Van Assche & Dierckx, 2019	Study 1a - TS	Feelings towards terrorists, Muslims, and refugees Immigrant trust, threat, and prejudice	Belgium	86 students	One week before the attacks	
		Study 1b - TS	Attitudes towards refugees Contact avoidance towards refugees	Belgium	38 adults	One week before the attacks	
123	Västfjäll et al., 2014	DS	Perceived risk and benefits of various everyday decision	Sweden	733 adults	A neutral word ("round")	Med: Affect; Subjective well-being scale
124	Wong & Yang, 2020	PS	Anxiety Loneliness	China	320 adults		Mod: Service quality, Length of stay
125	Xia et al., 2021	Study 1 – PS	Purchase intentions	US	459 Cloudresearch.com platform		Med: Nostalgia, Search for Meaning
		Study 2 – PS	Purchase intentions		247 participants from Study 1		Med: Nostalgia, Search for Meaning
126	Yousaf, 2022	PS	Psychological wellbeing	China	214 Muslim travelers		Med: Halal food anxiety
127	Yum & Schenck-Hamlin, 2005	TS	Proximal and distal defences	US	121 university students		Mod: Perspective taking, Interpersonal communication

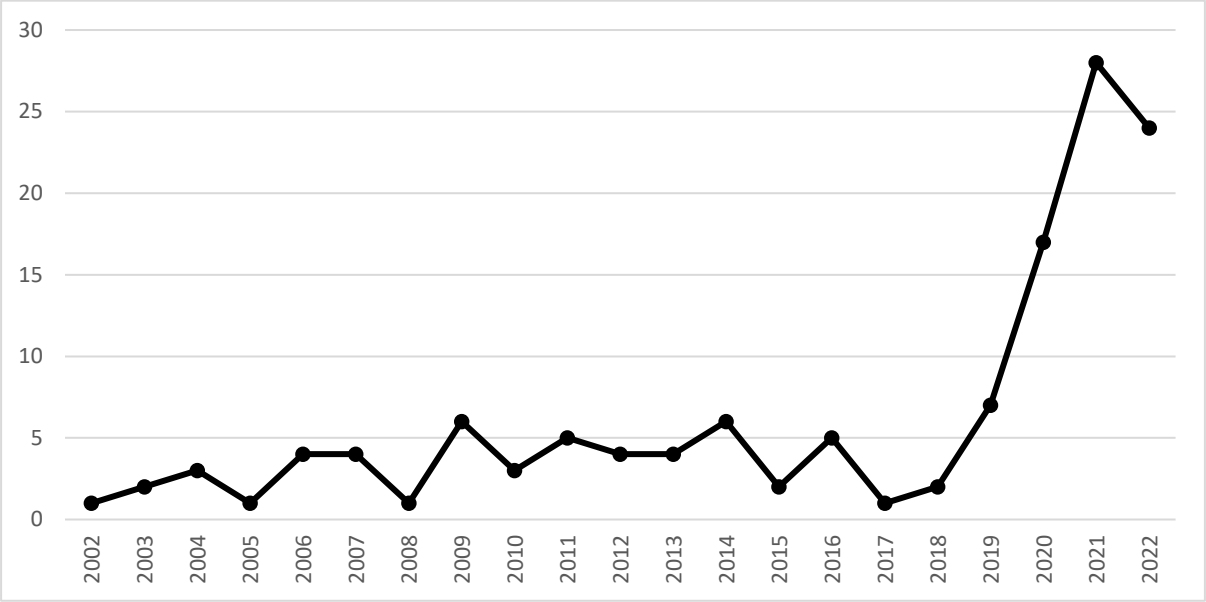
128	Zu et al., 2021	Study 1 – PS	Presence of death related words in their essays	Usefulness, novelty, and purchase intention of three types of products	China	41 from social networks	Description of tourist industry crisis and severe unemployment under the pandemic	PANAS
		Study 2 – PS	Presence of death related words in their essays	Usefulness, novelty, and purchase intention of three types of products	China	82 online	Description of tourist industry crisis and severe unemployment under the pandemic	PANAS

Notes: PS = Pandemic salience, include COVID-19, PANAS-X = Positive and Negative Affect Schedule - Expanded Form; PTSD = Post Traumatic Stress Disorder; Swine Flu and Ebola; TS = Terrorism salience, includes 9/11, 7/7 bombing, Madrid train bombing, Attacks at Charlie Hebdo, Nice Bastille Day, Stade de France, November shooting, Oklahoma City bombing; WS = War salience; DS = Disaster salience, includes earthquakes, fire, Asian tsunami; DTA = Death Thought Accessibility

Studies examining the use of critical incidents as MS inductions began 19 years ago, with the earliest publication in this review dating back to 2002, a year after the 9/11 attack (Thomas, 2003). This is not surprising given that terrorism became an international agenda since the 9/11 attack due to its adverse social, political, and economic impacts. Figure 2.2 shows the number of critical incident salience articles published annually since 2002. An average of 2.5 articles studying critical incidents and TMT were published from 2002 to 2009. This increased to 3.8 in the next decade, before reaching 17 in the year of 2020, which ballooned further to 28 in 2021 and 23 in 2022. As the social climate evolved, the trend also moved from terrorism to pandemics, in particular the COVID-19 pandemic.

Figure 2.2

Number of Critical Incident Salience Articles per Year



The critical incidents identified in this literature review include pandemics, natural disasters, wars and terrorism. The outcome variables can be consolidated into five themes, namely (i) worldview defence, (ii) self-esteem, (iii) close relationships, (iv) individual well-being and (v) organisational outcomes.

3.3.4.4 Types of Critical Incidents for MS Induction

Pandemics. Seventy-seven studies from 61 articles used infectious diseases as MS induction. Out of these 77 studies, 72 were related to COVID-19, two on Swine Flu, two on Ebola and one using a generic infectious disease to induce MS.

Amongst the studies studying COVID-19, 27 studies collected data during the COVID-19 periods in the respective countries and proposed that COVID-19 posed a significant threat to human lives (Tomaszek & Muchacka-Cymerman, 2020; Wong & Yang, 2020). Other studies attempted to induce MS from COVID-19 by asking participants to complete COVID-19 anxiety scales (Arcieri, 2022; Chen et al., 2021) or rate their level of fear on multiple items related to contracting or dying from COVID-19 (Brophy et al., 2021; Cox et al., 2021) . Other researchers presented information on COVID-19's transmissibility, severity and fatality rates, and also asked their participants to rate their perceived threat of COVID-19 following the presentation of this information (Kim, 2020; Nanni & Ulqinaku, 2021; Ratiu et al., 2022; Song et al., 2020; Ulqinaku et al., 2020) . Some studies asked participants about the likelihood of someone contracting COVID-19 in their community (Su & Shen, 2020), how often they reflected on their emotions on COVID-19-related deaths (Hu et al., 2020), and to respond to questions that led to the perceived conclusion that COVID-19 was incurable (Jutzi et al., 2020).

About 27.3% of the studies utilising COVID-19 as MS induction included control groups (Courtney et al., 2021; Fritsche et al., 2009; Jutzi et al., 2020). The proportion of studies assessing death cognitions was about 20.8%, out of which eight studies using the word fragment completion tasks to assess death cognitions (Arrowood et al., 2017; Fairlamb, 2022; Fairlamb & Courtney, 2022; Jin & Ryu, 2022) and another eight studies counting the number of death related words (i.e., 'death', 'dead', 'anxiety') in their participants' responses (Barnes, 2021; Solomon et al., 2021; Zu et al., 2021). About 11.6% of the PS studies assessed

existential and death anxiety through death anxiety scales (Brophy et al., 2021; Huang et al., 2020; Mahat-Shamir et al., 2021; Nkrumah et al., 2022; Partouche-Sebban et al., 2021; Ratiu et al., 2022; Shao et al., 2021), while a few studies explicitly asked participants if and to what extent, on a likert scale, they had been thinking about death when they underwent the pandemic salience condition (Cox et al., 2021; Hu et al., 2020; Jiang et al., 2021; Ma et al., 2022; Tomaszek & Muchacka-Cymerman, 2020).

Other studies have used either swine flu or Ebola virus as MS inductions. Two articles examined the effects of swine flu as MS induction by examining the perceived risk of swine flu by asking pig farmers if they thought about their deaths more frequently since the swine flu outbreak (Goodwin et al., 2011), or asked participants to write about contracting swine flu (Bélanger et al., 2013). Arrowood et al. (2017) conducted two studies examining the use of Ebola virus to induce MS. In these two studies, participants described thoughts of contracting Ebola virus before they completed the word fragment task to assess death thoughts. Both studies found that death-related words were significantly higher than in control conditions, and these death cognitions mediated the relationship between Ebola salience and the outcome variable.

Disasters. Twenty-one studies from 14 articles induced MS through natural or manmade disasters. Eight studies used earthquakes (Lykins et al., 2007; Maki et al., 2019; Okazaki et al., 2019; Prayag et al., 2021; Pyszczynski & Kesebir, 2011; Suzuki et al., 2020), one on the Asian Tsunami (Västfjäll et al., 2014), three on fire incidents (Cozzolino et al., 2004; Lykins et al., 2007), one on shipwreck (Higgins et al., 2020), one on driving incidents (Măirean & Havârneanu, 2021), one on destruction by meteorite (Fa & Kugihara, 2022) as MS inductions. Six used a mixture of natural (Kastenmüller et al., 2013; Struckmeyer et al., 2021) and manmade disasters (Vail et al., 2012, earthquakes, bombs, structural collapse).

MS was induced by asking individuals to write essays about their thoughts and feelings about dying in an earthquake or fire (Cozzolino et al., 2004; Lykins et al., 2007; Pyszczynski & Kesebir, 2011; Suzuki et al., 2020), through pictures of the aftermath of natural and human disasters (Kastenmüller et al., 2013; Vail et al., 2012), or by comparing the effects of disaster salience by collecting data before and after the disasters (Maki et al., 2019; Suzuki et al., 2020). Disaster salience effects were also assessed by comparing data collected at different time points post-earthquake and asking participants if they thought they would be killed in that particular earthquake (Lykins et al., 2007). Others induced MS with disaster themes by (i) providing information on natural disasters before asking individuals to complete a fear of death scale (Okazaki et al., 2019), (ii) visiting disaster sites (Prayag et al., 2021), (iii) asking participants to report three words after hearing the word 'tsunami' three months after the South Asian Tsunami incident (Västfjäll et al., 2014) or (iv) by listening to a song on shipwreck (Higgins et al., 2020).

All, except five studies (Lykins et al., 2007; Maki et al., 2019; Prayag et al., 2021; Struckmeyer et al., 2021; Suzuki et al., 2020), had control groups (i.e., dental pain or watching television, pictures of intact buildings, spoon, basket or imagined waking up to coffee instead of being in a fire). While there were controlled comparisons to isolate the effects of disaster salience, only two studies assessed death-related cognitions of the disaster salient stimuli (Vail et al., 2012).

Wars. Fourteen studies from 11 articles used war to induce MS. Six of these studies were conducted with samples in Israel (Ein-Dor & Hirschberger, 2013; Goren & Neter, 2016; Hirschberger et al., 2016; Naveh-Kedem & Sverdlik, 2019), three studies from the Ivory Coast (Chatard et al., 2011, 2012), and one each from South Korea (Hirschberger et al., 2016) and the United States (Struckmeyer et al., 2021) The other four examined MS effects of wars

in general (Du & Chi, 2016; Vail et al., 2012), wars with Afghanistan and Iraq (Koch & Nicholson, 2016), and one on drug war (Jiménez et al., 2021).

MS was inducted by asking participants to write essays about thoughts and feelings of their own deaths in wars or to answer closed-ended questions about dying in wars as compared to control conditions (e.g., pain, examinations, student life) (Chatard et al., 2012). War salience was also induced through pictures of destroyed buildings (Vail et al., 2012), reading about an attack from an enemy (Hirschberger et al., 2016), war casualty counts (Koch & Nicholson, 2016), exposure to war conflicts (Du & Chi, 2016; Hirschberger et al., 2016; Jiménez et al., 2021), self-report of lived war experiences amongst other traumatic events (Struckmeyer et al., 2021), or living in varying proximity to the site of war (Goren & Neter, 2016; Naveh-Kedem & Sverdlik, 2019). One study compared participants' responses based on the outcomes of the wars of their home country involvement (Ein-Dor & Hirschberger, 2013).

About half of the studies had control groups (i.e., difficult exams, low exposure to war) (Chatard et al., 2011, 2012; Goren & Neter, 2016; Hirschberger et al., 2016; Naveh-Kedem & Sverdlik, 2019). Only three studies examined death cognitions triggered by exposure to war-related stimuli (Chatard et al., 2012; Vail et al., 2012).

Terrorism. There are 71 studies from 48 articles that employed terrorism as their MS induction. Standard MS inductions such as asking participants to write essays about dying from terrorist attacks (e.g., Gordijn & Stapel, 2008; Pyszczynski et al., 2006; Routledge et al., 2010) were commonly used. Other studies adopted similar TMT procedures by randomly assigning participants into experimental groups, where individuals would read about news or would be shown pictures or videos related to terrorist attacks, or to control groups that were exposed to neutral (e.g., Wimbledon tennis) or non-fatal but distressing topics (e.g., animal abuse) (e.g., Das et al., 2009; Dunkel, 2002; Fairlamb & Cinnirella, 2020; Herzenstein et al.,

2015; Kastenmüller et al., 2013, 2014; Lopes & Jaspal, 2015; Prusova & Gulevich, 2021; Quirin et al., 2014; Ullrich & Cohrs, 2007; Vail et al., 2012). Some studies used questionnaires assessing threats of terrorism or anxiety following terrorist attacks (Erol, 2022; Gurari et al., 2009; Herzenstein et al., 2015). Others compared data before and after terrorist attacks (Brouard et al., 2018; Castanho Silva, 2018; Moskalenko et al., 2006; Nakonezny et al., 2004; Stein et al., 2011; Van Assche & Dierckx, 2019) or based on level of exposure to terrorism (Hall et al., 2009; Huet et al., 2019; Ruvio et al., 2014; Shechory-Bitton & Cohen-Louck, 2020). The rest of the terrorism salience studies collected data shortly after terrorist attacks (Fischer-Preßler et al., 2019; Nugier et al., 2016; Stoppa et al., 2011; Yum & Schenck-Hamlin, 2005) or at different time intervals after terrorist attacks (i.e., immediate or a week later) (Jonas & Fischer, 2006). Some studies got participants to imagine the probability of terror attacks (Kastenmüller et al., 2013), manipulated the personal relevance of the terrorism threat (Asbrock & Fritsche, 2013) or primed participants with terrorism-related words and anniversaries (e.g., 9/11, World Trade Centre) (Landau et al., 2004; Osborn et al., 2006).

About 74.6% of these terrorism salience studies as reported in Table 2 used experimental and control groups such as distressing but non-mortality related topics (e.g., intense physical pain, animal abuse, public speaking) and neutral topics (e.g., pictures of spoons, sports). The rest examined effects of terrorism salience by comparing data before and after terrorist attacks or effects of degree of exposure to terrorist attacks such as proximity to terrorism sites (Gurari et al., 2009; Kastenmüller et al., 2014; Ruvio et al., 2014) and probability of terrorist attacks (De Zavala et al., 2010,; Kastenmüller et al., 2013).

About 15.5% of these 71 terrorism salience studies examined the death cognitions of the terrorism salience inductions. With the exception of one study (i.e., Ullrich & Cohrs, 2007), the rest of the studies found that levels of death cognitions in terrorism salience conditions were similar to standard MS induction, which was higher than in control

conditions (Das et al., 2009; Kastenmüller et al., 2011; Landau et al., 2004; Pradel & Sattler, 2020; Prusova & Gulevich, 2021). One study assessed the perceived threat of terrorism through statements such as 'I am horrified to know that I go to places where terror attacks occurred, and I could have died in those attacks' (Herzenstein et al., 2015).

3.3.4.5 Outcomes Studied in Critical Incident Salience Research

Several themes related to outcome variables studied in critical incident salience research have been identified. They are (a) worldview defence, (b) self-esteem enhancement, (c) seeking close relationships, (d) individual well-being, (e) prosocial behaviours and (f) organizational factors.

Worldview Defence. According to TMT, cultural worldviews need to be reaffirmed to alleviate the anxiety when reminded of our impending deaths. Hence, one would expect stronger national identity or support values and groups that are in line with our worldviews when individuals are exposed to life-threatening critical incidents.

Nationalism. When reminded of the Swine Flu threat, participants in Bélanger et al.'s (2013) study reported more pride and attachment towards their home country. Affiliation with the national identity was also strengthened after individuals directly experienced natural disasters such as earthquakes (Maki et al., 2019).

Nationalism also manifested as support for national policies. When asked to rate the likelihood of someone being infected with COVID-19 in their community, Su and Shen (2020) found that individuals who perceived higher likelihood of infection in their neighbourhood demonstrated higher support for international travel ban to protect the country from foreign infection.

Studies on terrorism salience had derived similar findings. Reminders of terrorism have led to stronger national identities, especially for those who reported being more rigid cognitively (Routledge et al., 2010). It also garnered more support for more stringent national

policies related to security, immigration and refugee management in Europe and the United States (Castanho Silva, 2018; Pyszczynski et al., 2006). This was especially so for liberals who showed more support for more restrictive refugee policies when reminded of terrorism (Castanho Silva, 2018).

Ingroup Outgroup Split. Ingroup bias and outgroup prejudice also served to buffer anxiety when faced with CI threats. Pandemic, disaster, and in particular terrorism have typically led to more ingroup identification and more rejection towards outgroups (Chew, 2022; De Zavala et al., 2010; Jutzi et al., 2020; Kwon & Park, 2022; Pyszczynski & Kesebir, 2011). When threat of COVID-19 was made salient by giving information that COVID-19 was incurable, participants responded by showing more cynicism towards outgroups and believed that an outgroup was responsible for creating and spreading the pandemic (Jutzi et al., 2020). Similarly, Pyszczynski and Kesebir (2011) reported that Iranians expressed more negative sentiments towards outgroups with differing worldviews, such as individuals who did not adhere to strict Islamic dress codes for women, and rejecting foreign aid following exposure to the Zurand Earthquake.

Prejudice against outgroups, which terrorists were perceived to be affiliated with, could sometimes be more robust under terrorism salience conditions. When Fairlamb and Cinnirella (2020) reminded British participants of tolerance that is an important English value, before showing them a news clip on the 7/7 London Bombing or the death of Princess Diana, the researchers found that the tolerance prime could only buffer dislike for Muslims in the typical MS condition but not the terrorism salience condition. Instead, the tolerance prime intensified participants' dislike for Muslims in the terrorism salience condition. Although prejudice appeared stronger towards outgroups which were symbolically related to the perpetrators, Das et al. (2009) have provided empirical evidence that such prejudice was not directed only at these outgroups. In one of their studies, Das et al. (2009) reported that

terrorism news made non-Muslims more prejudiced against Arabs, and Muslims more prejudiced against Europeans, suggesting a general ingroup-outgroup split rather than a specific rejection based on symbolic affiliation with terrorism.

Studies examining the effects of critical incident salience have also found that under most war situations violence begets violence as an expression of ingroup-outgroup split. When reminded of war, individuals were more likely to express support for military retaliation against perceived enemy states (Chatard et al., 2011) as a means to restore justice, self-esteem and national pride. Using two separate studies, Hirschberger et al. (2016) found that reading about military attacks to their home countries encouraged Israelis and South Koreans with strong national identities to show more support for military aggression against their attackers. As long as they believed that the retaliation was to restore justice to their home countries, participants continued to express strong support for counterattacks even if they knew that the utility of such action was low.

In some situations, such aggression was displaced towards weaker foes. Ein-Dor and Hirschberger (2013) manipulated the aftermath of the Second Lebanon War (i.e., defeat, victory, neutral description of Lebanon) before asking Israelis to rate their support for violence towards either the original perpetrator or an enemy who was perceived as stronger or weaker. Both studies found that participants were more likely to displace their anger by initiating war towards the weaker foe when they were presented with the defeat scenario to restore self-esteem.

These supports for violence and aggression towards outgroups were observed in individuals under terrorism salience (Asbrock & Fritsche, 2013; Pyszczynski et al., 2006). Political ideologies also appeared to sway people towards violence and aggression towards outgroups. For example, right-wing authoritarianism has been found to mediate the relationship between personal terrorist threats and approval of torture (Asbrock & Fritsche,

2013) while conservatives were more likely to support extreme military actions and demonstrate more xenophobic attitudes under the terrorism salience condition (Pyszczynski et al., 2006). Nonetheless, individuals have also responded with more prosocial motivations and behaviours following critical incident salience if these were part of their worldview defence. Various research has shown that individuals were kinder, more motivated to help and donated more to victims after being exposed to critical incidents (Cozzolino et al., 2004; Higgins et al., 2020; Hu et al., 2020; Kumagai & Ohbuchi, 2003; Maki et al., 2019).

Self-Esteem Enhancement. Apart from national identities and ingroup-outgroup bias as discussed in the previous section, self-esteem enhancement is also another anxiety buffer in TMT. Self-esteem had been observed to be enhanced through relationships and consumer behaviours. As reported by Huang et al. (2020), individuals who were reminded of their mortality in disease conditions were more likely to seek social support, which led to an alleviation of death anxiety. This relationship between social support and death anxiety was mediated by self-esteem, where individuals' self-esteem was enhanced by social support, which then reduced death anxiety.

Individuals also boost their self-esteem by engaging in related consumer behaviours. When the COVID-19 pandemic put international travel to a halt, Nanni and Ulqinaku (2021) explored how virtual museum tours could be an alternative. While they did not find an effect of COVID-19 threat on the intention to visit museums, potential visitors, who deemed technology as more important to their self-esteem, were more inclined to participate in the virtual tours and donate to the museums.

Other aspects of consumer behaviours, which were related to self-esteem, were also explored using critical incidentthreats. When faced with potential death threats, individuals expressed preference for more variety in both food and non-food purchases (Kim, 2020), to make purchases similar to their peers as this conformity fulfilled their needs to belong and

materialism (Chew, 2022; Jiang et al., 2021; Mishra et al., 2022). They also reported higher intention to endorse and advocate preference for online luxury brands, which presumably increased the self-esteem (Sharma et al., 2022). These consumer behaviours appeared to alleviate anxiety and enhanced self-esteem and relational needs.

Similar outcome patterns were also found under terrorism salience conditions (Ruvio et al., 2014) where those who lived nearer to terrorism sites and reported higher post traumatic stress disorder symptoms exhibited more impulsive and compulsive buying, especially for those who valued materialism. These findings converged to support the anxiety buffering effects of self-esteem enhancement in the TMT through consumers' behaviours.

Seeking Close Relationships. Close relationships have been shown to buffer the effects of MS (Plusnin et al., 2018). When examining the effects of the Oklahoma City Bombing in 1995, Nakonezny et al. (2004) suggested that the decline in divorce rates after the bombing reflected individuals' need to seek close relationships in accordance to TMT. Through qualitative interviews, Thomas (2003) and Stoppa et al. (2011) identified seeking close relationships and strengthening familial ties as anxiety buffers to cope with the aftermath of 9/11. Suzuki et al. (2020) concretised these findings with empirical evidence. In particular, they found that immediately after an actual earthquake and following earthquake primes, Japanese individuals made significantly more calls to their loved ones to ensure their safety as compared to pre-disaster or control conditions. These studies unanimously demonstrated the anxiety buffering effects of close relationships during critical incidents within the TMT framework.

These patterns of seeking close relationship were also observed in the COVID-19 pandemic. When faced with COVID-19 salience, healthcare workers reported increased satisfaction with their close relationships (Chen et al., 2021). This increase in relationship satisfaction was more pronounced in healthcare workers who reported feeling less

vulnerability in the face of COVID-19, reinforcing the death anxiety buffer brought by close relationships.

Individual Well-being. Health Behaviours. Research in critical incident salience has also contributed to the understanding of adaptive and maladaptive health behaviours. When faced with COVID-19 salience, individuals were more likely to practice infection control behaviours (e.g., mask wearing, maintaining social distancing), especially when they perceived COVID-19 as threatening (Fairlamb & Courtney, 2022). They would also be more cautious about food safety and adopt healthy eating habits, presumably healthy eating habits reduces their risk of contracting COVID-19 (Ma et al., 2022). Similarly, when reminded of other infectious diseases and pandemics such as the Swine Flu, Goodwin et al. (2011) reported that pig farmers, who were more worried about the swine flu situation, were more cautious in their interaction with family and 'high-risk' outgroups (e.g., healthcare workers, homeless). Worried pig farmers also practiced more personal hygiene, and demonstrated more avoidant behaviours (e.g., avoiding crowds, less likely to use public transport). Avoidant behaviours were also seen in individuals who perceived less control over predicting the occurrence of terrorist attacks (Herzenstein et al., 2015).

Nevertheless, critical incident salience has also prompted riskier attitudes and unhealthy behaviours. Pradel and Sattler (2020) cautioned against unhealthy alcohol consumption in individuals with low alcohol-based self-esteem following terrorism salience as this group reported more positive attitudes towards alcohol. When reminded of traffic accidents, Măirean and Havârneanu (2021) found that drivers who derived self-esteem from speeding reported an increase in speeding behaviours. Ulqinaku et al. (2020) also highlighted unhealthy eating choices when their study noted that individuals, who perceived less personal power, consumed higher quantities of unhealthy snacks when they were reminded of terrorism or the COVID-19 situation.

Mental Well-being. Individuals who were exposed to critical incidents reported higher anxiety and post-traumatic stress symptoms, as well as poorer life satisfaction and well-being, and coping styles. As reported by Wong and Yang (2020), perceived poor health during COVID-19 quarantine was related to higher anxiety and loneliness among hotel guests. Terrorism salience also triggered anxiety, which was further exacerbated by ongoing identity exploration in adolescents (Dunkel, 2002). These effects were on top of demographic factors and other life events. In the organisational setting, critical incident threats have contributed to employee exhaustion and anxieties (Hu et al., 2020; Raja et al., 2020). Fortunately, preliminary evidence has found that service quality, resilience and self-regulation strategies can buffer some of these negative effects (Quirin et al., 2014; Raja et al., 2020; Wong & Yang, 2020). In addition, recent research has also found that while visiting disaster sites could trigger feelings of mortality salience, such visits can also facilitate healing for the bereaved by providing closure (Prayag et al., 2021).

Individuals have been found to experience shifts in values and goals in their personal lives following exposure to critical incident salience (Lykins et al., 2007, Study 1 & 3; Naveh-Kedem & Sverdlik, 2019, Study 1). These shifts in values and goals were consistent with exposure to critical incidents which had been found to correlate with post traumatic stress disorder symptoms (Dunkel, 2002; Goren & Neter, 2016).

Goren and Neter (2016) reported that individuals living in areas with high exposure to wars and who held more stereotypical thoughts about enemy groups experienced more post traumatic stress disorder symptoms. This relationship between critical incidents and post traumatic stress disorder symptoms was explored in the context of the anxiety buffer disruption theory (ABDT), which is an extension of the TMT (Pyszczynski & Kesebir, 2011). The anxiety buffer disruption theory posits that the usual anxiety regulating mechanisms of individuals as proposed in TMT (i.e., worldview defence, self-esteem, and close

relationships) broke down due to the traumatic nature of the situations. Hence, individuals are no longer capable of regulating their anxiety by turning to the TMT proposed mechanisms to restore psychological safety. This was indirectly observed from findings in populations that reported high exposure to traumatic events such as war, natural disasters, and domestic violence. When exposed to critical incident salience or MS, those who scored high on post traumatic stress disorder symptoms were less likely to endorse stronger worldviews or self-esteem enhancements after exposure to death reminders (Chatard et al., 2012), presumably because their anxiety buffers had disintegrated as the critical incidents were too overwhelming, highlighting the devastating effects of critical incidents on mental well-being.

Prosocial Behaviours. Apart from health behaviours and mental health, TMT research has also examined the effects of critical incidentson prosocial behaviours. Motivation to volunteer, donations to affected or underprivileged groups and attitudes towards vulnerable populations were some of the prosocial outcomes which have been examined with reference to critical incident salience. Following reminders of critical incidents individuals were more likely to volunteer for relief work or made more monetary donations (Jin & Ryu, 2022). Prosocial behaviours were also evident in those who were reportedly more self-serving. As depicted by Jin and Ryu (2022), individuals who were greedier, more selfish and narcissistic made higher donations, only when they were reminded of COVID-19 mortality threat rather than in the control condition. However, individuals displayed lower acceptance of older and disabled populations, as it was hypothesized that aging and disability further aggravate death anxiety, which was already triggered in the context of COVID-19. Hence, individuals tended to reject these populations as an attempt to avoid or reduce death anxiety (Arcieri, 2022).

Organisational Performance. Effects of critical incident salience has been explored in organisational contexts such as banking, aviation and healthcare sector. Specifically, the

relationships between critical incident salience, well-being, and job outcomes such as job performance, job satisfaction, engagement, ability to cope with organisational change and organisational commitment have received attention. These studies have unanimously reported the adverse effects of critical incident salience on organizational outcomes through heightened anxiety, negative affect and rumination (Hu et al., 2020; Soomro et al., 2020). Fortunately, these studies have also shown that factors such as servant leadership, perceived social support, job satisfaction, and psychological capital could potentially mitigate some of the effects of the critical incident on job performances (Hu et al., 2020; Kastenmüller et al., 2014; Raja et al., 2020; Ratiu et al., 2022; Soomro et al., 2020).

3.3.5 Discussion

3.3.5.1 Summary and Evaluation of Studies using Critical Incidents as MS Inductions

Fourteen articles in this review compared the effects of standard MS with critical incident salience. Seven out of these articles reported that terrorism salience and MS were related to more death cognitions, worldview defence and aggression to outgroups than in the control conditions (e.g., Fairlamb & Cinnirella, 2020; Landau et al., 2004; Vail et al., 2012). One article found that effects of terrorism salience were similar to both MS and control conditions but MS triggered significantly more outgroup prejudice than the control (Luke & Hartwig, 2014). Two articles did not find significant differences between terrorism salience, MS and control groups (Dewa et al., 2014; Lyall & Thorsteinsson, 2007). The authors speculated that the absence of significant TS effect could be due to participants not having strong opinions about terrorism, the terrorist event used was not recent enough or the mode of writing of the terrorist event was not as impactful as reading about news on terrorism (Dewa et al., 2014). Other speculations include the timing of data collection, during which a terrorist attack had just occurred when Lyall and Thorsteinsson (2007) conducted their study, and

there was already heated public discussions on national policies, that could have already triggered the effects explored in their study.

Most of the studies focused on terrorism salience, and eventually shifted to the MS effects of the COVID-19 pandemic. Despite increasing interest in the MS effects of pandemics, it is interesting to note that there were no studies on the MS effects of other pandemics such as Severe Acute Respiratory Syndrome , which also generated much worldwide anxiety in 2003 and was more fatal than COVID-19 (Mahase, 2020; Petersen et al., 2020). Further, about half of the studies had experimental control groups and only about 17.1% of the studies in this review assessed death-related cognitions, which is an important component of TMT. As Hayes et al. (2010) pointed out, the central mechanism of TMT is based on existential anxiety triggered by unconscious preoccupation with death. These unconscious death thoughts could not be better assessed other than by word fragments and implicit attitude tests. Even if individuals report their perceived threats of critical incidents, the actual anxiety may be buffered possibly due to social desirability, thus obscuring the effects of critical incident salience. The paucity of research comparing the effects of critical incident salience, standard MS, and control groups, the assessment of death cognitions triggered by critical incident, as well as examining the effects of critical incidents of varying severity call for future research directions which will be explored later in the discussion.

3.3.5.2 Summary and Evaluation of Outcomes Studied in Critical Incident Salience Research

Overall, the studies have provided empirical support for the tripartite anxiety buffers (i.e., worldview defence, self-esteem enhancement, and seeking close relationships) after reminders of critical incidents The anxiety buffer disruption theory further alludes to the life-threatening potential of critical incidents, when critical incidents s can undermine and disintegrate individuals' abilities to activate the tripartite anxiety buffer, hence leading to post

traumatic stress disorder symptoms. These, along with the limited number of studies that reported the link between critical incidentssalience and death cognitions, appear to support the hypothesis that critical incidents are sufficient triggers of death anxiety.

Based on the review, critical incident salience has triggered strong identification with ingroups, and consequently amplified ingroup-outgroup splits. Such splits have led to increased dislike and rejection of outgroups. They have also escalated into violence towards outgroups, especially amongst individuals with a particular political orientation, when a strong sense of ingroup identity was elicited or when such actions were perceived to restore self-esteem. Such aggression can lead to social unrest and risks perpetuating cycles of violence in situations that already incurred much social and economic damages. Maladaptive consumption such as more impulsive and compulsive shopping, as well as unhealthy food consumption, also increased with critical incident salience. While these appeared to bolster one's self-esteem, particularly for those who value materialism and reported high conformity to global brand cultures, these behaviours undermined financial, physical, and mental health. Nevertheless, current research has shown that these behaviours are amenable to interventions, as demonstrated by the studies that have explored the role of moderators and mediators in the relationships between critical incident salience and outcome variables.

Informing Crisis Management and Interventions

While it appears that critical incident reminders contribute to social tension, poorer organizational outcomes and individual well-being, the current research also provides suggestions to mitigate these reactions. Other than examining the effects of critical incident salience, researchers have also identified moderators that can be developed further to pave ways for interventions.

Anxiety Regulation Interventions. Death anxiety is at the heart of TMT. Various studies in this review have studied anxiety as a mediating factor between critical incident

salience and outcome variables. For instance, research on critical incident salience and organisational outcomes have pointed to anxiety, negative affect, and rumination as mediating factors leading to adverse outcomes at work (Hu et al., 2020; Raja et al., 2020; Soomro et al., 2020). If individuals can better regulate anxiety and negative affect, perhaps some of the adverse effects of critical incident salience can be alleviated. One possible anxiety regulating strategy could be religion. When exploring the effects of war salience on religiosity using data from over 80 000 individuals from over 50 countries, Du and Chi (2016) found that individuals who were more worried about wars were more likely to turn to religion and believed more in God, suggesting the anxiety buffering effects of religions. Jonas and Fischer (2006) have also reported that being intrinsically religious has prevented individuals from responding with worldview defence following reminders of a terrorist attack. This is in line with findings from Kastenmüller et al. (2011) in which firm believers of immortality, a concept inherent in most religions, showed less prejudice against Muslims after terrorism salience. This prejudice did not change even though the experiment was conducted during the active period of the Mumbai terrorist attack. Hence, encouraging healthy religious coping may help to regulate death anxiety and consequently reduce resentment and aggression towards outgroups.

The perception of control, psychological capacity and emotional regulation have been found to moderate the effects of critical incident salience by providing alternative avenues to regulate and buffer anxiety. When being reminded of terrorism, Israelis expressed more desire for control (Herzenstein et al., 2015). Further, as compared to those who were being led to think that they had less control over being causalities of terrorist attacks, those in the high control condition were less anxious and demonstrated fewer avoidant behaviours (Herzenstein et al., 2015). Control over trivial matters in life, such as being able to choose from a variety of consumer items, could enhance the sense of control, and countered the MS

effects of COVID-19 (Kim, 2020). These highlighted the importance of empowerment and control in regulating anxiety arising from critical incident threat.

Improving emotional regulation and cultivating resilience can buffer the effects of anxiety triggered by critical incidents . Quirin et al. (2014) replicated the moderating effects of emotional self-regulation between terrorism reminders and prejudice against Muslims, and reported that bias against Muslims did not increase in individuals who scored high on emotional regulation. Raja et al. (2020) also found that psychological capital, as defined by psychological resilience, optimism, capability, and hopefulness, buffered the effects of terrorism salience on job performance by alleviating negative affect. These learnings converge to suggest that strengthening anxiety-regulating strategies can be potential interventions to alleviate social tension arising from critical incident salience.

On a broader scale, organisations can achieve comparable benefits by empowering employees through their daily work to create a sense of control. Emotional and mental health support can be provided through employee assistance programmes (EAPs), which have been found to improve psychosocial well-being at work and in employees' personal life through counselling and teaching coping strategies (Joseph et al., 2018; Regel, 2007). Critical incident stress management and emotional support for government organisations prone to critical incidents have been shown to buffer some of these critical incident impacts (Kirschman, 2018). This focus on employee well-being is also consistent with servant leadership, which Hu et al. (2020) had found to moderate the impact of COVID-19 threats on job performance. Furthermore, Employee Assistance Programmes may help foster a sense of social and organisational support, which could also alleviate the effects of critical incident salience that can enhance individual well-being and organizational commitment when faced with threats of critical incidents (Raja et al., 2020; Soomro et al., 2020).

Cognitive Interventions. Cognitive factors such as stereotypical thinking and rigid cognitive styles have been found to be related to ingroup biases and outgroup hostilities, and poor mental health. Stereotypical thinking was related to higher post traumatic stress disorder symptoms in Israeli adolescents, as they endorsed more threatening stereotypes of Palestinians (Goren & Neter, 2016). Individuals with rigid thinking styles (e.g., high need for closure, politically conservative) were more likely to endorse hostile actions towards outgroups (De Zavala et al., 2010). In contrast, perspective taking has led to more empathy and prosocial behaviours in American adolescents following 9/11 (Yum & Schenck-Hamlin, 2005). These outcomes indicate that cognitive flexibility can potentially reverse or mitigate the effects of CI salience on intergroup tensions and well-being.

In fact, Menzies and Menzies (2020) have explored the application of Cognitive Behavioural Therapy (CBT) in the context of TMT and the COVID-19 situation. Preparing one's will and having end-of-life discussions can enhance personal control and reduce anxiety in the face of impending deaths during COVID-19. Cognitive behavioural therapy strategies, such as thought challenging and reframing, perspective taking, along with other evidence-based therapies, can be applied to counter effects of critical incident salience by reducing cognitive rigidity and promoting uncertainty tolerance. Primes of flexibility, openness and acceptance can also counter some of these rigid cognitions, which will have downstream impact on consequent attitudes and behaviours.

Prosocial Values. Reminders of prosocial and shared values can provide other valuable avenues for intervention. Although Fairlamb and Cinnirella (2020) found evidence which contradicted the effects of tolerance primes in reducing aggression towards Muslims after terrorism salience reminders, Nugier et al. (2016) reported that French participants, when reminded of the colour-blind equality value, perceived less threats from immigrants and showed less outgroup bias against Muslims after a terrorist attack. Koreans in Lee and Kim's

study (2020), who identified more with the collectivism value and reported higher psychological closeness to the Sewol Ferry Disaster, were also more likely to donate to the victims and families who were directly affected by the disaster. Such reminders of prosocial values and collectivism may encourage altruism instead of animosity in times of crises.

In addition, Niesta et al. (2008) and Jonas and Fritsche (2013) reviewed evidence to indicate the robustness of prosocial primes in alleviating hostility towards outgroups which were symbolically related to terrorism. In particular, Niesta et al. (2008) documented that reminding communities of tolerance, benevolence and pacifism may offset some of the negative attitudes towards outgroups. Wolf et al. (2020) have also advocated reminders of shared values to encourage communities to work together during COVID-19, suggesting that prosocial reminders may alleviate social tension after critical incidents.

Common Identity. National identities, when strengthened, could also lead to less perception of social insecurity and more prosocial behaviours during critical incidents. Exploring the post 9/11 effects in the US, Kumagai and Ohbuchi (2003) found that Americans, who identified more with being American, made more donations to victims after the 9/11. This national identity superseded other racial identities that could have created social tension post 9/11. Indeed, identities are highly malleable and individuals can be re-categorised into members of different groups, thereby responding differently. Halloran and Kashima (2004) recruited participants from the same Australian community and primed them with either the Aboriginal or Australian identity. Following death reminders, participants who were primed with the Aboriginal identity endorsed more collective values while those primed with Australian identity endorsed more individualistic values. The same pattern of results emerged in a separate group of participants who were primed with student or Australian identity. These supported Jonas and Fritsche's (2013) proposition to re-categorise communities into an inclusive identity and reinforcing positive norms to reverse or mitigate

the adverse effects of war salience and terrorism salience. Therefore, highlighting a common collective identity that enhances perceived homogeneity could potentially inspire more cohesion, acceptance and kindness when faced with deaths from critical incidents.

The interventions suggested are not exhaustive. Careful examination and consideration of the research evidence, combined with good knowledge about the cultures of affected communities, will be paramount in designing and implementing effective mitigating strategies. Communities will be exceptionally vulnerable following critical incidents. Therefore, the implementation of these evidence-based interventions requires tact, delicacy, and sensitivity to reduce resistance and to maximise their benefits during and post critical incidents.

3.3.5.3 Future Research Directions

The current review summarises the different types of critical incidents as MS inductions. Overall findings from the studies have provided support of the MS effects of critical incidentson outcome variables, in particular terrorism salience. Unfortunately, foundational research needs to be strengthened given the paucity of research in death cognitions triggered by critical incidents.

Death cognitions is one of the key mechanisms in TMT. As reviewed, only 17.1% of the 181 studies from the 128 articles examined the presence of death cognitions in the empirical studies, with some articles trying to make a case for death cognitions by assessing death anxiety and using proxy questions to assess perceived life-threats of critical incidents. In addition, most of the articles tried to enhance the real-life application of critical incidentss by using pre and post critical incident data but had not pursued further comparisons with experimental controls. Hence, one potential area for further research is to examine the death cognitions triggered by different critical incidents and the standard MS manipulations, and to make comparisons with control groups to further isolate effects of critical incident salience.

Research reviewed in this paper has made comparison between different types of critical incident salience, and sometimes with standard MS. Although most of the studies which assessed the differences reported comparable effects between standard MS and critical incident salience, these only formed a small portion of the 181 studies reviewed in this paper. Hence, more work needs to be done to determine if the effects of critical incident salience are different from typical MS, and if variation in severity of critical incidents (e.g., death rates, economic impact, or transmissibility of diseases in a pandemic) would yield differences in outcomes. Future research has the capacity to inform and refine intervention efforts by matching interventions based on MS effects of critical incidents of differing severity.

Another area worthy of exploration will be the relationship between critical incident salience and close relationships. Despite earlier reviews supporting close relationships as an anxiety buffer in TMT (Plusnin et al., 2018), only five studies in this review examined close relationships as outcome variables. In view of the social climate, exploring how seeking close relationships in a prolonged critical incident such as a pandemic, interacts with social distancing measures, may encourage adherence to social distancing measures, which is an effective way to curb infectious diseases (Fong et al., 2020). Another relevant area will be how critical incident salience will influence the circulation of unverified information to keep loved ones safe during critical incidents; especially as information technology permeates contemporary society and blurs physical boundaries.

Attention should continue to be devoted to replicating and exploring new mitigating factors for critical incidents, especially disaster and war salience. As seen in this review, research in the area of disasters and wars, which are equally destructive in human society, have paled in comparison to pandemic and terrorism. While the current review has consolidated the moderating and mediating variables with intervention potential, replication research has been limited for some of the potential variables. Research into these moderators,

such as prosocial primes, can value add to remediation efforts in times of crises. This could be achieved by designing programmes and materials to ease social tension and facilitate rebuilding processes for post critical incident recoveries in a data driven manner. Empirical evaluation of these initiatives will be a natural extension of this research.

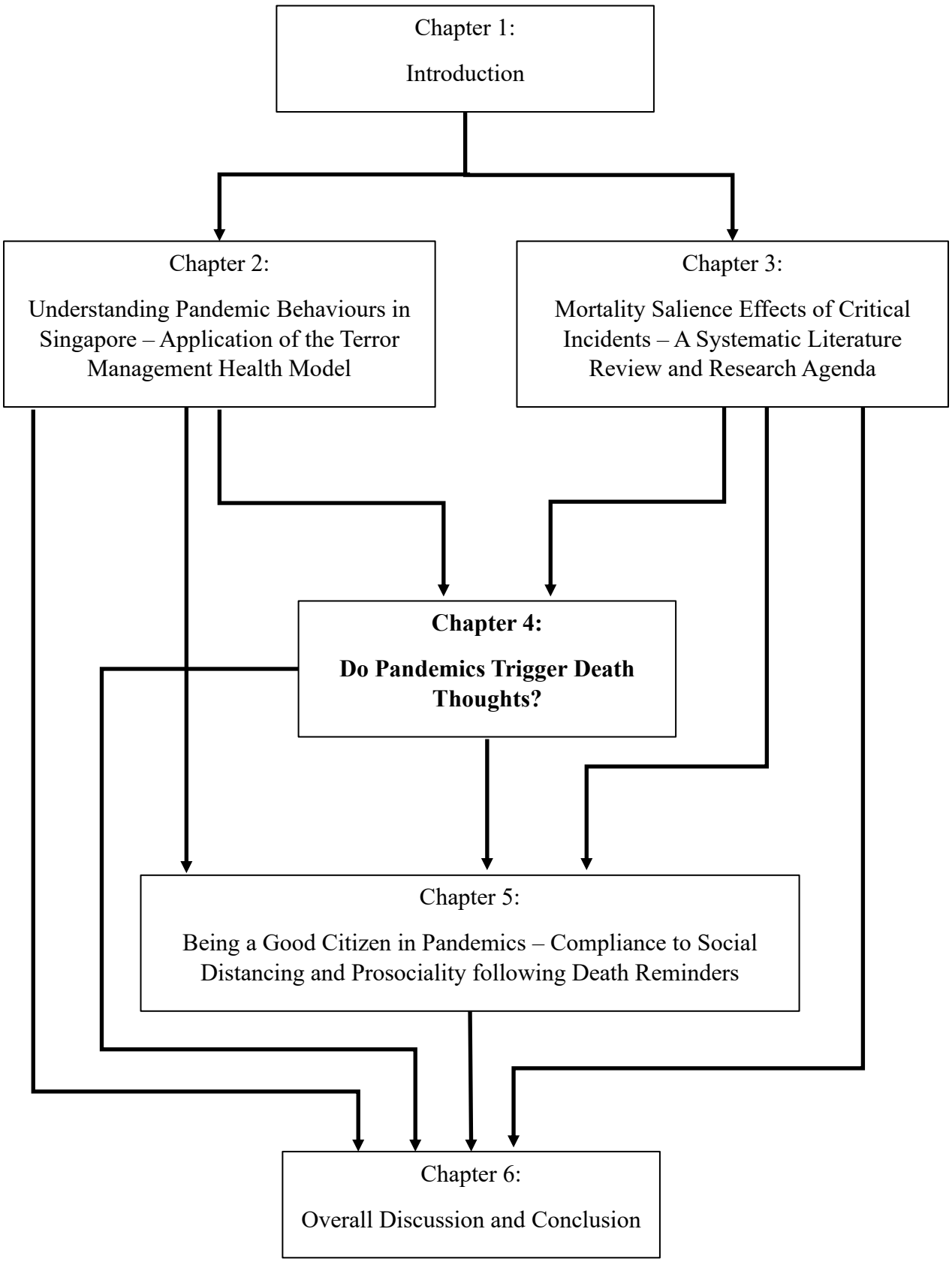
Finally, the studies reviewed in this chapter include studies of varying quality. While the rigour of work is important and we should strive to produce scientific works with high standards, we also require the editors' and reviewers' support and recognition for rigorous scientific works which may present results which are inconsistent with their beliefs or which they think may not draw readership. As discussed in this review, there is a paucity of research examining death cognitions, and even fewer published studies documenting non-significant results. These may point to a publication bias, which requires a perspective change to offer a more balanced and objective test and understanding of psychological theories. Taking the entire thesis into consideration, apart from encouraging related research, this review also hopes to appeal to journal editors and reviewers to consider publication of TMT research involving sound conceptualisation and methodologies but did not find significant results so as to balance possible publication bias (Francis, 2012; Maxwell et al., 2015).

3.3.6 Conclusion

This systematic literature review has examined the TMT studies using critical incidents as MS inductions published over the last 36 years. As far as the evidence has shown, critical incidents have triggered death cognitions akin to standard MS. Critical incidents have contributed to distal defences such as defending worldview, bolstering self-esteem, seeking of close relationships, and impacting mental health. It has consolidated potential mitigating factors for critical incident interventions and calls for further research to ascertain their potential in moderating the effects of critical incident salience. Other relevant directions suggested for future research, include the examination of varying severity of

critical incidents as MS induction, and the expansion of research into different manifestation of close relationships. There is an expectation that this review will encourage more research and evidence-based interventions to facilitate national and social recovery following critical incidents in a data-driven manner. In response to the findings from this systematic literature review, four empirical studies were conceputalised. The first two studies examine the effect of pandemic salience on death thought accessiblity. The next two studies investigate the effects of pandemic salience and a possible moderator, self-construal, on pandemic behaviours.

Chapter 4 - Do Pandemics Trigger Death Thoughts?



4.1 Chapter Overview

Chapter 4 aims to examine the mortality salience effects of pandemic using the word fragment completion task, death anxiety scale, lexical decision task and the dot probe task.

4.2 Publication Status

An earlier version of Chapter 4 is under review at the time of submission.

Leung, H. T., Chew, P. K. H., & Caltabiano, N. J. (2022). *Do Pandemics Trigger Death Thoughts?* [Manuscript submitted for publication]. College of Heath Care Sciences, James Cook University.

4.3 Manuscript

4.3.1 Abstract

The current paper aims to investigate the effects of pandemics of varying severity on death thought accessibility in two studies while controlling for health anxiety. Study 1 (n = 203) examined the effect of standard MS, severe pandemic, mild pandemic, and dental conditions on death thought accessibility as assessed by the death word fragment task (DWFT). Study 1 did not find significant effects of MS and delay on death thought accessibility, which could be attributable to the less sensitive nature of the death word fragment task. Thus, Study 2 (n = 163) was conducted with more sensitive death thought accessibility measures. Results from Study 2 found that response time towards death and positive words on the lexical-decision task was significantly faster than in standard MS and dental conditions. Both studies recruited predominantly Americans (Study 1) and Europeans (Study 2), which limit the generalizability of the results to other populations. Future studies can consider replicating the studies in other populations.

Keywords: Terror management theory, Pandemics, Death anxiety, Death thought accessibility

4.3.2 Introduction

Critical incidents, such as terrorist attacks and pandemics have demonstrated mortality salience (MS) effects on attitudes and behaviours (Arrowood et al., 2017; Das et al., 2009; Maki et al., 2019). These studies on critical incidents have consistently maintained that exposure to life threatening events such as pandemics, natural hazards, terrorist attacks and wars have led to the activation of the tripartite anxiety buffers (i.e., worldview defence, self-esteem enhancement, and seeking close relationships) of the Terror Management Theory (TMT) (Plusnin et al., 2018). While TMT research regarding MS effects of pandemics is growing, there are a few research gaps that need to be addressed. First, very few TMT studies exploring MS effects of pandemics have also examined the role and presence of death cognitions (Arrowood et al., 2017; Goodwin et al., 2011; Hu et al., 2020). Also, no studies have investigated the MS effects of pandemics of varying severity (Leung et al., 2022a). As highlighted in crisis management resources (Pfeifer & Roman, 2016; Sapriel, 2003), different critical incidents' severity may require varying levels of intervention. Thus, it will be helpful to examine if MS effects of pandemics will change according to severity, which would have downstream impact on resource utilisation. Finally, pandemics, being a health-related incident, could have triggered health anxiety, which has been hypothesized to trigger responses similar to those observed in TMT (Taylor, 2019). This overlap between health and death anxiety will need to be examined to clarify the unique MS effects of pandemics. Hence, the current study hopes to address these gaps by investigating the effects of pandemics of varying severity on death thought accessibilities.

4.3.2.1 Terror Management Theory

Terror Management Theory (TMT) proposes that individuals recognize that their lives are finite, which triggers death-thought accessibility, and in turn anxiety. To cope with this anxiety arising from a salience of one's mortality, individuals seek ways to reduce death

thoughts by extending their mortality in symbolic ways; in particular, by defending their worldview, enhancing self-esteem, and/or seeking close relationships (Plusnin et al., 2018).

When reminded about their mortality, the dual process system would be activated to guide individual responses depending on whether death thoughts are within or outside of focal attention (Kosloff et al., 2019). This dual process system suggests that if death thoughts are in the forefront of individuals' awareness, individuals are more likely to actively suppress these death thoughts to regulate the triggered anxiety. Nonetheless, when death thoughts recede into the background after a time delay and are less prominent in the individual's awareness, these previously suppressed death thoughts would rebound, making death thoughts more accessible and triggering the tripartite anxiety buffers (Steinman & Updegraff, 2015). Hence, in many TMT studies, death thought accessibility tends to increase significantly after a time delay when death thoughts rebound as individuals stopped the active suppression of death thoughts (Hayes et al., 2010; Steinman & Updegraff, 2015).

There had been some studies suggesting that death thoughts appeared immediately following death reminders, and weakened with time delay (Trafimow & Hughes, 2012). In a series of five experiments, Trafimow and Huges (2012) consistently found that death thought accessibility was elevated on the death word fragment task or the lexical decision task immediately after death reminders. The effect of the delay was absent despite various manipulations of the lengths of delay. In their final experiment, the authors instructed participants to consciously avoid thinking about death in an attempt to mimic death thought suppression/delay rebound effect. Instead of the established delayed TMT effects on death thought accessibility, the authors found that the death thought accessibility was significantly higher in the suppression condition, which asked participants to consciously track and avoid death thoughts whenever they arise, thus disconfirming the thought suppression/delay rebound effect. Nevertheless, these studies had not been replicated at the time of writing and

research indicating a delayed rebound of death thought accessibility has been more robust and well-documented (Hayes et al., 2010; Steinman & Updegraff, 2015).

To alleviate the death thoughts arising from death reminders, individuals would defend their worldview, enhance self-esteem, and seek close relationships to reduce death-thought accessibility. These pathways, also known as the tripartite anxiety buffers, have been widely researched and established (Rosenblatt et al., 1989; Tam et al., 2007). For instance, as compared to control groups, individuals who were asked to write about their personal deaths were more likely to provide less resources (Tam et al., 2007) or mete out harsher punishment (Rosenblatt et al., 1989) to those who represent or uphold a different worldview from themselves. They are also more likely to bolster their self-esteem following reminders of death by buying items that are endorsed by celebrities (Arndt et al., 2004) or seeking out interpersonal intimacy (Birnbaum et al., 2011; Lam et al., 2009; Mikulincer et al., 2003). Other studies have shown that death reminders act through death thoughts to trigger these tripartite anxiety buffers (Vail et al., 2012). When being reminded of death through pictures of buildings destroyed by war or natural disasters, Vail et al. (2012) found that individuals reported higher death thoughts and showed more intensified support for their political orientation as compared to those in control conditions. These death reminders, also known as mortality salience (MS), are likely to trigger death anxiety and consequently activate the tripartite anxiety buffers (Plusnin et al., 2018).

4.3.2.2 MS Effects of Pandemics

Over the years, infectious diseases and pandemics have led to numerous fatalities (Saunders-Hastings & Krewski, 2016). The Spanish Flu, which occurred in 1918, killed at least 50 million worldwide. Between 2014 to 2016, Ebola had accumulated over 11 000 deaths in Guinea, Liberia, and Sierra Leone. The ongoing COVID-19 pandemic has caused

close to seven million deaths worldwide since December 2019 (John Hopkins University, 2023). This association with deaths insinuates the ability of pandemics to trigger MS.

Indeed, terror management studies have utilized pandemics as MS inductions. Ebola, swine flu and COVID-19 have been studied as a form of death reminder in TMT studies (Arrowood et al., 2017; Bélanger et al., 2013; Goodwin et al., 2011; Jutzi et al., 2020). For instance, Arrowood et al. (2017) conducted two studies to investigate the MS effects of Ebola virus on death cognitions and adherence to religious teachings. Participants were instructed to pen down thoughts and feelings of contracting Ebola virus before completing the word fragment task, which assessed death thoughts, and the religious fundamentalism scale. Both studies found that the Ebola condition yielded significantly more death-related words than the control condition. The death cognitions also mediated the relationship between Ebola salience and individuals' commitment to religious teachings, indicating the process through which death reminders trigger worldview defence.

Similar patterns of the MS effect on death cognitions were observed in TMT studies using swine flu. Bélanger et al. (2013) and Goodwin et al. (2011) both reported elevated death-related thoughts when their participants were being reminded of the swine flu such as writing significantly more death-related words after reading about contracting swine flu or thinking about their deaths more frequently since the swine flu outbreak.

More recently, researchers have begun investigating the MS effects of COVID-19. Some assessed the MS effects of COVID-19 by collecting data during the COVID-19 peak periods (Tomaszek & Muchacka-Cymerman, 2020; Wong & Yang, 2020) while others have tried to induce MS by asking participants to rate their perceived threat of COVID-19 (Nanni & Ulqinaku, 2021; Song et al., 2020). Su and Shen (2020) induced MS by asking participants to consider the chances of someone contracting COVID-19 in their community. They found that those who perceived a higher likelihood of infection in their community showed more

support for a nationalistic policy (i.e., international travel ban). Jutzi et al. (2020) also found MS effects on ingroup bias, an example of worldview defence, when they manipulated the COVID-19 threat. Specifically, when participants were led to believe that COVID-19 was incurable, they exhibited more ingroup bias than those in the control group. Individuals also behaved in ways which boosted their self-esteem in the face of COVID-19 threats. For instance, individuals who perceived technology as central to their self-esteem were more accepting towards virtual tours of museums (Nanni & Ulqinaku, 2021) when the perceived COVID-19 threat was high. This evidence converged to highlight the MS effects of pandemics on worldview defence and self-esteem enhancement.

Studies have also found MS effects of pandemics on death thought accessibility (Arrowood et al., 2017; Grover et al., 2010). To explore the MS effects of the AIDS pandemic, Grover et al. (2010) compared number of death-related words completed in a word fragment task by participants randomized to the standard MS (i.e., thinking about death in general), AIDS, or dental pain conditions. They found that both standard MS and AIDS conditions yielded significantly more death words, and hence higher death thought accessibility, than the dental pain control condition. Arrowood et al. (2017) also assessed significantly higher death thought accessibility in the Ebola condition than the control condition. These results demonstrated that pandemic situations had similar MS effects as thinking about death in general and both heightened death thought accessibility significantly than control conditions.

4.3.2.3 Anxieties during Pandemics

Pandemics like COVID-19 have triggered elevated levels of psychological distress, such as depression and anxiety. In a nationwide study assessing anxiety, depression, avoidant and compulsive behaviours and physical symptoms during COVID-19, Qiu et al. (2020) found that 35% of their 52000 sample reported significant psychological distress. In the U.S.,

Twenge and Joiner (2020) found that as compared to the National Health Interview Survey conducted in 2018, American adults were at least three to eight times more likely to meet criteria for severe mental distress, as represented by depressive and anxiety symptoms, when surveyed during the COVID-19 pandemic. This pattern of heightened psychological distress during COVID-19 was evident across the world (Bäuerle et al., 2020; Vahedian-Azimi et al., 2020; Özdin & Bayrak Özdin, 2020; Bigot et al., 2021), reflecting the increased fear and anxieties during pandemics and their possible relationships to health behaviours in pandemics.

Other studies have examined the relationship between psychological distress and health behaviours in pandemics. For instance, researchers have reported that state anxiety predicted handwashing behaviours, but not adherence to social distancing measures, in Koreans during the Swine flu pandemic (Kim et al., 2011). Others have found health anxiety was related to higher frequency of handwashing, better indoor ventilation, and more frequent disinfection of households during COVID-19 (Ko et al., 2020).

The COVID-19 pandemic, being a health-related scenario, could have triggered a health-anxiety-related response other than TMT responses. From a health-anxiety perspective, individuals are more likely to misinterpret bodily symptoms as disease, triggering anxiety, which eventually can lead to behaviours such as seeking medical attention and adherence to infection-control measures. It was also suggested that individuals who breached social-distancing measures could be low in health anxiety, held an ‘unrealistic optimism bias’, where individuals felt that they would not contract the disease, or probably coped with stressful events, such as a prolonged crisis like a pandemic, by seeking social closeness (Taylor, 2019). Extrapolating evidence related to health anxiety, Taylor (2019) and Asmundson and Taylor (2020a, 2020b) hypothesized that people adopted many of the health behaviours observed in the COVID-19 pandemic, such as stockpiling, more adherence to

infection control measures and xenophobic sentiments as a means to protect and maintain good health, thereby alleviating health anxiety. Coincidentally, these behaviours were also similar to those observed in TMT (Courtney et al., 2020; Pyszczynski et al., 2020).

4.3.2.4 Health Anxiety and TMT

These responses triggered by health anxiety were similar to the defences depicted in the TMT. As illustrated by Courtney et al. (2020) and Pyszczynski et al. (2020), health-related behaviours could also be appreciated through the lens of TMT. Specifically, these responses serve as defence mechanisms to regulate anxiety arising from an innate need for self-preservation in the face of death threats (i.e., pandemics). Thus, one major difference between the two approaches is the individual's preoccupation. In TMT, preoccupation with death thoughts has been shown to mediate the relationship between death threat with behavioural and attitudinal outcomes such as adherence to religious practices and political preferences (Arrowood et al., 2017; Vail et al., 2012). Alternatively, individuals with health anxiety could be preoccupied with health or other catastrophic consequences of illnesses such as physical suffering, loss of mobility and enjoyment in life (Salkovskis et al., 2002).

Hu et al. (2020) examined the relationship between COVID-19 threat and anxiety. They found that perceived COVID-19 threat was related to general anxiety and death anxiety, suggesting that COVID-19 could bring about TMT-related outcomes. Tomaszek and Muchacka-Cymerman (2020) found that individuals' post-traumatic stress symptoms were related to their existential anxiety during the peak of COVID-19. Further analysis in their study concluded that existential anxiety mediated the relationship between COVID-19 and post traumatic stress disorder symptoms. On the other hand, Ko et al. (2020) and Bigot et al. (2021) examined the relationships between worries and health anxieties during COVID-19, and their relationship to health behaviours. These suggested that the COVID-19 pandemic also triggered health anxiety, which motivated behaviours which overlapped with the

defences of TMT. Therefore, this study controls for health anxiety, to isolate the effects of death anxiety in pandemics (Arrowood et al., 2017; Goodwin et al., 2011; Hu et al., 2020).

4.3.2.5 Addressing Research Gaps

Despite evidence pointing to the MS effects of pandemics, several research gaps still exist. First, although most studies have shown that pandemics trigger worldview defence and self-esteem enhancement (Jutzi et al., 2020; Nanni & Ulqinaku, 2021), few have assessed death-related cognitions, an important component of TMT (Leung et al., 2022a). As Hayes et al. (2010) pointed out, unconscious preoccupation with death, which triggers death anxiety, forms the basis of TMT. These implicit death thoughts could be assessed through measures such as word fragments and implicit attitude tests (Naidu et al., 2020; Vail et al., 2012). Indeed, some studies have observed increased death cognitions in standard MS and CI conditions (Fairlamb & Cinnirella, 2020; Pyszczynski & Kesebir, 2011; Suzuki et al., 2020), but others have not been able to replicate these findings (Dewa et al., 2014; Luke & Hartwig, 2014; Lyall & Thorsteinsson, 2007). Further, these studies were conducted in the context of terrorism and wars, and not specific to pandemics. Thus, there is a need to investigate the relationship between pandemics and death cognitions.

Another research gap to be examined would be the MS effects of pandemic conditions of varying severity. Although some studies have explored a specific pandemic (e.g., Swine Flu; COVID-19), they have not compared the MS effects of CIs of varying severity. As far as the current researchers are aware, MS effects of pandemics of varying severity have not been the focus of studies to date. The differentiation between the varying severity might refine crisis responses and maximize utility of resources for intervention. As recommended in crisis management guidelines, tiered responses based on severity and the nature of CIs will help to deploy resources in an efficient and effective manner (Pfeifer & Roman, 2016; Sapriel,

2003). Thus, exploring the MS effects and designing interventions based on these differences would ensure timely deployment and utilization of resources.

Finally, the pandemic, being a health-related critical incident, could have triggered health anxiety, which in turn, triggered behaviours observed in pandemics (Asmundson & Taylor, 2020a). However, these behaviours could also be a product of the death anxiety triggered by the infectious nature and fatalities of COVID-19. To isolate the MS effects of the pandemic, it will be important to acknowledge and control the potential contribution of health anxiety.

Thus, study 1 aims to address these research gaps. In summary, the present study hypothesizes that the severe pandemic condition and the standard MS condition will yield significantly higher levels of death cognitions than the mild pandemic and dental conditions after a time delay, and will continue to do so when controlled for health anxiety.

4.3.3 Study 1 Method

4.3.3.1 Participants

An a priori power analysis for a two-way ANOVA with medium effect size of 0.25 (Steinman & Updegraff, 2015, $\alpha = .05$, $1–\beta = .8$), revealed that a minimum of 179 participants would be required for a sufficiently-powered test. Five hundred and fourteen full data sets were collected, out of which 63 participants indicated they were under 18 years old and hence not allowed to participate in the study while 2 eventually decided to decline participation. Another 246 participants responded with excerpts extracted verbatim from online sources, keyed in only single word answers to the essay questions or demonstrated response sets and were thus excluded from the study. This leaves a final sample size of 203. The average time taken to complete the survey was 1001.58 seconds or approximately 16 minutes.

Most of the participants were from the United States (73.4%) while the rest were from India, Brazil, and other countries (e.g., Kenya, England). Their age ranged from 19 to 64 years (M = 35.9 years, SD = 10.34). The majority of the participants received at least two doses of vaccination (47.8%) and had personal experience with COVID-19 (58.6%; i.e., personally or had relatives who had contracted COVID-19 or quarantined due to COVID-19).

4.3.3.2 Materials

Short Health Anxiety Inventory (SHAI)

The Short Health Anxiety Inventory consists of 18 items assessing individuals' symptoms of health anxiety (hypochondriasis) and their attitudes as to how unpleasant it would be if they were to develop a particular illness (Salkovskis et al., 2002). Four statements of varying levels of health anxiety would be presented within each item. For instance, when asked about general worries about health, the statements were 'I do not worry about my health.', 'I occasionally worry about my health.', 'I spend much of my time worrying about my health.', and 'I spend most of my time worrying about my health.'. Respondents were instructed to choose one of these four options which reflected their level of health anxiety. The items are rated on a Likert scale of 0 to 3 with higher ratings indicating higher anxieties. Items one to 14 assessed an individual's level of health anxiety with total scores ranging from zero to 52. Items 15 to 18 assessed an individual's attitude towards the negative consequences of developing a severe illness. The total scores ranged from zero to 12. Salkovskis et al. (2002) reported that the Short Health Anxiety Inventory converged with a two-factor solution through confirmatory factor analysis with a health anxiety factor and a negative consequence factor. The Cronbach αs were .92 for health anxiety and .79 for the attitudes towards negative consequences of developing severe illnesses subscale for the present study.

Mortality Salience Manipulation

Participants were asked to pen down their thoughts and feelings about either (1) their own death (standard MS condition), (2) contracting a severe and highly transmissible flu virus (severe pandemic condition), (3) contracting a mild and low transmissible flu virus (mild pandemic condition), or (4) dental pain (control condition). Those who were assigned to the pandemic conditions were instructed to read the following passage before responding to the two questions: '*The World Health Organization (WHO) has recently announced the discovery of a new flu virus. Based on the analysis of the epidemiological data over the last three months from countries with cases, WHO and pandemic experts have classified this virus to be highly contagious with severe symptoms (severe pandemic condition) / not contagious with mild symptoms (mild pandemic condition). Frontline observations (i.e., General Practitioners, Hospitals) reported that the hospitalization rate for infected cases is as high as 10% (1000 in 10 000 people) and fatality rate stands at a high rate of 1% (100 in 10 000 people) (severe pandemic condition) / as low as 0.5% (50 in 10 000 people) and fatality rate stands at a low rate of 0.02% (2 in 10 000 people) (mild pandemic condition) for those who contracted the virus.*' They were then asked to respond to the following '*Please briefly describe the emotions and possible consequences that the thought of contracting this new flu arouses in you*' and '*Jot down, as specifically as you can, what you think will happen to you physically get the new flu and once you have physically gotten the new flu'*. Previous research on diseases has shown that asking individuals to reflect on their thoughts, feelings and physical conditions if they were to contract the disease would be sufficient to heighten death thoughts (Arrowood et al., 2017; Bélanger et al., 2013).

PANAS-X Scale

Participants were then asked to rate their present feelings and emotions on the Positive and Negative Affect Schedule - Expanded Form (PANAS-X) (Watson & Clark,

1999). The scale comprises of 30 positive and 30 negative emotions. The Positive and Negative Affect Schedule - Expanded Form has been shown to have two higher order factors of positive (e.g., cheerful) and negative affect (e.g., sad). Participants rate their emotions on a scale of 1 (Very Slightly or Not at All) to 5 (Extremely). Items making up the positive and negative affect scales were summed together. Higher scores suggest higher levels of positive and negative affect. Scores ranged from 10 to 50 for the higher order factors of positive and negative. The Positive and Negative Affect Schedule - Expanded Form assesses the emotions the participants are feeling after completing the essays on the MS inductions. The Cronbach αs for positive and negative affect in the current study are .91 and .95 respectively.

Death Word Fragment Task

The Death Word Fragment Task (DWFT) consists of 25 incomplete word stems which were used to access death-related thoughts. Out of the 25-word stems, six can be completed with a neutral or death-related word. For example, the word stem 'DE _ _' can be completed as either 'DEAD' (death-related word) or 'DEED' (neutral word). Participants complete the task by filling letters in the blanks to create words that first come to their mind. The more death-related words completed, the higher the death thought accessibility. This measure was selected as it was one of the common tools to assess for death thought accessibility in TMT studies (Hayes et al., 2010; Naidu et al., 2020).

4.3.3.3 Procedures

A 4 (IV 1: Standard MS vs. Severe Pandemic vs. Mild Pandemic vs. Dental Pain) x 2 (IV 2: Delay vs. No-Delay) between-subjects design was used with death thought accessibility as the dependent variable. Participants were informed that they would be participating in a survey ostensibly about personality, health beliefs and emotions, which would take about 30 minutes. The survey was hosted on Qualtrics and the Qualtrics link was placed on the mTurk platform.

Informed consent was taken through participants' declaration if they consent to take part in the study and if they were 18 years old and above. After indicating their consent, participants began the survey by responding to the Short Health Anxiety Inventory,before being randomly assigned to one of the four MS conditions. Participants were then randomized to the delay or no-delay group. For those assigned to the delay group, they rated their emotions on the Positive and Negative Affect Schedule - Expanded Form and completed a filler task related to a short story. They then completed the 25-word stem dependent measure. Those in the non-delay condition completed the 25-word stem immediately after responding to the MS questions. They then proceeded to complete the Positive and Negative Affect Schedule - Expanded Form . All participants ended the survey by filling in a demographic form.

Based on the manipulation checks conducted after the questionnaires, none of the participants were aware of the true purpose of the study. They were then presented with a list of mental health resources if they felt uncomfortable after having participated in the survey. After completing the survey, participants were given USD$1.50 on the mTurk platform. This procedure was approved by the university's ethics committee (Approval number: H8295).

4.3.4 Study 1 Results

The data was analyzed using SPSS Version 22 with the alpha level set at .05. In accordance with standard MS studies, the effect of MS on negative affect was examined to assess if the MS effects are due to unique death concerns rather than negative affect. A 4x2 between-subjects ANOVA was conducted to assess the effects of MS on negative affect on the Positive and Negative Affect Schedule - Expanded Form. Results showed that MS, $F(3,195) = .611$, $p = .609$, and Delay, $F(1,195) = .075$, $p = .785$, did not have a significant effect on negative affect. There was no significant interaction effect of MS and Delay on negative affect, $F(3,195) = .86$, $p = .463$.

Table 4.1

Means and Standard Deviations of Words Completed on the DWFT

	Standard MS	PS - Severe	PS - Mild	Dental Pain
Delay	1.96 (1.10)	2.00 (1.30)	1.86 (1.04)	2.04 (0.82)
No Delay	2.27 (1.37)	1.96 (0.84)	1.69 (0.97)	1.75 (0.79)

Note: Standard deviations are presented in parentheses. DWFT = Death Word Fragment Task; MS = Mortality Salience; PS = Pandemic Salience.

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

To test the hypothesis, a 4x2 between-subjects ANCOVA, was performed to examine the effects of MS and Delay on death thought accessibility while controlling for health anxiety. Results did not find significant effects of MS, $F(3,193) = 1.03$, $p = .38$, and Delay, $F(1,193) = .04$, $p = .84$, on death thought accessibility when controlling for health anxiety. The interaction effect of MS and Delay, after controlling for health anxiety, was also not significant on death thought accessibility, $F(3,193) = .68$, $p = .57$. No significant main effect of Nationality was yielded when Nationality was included into the analysis. This indicates that familiarity with English based on Nationality was not related to the number of death words generated. The means and standard deviations for the death word fragment task are shown in Table 4.1.

4.3.5 Study 1 Discussion

Study 1 set out to investigate the MS effects of varying pandemic conditions on death cognitions and to isolate the effects of MS on death thought accessibility while controlling for health anxiety. However, there were no significant differences in death thought accessibility between standard MS, severe or mild pandemic and control conditions, and between delay and no-delay conditions, even when controlling for health anxiety. Hence our hypothesis was not supported.

These findings were inconsistent with previous studies that have found robust MS and delay effects on death thought accessibility (Hayes et al., 2010; Steinman & Updegraff, 2015). The non-significant results could be accounted for by five reasons. Firstly, the presentation of the health anxiety inventory prior to the test conditions could have primed participants of death thoughts. Although unlike typical death anxiety scales which make explicit references to death, the health anxiety inventory did assess individuals' attitudes towards severe illnesses, which would have implicitly triggered associations with death and consequently death thoughts (Steinman & Updegraff, 2015). When death reminders were indirect, individuals were less likely to engage in active suppression of death thoughts to self-preserve. Instead, death thoughts would hover subtly in their awareness and time delay would not be required before the death thoughts became accessible (Steinman & Updegraff, 2015). Nevertheless, if the health anxiety inventory had acted as a subtle death reminder, the current results would have found significantly higher death thought accessibility in the no-delay conditions. This was not the case, which suggests that the likelihood of Short Health Anxiety Inventory triggering death thought accessibility was low.

Another potential explanation for the lack of evidence for death cognitions in critical incident salience condition (i.e., pandemic condition) could be related to the severity of the conditions prepared. If a critical incident condition was mild and did not trigger a life-threatening perception, it might not trigger death cognitions. When examining the effects of COVID-19, Hu et al. (2020) found that it was the perceived threat of COVID-19, rather than the objective fatality and infection information of COVID-19, which was related to MS effects. When reviewing some of the responses in the high severity pandemic condition, some participants reported that they were not concerned about being infected and believed that practicing infection control measures would protect them from the flu virus. Stated differently, the practice of infection control strategies, which are consistent with proximal

defence (i.e., health-oriented behaviours) in the terror management health model (TMHM), could have allayed some of the death anxiety which was triggered by the exposure to the pandemic conditions. In addition, the pandemic conditions employed in the current study had been pretested and had shown a significant difference in the perceived threat triggered by the conditions.

A third possibility could be due to the immersion in the year-long COVID-19 pandemic. The COVID-19 pandemic could have heightened death cognitions and psychological distress in individuals over the two to three years. As highlighted by Courtney et al. (2020) and Pyszczynski et al. (2020), individuals had responded in accordance to the TMT and TMHM during COVID-19, suggesting heightened death cognitions. Other studies have also shown elevated levels of general and death anxiety during COVID-19 (Bigot et al., 2021; Qiu et al., 2021; Shakil et al., 2020). Being immersed in the pandemic could have already triggered and maintained the anxiety, obscuring the MS effects being explored in the current study.

A previous study exploring the MS effects of critical incident had not been able to find MS effects of terrorism, as the community had just gone through a recent terrorist attack (Lyall & Thorsteinsson, 2007). The authors postulated that the experience of a recent terrorist attack had elevated death cognitions in their sample, thus masking the MS effects of their studies. While terrorist attacks are relatively time limited, other studies examining longer term critical incidents such as wars have also reported similar patterns in their findings (Ginzburg et al., 2010; Llabre & Hadi, 2009). Longitudinal studies have revealed that soldiers' depressive, anxiety and post traumatic stress disorder symptoms stayed elevated over 20 years of war (Ginzburg et al., 2010). These negative effects continued to have post-war adverse effects on individual health such as poor sleep quality and obesity, suggesting the long-lasting effects of critical incidents (Llabre & Hadi, 2009). Research examining the

effects of natural disasters has also shown that survivors continued to experience elevated levels of distress as compared to controls four years post disaster (Van Den Berg et al., 2008). These seemed to indicate that even if the critical incidents are over, their effects could have a long-lasting impact post incident, which could have attenuated the MS effects, let alone a prolonged critical incident like the COVID-19 pandemic.

A fourth explanation is the limited sensitivity of the death word fragment task. The utility of the word-stem had been tested and compared with other measures of death thought accessibility. Although widely used in TMT, a recent study by Naidu et al. (2020) found that the death word fragment task had not been able to distinguish between MS conditions. Rather, other implicit measures, such as the lexical-decision task, dot-probe task and ambiguous inkblot pictures, demonstrated higher sensitivity to differentiate the conditions. The death word fragment task might not have been sufficiently sensitive in this instance and had not captured the death cognitions to distinguish the MS conditions despite its prevalence and success in detecting death thought accessibility s in other TMT studies.

Finally, the non-significant results could also indicate a failure to replicate the MS effects. While TMT has shown robust evidence that supports the relationship between MS and death cognitions (Greenberg et al., 1994; Hayes et al., 2010), some studies had not been able to replicate MS effects (Haaf et al., 2020; Lyall & Thorsteinsson, 2007; Sætrevik & Sjåstad, 2022; Ullrich & Cohrs, 2007). In view of these issues, a replication study in the form of Study 2, is required.

4.3.6 Study 2

Data collection for Study 2 was conducted between December 2021 to February 2022, during which COVID-19 continued to ravage the world. By then, the global population had been immersed in COVID-19 for at least two years and different governments continued to relax and tighten the COVID-19 infection control measures based on the evolving situation.

The study design is the same as Study 1, except for the removal of the mild pandemic condition and a change of dependent variables (DVs) to assess death thought accessibility. The mild pandemic condition was removed as it did not trigger significant perception of threats in our pilot study and there were no significant effects of mild pandemic condition on death thought accessibility in Study 1. The death word fragment task was replaced with the Death Anxiety Scale (DAS), lexical-decision task, and the dot-probe task. These dependent variables were selected as they had been used to assess death thought accessibility in TMT studies (Arndt et al., 2007; Vail et al., 2012). Also, as reported by Naidu et al. (2020), the Lexical-Decision Task and Dot-Probe Task were more sensitive measures of DTA as compared to the death word fragment task. Permission was obtained from Naidu et al. (2020) to use the same stimuli for the Lexical-Decision Task and Dot-Probe Task. The stimuli are presented in Appendix 19.

Similar to Study 1, Study 2 hypothesizes that the pandemic condition and the standard MS condition will yield significantly higher levels of death cognitions than the control condition after a time delay, while controlling for health anxiety. Study 2 was pre-registered with Open Science Framework (OSF) Registries (Registration DOI: 10.17605/OSF.IO/4SD2J).

4.3.7 Study 2 Method

4.3.7.1 Participants

For the current study, a minimum sample size of 158 was required to achieve a high-powered test (Steinman & Updegraff, 2015; i.e., $d = 0.25$, $\alpha = 0.05$, $1–\beta = 0.8$). Responses were collected from mTurk, Prolific, a local telegram community ‘SgResearchLobang’, and the university’s research participation program. Five hundred and thirty-five full data sets were collected. After removing 372 responses which used verbatium content from online sources, comprised single words (e.g., Good), indicated response sets (e.g., all the same

scores) and/or those which did not meet Naidu et al.'s (2020) inclusion criteria for the Lexical-Decision Task and Dot Probe tasks (i.e., no more than 10 errors, response time <200ms and >1500ms after presentation of stimuli), 163 complete responses were retained for data analysis. Participants were mainly from Europe (39.3%), Africa (26.4%), followed by America (22.1%) and Asia (11.7%). The age ranged from 18 to 63 years old (M = 27.75 years, SD = 9.0). The majority of the participants received at least two doses of vaccination (81.0%) at the time of the study and had personal experience with COVID-19 (79.8%).

4.3.7.2 Materials

The Lexical-Decision Task

The Lexical-Decision Task stimuli were made up of 24 words - eight death-related words as the death word fragment task (e.g., skull, grave), eight threat-related words (e.g., criticism, crisis), and eight positive-related words (e.g., kindness, cheer). Each of the words was paired with a neutral word of corresponding word length, word frequency, and arousal. The non-words were also matched with corresponding length and syllables using the Wuggy pseudo-word generator. Participants would be shown the word stimuli and were instructed to press the spacebar when the stimulus was a word and not to respond if it was a nonword. They completed 15 practice trials which comprised neutral words before attempting the actual 96 trials.

Dot-Probe Task

Twenty-four word pairs were formed with the same stimuli from the Lexical-Decision Task, . with one word from each word categories (i.e., death-, threat-, positive-), and a neutral word matched on word length and frequency. Each trial began with a fixation display at the centre of the screen for 500 ms, after which a word pair would be presented simultaneously, one on to the upper-middle and another on the lower-middle of the screen. A probe '*' or '**' then appeared for 500 ms in the location of either the death-, threat- or, positive- related word

(congruent presentation), or the neutral word (incongruent presentation. Participants were instructed to press corresponding arrow keys as quickly and accurately as possible to differentiate between two probes when they saw either one or two probes respectively. Participants completed 192 critical trials, which were presented in a randomised order. An Attentional Bias (AB) index was computed by subtracting response time for congruent (probe at presentation category location) from incongruent presentations (probe at neutral word location).

Death Anxiety Scale

The Death Anxiety Scale (Templer, 1970) is made of 15 items. Individuals would respond if the items were 'true' or 'false' in their experience. An example of the items is '*I am very much afraid to die*'. The total scores ranged from zero to 15, with higher scores indicating higher death anxiety. The Death Anxiety Scale has been found to have good convergent validity with other scales measuring death anxiety such as the Fear of Death Scale (Templar, 1970; Gilliland & Templar 1980). It has been translated to other languages and have demonstrated good reliabilities and validities (Abdel-khalek & Neimeyer, 2020; Tomás-Sábado & Gómez-Benito, 2002; Tavakoli, & Ahmadzadeh, 2011).

4.3.7.3 Procedures

All instructions and materials were the same as Study 1 except for (i) the removal of the mild pandemic condition and (ii) the use of different dependent measures. Participants were randomly assigned to one of the conditions before completing all the three dependent measures. The Lexical-Decision Task and Dot-Probe Task were programmed in accordance with Naidu et al. (2020). Together with the Death Anxiety Scale, the Lexical-Decision Task and Dot-Probe Task were presented in a randomized manner on the Millisecond Inquisit Software. Participants were required to enter their participant number or their workers' ID number at the beginning of the computer tasks and when they were directed back to the final

phase of the study (i.e., demographic information) after the computer tasks to ensure that datasets are accurately matched.

4.3.8 Study 2 Results

The data was analyzed using SPSS Version 22 with the alpha level set at .05. Amongst the final group of participants, the average time taken to complete the survey was 1525.30s seconds or approximately 25 minutes.

The Cronbach αs were .90 for health anxiety and .69 for the attitudes towards negative consequences of developing severe illnesses subscale for the present study. The Cronbach αs for positive and negative affect in the current study are .92 and .90 respectively.

The means and standard deviations of the DVs are presented in Table 4.2. There was no significant effect of MS on positive affect, $F(2,157) = .09$, $p = .92$, or negative affect, $F(2,157) = 1.55$, $p = .22$. Delay also did not have any significant effects on positive affect, $F(1,157) = .27$, $p = .61$, or negative affect, $F(1,157) = .03$, $p = .87$. The interaction effect of MS and Delay was also not significant on both positive and negative affect, $p > .05$.

To address the hypothesis, a 3 (IV 1: Standard MS vs. Severe Pandemic vs. Dental Pain) x 2 (IV 2: Delay vs. No-Delay) between-subjects ANCOVA, was performed to examine the effects of MS and Delay on the Lexical-Decision Task while controlling for health anxiety. Results showed that MS has a significant effect on Lexical-Decision Task Death and Positive words, $F(2,155) = 3.17$, $p = .05$ and $F(2,155) = 3.37$, $p = .04$. To ascertain if familiarity with English could have influenced the results, Nationality was included into the ANCOVA analysis. There were no main effects of Nationality on any of the Lexical-Decision Task dependent variables.

Table 4.2

Means and Standard Deviation of the Death Anxiety Scale (DAS), the Lexical-Decision Task (LDT) and the Dot-Probe Task (DPT)

		Standard MS	PS	Dental
LDT Response Time				
Death words	No Delay	518.39 (123.00)	504.79 (65.93)	534.08 (89.87)
	Delay	526.04 (100.34)	488.02(63.38)	556.50 (140.52)
	Total	522.15 (111.48)	495.98 (64.52)*	545.50 (117.85)*
Positive words	No Delay	513.32 (127.30)	504.84 (55.36)	525.01 (95.68)
	Delay	517.54 (98.24)	483.16 (38.14)	557.72 (129.05)
	Total	515.39 (112.93)	493.39 (47.84)*	541.66 (114.05)*
Threat words	No Delay	544.29 (120.74)	541.50 (75.52)	558.24 (98.89)
	Delay	548.26 (114.13)	507.47 (37.71)	580.83 (132.09)
	Total	546.24 (116.47)	523.52 (60.54)	569.74 (116.46)
DAS scores				
DAS	No Delay	8.57 (3.37)	9.16 (2.75)	9.00 (3.93)
	Delay	7.56 (3.89)	7.93 (2.87)	10.04 (3.07)
	Total	8.07 (3.64)	8.51 (2.85)	9.53 (3.53)
DPT Attention Bias Index				
Death words	No Delay	-3.81 (18.67)	-1.41 (33.15)	5.07 (18.38)
	Delay	2.00 (16.29)	-2.09 (29.71)	4.47 (18.30)
	Total	-.96 (17.63)	-1.77 (31.07)	4.77 (18.17)
Positive words	No Delay	12.32 (17.77)	29.09 (44.38)	19.36 (16.68)
	Delay	11.35 (18.55)	15.02 (23.73)	20.29 (19.69)
	Total	11.84 (17.99)	21.65 (35.38)	19.84 (18.11)

Threat words	No Delay	-8.37 (17.26)	1.36 (32.49)	4.20 (16.11)
	Delay	-1.28 (14.43)	-2.78 (32.43)	-8.71 (22.32)
	Total	-4.89 (16.19)	-.83 (32.21)	-2.38 (20.41)

Note: Standard deviations are presented in parentheses. DAS = Death Anxiety Scale; DPT = Dot-Probe Task; MS = Mortality Salience; PS = Pandemic Salience; LDT = Lexical Decision Task.

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

Post-hoc analysis with the Tukey HSD revealed that response time to death words were significantly faster in the pandemic (M = 495.93, SD = 64.52) than dental condition (M = 545.50, SD = 117.85), d = .53. Similar post-hoc Tukey HSD analysis found that response to positive words were significantly faster in the pandemic (M = 493.39, SD = 47.84) than dental condition (M = 541.66, SD = 114.05), d = .55. There were no significant differences in response times between death and positive words between standard MS and control condition. The faster response time towards Lexical-Decision Task Death words in the pandemic than the control condition provided partial support for our hypothesis. There were no significant differences in response times between death and positive words between standard MS and control conditions.

The MS effect on Dot-Probe Task and Death Anxiety Scale were not significant. Dot-probe task results did not reveal differences for AB toward death-related words between conditions. There were no significant main effects of MS on AB towards death related words, $F(2,158) = 1.17$, $p = .31$, postive words, $F(2,158) = 2.44$, $p = .09$, and threat words, $F(2,155) = .42$, $p = .66$. There was also no main effect of Delay or interaction effect of MS and Delay on Dot-Probe Task and Death Anxiety Scale scores, $p > .05$. Thus, our hypothesis was partially supported as response time was significantly faster towards Lexical-Decision Task

Death words in the pandemic than control condition but not for the other dependent variables, when controlling for health anxiety.

4.3.9 Study 2 Discussion

The purpose of Study 2 was to examine issues raised in Study 1's findings. The current study found that the response times were significantly faster towards Lexical-Decision Task death words than threat words following exposure to the severe pandemic as compared to the control condition. However, this inclination towards death words was not observed for Dot Probe Task. Although not formally recorded, several participants had reported that the Dot Probe Task was challenging as they could not comprehend the task. This could have impacted the performance and outcomes on the Dot Probe Task. In addition, the Dot Probe Task has been criticised to have poor reliability, suggesting its limitation in accessing death cognitions and anxiety (Kappenman et al., 2014; Torrence & Troup, 2017). An increase in death anxiety was also not observed on the Death Anxiety Scale. As highlighted by Pyszczynski et al. (1999). And demonstrated by Naidu et al. (2020), the death cognitions amd anxiety might not have been as easily accessible in individuals' consciousness and thus not reflected through the responses on the Death Anxiety Scale, which is an explicit assessment of death anxiety.

The results obtained from the Lexical Decision Task suggest that death thoughts were more accessible, leading individuals to respond faster to death words when they were reminded of severe pandemics. The effect of MS on death thought accessibility remained significant when we controlled for health anxiety, supporting the hypothesis that the severe pandemic condition was able to trigger MS effect, and continued to do so when controlling for health anxiety. This finding also increased the confidence that the absence of death thought accessibility in Study 1 was unlikely to be a consequence of the exposure of Short Health Anxiety Inventory-Short Form but rather a consequence of the use of a less sensitive

death thought accessibility measure. In addition, the world continued to be ravaged by COVID-19 when Study 2 was conducted. This makes the obscuring of death thought accessibility arising from prolonged exposure to COVID-19 an unlikely explanation for the absence of the death thought accessibility in Study 1.

Apart from significant differences in response time towards Lexical-Decision Task Death words, results also showed that participants responded significantly faster towards positive words. This might appear counterintuitive given that MS typically trigger death-related anxiety. Nevertheless, some studies have suggested that this attunement to positive stimuli could be a coping response in the face of MS (DeWall & Baumeister, 2007; Kelley et al., 2014). When confronted with personal death reminders, participants were likely to regulate the anxiety aroused by seeking positive information such as responding faster to positive word associations or gazing longer at positive images (DeWall & Baumeister, 2007; Kelley et al., 2014). The seeking of positive information was found in both delay and no-delay MS conditions. Through a series of three studies, Dewall and Baumeister (2007) have consistently found an inclination towards positive information immediately and after a time delay following MS presentation, leading the authors to postulate that the regulation of death anxiety by seeking positive information began immediately after death reminders and persevered throughout the time delay. In line with this research, participants in the current study have demonstrated this inclination towards Lexical-Decision Task positive words, possibly as an attempt to regulate the anxiety arising from death reminders in the pandemic condition.

The MS effect of pandemic was prevalent in both delay and no-delay conditions. Based on the dual process model of TMT, the MS effects are expected to be more robust following a time delay. This is a result of the rebound effects following the active suppression of death thoughts which were triggered immediately after death reminders. Nevertheless, the

effect of delay on death thought accessibility was not found in this study, suggesting that death thought accessibility was triggered immediately after exposure to the pandemic condition, and stayed elevated after a time delay.

One possible explanation is the presence of cognitive load when individuals were embarking on the computerised tasks assessing the DVs. As noted in Hayes et al. (2010), suppression of death thought accessibility would be disrupted when a competing task was introduced, allowing the manifestation of death thought accessibility. For instance, participants in the present study could have been engaging in other competing tasks as it is not uncommon for individuals to multitask when embarking on online surveys and studies (Revilla & Ochoa, 2015). This multitasking could have interfered with the active suppression of death thoughts following exposure to the pandemic condition, allowing the manifestation of elevated death thought accessibility immediately after MS induction.

A second possibility is the subtlety of MS prime of the pandemic condition. As compared to the standard MS condition, the severity of the pandemic condition was presented using statistics on fatalities and gravity of the symptoms experienced, after which participants were asked to jot down their thoughts and emotions if they 'had gotten' the virus rather than 'die' from the virus. This presentation of the impact of the pandemic condition on participants could have been perceived as less explicit and confrontational, thereby triggering death thoughts in a subtle manner, making them more accessible immediately (Steinman & Updergraff, 2015).

Finally, there had been evidence that MS effects could weaken following a time delay (Trafimow & Hughes, 2012). Trafimow and Huges (2012) consistently found that death thought accessibility was elevated on death word fragment task or Lexical-Decision Task immediately after the MS induction. The current results follow a similar pattern of significant elevation of death thought accessibility immediately following pandemic salience. Hence, the

interference of thought suppression from multitasking, the subtlety of the MS presentation of the pandemic condition and the possible absence of a delayed MS effect on death thought accessibility could account for the current results.

While there was a MS effect of severe pandemic on death thought accessibility, there was no MS effect observed in the standard MS condition in the two studies, suggesting a failure to replicate the standard MS effect. The failure to replicate results of published psychological research has been a topic of contention, with some suggesting that publication biases have contributed to this issue (Francis, 2012; Maxwell et al., 2015). Indeed, most studies examining critical incidents seldom compared death thought accessibility between standard MS and critical incident conditions (Leung et al., 2022a). Amongst the limited published literature investigating the MS effects of diseases, Leung et al. (2022a) only found one peer-reviewed article which compared the death thought accessibility between Ebola and control conditions, but this had not included the standard MS condition (Arrowood et al., 2017). Also, studies which reported a non-significant effect of standard MS and critical incident seemed to be under-represented, with only one study in Leung et al.'s review (2022a) reporting null effects of standard MS and terrorism on death thought accessibility (Ullrich & Cohrs, 2007). These could indicate a possibility that research which did not detect standard MS effects on death thought accessibility have not been represented in published literature.

Recent large scale replication efforts have also challenged the robustness of the MS effects (Haaf et al., 2020; Sætrevik & Sjåstad, 2022; Klein et al., 2019). A large scale replication effort by Many Labs 4 which replicated MS experimental designs had not found significant MS effects (Klein et al., 2019). This absence of MS effects holds even when the original authors were involved in the replication studies (Klein et al., 2019) and following a Bayesian reanalysis of the Many Labs 4 data (Haaf et al., 2020). More recently, Sætrevik and Sjåstad (2022) attempted to replicate MS effects on traditional and novel measures using

sample sizes that are statistically powerful enough to detect the MS effects but to no avail. These failures to replicate seemed to be cumulative evidence implying that MS effects were not as robust as previously published.

4.3.10 General Discussion

This research aimed to examine the MS effect of pandemic salience condition in view of the COVID-19 pandemic. To the best of the authors' knowledge, it is also the first study which assessed death thought accessibility of pandemic salience using TMT endorsed measures (Cox et al., 2019). Using the death word fragment task, the first study had not found significant MS effects on death thought accessibility. This was contrary to past studies, which have found MS effects of diseases (e.g., Ebola, cancer) on death thought accessibility as assessed by the death word fragment task (Arrowood et al., 2017; Arndt et al., 2007). However, death thought accessibility was significantly elevated in the pandemic condition than in the control condition when we replaced the death word fragment task with the Lexical-Decision Task in the second study. In particular, participants responded significantly faster towards death words in the pandemic condition as compared to the control condition. The shorter response time towards death words was consistent with other TMT studies assessing death thought accessibility with Lexical-Decision Task following exposure to pictures of buildings destroyed by war (Vail et al., 2012; Hayes et al., 2008).

It is interesting to note that unlike past studies (Arrowood et al., 2017; Das et al., 2009; Kastenmüller et al., 2011), MS effects on death thought accessibility, as assessed by the death word fragment task, was not significant in Study 1. This led to questions about the sensitivity and psychometric properties of the death word fragment task, which were explored by Naidu et al. (2020). In their first study, responses on the death word fragment task did not show significant differences in death words generated between MS and the control condition. However, responses on implicit tasks were able to distinguish between MS and control

conditions, in which participants responded significantly faster to death words in the Lexical-Decision Task and reported more death images based on the inkblot stimuli. Similarly, Study 1 did not find significant differences in death words generated on the death word fragment task between MS and control conditions. Instead, response time towards death words in the Lexical-Decision Task was able to distinguish pandemic and control conditions when we replace death word fragment task with Lexical-Decision Task, supporting the idea that death word fragment task may be less sensitive than other implicit measures in assessing death thought accessibility (Naidu et al., 2020). We also found that following pandemic reminders, individuals showed a faster response time towards positive words, which some studies have interpreted as an immediate coping after MS inductions (Dewall & Baumeister, 2007; Kelley et al., 2014).

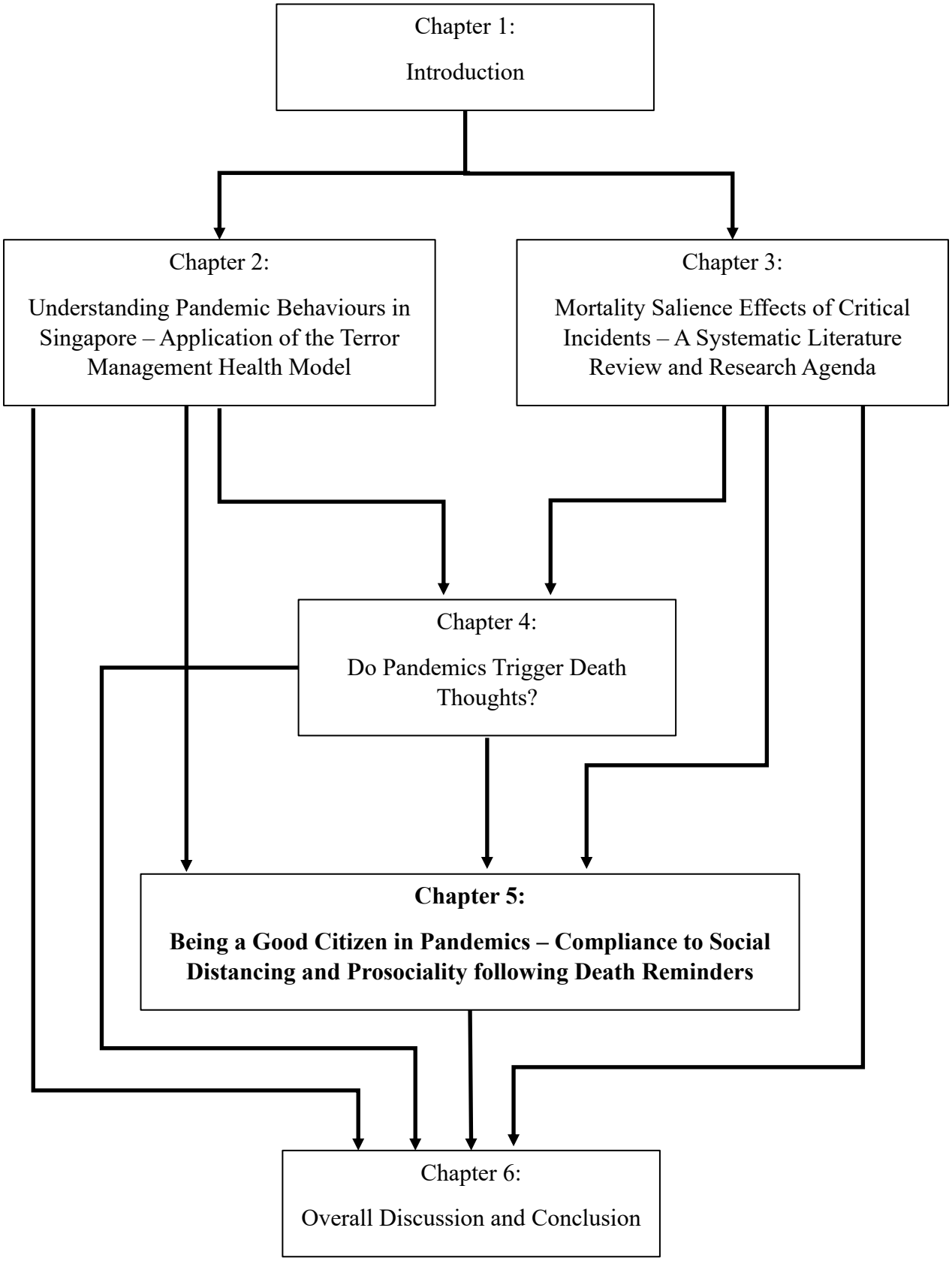
A final point to note for this study is the failure to replicate MS effects of standard MS inductions. While the standard MS effects have been found to be robust (Hayes et al., 2010; Steinman & Updergraff, 2015), the current study did not find effects of standard MS on both the death word fragment task and Lexical-Decision Task. Apart from the absence of MS effects of the standard MS induction, the absence of the MS effects on the death word fragment task could also be attributable to the limited sensitivity of the death word fragment task (Naidu et al., 2020). Recent studies have tried to replicate the standard MS induction (i.e., asked about thoughts and feelings evoked by death), as well as employed appropriate statistical analysis, but to no avail (Haaf et al., 2021; Klein et al., 2019; Sætrevik, & Sjåstad, 2022). However, we were able to find MS effects of death associated conditions (i.e., severe pandemic), which were indicative of MS effects consistent with TMT.

This study has two limitations. First, the samples are mainly made up of individuals from the United States in Study 1 while Europeans formed the majority of participants in Study 2, thus making these results unlikely to be generalisable to other populations. A related

second limitation is that data were collected online due to the COVID-19 social distancing restrictions. This could have biased sampling, as there could be inherent differences between individuals who had a strong online presence as compared to those who do not. Nevertheless, with online data collection being more prevalent, studies examining TMT effects have continued to report robust TMT effects, similar when data collection was done face-to-face.

In conclusion, the current study found a MS effect in the pandemic condition on death cognitions when they were assessed on the Lexical-Decision Task instead of the death word fragment task. This could be a result of the limited sensitivity of the death word fragment task. Also, standard MS effect was not present regardless of death thought accessibility measures employed, leading to a consideration of the failure to replicate. Nevertheless, more research and unbiased publication are needed to re-examine the issue of a failure to replicate. Following the partial support that pandemics can trigger death thought accessibility, the thesis will now move to examine the effects of pandemic salience on pandemic behaviours within the terror management health model (TMHM).

Chapter 5 – Being a Good Citizen in Pandemics – Compliance to Social Distancing and Prosociality following Death Reminders



5.1 Chapter Overview

Chapter 5 aims to examine the mortality salience effects of pandemic on compliance to social distancing measures and prosociality, while controlling for effects of health anxiety.

5.2 Publication Status

An earlier version was under review at the time of submission. The manuscript has been reviewed and published in December 2023 after the thesis was submitted for examination.

Leung, H. T., Chew, P. K. H., & Caltabiano, N. J. (2023). Being a good citizen in pandemics–compliance to social distancing and prosociality following death reminders. *Current Psychology*, 1-14.

5.3 Manuscript

5.3.1 Abstract

The current paper aims to investigate the effects of pandemics and self-construal primes (i.e., collectivist/individualist) on two pandemic behaviours, namely compliance to social distancing measures and prosociality while controlling for health anxiety. Study 1 (n = 207; *M age* =39.8 years, *SD age* = 12.3) examined the effect of pandemic salience and self-construal on compliance to social distancing measures. Results found a significant effect of pandemic salience on compliance to social distancing measures. Study 2 (n = 203; *M age* = 38.9, *SD age* = 11.6) examined the effects of pandemic salience and self-construal on prosociality, as measured by the Prosocial Behavioural Intentions Scale and Prosociality Scale. Results from Study 2 found a two-way interaction effect of pandemic salience and delay for helping actions, and a three-way interaction effect of pandemic salience, delay, and self-construal for caring actions and empathy. Individuals were more inclined to help others immediately after pandemic salience regardless of self-construal. They also endorsed more caring actions and empathy immediately after pandemic salience, only if they had been primed with collectivism self-construal. Findings from these studies offer important

considerations in the conceptualization of community interventions during crises such as a pandemic or other community disasters.

Keywords: Terror management health model, Pandemics, Health behaviours, Compliance, Social Distancing Measures, Prosocial Tendencies

5.3.2 Introduction

The mortality salience (MS) effect of infectious diseases and pandemics are undeniable given their affiliation with fatalities (Leung et al., 2022a; Saunders-Hastings & Krewski, 2016). The Spanish Flu, which occurred in 1918, killed at least 50 million worldwide while COVID-19 had taken more than six million lives globally since it was identified in December 2019 (John Hopkins University, 2023). This association with deaths highlights the MS effects of pandemics and infectious diseases.

Over the years, studies investigating terror management theory (TMT) have induced MS through pandemics and infectious diseases. Researchers have examined the use of Ebola, swine flu and COVID-19 as death reminders in TMT studies. They reported significant increases in death cognitions following these pandemic salience) inductions, while some have also shown TMT defences involving worldview defence, self-esteem enhancement and social intimacy inclination (Arrowood et al., 2017; Bélanger et al., 2013; Nejat & Tabas, 2022; Jutzi et al., 2020; Leung et al., 2022b).

The basis of TMT rests on the conflict between human beings' developed cognitive abilities to recognise that our lives are finite and our need for self-preservation. This conflict triggers death anxiety within humans, which is regulated through the literal or symbolic extension of mortality, such as avoiding or minimizing threats, taking immediate corrective actions (Routledge et al., 2004) or defending worldviews, enhancing self-esteem, or seeking close relationships (Plusnin et al., 2018).

As depicted in the dual process model in TMT, these remedial actions and attitudes aimed at regulating our death anxiety, may or may not be logical and relevant to the threats at hand. Instead, they are determined by the salience of death thoughts in the individuals' conscious awareness (Pyszczynski et al., 1999). Based on the dual process model, if death thoughts are at the forefront of our awareness, we are more inclined to engage in proximal defences. Stated differently, we would respond in rational and logical ways to alleviate death anxiety. As death thoughts recede and hover at the periphery of consciousness after a time delay, we will shift towards distal defences. Distal defences are responses that may appear illogical and contradictory to the current threats, but are helpful in alleviating anxiety through the enforcement of our worldview, self-esteem, or relational needs (Pyszczynski et al., 1999).

5.3.2.1 Terror Management Health Model (TMHM)

This dual process model of TMT forms the backbone of the Terror Management Health Model (TMHM; Arndt & Goldenberg, 2017). When applying the dual process model to health behaviours, individuals are likely to respond with proximal defences such as minimising the threat of the health risks or take protective actions to reduce their risks immediately after death reminders are presented. However, they will respond with distal defences, such as acting in accordance with their worldview, enhancing self-esteem or seeking intimacy, following a time delay after the death cognitions have receded from conscious awareness (Routledge et al., 2004; Morris et al., 2019).

When exploring attitudes towards suntanning and sun protection, Routledge et al. (2004) found that female participants, who valued being tanned, expressed higher interest in sunscreens with better protection immediately after they were reminded of the health threatening potential of exposure to sun. However, those in the delay condition did not show such a preference. This reflected a pattern of proximal and distal defences based on the prominence of death thoughts. Presumably, individuals, who valued being tanned, adopted

the proximal defence by showing more interest in sunscreen products for personal protection immediately after they were reminded of death threats, when death thoughts are active in their consciousness. However, as death thoughts recede into the background after a time delay, participants adopted distal defences by expressing significantly less interest in sunscreen products as they valued being tanned. This difference in interest in sunscreen products was not apparent in the control condition. Similar trends in results have been replicated with other health situations and behaviours, such as drinking water (McCabe et al., 2014), exercises (Morris et al., 2019) and sexual behaviours (Bessarabova & Massey, 2020).

5.3.2.2 TMHM and Pandemic Behaviours

The TMHM has been applied to understand pandemic behaviours observed during COVID-19. The COVID-19 pandemic has triggered behaviours which have not been observed in previous pandemics such as Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome (MERS), and Ebola. These behaviours include intentionally breaching infection control measures, such as safe distancing measures and quarantine orders and not wearing facemasks when mandatory, which were implemented to safeguard the health of individuals and communities (Leung et al., 2022b). Other undesired behaviours include stockpiling of groceries, facemasks, paracetamol and sanitisers (Khan, 2020; Leung et al., 2022b). Although some have behaved in socially irresponsible ways which jeopardized the health and needs of others, there are some who chose to behave prosocially. As documented anecdotally, there are groups of individuals who made and gave out reusable facemasks when this resource was scarce, provided bottles of hand sanitisers in lifts for the community and donated government subsidies to the needy or gave free meals during the heat of the COVID-19 pandemic (Leung et al., 2022b; Shukla et al., 2022). Others have also documented caring and helpful actions during COVID-19, including offering

emotional support to family and friends, higher donation for Emergency Funds and showing more interest in volunteering for COVID-19 related causes (Sweijen et al., 2022).

The TMHM offers an insight into some of the possible processes motivating these behaviours and attitudes in the pandemic. It also offers a glimpse of a possible intervention to mitigate maladaptive behaviours and encourage helpful ones. Using the TMHM, Courtney et al. (2020) and Leung et al. (2022b) have identified and framed some of these behaviours observed in the US, UK and Singapore. For instance, the denial of the COVID-19 threat or increase in the purchase of surgical masks and sanitisers were conceptualised as proximal defences, which immediately alleviate death threats and death anxiety. Others such as resistance to comply with infection control measures as it represents foregoing individual freedom, the expression of xenophobic attitudes, and breaching social distancing measures, could be perceived as distal defences which reinforce worldviews, boost self-esteem or facilitate intimacy to alleviate death anxiety. Courtney et al. (2020) further suggested interventions in accordance with TMT principles to encourage adaptive health behaviours during COVID-19. These include using celebrity endorsement to encourage adaptive health behaviours, and through the self-construal prime (i.e., collectivism/individualism) to encourage compliance with personal infection control measures (e.g., handwashing; maintaining social distancing) and increasing vaccination intent (Courtney et al., 2021).

5.3.2.3 Role of Self-Construal in Affecting Behaviours

Self-construal, such as collectivism and individualism, can be made salient by our circumstances, social environment, or accidental reminders. The salience of self-construal would in turn guide our attitudes and behaviours (Cojuharenco et al., 2012; Green & Merle, 2013). As demonstrated by Halloran and Kashima (2004), Australian students were more likely to behave consistently as an Australian or as a student depending on which identity was made salient, suggesting that social identity is malleable and can guide corresponding

behaviours. When primed with the collective self-construal, Cojuharenco et al. (2012) found that participants were less likely to engage in unethical behaviours such as cheating in an exam in order to advance self-interest than those primed with individualism. Green and Merle (2013) provided further support for the effect of self-construal on prosocial behaviours. When presented with the collective self-construal, Green and Merle (2013) found that participants reported higher civic-mindedness, regardless of MS conditions. These reinforce the idea that collective and individualist self-construals are malleable and can affect outcomes in a controlled setting.

Outside of the laboratories, Zaki (2020) introduced the concept of 'catastrophe compassion', which are prosocial behaviours in crises and disasters triggered by shared identities and empathy towards each other. Under catastrophe compassion, victims and survivors, who are unrelated, develop a collective identity that leads to collaboration to increase chances of survival (Zaki, 2020). These demonstrated the power of self-construal, specifically collectivism, in shaping adaptive behaviours during peace times or when in crises (Cojuharenco et al., 2012; Green & Merle, 2013; Zaki, 2020).

Past research examining self-construal and MS have also shown that collectivism and individualism alleviated death anxiety in individuals through distal defences such as reinforcing worldview and self-esteem (Du et al., 2013; Ma-Kellams & Blascovich, 2011). When faced with mortality salience, individuals tend to express attitudes or behaviours consistent with their valued self-construal. For instance, when reminded of personal deaths, those who value collectivism will increase in their collectivist esteem or show more empathy and positive attitudes towards other people, even when they are not in-group members. On the other hand, those who value individualism reported higher individual esteem to buffer death anxiety, and showed less care for others when reminded of MS (Ma-Kellams & Blascovich, 2011).

Tapping into the potential of a self-construal, Lee and Kim (2020) and Courtney et al. (2021) examined how collectivism and individualism can interact with mortality salience to influence behavioural intentions. Lee and Kim (2020) explored how personal death reminders and a self-construal impact on the prosocial intent of Koreans towards families of victims of the Sewol ferry disaster. Following reminders of a collective self-construal, participants expressed greater prosocial intentions to help and donate to families of the disaster victims (Lee & Kim, 2020). Adaptive behavioural intentions to practice infection control measures and to vaccinate against COVID-19 were higher in an American sample in Courtney et al.'s study (2021), which induced MS through COVID-19 reminders. Participants who were primed to be collectivist and who had undergone the COVID-19 condition tended to report higher health behaviour intentions than control groups. They also found that, as compared to those primed to be individualistic, participants primed to be collectivistic reported higher intention to be vaccinated when they were reminded of COVID-19 death threats. Therefore, collective and individualist self-construals, can be made salient, and have the potential to influence responses to public health interventions and encourage health-oriented behaviours.

5.3.2.4 Health Anxiety and TMHM

Pandemics like COVID-19 have triggered significant psychological distress and health anxiety across the globe (Bäuerle et al., 2020; Bigot et al., 2021; Qiu et al., 2020; Vahedian-Azimi et al., 2020), reflecting the increased fear and anxieties and their relationships to health behaviours in pandemics. Psychological distress has been found to predict handwashing behaviours (Kim et al., 2011), while health anxiety was related to higher frequency of handwashing, better indoor ventilation, and more frequent disinfection of households during COVID-19 (Bigot et al., 2021; Ko et al., 2020).

The COVID-19 pandemic, being a health-related crisis, is likely to trigger health-anxiety-related responses other than TMT responses. Asmundson and Taylor (2020)

hypothesized that people adopted many of the health behaviours observed in the COVID-19 pandemic, such as stockpiling, more adherence to infection control measures and xenophobic sentiments as a means to protect and maintain good health, thereby regulating health anxiety.

Coincidentally, these behaviours triggered by health anxiety also highly resemble defences in TMHM. These health-related behaviours could also be appreciated as TMT defence mechanisms aimed at regulating anxiety arising from an innate need for self-preservation in the face of death threats (i.e., pandemics) (Courtney et al., 2020; Pyszczynski et al., 2020). For instance, Song et al. (2022) examined the relationship between COVID-19 threat, death anxiety and willingness to pay for healthcare. They found that the severity of COVID-19 pandemic was related to higher willingness to pay for healthcare, and this relationship is mediated by death anxiety. On the other hand, Ko et al. (2020) and Bigot et al. (2021) reported significant levels of worries and health anxieties in their participants during COVID-19 which were closely related to participants' health behaviours (e.g., indoor ventilation, disinfecting household, handwashing). These suggest that the COVID-19 pandemic not only triggered death anxiety, but also health anxiety, which motivated behaviours similar to the defences speculated in TMHM. Therefore, it is paramount to isolate health anxiety to examine the effect of death anxiety in pandemics by controlling the contribution of health anxiety on these behaviours.

5.3.2.5 The Present Study

In view of the above discussion, the present study hopes to achieve two aims. The first is to clarify the role of death anxiety in pandemics by controlling for health anxiety. Second, this research aims to examine the compliance to social distancing measures and prosociality as they are important pandemic behaviours under the TMHM. This latter objective will enhance the utility of the TMHM in community health and crisis intervention,

and consequently guide interventions to enhance community resilience and public health protection.

Hence, the current study aims to investigate the effect of pandemic salience on compliance to social distancing measures (Study 1) and prosociality (Study 2) while controlling for health anxiety. It is hypothesized that:

H1: Individuals primed with collectivism will show more compliance to social distancing measures following pandemic salience and after a time delay.

H2: Individuals primed with collectivism will report higher prosociality following pandemic salience and after a time delay.

Both Studies 1 and 2 were pre-registered with Open Science Framework (OSF) Registries (Registration DOI:https://doi.org/10.17605/OSF.IO/NQY4T). Data collection spanned from September to November 2022 for Study 1 and from December 2022 to March 2023 for Study 2. All measures, manipulations and exclusions in the study are reported. Sample sizes were determined before any data analysis.

5.3.3 Study 1 Method

5.3.3.1 Participants

An a priori power analysis for a three-way ANOVA with medium effect size of 0.25 (Steinman & Updegraff, 2015, $\alpha = .05$, $1–\beta = .8$), revealed that a minimum of 128 participants would be required for a sufficiently-powered test. Only participants who had task approval of at least 90% were recruited from mTurk. Two hundred and seventy-four full data sets were collected, out of which 74 participants were excluded as they responded with excerpts extracted verbatim from online sources, keyed in only single word answers to the essay questions, demonstrated response sets and/or failed attention checks (e.g., please select 2 for this item). This leaves a final sample size of 207 which was analysed for Study 1.

Most of the participants were female (51.2%) and from the United States (85.0%), followed by India (13.0%) and other countries (1.9%) such as Singapore and Poland. Their age ranged from 18 to 75 years (M = 39.8 years, SD = 12.3). Most were married (59.9%), fully vaccinated (78.7%) and had no chronic health conditions (83.6%). Most had personal experience with COVID-19 (80.7%).

5.3.3.2 Materials

Short Health Anxiety Inventory (SHAI)

The Short Health Anxiety Inventory is an 18-item questionnaire assessing individuals' symptoms of health anxiety and their attitudes towards developing a particular illness (Salkovskis et al., 2002). Four statements reflecting varying levels of health anxiety were presented within each item. For example, when asked about general worries about health, the statements were 'I do not worry about my health.', 'I occasionally worry about my health.', 'I spend much of my time worrying about my health.', and 'I spend most of my time worrying about my health.'. Respondents were instructed to choose one of these four options which was most reflective of their level of health anxiety. Items are rated on a Likert scale of 0 to 3 with higher ratings indicating higher anxieties. The first 14 items, with total scores ranging from zero to 52, assessed an individual's level of health anxiety. The last four items, with total scores ranging from zero to 12, assessed an individual's attitude towards the negative consequences of developing a severe illness. Salkovskis et al. (2002) reported that the Short Health Anxiety Inventory converged with a two-factor solution through confirmatory factor analysis with a health anxiety factor and a negative consequence factor. The Cronbach αs were .91 for health anxiety and .79 for the attitudes towards negative consequences of developing severe illnesses subscale for the present study.

Self-Construal Manipulation

To prime individuals into a collectivist or individualist mindset, participants were instructed to read from a passage (Appendix 21) and to select all the collectivist or individualist pronouns (e.g., 'I', 'me, 'we', 'us') based on the experimental conditions assigned (Brewer & Gardner, 1996; Courtney et al., 2021). These passages have been shown to successfully prime collectivism and individualism (Brewer & Gardner, 1996; Oyserman & Lee, 2008).

Mortality Salience Manipulation

Participants were asked to write their thoughts and feelings about either contracting a severe and highly transmissible flu virus (pandemic salience) or dental pain (control condition). Those who were assigned to the pandemic conditions were instructed to read the following passage before responding to the two questions: '*The World Health Organization (WHO) has recently announced the discovery of a new flu virus. Based on the analysis of the epidemiological data over the last three months from countries with cases, WHO and pandemic experts have classified this virus to be highly contagious with severe symptoms. Frontline observations (i.e., General Practitioners, Hospitals) reported that the hospitalization rate for infected cases is as high as 10% (1000 in 10 000 people) and fatality rate stands at a high rate of 1% (100 in 10 000 people) for those who contracted the virus.*' They were then asked to respond to the following '*Please briefly describe the emotions and possible consequences that the thought of contracting this new flu arouses in you*' and '*Jot down, as specifically as you can, what you think will happen to you physically when you get the new flu and once you have physically gotten the new flu*'.

PANAS-X Scale

The Positive and Negative Affect Schedule - Expanded Form (PANAS-X) (Watson & Clark, 1999), which comprises 30 positive and 30 negative emotions, was used to assess

participants' present feelings and emotions after exposure to the MS conditions. Participants rate their emotions on a scale of 1 (Very Slightly or Not at All) to 5 (Extremely). Items making up the scales would be summed together, with scores ranging from 10 to 50. The Positive and Negative Affect Schedule - Expanded Form has been shown to have two higher order factors of positive (e.g., cheerful) and negative affect (e.g., sad). The Cronbach αs for positive and negative affect in the current study are .91 and .95 respectively.

Compliance to Social Distancing Measures

The Compliance with Social Distancing Measures was developed and validated by Van Rooij et al. (2020). It is a 5-item scale which assesses overall compliance with the social distancing measures. It can also be calculated to derive two sub scores, one for compliance to not visiting others including relatives and friends and one for compliance to stay at home. Items are rated on a 7-point scale from 1 (never) to 7 (always), with items 1, 3, and 4 being reverse-coded. Higher scores indicate stronger attention and compliance to social distancing rules. The compliance to social distancing measure has been translated into Turkish and validated by Oral and Gunlu (2021). Both Van Rooij et al. (2020) and Oral and Gunlu (2021) reported a one-factor structure following factor analysis. The Cronbach α for the measure in the present study is 0.83.

5.3.3.3 Procedures

A 2(IV1: Pandemic Salience vs. Dental Pain) x 2 (IV2: Individualist vs. Collectivist prime) x 2 (IV3: Delay vs. No Delay) between-subjects design was set up. The dependent measure in this study is compliance to social distancing measures (Van Rooij et al., 2020). Participants were informed that this is a 30-minute survey on personality, health beliefs, and emotions. The survey was hosted on Qualtrics. A Qualtrics link was generated and placed on the mTurk platform.

Participants' consent was sought before the commencement of the survey. They began the survey by responding to the Short Health Anxiety Inventory, before being randomly assigned to either the collectivist or individualistic conditions. A manipulation check item was presented to assess the priming effect of the collectivist/individualist primes (Ferenczi et al., 2015). Participants then proceeded to write about either contracting the severe flu or dental pain (control condition), before finally being assigned to the delay or no-delay groups. Those in the delay group rated their emotions on the Positive and Negative Affect Schedule - Expanded Form before moving on to the compliance to social distancing measure. Those in the no-delay condition completed the social distancing measure immediately after responding to the pandemic salience questions. They then went on to the Positive and Negative Affect Schedule - Expanded Form. All participants ended the survey by filling in a demographic form. Attention check items (e.g., indicating a specific rating for an item) were inserted to ensure that participants were paying attention when embarking on the survey (Courtney et al., 2021).

A manipulation check was conducted by asking participants what they think the purpose of the study is, and then they were debriefed. A list of mental health resources was provided to participants at the end of the survey if they felt uncomfortable after the survey. After completing the survey, participants were given USD$1.50 on the mTurk platform. This procedure was approved by the university's ethics committee (Approval number: H8831).

5.3.4 Study 1 Results

To examine if the data are normally distributed, a kurtosis and skewness analysis was conducted. The kurtosis values of the outcome measures ranged from -.48 to .06, while the skewness ranged from -.89 to .29, and can be considered normal if skewness is between -2 to +2 and kurtosis is between -7 to +7 (Hair et al., 2010). Table is attached in Appendix 11.

The data were analysed using SPSS Version 22 with the alpha level set at .05. MANOVA was used to analyse the data as the dependent variables are subscales belonging to the same instrument, which are correlated (Field, 2009). The average time taken to complete the survey was 823.93 seconds or approximately 13.7 minutes.

Amongst the demographic variables, there was a significant main effect of marital status on overall compliance to social distancing, $F(4, 71) = 2.81$, $p = .032$, and compliance to no visiting of others, $F(4,71) = 2.83$, $p = .031$. However, post-hoc analysis with Tukey HSD did not reveal significant differences between marital status on any of the social distancing measures. Vaccination status was also found to have a significant main effect on overall compliance to social distancing measures, $F(4,194) = 3.45$, $p = .037$, and compliance to stay home, $F(4,194) = 7.15$, $p < .001$. Post- hoc analysis with Tukey HSD revealed that participants who were fully vaccinated ($M = 21.88$, $SD = 7.10$) or awaiting vaccination ($M = 20.96$, $SD = 6.06$) reported higher compliance to overall social distancing measures than those who declined vaccination ($M = 14.87$, $SD = 7.17$), $p < .05$. Fully vaccinated participants ($M = 5.44$, $SD = 1.54$) and those awaiting vaccination ($M = 5.12$, $SD = 1.39$) were also more likely to comply with stay home orders than those who declined vaccination ($M = 3.07$, $SD = 1.75$), $p < .05$. Also, those who were fully vaccinated ($M = 16.44$, $SD = 6.36$) reported higher compliance to not visiting others than those who declined vaccination ($M = 11.80$, $SD = 5.61$), $p = .027$.

The effect of pandemic salience on negative affect was also examined to assess if the pandemic salience effects were due to unique death concerns rather than negative affect. A 2 (IV1: pandemic salience vs. Dental Pain) x 2 (IV2: Individualist vs. Collectivist prime) x 2 (IV3: Delay vs. No Delay) between-subjects MANOVA was conducted to assess the effects of PS on negative and positive affect on the Positive and Negative Affect Schedule -

Expanded Form. There were no significant effects of pandemic salience, delay or self-construal on both positive and negative affect, $p > .05$.

Table 5.1

Means and Standard Deviation of Compliance to Social Distancing Measures

Outcome Variable	PS		Control	
	Mean	*SD*	Mean	*SD*
Overall Compliance to SDM	22.98**	7.34	19.52	6.49
Compliance to No Visits to Others	17.61**	6.53	14.49	5.52
Compliance to Staying a Home	5.37	1.64	5.03	1.69

Note: Standard deviations are presented in parentheses. SDM = Social Distancing Measures, PS = Pandemic Salience, * $p<.05$, ** $p<.001$

To test the hypothesis, a 2 (IV 1: pandemic salience vs. Dental Pain) x 2 (IV 2: Delay vs. No Delay) x 2 (Collectivist vs. Individualist prime) between-subjects MANOVA, was performed to examine the effects of pandemic salience, delay and self-construal on compliance to social distancing. These results remained similar when controlling for health anxiety, marital status and vaccination status. Hence, only results from the MANOVA are presented.

Results showed significant main effects of pandemic salience on overall compliance with social distancing measures, $F(1, 199) = 13.17$, $p <.001$ and compliance to no visitation to others, $F(1,199) = 14.10$, $p <.001$. These indicated that participants, who were reminded of pandemic salience, showed higher overall compliance with social distancing measures and compliance to not visiting others, than those in the control condition. There were no significant main effects of delay or self-construal on any aspects of social distancing measures. There were also no significant interaction effects of pandemic salience, delay, and

self-construal. The means and standard deviations for the overall compliance to social distancing measures, compliance to stay home and compliance to no visitation to others are shown in Table 5.1.

5.3.4 Study 1 Discussion

Study 1 set out to investigate the MS effects of pandemic salience on compliance to social distancing measures. Results from the current study showed that when exposed to the death threatening nature of a pandemic, individuals were more likely to comply with social distancing measures by staying at home and not visiting others. This compliance was maintained regardless of time delay or self-construal. Hence, H1 was partially supported.

These findings might have appeared inconsistent with previous studies investigating the effects of pandemic salience and self-construal primes on health behaviours that found participants, who were primed with collectivism, expressed higher vaccination intent when reminded of death (Courtney et al., 2022). However, pandemic salience and self-construal could have influenced the rationalization of health behaviours differently within individuals, which eventually resulted in a similar expression of compliance. For instance, individuals, when presented with either a collectivistic or individualistic prime, would both have expressed compliance to social distancing measures, not because the self-construal was unsuccessful. Rather, participants primed with collectivism could have expressed compliance to protect the collective good, while those primed with individualism would have complied to protect themselves, hence, obscuring any effects of self-construal primes on social distancing measures. This is in line with findings from a large-scale US study examining mask wearing and cultural factors (Kemmelmeier & Jami, 2021). Essentially, the authors reported that individuals high on either individualism or collectivism complied with mask-wearing during COVID-19 for different reasons related to the respective self-construal. Following this

perspective, it is understandable when self-construal primes did not appear to have any significant effect on social distancing measures.

In our current study, the adherence to social distancing measures was maintained regardless of delay. While some TMHM research has shown robust delayed effects on outcome variables, some have shown that health behaviours transcend time following death reminders (Arndt et al., 2003; Morris et al., 2019). When examining the effect of personal death reminders on physical exercises, Arndt et al. (2003) found that commitment to physical exercises increase immediately after death reminders. This commitment was maintained after a time delay in individuals who perceived physical exercise as part of their self-esteem.

The transcendence across time was not only limited to short delays during experimental studies and surveys. Morris et al. (2019) explored commitment to adaptive health behaviours immediately and after two to six weeks post MS. In these studies, Morris et al. (2019) found that participants, who were reminded of their personal deaths, reported significantly higher exercise intent immediately after MS as compared to the control group. This intention to exercise more was further translated into actual exercise behaviours when participants returned for follow-up two weeks later. This increase in exercise behaviours predicted fitness related self-esteem for this group of participants, suggesting that the consistent practice of adaptive health behaviours could slowly develop into a source of self-esteem and encourage further commitment to these behaviours. In light of these examples, compliance to social distancing measures immediately after pandemic salience could be indicative of health-oriented behaviours, which serve as a proximal defence to reduce anxiety arising from immediate death threat. Compliance to social distancing measures following time delay would be suggestive of some underlying distal defence related to individuals' worldview or self-esteem (Arndt & Goldenberg, 2017), especially when the global population

was expected to repeatedly practice infection control measures such as social distancing measures during COVID-19.

It is interesting to note that individuals who were vaccinated or awaiting vaccination were more likely to comply with social distancing measures as compared to those who declined vaccination. This incidental finding could be reflective of individuals' existing beliefs about their vulnerability to infectious diseases and that vaccination and infection control measures could offer protection, thus making them more likely to comply with social distancing measures. While this is not within the scope of the current research, future research can extend into these areas to examine and possibly synthesize TMHM and health beliefs, as well as investigate the effects of demographic variables on health behaviours in pandemic conditions.

5.3.5 Study 2

The design of Study 2 is the same as Study 1, except for the change of dependent variable (DV). Like Study 1, Study 2 hypothesizes that pandemic salience will yield significantly higher prosocial intentions, actions, and feelings than the control condition after a time delay, and when we control for health anxiety.

5.3.6 Study 2 Method

5.3.6.1 Participants

An a priori power analysis for a three-way ANOVA with medium effect size of 0.25 (Steinman & Updegraff, 2015, $\alpha = .05$, $1–\beta = .8$), revealed that a minimum of 128 participants would be required for a sufficiently-powered test. Responses were collected from mTurk participants who received task approval of at least 90%, the university's research participant pool and a local social media group 'SGResearchLobang'. Three hundred and eight full data sets were collected, out of which 105 participants were excluded as they responded with excerpts extracted verbatim from online sources, keyed in only single

word answers to the essay questions, demonstrated response sets and/or failed attention checks (i.e., please select '2' for this item'. Following these exclusions, 203 complete responses were retained for data analysis. Participants were mainly from America (26.1%), India (26.1%), followed by Europe (e.g., Poland, Portugal; 12.3%), and Singapore (4.4%). The age ranged from 19 to 75 years old (M = 38.91 years, SD = 11.62). Most of the participants received full COVID-19 vaccination (81.8%) at the time of the study and had personal experience with COVID-19 (85.2%).

5.3.6.2 Materials

The materials are the same as Study 1, except the social distancing measures measure was replaced with the Prosocial Behavioural Intentions Scale (Baumsteiger & Siegel, 2018) and Prosociality Scale (Caprara et al., 2005).

The Prosocial Behavioural Intentions Scale (Baumsteiger & Siegel, 2018) comprises four items which assess individuals' intentions on the likelihood of performing prosocial behaviours. Each item is rated on a 7-point Likert scale ranging from 1 (definitely would not do this) to 7 (definitely would do this). Items are positively coded, with higher scores indicating stronger intentions to perform the behaviours. The Cronbach α for prosocial intent is .87 in the present study.

The Prosociality Scale (Caprara et al., 2005) is a 16-item scale used to assess the overall inclination to behave in a prosocial manner from late adolescence to adulthood. Participants will rate the items on a scale of 1(never/almost never true) to 5(almost always/ always true) which reflects their tendencies to enact prosocial behaviours. This scale measures two overarching factors, namely prosocial actions, and prosocial feelings, which could be broken down into four subfactors - helping actions, sharing actions, caring actions and empathy (Fassbender & Luhmann, 2021). The Cronbach αs for helping actions is .81, sharing actions .74, caring actions .79 and empathy .81.

5.3.6.3 Procedures

All instructions and materials were the same as Study 1 except for the use of different dependent measures aimed to assess prosociality. Participants were randomly assigned to one of the eight conditions. They were also randomly presented with either the Prosocial Behavioural Intentions Scale or The Prosociality scale first before the other prosociality measure.

5.3.7 Study 2 Results

The data were analysed using SPSS Version 22 with the alpha level set at .05. MANOVA was conducted as four of the five dependent variables measuring prosociality are subscales belonging to a same instrument (Field, 2009). The average time taken to complete the survey was 951.2 seconds or approximately 15.9 minutes.

To examine if the outcome measures are normally distributed, a kurtosis and skewness analysis was conducted. The kurtosis values of the outcome measures ranged from .35 to 1.43, while the skewness ranged from -.57 to -1.0. Although the data are left-skewed, the data are still considered normal if skewness is between -2 to +2 and kurtosis is between -7 to +7 (Hair et al., 2010). Table is attached in Appendix 12.

The Cronbach αs were .92 for health anxiety and .75 for the attitudes towards negative consequences of developing severe illnesses subscale for the present study. The Cronbach αs for positive and negative affect in the current study are .92 and .96 respectively. The means and standard deviations of the prosociality measures are presented in Table 5.2.

Table 5.2

Means and Standard Deviation of Prosocial Intent, Feelings and Actions

Outcome Variable	Prime	PS		Control	
		Delay	No Delay	Delay	No Delay
Prosocial Intent					
	Individualist	21.56 (5.40)	22.81 (5.00)	20.85 (4.76)	23.56 (3.83)
	Collectivist	21.76 (4.74)	23.24 (3.91)	23.28 (3.60)	23.23 (3.60)
Helping Action					
	Individualist	15.04 (3.17)	15.96 (2.88)	14.81 (2.14)	15.12 (3.21)
	Collectivist	14.56 (3.03)	16.72 (2.69)	15.92 (2.23)	15.46 (2.93)
Sharing Action					
	Individualist	14.12 (3.36)	14.77 (2.82)	14.46 (2.63)	15.32 (2.48)
	Collectivist	14.40 (3.15)	15.48 (2.86)	15.24 (2.76)	14.73 (1.99)
Caring Action					
	Individualist	14.04 (3.19)	14.88 (3.15)	13.85 (3.06)	15.44 (2.71)
	Collectivist	13.76 (3.03)	16.28 (2.85)	15.64 (2.38)	14.92 (3.37)
Empathy					
	Individualist	13.96 (3.25)	15.35 (3.45)	14.19 (2.79)	15.52 (2.47)
	Collectivist	13.44 (3.34)	16.24 (2.57)	16.04 (2.54)	15.04 (3.41)

Note: Standard deviations are presented in parentheses. PS = Pandemic Salience

None of the demographic variables had significant effects on any of the prosociality measures. There was also no order effect on the prosociality measures. In accordance with standard MS studies, the effect of pandemic salience on negative affect was examined to assess if the pandemic salience effects are due to unique death concerns rather than negative affect. A 2 (IV1: pandemic salience vs. Dental Pain) x 2 (IV2: Individualist vs. Collectivist prime) x 2 (IV3: Delay vs. No Delay) between-subjects MANOVA was conducted to assess the effects of PS on negative and positive affect on the Positive and Negative Affect Schedule - Expanded Form. Effects of pandemic salience was significant on negative affect, $F(1,195) = 4.89$, $p = 0.28$, but not on positive affect, $F(1,195) = .023$, $p = .88$.

To test the hypothesis, a 2 (IV 1: pandemic salience vs. Dental Pain) x 2 (IV 2: Delay vs. No Delay) x 2 (Collectivist vs. Individualist prime) between-subjects MANOVA was

performed to examine the effects of pandemic salience, delay and self-construal on prosocial intentions, actions and feelings. These results remained similar when controlling for health anxiety and negative affect. Hence, as presented in Table 5.3, only the results from the MANOVA are shown.

Table 5.3

Three-Way MANOVA Statistics for Prosociality following Pandemic Salience and Self-Construal Prime

	Dependent Variable	F	*p*	η_p^2
PS	Prosocial Intention	.39	.53	.00
	Helping Action	.38	.54	.00
	Sharing Action	.40	.53	.00
	Caring Acting	.28	.60	.00
	Empathy	1.14	.29	.01
Delay	Prosocial Intention	4.75	.03	.02
	Helping Action	3.47	.06	.02
	Sharing Action	1.78	.18	.01
	Caring Acting	6.41	.01	.03
	Empathy	7.11	.01	.04
Prime	Prosocial Intention	1.22	.27	.01
	Helping Action	1.21	.27	.01
	Sharing Action	.57	.45	.00
	Caring Acting	2.04	.16	.01
	Empathy	1.06	.30	.01
PS x Delay	Prosocial Intention	.00	.98	.00
	Helping Action	4.19	.04	.02
	Sharing Action	.78	.38	.00
	Caring Acting	2.20	.14	.01
	Empathy	5.22	.02	.03
PS x Prime	Prosocial Intention	.35	.55	.00
	Helping Action	.56	.46	.00
	Sharing Action	.26	.61	.00
	Caring Acting	.01	.92	.00
	Empathy	.35	.56	.00
Delay x Prime	Prosocial Intention	1.05	.31	.01
	Helping Action	.09	.77	.00
	Sharing Action	.36	.55	.00
	Caring Acting	.14	.71	.00
	Empathy	.30	.59	.00
PS x Delay x Prime	Prosocial Intention	1.47	.23	.01
	Helping Action	1.63	.20	.01
	Sharing Action	1.33	.25	.01
	Caring Action	5.66	.02	.03
	Empathy	4.91	.03	.03

The results did not show significant main effects of pandemic salience or self-construal on any of the prosocial measures, $p > .05$. However, main effects of delay were found on prosocial intent, $F(1,192) = 4.75$, $p = .03$, caring actions, $F(1,192) = 6.41$, $p = .012$ and empathy, $F(1,192) = 7.14$, $p = .008$. The main effect of delay on prosocial intention became nonsignificant when controlling for health anxiety and negative affect, $p = .068$.

Two-way interaction effects of pandemic salience and delay were found on helping actions, $F(1,192) = 4.19$, $p = .042$. Post-hoc Tukey HSD indicates that participants in the pandemic salience condition endorsed more helping actions immediately after being reminded of pandemic salience ($M = 16.33$, $SD = 2.78$) rather than after a delay ($M = 14.80$, $SD = 3.08$), $p = .033$.

Three-way interaction effects of pandemic salience, delay and self-construal were found on caring actions, $F(1,192) = 5.66$, $p = .018$, and empathy, $F(1,192) = 4.91$, $p = .028$. Post-hoc Tukey HSD indicates that only participants who were in the collectivist condition endorsed more caring actions immediately after pandemic salience ($M = 16.28$, $SD = 2.85$) rather than after a delay ($M = 13.76$, $SD = 3.02$), $p = .043$.

Further, after going through collectivist primes, participants tended to report more empathy immediately after being reminded of pandemic salience ($M = 16.24$, $SD = 2.57$) rather than after a delay ($M = 13.44$, $SD = 3.34$), $p = .016$. Stated differently, participants who had been reminded of pandemic threat reported more empathy immediately if they had also been primed to be collectivist. Nevertheless, when primed with collectivism, participants reported significantly less empathy in the pandemic salience ($M = 13.44$, $SD = 3.34$) than the control condition ($M = 16.04$, $SD = 2.54$) after a time delay, $p = .034$. Stated differently, individuals who were reminded of deaths in the pandemic and primed to be collectivistic tended to experience significantly less empathy than those in the control condition after a time delay.

5.3.8 Study 2 Discussion

The purpose of Study 2 was to examine another behaviour observed in pandemics, namely prosociality. Current findings suggest that participants were likely to endorse more helping actions immediately after pandemic salience, regardless of self-construal primes. More caring actions and higher empathy were also reported by participants immediately after being reminded of pandemic salience, and only if they had been primed with collectivism.

Collectivism has a strong relationship with empathy and prosociality (Kang, 2021; Zhu, 2023). Comparing individuals from collectivist and individualist countries, Zhu (2023) noted that individuals from collectivist cultures demonstrated more empathy and compassion than those from individualistic cultures. Empathy, which is related to collectivism, has been consistently shown to facilitate prosocial behaviours (Yin & Wang, 2023). Using a sample of Japanese adults, Kang (2021) investigated the relationship between collectivism, empathy, and volunteerism. As expected, Japanese endorsing higher collectivism were more likely to be involved in volunteer work, and this relationship is mediated by empathy.

These concepts of collectivism and empathy are also present in crisis situations, as evident in ‘catastrophe compassion’, defined by Zaki (2020) as a shared identity and empathy between victims of critical incidents. ‘Catastrophe compassion’ helps explain current findings related to pandemic salience, collectivism, empathy, and other prosocial behaviours. Prosociality in the face of pandemic salience could be further facilitated by the collectivistic primes through enhanced empathy. As demonstrated in the current study, individuals reported higher empathy and caring actions when primed with collectivism and immediately after exposure to pandemic salience. The collectivistic prime could have highlighted a common group identity, that was further reinforced by the exposure to pandemic salience, as our participants are also victims of the COVID-19 pandemic (Eisenberg et al., 1987; Frazier et al., 2013). This interaction of collectivistic prime and pandemic salience eventually led to

higher empathy and prosocial actions. Understanding this with reference to the TMHM, the collectivistic prime successfully shaped participants' frame of reference and activated a collective identity, which was further strengthened by the relevance of pandemic salience. This reframing of identity facilitated TMT defence, which is represented by more empathy and caring actions towards others, thereby enhancing group survival that can also be interpreted as a symbolic way to extend mortality. This distal defence is expressed without time delay as the pandemic salience condition is subtle in nature (Bélanger et al., 2013; Hayes et al., 2010).

Prosociality could also be a true TMT defence. Deeper consideration of prosociality suggests that prosociality can be construed as a value (Baer, 2015), which is also aligned with worldview defences. From this perspective, endorsing more prosocial actions and empathy are consistent with past TMT literature which indicated that subtle death primes could elicit immediate expression of distal defences (Bélanger et al., 2013; Routledge et al., 2004). In particular, the alignment with prosociality could represent an enhancement of self-esteem through extending more help, care, and empathy to others (Brown & Smart, 1991; Wang, 2022).

Such motivation to behave in ways beneficial of the collective good and for the purpose of group survival could be underpinned by psychological closeness. Lee and Kim (2020) examined psychological closeness, collectivism, and prosocial intentions on the background of the Sewol ferry disaster. Koreans who reported higher collectivism, perceived the need to offer more help and monetary donations to the families of the victims of the ferry incident as they felt psychologically closer to the victims. This effect to help families of the victims is stronger when participants high on psychological closeness and collectivism were also reminded of their personal death than those who were not, implying strong identification and empathy (Eisenberg et al., 1987; Frazier et al., 2013).

A third way to understand the current results involves perceiving prosociality as a coping for distress. Prosociality is related to positive mood (Schacter & Margolin, 2019; Snippe et al., 2018). Previous studies have shown that individuals gravitate towards positive stimuli to cope with anxiety triggered by MS (DeWall & Baumeister, 2007; Kelley et al., 2014). Specifically, individuals tended to seek positive information such as responding faster to positive words or gazing longer at positive images when confronted with personal death reminders (DeWall & Baumeister, 2007; Kelley et al., 2014). Recently, utilizing the COVID-19 pandemic as a backdrop, Varma et al. (2022) found that behaving in a prosocial manner is related to higher positive affect, empathy, and social connectedness. This suggests that engagement in prosociality could be an attempt to regulate and enhance mood immediately after being confronted with pandemic salience. Stated differently, prosociality can be interpreted as immediate coping for death anxiety or other distressing emotions arising from pandemic salience. This point is further substantiated by the immediate increase in empathy reported by participants who were reminded of pandemic salience and primed to be collectivist, which could heighten distress. Hence, coping through helping and caring actions may alleviate the death anxiety and other distress which could have been intensified by empathy. Although our study had not explored these factors and processes in greater detail, it will be interesting for future research to examine the explicit relationships between collectivism, empathy, psychological closeness and prosociality to shed more light into the psychological processes and boundary conditions of TMT in the context of disasters.

The current finding provides empirical support to the helping actions demonstrated during COVID-19 and other critical incidents which result in fatalities. Tekin et al. (2021) compiled anecdotes from different countries to examine prosociality during COVID-19. After analysing 104 stories qualitatively, they reported that individuals were more likely to help vulnerable or socially disadvantaged groups by providing food and monetary help (Tekin et

al., 2021). Similarly, with reference to the TMHM, Leung et al. (2022b) reported that Singaporeans produced and gave away homemade reusable facemasks to those who had no access to these resources, while others made monetary donations to the financially disadvantaged. Helping others could have met the psychological needs of individuals who had been confronted with their deaths through pandemic salience as discussed in the previous sections.

It may appear puzzling when our participants had not endorsed significantly more sharing actions since they are part of prosociality. However, this is not illogical in the face of infectious disease. Communal sharing, such as sharing food and physical space, has been found to increase chances of disease transmission (Aloot et al., 1993; Saenna et al., 2017). Safe distancing and quarantine orders further reinforce the notion that sharing spaces can increase chances of infection (Pozo-Martin et al., 2021). Thus, it is not surprising if participants expressed mixed sentiments towards sharing for fear of infection.

Interviewees in Shukla et al.'s (2022) study reported being torn in this moral dilemma of helping. Although it was clear that interviewees would like to offer help during COVID-19, some were deterred from helping others or helped others in a measured manner due to concerns of possible infection (Shukla et al., 2022). These fears of infection were not invalid and represented one of the core concerns of many people (Ashley et al., 2021).The expression of giving (i.e., helping) and caring, appear to be safer prosocial options as they limit risk of transmission as giving did not encompass the idea of returning or sharing something, which heightened risk of infection, while care can be expressed virtually without direct contact (e.g., phone calls, messages).

5.3.9 General Discussion

This research aimed to examine the MS effect of pandemic on compliance with social distancing measures and prosociality. It is hoped that the present findings will inform

strategies to enhance compliance to infection control measures during a pandemic and to foster better community resilience in times of prolonged crises through prosocial actions.

Findings from Study 1 indicate that participants reported higher compliance to social distancing measures following pandemic salience, and this compliance transcends time. Study 2 reveals that individuals were more likely to endorse helping actions immediately after pandemic salience. Individuals also reported higher empathy and more caring actions immediately after pandemic salience, especially when they had also been primed to be collectivistic.

Synthesizing the findings from this research with other empirical evidence, merely reminding individuals of their personal death reminders or possible threat of critical incidents such as a pandemic, can have a lasting effect on individuals' health intention and behaviours. As demonstrated by Morris et al. (2019) and Arndt et al. (2003), immediate behavioural intentions following death reminders, could evolve into actual behaviours. These behaviours, when practiced consistently, may feedback internally, and become a source of self-esteem for individuals, which would then be maintained. It is not surprising if our participants have eventually internalised compliance to social distancing measures and somehow made it into a source of self-esteem or value for themselves as the global population has practiced social distancing measures consistently for the last three years.

With reference to self-construal primes, it will be worthwhile for public interventions to highlight collectivism and interdependence to encourage adaptive attitudes and behaviours during crises. By making the collectivist identity salient, helpful attitudes and behaviours can be promoted even when knowledge may be inadequate (Kemmelmeier & Jami, 2021). For instance, public messages can be framed to articulate how practicing certain behaviours can contribute to the greater good or protect the in-groups such as family and friends. Another angle of publicity could involve individualism, where adopting adaptive behaviours can

protect and promote self-interests such as personal health and wellbeing. By breaking health behaviours into simpler steps to enhance self-efficacy, and with reminders of the benefits of health behaviours to self and others, individuals will be more likely to practice health behaviours consistently and internalise them (Strecher et al., 1986; van Rijen et al., 2021).

A deeper evaluation of the effect of a self-construal prime on prosociality in this instance relates to the matching between the nature of primes and prosociality. As demonstrated by Halloran and Kashima (2004), individuals endorsed significantly more values consistent with the identity which had been made salient. Following this line of argument, if primes are matched with corresponding target attitudes and behaviours, we are likely to see an endorsement of these target attitudes and behaviours. For instance, if the target behaviour is to evacuate in an orderly manner during crises, primes related to orderliness and compliance should be used (Jackson et al., 2010). Similarly, if evaluation of crisis information is important, primes related to critical thinking and conscientiousness could be utilised (Puig et al., 2021). The utilisation of self-construal primes in the current study which examined two different pandemic behaviours provides an important insight on how the choice of corresponding primes based on target behaviours and attitudes could be key to developing effective crisis interventions for better public health management and greater community resilience. Nevertheless, this idea has not been empirically tested and any supporting evidence would be seen as an exciting development.

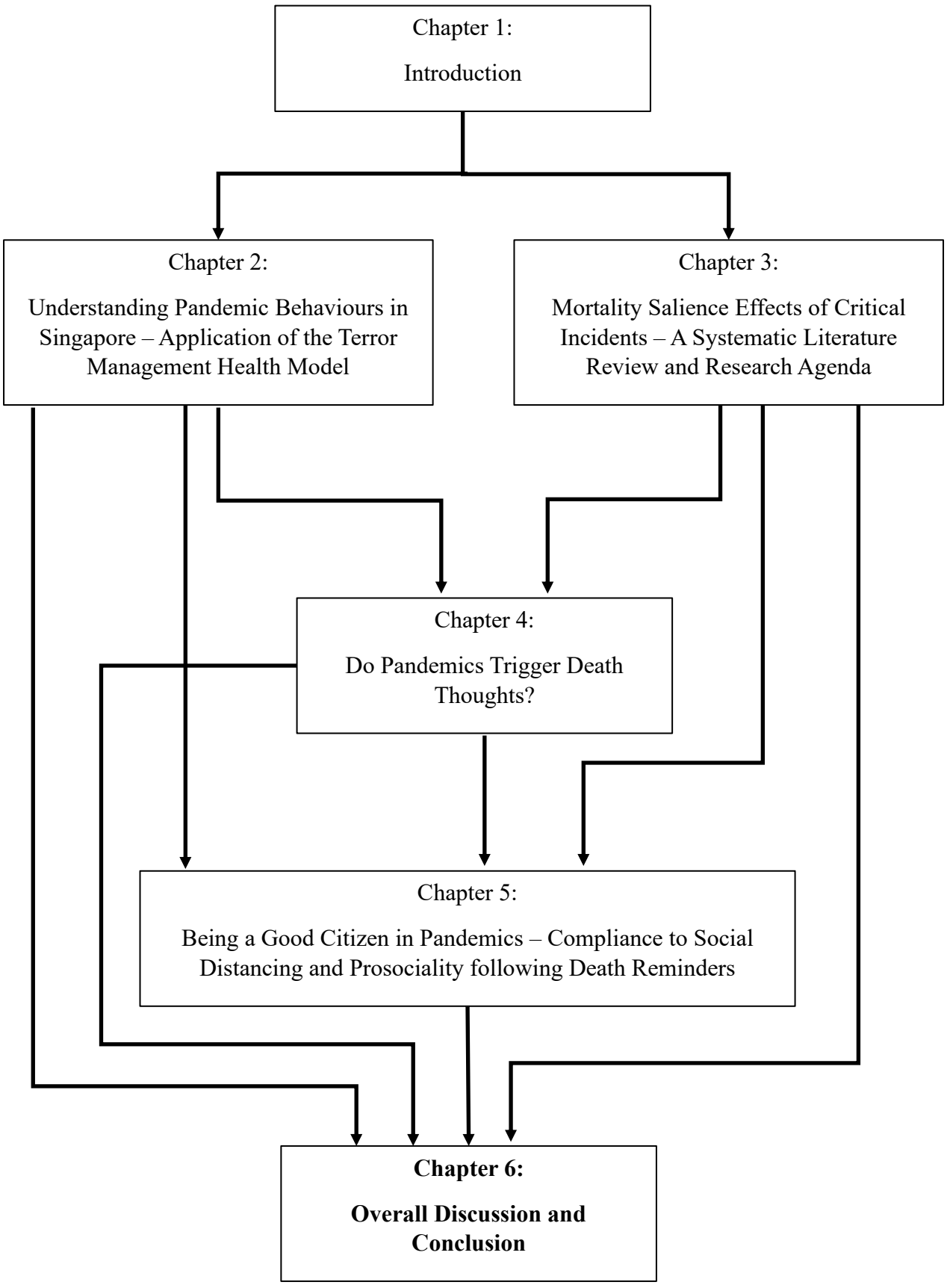
This study has two limitations. First, social desirability was not assessed and controlled for in the analysis. Individuals could have rated themselves as highly compliant and highly prosocial to present a positive image of themselves. Nevertheless, the social desirability effect may be more present during face-to-face data collection. Rather, individuals completing this survey online may feel less compelled to be socially desirable as

the responses are anonymous. Thus, the authors' conclusion was that social desirability may not have impacted significantly on the findings of both studies.

Secondly, the samples are mainly made up of individuals from the United States in Study 1 while Americans and Europeans formed the majority of participants in Study 2, thus making these results unlikely to be generalizable to other populations. A related limitation is that data were collected online due to the COVID-19 social distancing restrictions although social distancing measures relaxed slightly near the end of data collection. This could have biased sampling, as there could be inherent differences between individuals who were more active online as compared to those who were not. Nevertheless, studies examining TMT effects have continued to report robust TMT effects with the switch from face-to-face data collection to online platforms.

It is hoped that this research would continue to advance the development of TMT and TMHM in the understanding of pandemic salience and boundary conditions, which can feedback into related interventions to bring about better public health management and foster greater community resilience in times of crises.

Chapter 6 Overall Discussion and Conclusion



6.1 Introduction

The present thesis applied the terror management health model to understand pandemic behaviours. It began with a conceptual application of Terror Management Health Model (TMHM) on the pandemic behaviours reported in the local Singapore news. This was followed by a systematic literature review of 129 articles on Terror Management Theory (TMT) to examine the mortality salience (MS) effects of critical incidents, including natural disasters, wars, terrorism, and pandemics, on the tripartite anxiety buffers (i.e., worldview defence, self-esteem, and close relationships), individual wellbeing, prosocial behaviours, and organisation performance. Crisis intervention recommendations were made based on empirical evidence reviewed in this chapter.

Taking reference from the observations of pandemic behaviours and results from the systematic literature review, a series of four empirical studies were conceptualised. The first two studies examined the MS effects of a pandemic on death thoughts, which is the central mechanism of the TMT. The last two studies examined the effects of pandemic salience and self-construal (i.e., collectivism/individualism) to social distancing measures and prosociality. Results from the last two studies would inform crisis interventions during pandemics and help to build more resilient and cohesive communities. In conclusion, the summary of the chapters will be revisited.

6.2 Chapter 2

COVID-19 had triggered both adaptive and maladaptive behaviours, which were reported in the media. Some were directly aimed to curb the transmission and spread of the virus while some appeared to contradict the coping and curbing of the threat of COVID-19. Adaptive behaviours such as the purchase and use of surgical masks and sanitisers to protect oneself from COVID-19 were observed. On the contrary, breaching of quarantine orders and

social distancing measures, as well as the forwarding of unverified news, which had detrimental effects on community infection control, were noted.

These behaviours were understood in the context of the dual system in the Terror Management Health Model (TMHM). When death thoughts are in the forefront of individuals' awareness, individuals are more likely to adopt proximal defences, which are behaviours and attitudes aimed at reducing death anxiety immediately. These behaviours include health-oriented behaviours such as wearing face masks, using sanitisers or increasing vaccine intent (if proven safe and effective). However, these behaviours could also be avoidant in nature, where individuals avoided exposure to public places and stockpiled resources to stay home for extended periods of time.

When death thoughts recede into the background, individuals cope with death anxiety through distal defences, which are consistent with the tripartite anxiety buffers (i.e., worldview defence, self-esteem enhancement, intimate relationships). Breaching quarantine orders and social distancing measures to seek intimate relationships, xenophobia and scapegoating foreigners as a source of infection, and noncompliance with infection control measures due to the perception of infringement of personal freedom are some examples of distal defences. Thankfully, prosocial behaviours were also observed. As COVID-19 continued, some individuals responded by giving and donating resources such as reusable face masks and sanitisers as they ran out in retail stores, and monetary donations to the financially disadvantaged to support others while the community copes with the COVID-19 pandemic. This chapter helped to extend our understanding of TMHM and its application to pandemic behaviours observed in Singapore.

6.3 Chapter 3

A systematic literature review was conducted to assess the MS effects of critical incidents (CI), including natural disasters, wars, terrorist attacks and pandemics. These CIs

usually result in deaths and serious physical injuries, and can trigger acute stress reactions and psychological trauma. Their life-threatening nature makes them reasonable candidates to induce MS. Overall, 129 articles with 182 studies published from the birth of TMT in 1986 till 31st December 2022 were reviewed. This review found strong support for MS effects of CIs and their effect on the tripartite anxiety buffers, individual wellbeing, prosocial behaviours and organisation health. Approximately half of the studies had experimental control groups and about 17.1% of the studies reviewed assessed death-related cognitions, which is the central mechanism of TMT.

This review also summarised the effects of CI salience on strong identification with ingroups, which led to increased dislike and rejection of outgroups. This ingroup-outgroup split has escalated into violence towards outgroups, which aimed to reinstate a strong sense of ingroup identity and to restore self-esteem. The self-report ingroup-outgroup biases in the artificial experimental settings have materialised in the real world during the COVID-19 pandemic in the form of xenophobic sentiments and petitions to block foreigners into home countries as documented in Chapter 2. These hostile attitudes and behaviours had much potential to escalate into social unrest and risks perpetuating cycles of violence. While it appears that CI reminders contribute to social tension, poorer organizational outcomes and individual well-being, the current research also provides suggestions to mitigate these reactions. TMT studies have explored and identified moderators and boundary conditions that can be developed further to pave the way for interventions.

In summary, there is a paucity of research comparing the effects of CI salience, standard MS, and control groups, as well as a limited assessment of death cognitions triggered by CIs. There is also a need to explore potential moderators and boundary conditions, such as building a common identity or examining prosociality, to mitigate

negative reactions or guide prosocial behaviours and attitudes in pandemics. These set the backdrop for the experimental studies described in Chapters 4 and 5.

6.4 Chapter 4

Using two experimental studies, this research examined the MS effect of pandemic salience condition on death thought accessibility. Contrary to past studies (Arndt et al., 2007; Arrowood et al., 2017), the first study had not found significant MS effects on death thought accessibility using the death word fragment task. However, death thought accessibility was significantly elevated in the pandemic condition than in the control condition when the death word fragment task was replaced with the Lexical Decision Task in the second study. Response times were significantly faster towards Lexical-Decision Task Death words, but not towards threat words, following exposure to the pandemic condition as compared to the control condition. The shorter response time towards death words was consistent with other TMT studies assessing death thought accessibility with Lexical-Decision Task following exposure to pictures of buildings destroyed by war (Joseph Hayes et al., 2008; Vail et al., 2012). The effect of MS on death thought accessibility remained significant when controlling for health anxiety, supporting the unique role of pandemic salience.

6.5 Chapter 5

After establishing the effect of pandemic salience on death thought accessibility, the next two studies investigated the effects of pandemic salience and self-construal primes (i.e., collectivist/individualist) on two pandemic behaviours, namely compliance to social distancing measures and prosociality while controlling for health anxiety. As reviewed in Chapter 2 and 3, common identity and prosociality may be potential means to mitigate ingroup-outgroup biases and tension, which commonly arise when communities were reminded of their deaths.

Results indicate that pandemic salience, but not self-construal and time delay, had a significant impact on compliance to social distancing measures, where reported increased compliance to social distancing measures followed reminders of pandemics. With reference to prosociality, individuals were more likely to endorse helping actions immediately after pandemic salience. Individuals also reported higher empathy and more caring actions immediately after pandemic salience, but only when they had been primed to be collectivistic.

Results from this chapter echoed those in other TMHM studies (Arndt et al., 2003; Morris et al., 2019). As demonstrated by Morris et al. (2019) and Arndt et al. (2003), immediate behavioural intentions following death reminders, could evolve into actual behaviours. When practiced consistently, these behaviours may be internalised into a source of self-esteem for individuals. With consistent practices over the last three years, it is not surprising if compliance to social distancing measures has been internalised into a source of self-esteem or value for most of the global population. With reference to prosociality and self-construal primes, making the collectivist identity salient can promote helpful attitudes and behaviours (Kemmelmeier & Jami, 2021). It may also provide an alternative to enhancing compliance to social distancing measures, as prosociality has been shown to be related to perceived social support (Ramkissoon, 2022), which became largely absent during social distancing measures.

6.6 Project Highlights and Contribution to Knowledge

The current research contributed to the field in three main areas. First, it addressed existing research gaps in the TMT and critical incident literature on the MS effects of pandemics. The current research has shown that pandemics triggered death thoughts, albeit only on the Lexical-Decision Task. As discussed previously, this finding could be eliminated by the limited sensitivity of the death word fragment task.

Second, the current thesis has demonstrated consistently that the behavioural intentions observed in pandemics were not merely effects of health anxiety. Across the four experimental studies, it has been established that pandemic salience contributes to death thought accessibility and behavioural intentions on top of health anxiety. Rather, TMT has a significant contribution in explaining these behavioural intentions as the effect of pandemic salience on these dependent variables (i.e., social distancing measures and prosociality) continued to be significant after controlling for health anxiety. This finding suggested a more complex picture of psychological processes when determining individual reactions in pandemic situations, and calls for further refinement of health models to predict health behaviours and attitudes.

Although other health models such as the Health Belief Model and Theory of Planned Behaviour have been commonly applied for COVID-19, these models were not without limitations (Abraham & Sheeran, 2014; Anagaw et al., 2023; Sniehotta et al., 2014). As shared in Chapter 1, there were operationalisation issues which undermined the validity of the Health Belief Model (Abraham & Sheeran, 2014). The Theory of Planned Behaviour was heavily criticised for not being able to account for 'inclined abstainers', a group of individuals who chose to respond otherwise despite an intent to perform a health behaviour (Sniehotta et al., 2014). In fact, there had been empirical resesearch highlighting the effects of factors not taken into account by the health models. These include self-identity, moral norms and values such as social responsibility (Armitage & Conner, 1999a; Oosterhoff et al., 2020; Pfattheichera et al., 2020), which appeared to be aligned with the tripartite defence of TMT.

While there are existing criticisms for the TMT, such as failure to replicate the standard MS effect and other researchers suggesting additional components to the TMHM (Dimoff et al., 2021), the TMHM continues to offer much potential to understand attitudes and behaviours observed in the pandemic. For instance, Dimoff et al. (2021) suggested the

inclusion of psychological reactance in the TMHM to explain intentional noncompliance to mandated infection control measures. In particular, the Psychological Reactance Theory postulated that freedom of behaviour is paramount for individuals and attempts to restrict such freedom are perceived as aversive. Hence, individuals would reject compliance with mandated measures. To counter reactance, Dimoff et al. (2021) suggested disclaimers at the end of public health messages to provide individuals choices on whether they would like to adopt the measures or not. From the TMHM perspective, psychological reactance represents an example of worldview defence and/or reinforcement of a source of self-esteem aimed at reducing death anxiety following exposure to death reminders. The suggestion to offer individual choices to overcome psychological reactance appeared to be consistent with the concept of moderators and boundary conditions, which could potentially mitigate tripartite defences within the TMHM, which is the intentional noncompliance to mandated measures in this instance (Hayes et al., 2010). Thus, before a more comprehensive model or theory has been identified and validated, the TMHM continues to be a versatile model that can adequately explain the variety of attitudes and behaviours observed in pandemics.

Thirdly, this research has direct implications on the improvement of the physical and psychological resilience of communities during pandemics. Through the application of the TMHM and moderators on infection control behaviours and prosociality, Chapter 5 has shown that merely reminding individuals of pandemic salience can enhance compliance to social distancing measures, specifically not visiting others, and could possibly reduce transmission in the community and foster physical resilience. The reminders of both pandemic salience and collective identity help to enhance empathy towards each other in the community and increase giving and helping behaviours, which can enhance psychological resilience during crisis through the strengthening of perceived social support from others. This last point is important in pandemics, as prosociality may offer some solace from the

isolation brought upon by the mandated social distancing. Findings from these studies offer important considerations in the conceptualization of community interventions during crises such as pandemics or other community disasters.

One way through which we can translate our empirical findings to encourage compliance to infection behaviours would be through public messaging. Since reminders of both individualism and collectivism can guide individuals to the same desired compliance to social distancing measures, albeit through different processes, public messaging can frame compliance to infection control measures as a way to protect oneself and others. This could be achieved with corresponding visuals of a healthy person or healthy family or communities, so as to appeal to both individualistic and collectivistic individuals respectively. A second strategy is to link compliance with mandated measures to moral codes and ethics that these are 'the right things to do', especially in pandemics, by professionals, celebrities and even politicians.

Similar operationalisation can be applied to encourage prosociality, such as framing prosocial behaviours as valued behaviours (e.g., 'the right thing to do') and sources of self-esteem (e.g., celebrity endorsement to be prosocial) (Fairlamb & Courtney, 2022; McCabe et al., 2014). Another possible avenue is to foster social support and cohesiveness within immediate communities through promoting prosocial attitudes and behaviours amongst neighbours. Prosociality is closely related to perceived social support and environmental attachment, which may provide relief to the isolation and anxiety during strict social distancing measures (Ramkissoon, 2020). While these may not completely achieve similar extent of death anxiety alleviation as the distal defence of seeking close relationships depicted in the TMHM, stronger perceived social support and community identity may offer attractive alternative distal defences that serve to alleviate death anxiety. This is especially so when individuals can adopt adaptive health behaviours to protect the community which they

strongly identified with (i.e., worldview defence), or seek social support from sufficiently close relationships developed within the immediate communities (i.e., seeking close relationships). Nevertheless, sufficient community building efforts during peacetime are required to achieve such community resilience, and may include festive activities for the communities, which provide opportunities for social interaction.

6.7 Limitations

This current research is not without limitations. As discussed in Chapter 2, the generalisability of the TMHM may be questionable due to individual differences despite similar levels of exposure to COVID-19 risks. Nevertheless, Hayes et al. (2010) addressed this discrepancy by highlighting the influence of other personal variables on individual responses following mortality salience. For instance, even if individuals reported an increase in death cognitions following death reminders, they would be less likely to defend their worldviews if they were religious or securely attached (Hayes et al., 2010). Also, the differentiation of proximal and distal defences was challenging in the real world as it was not possible to control one's exposure to other mortality threats following the initial exposure before behavioural outcomes or decision making are assessed. Hence, to overcome this challenge of clearly demarcating proximal and distal defences, we turned to the underlying motivations for these behaviours and decisions.

Another limitation is related to social desirability when assessing for compliance to social distancing measures and prosociality in Chapter 5. As participants were asked about compliance to social distancing measures and prosociality, they could have tried to create a positive impression of themselves and hence report in a socially desirable manner. Nevertheless, online data collection could have buffered the need to behave in a socially desirable manner as the responses are anonymous.

A third limitation is related to biased sampling. Due to COVID-19 restrictions, the data collection was mainly conducted through online sampling. Participants were recruited from online platforms, including Amazon mTurk and Prolific and SGResearchLobang. A related limitation was that participation rate in Asian countries was low despite efforts to diversify and increase participation in these areas. Thus, participation from the United States and European countries was overrepresented.

6.8 Future Directions

This research only marks the beginning of the exploration of pandemics as MS inductions and to examine the application of TMHM in pandemic situations. Despite having shown empirical support on the use of moderators to mitigate MS effects of pandemics on social distancing measures and prosociality, future research can extend the research in several ways. First, future research can extend the current research by deepening the understanding of the relationship between empathy, prosociality and relational needs. Research has demonstrated that perceived social support mediated relationships between empathy and prosocial behaviours (Fu et al., 2022). This would contribute to the field of TMT and CIs by demonstrating how prosociality may in some ways substitute relational needs as a death anxiety buffer, thereby tapping into community prosocial behaviours to reduce noncompliance to social distancing measures.

Second, future research can examine other pandemic behaviours or outcomes. As stated in Chapter 3, another behaviour which commonly occurs in crises includes circulating unverified news. Across observations and empirical research, the circulation of unverified news would undermine crisis mitigation and intervention efforts (Apuke & Omar, 2021; Laato et al., 2020). Nevertheless, individuals would circulate and share unverified news as an attempt to alleviate anxiety if it was perceived as reaching out to loved ones or as an attempt

to extend their mortality symbolically by sharing information that would increase the survival of ingroup members.

Apart from investigating the processes within the TMHM and other pandemic behaviours, a third suggestion involves evaluating the effectiveness of crisis intervention materials based on TMT principles. As demonstrated by Courtney et al. (2020), crisis intervention materials can be conceptualised to appeal to the worldviews or self-esteem of individuals during critical incidents. For instance, infection control measures or vaccination take up during pandemics can be endorsed by medical professionals or enforcement officers during the acute phase of crises when death thoughts are salient or by celebrities to remind communities of crisis responses during peacetime. Communities can also consider building a collective identity, which can be made salient during crises to enhance social support and trust to reduce ingroup-outgroup tensions.

6.9 Conclusion

As many virologists have pointed out (Binnicker, 2020), COVID-19 will not be the last pandemic the human race will encounter. In the face of the inevitable, there is a need to be prepared for future pandemics by learning and studying current experiences, how individuals respond and cope with the prolonged crises so that maladaptive behaviours can be addressed or adaptive behaviours can be facilitated in an evidence-based manner.

The TMHM offers a novel perspective to make sense of individual behaviours in a pandemic. The present thesis has created a fertile ground for continued empirical exploration of TMT and critical incidents. From the conceptual application of TMHM onto pandemic behaviours observed anecdotally in Singapore, to the systematic literature to examine the MS effects of critical incidents including pandemics and the proposition of a research agenda, and finally the four experimental studies, this thesis has enhanced our understanding and extended the application of TMHM from routine health behaviours to pandemics. It is hoped

that this thesis will encourage the continued advancement of TMT and TMHM in the understanding of critical incidents, including pandemics, and boundary conditions, which can feedback into related interventions to bring about better public health management and foster greater community resilience in crises.

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Appendices

Appendix 1 Search Strategies for Chapter 3

Disaster	(('terror management' OR ‘mortality salien*’ OR 'death attitude' OR 'death anxiet*' OR 'existential anxiet*') AND (accident OR Crises OR natural disaster)) NOT (stype.exact("Books") AND la.exact("ENG"))
Terrorism	(('terror management' OR ‘mortality salien*’ OR 'death attitude' OR 'death anxiet*' OR 'existential anxiet*') AND (‘terrorist attack’ OR hostage OR bioterrorism OR war)) NOT (stype.exact("Books") AND la.exact("ENG"))
Pandemics	(('terror management' OR ‘mortality salien*’ OR 'death attitude' OR 'death anxiet*' OR 'existential anxiet*') AND (pandemic OR infectious disorder OR communicable disease OR disease transmission OR epidemic OR viral disorder OR disease outbreak)) NOT (stype.exact("Books") AND la.exact("ENG"))
	(('terror management' OR ‘mortality salien*’ OR 'death attitude' OR 'death anxiet*' OR 'existential anxiet*') AND (COVID OR Coronavirus)) NOT (stype.exact("Books") AND la.exact("ENG"))
	(('terror management' OR ‘mortality salien*’ OR 'death attitude' OR 'death anxiet*' OR 'existential anxiet*') AND (SARS OR severe acute respiratory syndrome)) NOT (stype.exact("Books") AND la.exact("ENG"))
	(('terror management' OR ‘mortality salien*’ OR 'death attitude' OR 'death anxiet*' OR 'existential anxiet*') AND (influenza)) NOT (stype.exact("Books") AND la.exact("ENG"))
	(('terror management' OR ‘mortality salien*’ OR 'death attitude' OR 'death anxiet*' OR 'existential anxiet*') AND (h1n1 OR swine flu)) NOT (stype.exact("Books") AND la.exact("ENG"))
	(('terror management' OR ‘mortality salien*’ OR 'death attitude' OR 'death anxiet*' OR 'existential anxiet*') AND (middle east respiratory syndrome OR MERS)) NOT (stype.exact("Books") AND la.exact("ENG"))
	(('terror management' OR ‘mortality salien*’ OR 'death attitude' OR 'death anxiet*' OR 'existential anxiet*') AND (respiratory tract disorder)) NOT (stype.exact("Books") AND la.exact("ENG"))

Appendix 2 PRISMA Checklists

PRISMA 2020 for Abstracts Checklist

Section and Topic	Item #	Checklist item	Reported (Yes/No)
TITLE			
Title	1	Identify the report as a systematic review.	Y
BACKGROUND			
Objectives	2	Provide an explicit statement of the main objective(s) or question(s) the review addresses.	Y
METHODS			
Eligibility criteria	3	Specify the inclusion and exclusion criteria for the review.	N
Information sources	4	Specify the information sources (e.g. databases, registers) used to identify studies and the date when each was last searched.	N
Risk of bias	5	Specify the methods used to assess risk of bias in the included studies.	N
Synthesis of results	6	Specify the methods used to present and synthesise results.	N
RESULTS			
Included studies	7	Give the total number of included studies and participants and summarise relevant characteristics of studies.	Y
Synthesis of results	8	Present results for main outcomes, preferably indicating the number of included studies and participants for each. If meta-analysis was done, report the summary estimate and confidence/credible interval. If comparing groups, indicate the direction of the effect (i.e. which group is favoured).	Y
DISCUSSION			
Limitations of evidence	9	Provide a brief summary of the limitations of the evidence included in the review (e.g. study risk of bias, inconsistency and imprecision).	N
Interpretation	10	Provide a general interpretation of the results and important implications.	Y
OTHER			
Funding	11	Specify the primary source of funding for the review.	NA
Registration	12	Provide the register name and registration number.	NA

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

For more information, visit: http://www.prisma-statement.org/

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Section 3.2
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Attached as Appendix
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Section 3.3.2.1
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Section 3.3.2.1
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Section 3.3.3.1
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Section 3.3.3.2
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Section 3.3.3.2 and Apeendix
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Section 3.3.3.3
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Section 3.3.3.3
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Section 3.3.4.3/4/5
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	NA
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Section 3.3.4.2
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	NA
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Section 3.3.3
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	NA
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Table 3.2
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	NA
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	NA
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	NA
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Section 3.3.4.2
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	NA

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Figure 3.1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Section 3.3.3.3
Study characteristics	17	Cite each included study and present its characteristics.	Section 3.3.4.3
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Table 3.1
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	NA
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Section 3.3.4.2 and 3.3.4.3
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	NA
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	NA
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	NA
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Table 3.1
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	NA
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Section 3.3.4
	23b	Discuss any limitations of the evidence included in the review.	Section 3.3.4
	23c	Discuss any limitations of the review processes used.	
	23d	Discuss implications of the results for practice, policy, and future research.	Section 3.3.4
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	NA
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Section 3.3.2.1
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	NA
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	NA
Competing interests	26	Declare any competing interests of review authors.	NA
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Section 3.3.3 and Appendix Search Strategy

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

For more information, visit: http://www.prisma-statement.org/

Appendix 3 Chapter 4 Study 1 Demographics

Nationality	
U.S.	73.4%
Non U.S	26.6%
Gender	
Male	47.8%
Female	51.2%
Declined to answer	1%
Marital Status	
Single	24.6%
In a relationship	7.4%
Cohabit	3%
Married	61.1%
Divorce	3.4%
Widowed	0.5%
Psychological Closeness	
Self/relative contracted COVID-19	58.6%
Friend contracted COVID-19	18.2%
None	22.7%
Vaccination Status	
Received full COVID-19 vaccination	47.8%
Signed up and awaiting COVID-19 vaccination	25.1%
Declined COVID-19 vaccination	7.4%
Still considering if they want COVID-19 vaccination	15.3%
No access to COVID-19 vaccination	4.4%

N = 203

Appendix 4: Chapter 4 Study 1 Means and Standard Deviations of Health Anxiety Inventory Scores and PANAS-X

	Standard MS	PS - Severe	PS - Mild	Dental Pain
Health Anxiety				
Delay	29.92 (7.39)	29.31 (7.00)	30.14 (6.15)	24.69 (6.98)
No Delay	29.23 (9.69)	29.56 (8.93)	28.07 (7.69)	29.42 (9.91)
PANAS – Positive Emotions				
Delay	32.20 (10.46)	32.58 (8.39)	34.10 (10.12)	36.38 (9.25)
No Delay	36.04 (7.86)	34.52 (10.50)	35.03 (8.95)	35.92 (8.09)
PANAS – Negative Emotions				
Delay	23.52 (9.09)	24.38 (10.54)	22.23 (9.88)	19.46 (8.15)
No Delay	22.73 (10.58)	20.28 (11.41)	23.38 (11.58)	21.58 (12.31)

N = 203

Appendix 5 Chapter 4 Study 2 Demographics

Nationality	
South African	26.4%
Mexican	12.9%
Singaporean	10.4%
Others	50.5%
Gender	
Male	47.9%
Female	48.5%
Declined to answer	3.7%
Marital Status	
Single	50.3%
In a relationship	28.2%
Cohabit	4.3%
Married	12.9%
Divorce	0%
Widowed	0.6%
Missing	3.7%
Psychological Closeness	
Self/relative contracted COVID-19	79.8%
Friend contracted COVID-19	14.1%
None	6.1%
Vaccination Status	
Received full COVID-19 vaccination	81%
Signed up and awaiting COVID-19 vaccination	1.8%
Declined COVID-19 vaccination	4.9%
Still considering if they want COVID-19 vaccination	12.3%

N = 163

Appendix 6 Chapter 4 Study 2 Means and Standard Deviations of Health Anxiety Inventory Scores and PANAS-X

	Standard MS	PS - Severe	Dental Pain
Health Anxiety			
Delay	27.00 (9.11)	27.61 (6.00)	28.07 (6.52)
No Delay	27.61 (5.87)	27.52 (5.05)	30.30 (8.26)
PANAS – X - Positive Emotions			
Delay	26.26 (8.49)	27.04 (9.61)	28.04 (9.99)
No Delay	27.46 (10.64)	27.00 (10.18)	24.56 (7.58)
PANAS – X - Negative Emotions			
Delay	17.48 (7.84)	19.04 (9.53)	20.14 (8.06)
No Delay	17.39 (7.03)	19.96 (8.89)	19.96 (7.60)

N = 163

Appendix 7 Chapter 5 Study 1 Demographics

Nationality	
U.S.	85.0%
India	13.0%
Singaporean	0.5%
Others	1.4%
Gender	
Male	48.8%
Female	51.2%
Marital Status	
Single	22.7%
In a relationship	9.7%
Cohabit	2.9%
Married	59.9%
Divorced	4.3%
Widowed	0.5%
Chronic Health Conditions	
Yes	16.4%
No	83.6%
Vaccination Status	
Received full COVID-19 vaccination	78.71%
Signed up and awaiting COVID-19 vaccination	12.1%
Declined COVID-19 vaccination	7.2%
Still considering if they want COVID-19 vaccination	1.4%
No Access to COVID-19 vaccination	0.5%

N = 207

Appendix 8 Chapter 5 Study 1 Means and Standard Deviations of Health Anxiety Inventory Scores and PANAS-X

	PS	Dental Pain
Health Anxiety	25.91 (7.14)	28.59 (7.83)
PANAS-X – Positive Emotions	30.74 (9.55)	33.13 (9.55)
PANAS-X – Negative Emotions	18.35 (8.92)	20.44 (11.04)

N = 207

Appendix 9 Demographics for Chapter 5 Study 2

Nationality	
U.S.	73.9%
India	13.8%
Singaporean	4.4%
Others	7.9%
Gender	
Male	41.9%
Female	58.1%
Marital Status	
Single	29.6%
In a relationship	6.4%
Cohabit	4.4%
Married	54.7%
Divorced	4.9%
Chronic Health Conditions	
Yes	15.8%
No	84.2%
Vaccination Status	
Received full COVID-19 vaccination	81.8%
Signed up and awaiting COVID-19 vaccination	3.0%
Declined COVID-19 vaccination	10.8%
Still considering if they want COVID-19 vaccination	3.4%
No Access to COVID-19 vaccination	1.0%

N = 203

Appendix 10 Means and Standard Deviation of Health Anxiety Inventory Scores and PANAS-X for Chapter 5 Study 2

	PS		Dental	
	Delay	No Delay	Delay	No Delay
Health Anxiety				
Individualist	28.56	26.77	27.65	26.96
	(7.54)	(8.38)	(6.29)	(7.96)
Collectivist	27.68	25.52	28.56	29.35
	(6.08)	(6.38)	(9.00)	(8.03)
PANAS-X – Positive Emotions				
Individualist	34.16	32.12	30.35	30.88
	(10.10)	(9.46)	(10.42)	(8.84)
Collectivist	30.60	31.68	34.32	31.73
	(9.10)	(10.01)	(9.04)	(10.49)
PANAS-X – Negative Emotions				
Individualist	18.84	15.00	26.62	25.84
	(10.55)	(7.26)	(10.87)	(6.15)
Collectivist	18.64	17.72	23.44	20.00
	(10.17)	(13.47)	(12.13)	(14.86)

N = 203

Appendix 11 Chapter 5 Supplementary Table: Kurtosis and Compliance to Social Distancing Measures

	Compliance to No Visits to Others	Compliance to Staying a Home	Overall Compliance to SDM
Mean	16.04	5.20	21.24
Std. Deviation	6.23	1.67	7.14
Skewness	.29	-.88	.14
Standard Error of Skewness	.17	.17	.17
Kurtosis	-.48	.06	-.11
Standard Error of Kurtosis	.34	.34	.34
Minimum	.00	1.00	2.00
Maximum	28.00	7.00	35.00

Appendix 12 Chapter 5 Supplementary Table: Kurtosis and Skewness for Prosociality

	Prosocial Intentions	Helping Actions	Sharing Actions	Caring Actions	Empathy
Mean	22.53	15.45	14.81	14.85	14.97
Std. Deviation	4.43	2.84	2.77	3.05	3.10
Skewness	-1.03	-.66	-.57	-.71	-.61
Standard Error of Skewness	.17	.17	.17	.17	.17
Kurtosis	1.43	.40	.35	.59	.43
Standard Error of Kurtosis	.34	.34	.34	.34	.34
Minimum	4.00	6.00	5.00	4.00	4.00
Maximum	28.00	20.00	20.00	20.00	20.00

Appendix 13 Ethics Approval for Studies reported in Chapters 4 and 5

This administrative form has been removed

Appendix 14 Health Anxiety Inventory (short version)

Each question is this section consists of a group of four statements. Please read each group of statements carefully and then select the one which best describes your feelings, over the past six months. Identify the statement by ringing the letter next to it, i.e. if you think that statement (a) is correct, ring statement (a); it may be that more than one statement applies, in which case, please ring any that are applicable.

1.	(a) I do not worry about my health. (b) I occasionally worry about my health. (c) I spend much of my time worrying about my health. (d) I spend most of my time worrying about my health.
2.	(a) I notice aches/pains less than most other people (of my age). (b) I notice aches/pains as much as most other people (of my age). (c) I notice aches/pains more than most other people (of my age). (d) I am aware of aches/pains in my body all the time.
3.	(a) As a rule I am not aware of bodily sensations or changes. (b) Sometimes I am aware of bodily sensations or changes. (c) I am often aware of bodily sensations or changes. (d) I am constantly aware of bodily sensations or changes.
4.	(a) Resisting thoughts of illness is never a problem. (b) Most of the time I can resist thoughts of illness. (c) I try to resist thoughts of illness but am often unable to do so. (d) Thoughts of illness are so strong that I no longer even try to resist them.
5.	(a) As a rule I am not afraid that I have a serious illness. (b) I am sometimes afraid that I have a serious illness. (c) I am often afraid that I have a serious illness. (d) I am always afraid that I have a serious illness.
6.	(a) I do not have images (mental pictures) of myself being ill. (b) I occasionally have images of myself being ill. (c) I frequently have images of myself being ill. (d) I constantly have images of myself being ill.
7.	(a) I do not have any difficulty taking my mind off thoughts about my health. (b) I sometimes have difficulty taking my mind off thoughts about my health. (c) I often have difficulty in taking my mind off thoughts about my health. (d) Nothing can take my mind off thoughts about my health.
8.	(a) I am lastingly relieved if my doctor tells me there is nothing wrong. (b) I am initially relieved but the worries sometimes return later. (c) I am initially relieved but the worries always return later. (d) I am not relieved if my doctor tells me there is nothing wrong.

9.	(a) If I hear about an illness I never think I have it myself. (b) If I hear about an illness I sometimes think I have it myself. (c) If I hear about an illness I often think I have it myself. (d) If I hear about an illness I always think I have it myself.
10.	(a) If I have a bodily sensation or change I rarely wonder what it means. (b) If I have a bodily sensation or change I often wonder what it means. (c) If I have a bodily sensation or change I always wonder what it means. (d) If I have a bodily sensation or change I must know what it means.
11.	(a) I usually feel at very low risk for developing a serious illness. (b) I usually feel at fairly low risk for developing a serious illness. (c) I usually feel at moderate risk for developing a serious illness. (d) I usually feel at high risk for developing a serious illness.
12.	(a) I never think I have a serious illness. (b) I sometimes think I have a serious illness. (c) I often think I have a serious illness. (d) I usually think that I am seriously ill.
13.	(a) If I notice an unexplained bodily sensation I don't find it difficult to think about other things. (b) If I notice an unexplained bodily sensation I sometimes find it difficult to think about other things. (c) If I notice an unexplained bodily sensation I often find it difficult to think about other things. (d) If I notice an unexplained bodily sensation I always find it difficult to think about other things.
14.	(a) My family/friends would say I do not worry enough about my health. (b) My family/friends would say I have a normal attitude to my health. (c) My family/friends would say I worry too much about my health. (d) My family/friends would say I am a hypochondriac.
For the following questions, please think about what it might be like if you had a serious illness of a type which particularly concerns you (such as heart disease, cancer, multiple sclerosis and so on). Obviously you cannot know for definite what it would be like; please give your best estimate of what you think might happen, basing your estimate on what you know about yourself and serious illness in general.	
15.	(a) If I had a serious illness I would still be able to enjoy things in my life quite a lot. (b) If I had a serious illness I would still be able to enjoy things in my life a little. (c) If I had a serious illness I would be almost completely unable to enjoy things in my life. (d) If I had a serious illness I would be completely unable to enjoy life at all.
16.	(a) If I developed a serious illness there is a good chance that modern medicine would be able to cure me. (b) If I developed a serious illness there is a moderate chance that modern medicine would be able to cure me.

	(c) If I developed a serious illness there is a very small chance that modern medicine would be able to cure me. (d) If I developed a serious illness there is no chance that modern medicine would be able to cure me.
17.	(a) A serious illness would ruin some aspects of my life. (b) A serious illness would ruin many aspects of my life. (c) A serious illness would ruin almost every aspect of my life. (d) A serious illness would ruin every aspect of my life.
18.	(a) If I had a serious illness I would not feel that I had lost my dignity. (b) If I had a serious illness I would feel that I had lost a little of my dignity. (c) If I had a serious illness I would feel that I had lost quite a lot of my dignity. (d) If I had a serious illness I would feel that I had totally lost my dignity.

Appendix 15 The Projective Life Attitudes Assessment – Pandemic Salience

This assessment is a recently developed, innovative personality assessment. Recent research suggests that feelings and attitudes about significant aspects of life tell us a considerable amount about the individual's personality. Your responses to this survey will be content-analyzed in order to assess certain dimensions of your personality. Your honest responses to the following questions will be appreciated

The World Health Organisation (WHO) has recently announced the discovery of a new flu virus. Based on the analysis of the epidemiological data over the last three months from countries with cases, WHO and pandemic experts have classified this virus to be highly contagious with severe symptoms. Frontline observations (i.e. General Practitioners, Hospitals) reported that the hopsitalisation rate for infected cases is as high as 10% (1000 in 10 000 people) and fatality rate stands at a high rate of 1% (100 in 10 000 people) for those who contracted the virus.

1. Please briefly describe the emotions and possible consequences that the thought of you contracting this new flu virus arouses in you

2. Jot down, as specifically as you can, what you think will happen to you as you physically get the new flu and once you have physically gotten the new flu virus

Appendix 16 The Positive and Negative Affect Schedule - Expanded Form

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way right now (that is, at the present moment). Use the following scale to record your answers:

1	2	3	4	5
Very slightly or not at all	A little	Moderately	Quite a bit	Extremely

_____ cheerful	_____ sad	_____ active	_____ angry at self
_____ disgusted	_____ calm	_____ guilty	_____ enthusiastic
_____ attentive	_____ afraid	_____ joyful	_____downhearted
_____ bashful	_____ tired	_____ nervous	_____ sheepish
_____ sluggish	_____ amazed	_____ lonely	_____ distressed
_____ daring	_____ shaky	_____ sleepy	_____blameworthy
_____ surprised	_____happy	_____ excited	_____ determined
_____ strong	_____ timid	_____ hostile	_____ frightened
_____ scornful	_____ alone	_____ proud	_____ astonished
_____ relaxed	_____ alert	_____ jittery	_____ interested
_____ irritable	_____ upset	_____ lively	_____ loathing
_____ delighted	_____ angry	_____ ashamed	_____ confident

_____ inspired _____ bold _____ at ease _____ energetic

_____ fearless _____ blue _____ scared _____concentrating

_____ disgusted with self _____ shy _____ drowsy _____ dissatisfied with self

Appendix 17 Opinion Questionnaire 1: Literature

Please read the following short passage from a novel and answer the questions below it.

The automobile swung clumsily around the curve in the red sandstone trail, now a mass of mud. The headlights suddenly picked out in the night—first on one side of the road, then on the other—two wooden huts with sheet metal roofs. On the right near the second one, a tower of course beams could be made out in the light fog. From the top of the tower a metal cable, invisible at its starting-point, shone as it sloped down into the light from the car before disappearing behind the embankment that blocked the road. The car slowed down and stopped a few yards from the huts.

The man who emerged from the seat to the right of the driver labored to extricate himself from the car. As he stood up, his huge, broad frame lurched a little. In the shadow beside the car, solidly planted on the ground and weighed down by fatigue, he seemed to be listening to the idling motor. Then he walked in the direction of the embankment and entered the cone of light from the headlights. He stopped at the top of the slope, his broad back outlined against the darkness. After a moment he turned around. In the light from the dashboard he could see the chauffeur's black face, smiling. The man signaled and the chauffeur turned of the motor. At once a vast cool silence fell over the trail and the forest. Then the sound of the water could be heard.

The man looked at the river below him, visible soley as a broad dark motion flecked with occasional shimmers. A denser motionless darkness, far beyond, must be the other bank. By looking fixedly, however, one could see on that still bank a yellowish light like an oil lamp in the distance. The big man turned back toward the car and nodded. The chauffeur switched off the lights, turned them on again, then blinked them regularly. On the embankment the man appeared and disappeared, taller and more massive each time he came back to life. Suddenly, on the other bank of the river, a lantern held up by an invisible arm back and forth several times. At a final signal from the lookout, the man disappeared into the night. With the lights out, the river was shining intermittently. On each side of the road, the dark masses of forest foliage stood out against the sky and seemed very near. The fine rain that had soaked the trail an hour earlier was still hovering in the warm air, intensifying the silence and immobility of this broad clearing in the virgin forest. In the black sky misty stars flickered.

How do you feel about the overall descriptive qualities of the story?

1	2	3	4	5	6	7	8	9
Not at all descriptive				Somewhat descriptive				Very descriptive

Do you think the author of this story is male or female?

_____ male _____ female

Appendix 18 Sample Word Completion Task

We are simply pre-testing this questionnaire for future studies. Please complete the following by filling letters in the blanks to create words. Please fill in the blanks with the first word that comes to mind. Write one letter per blank. Some words may be plural. Thank you.

1. BUR _ _ D
2. PLA _ _
3. _ _ OK
4. WAT _ _
5. DE _ _
6. MU _ _
7. _ _ NG
8. B _ T _ LE
9. M_ J _ R
10. P _ _ TURE
11. FL _ W _ R
12. GRA _ _
13. K _ _GS
14. CHA _ _
15. KI _ _ ED
16. CL _ _ K
17. TAB _ _
18. W _ _ DOW
19. SK _ _ L
20. TR _ _
21. P _ P _ R
22. COFF _ _
23. _ O _ SE
24. POST _ _
25. R _ DI _

Appendix 19 Lexical Decision Task/Dot Probe Task

In the following task you will be presented with a string of letters. Your task is to quickly and accurately identify whether the string of letters is a word (e.g., THE) or non-word (e.g., TEH).

Please respond by pressing the **spacebar** key if the string of letters is a **word**.

If the string of letters is a **non-word**, please **do not press any key** and the next trial will begin soon after.

Please place your finger on the spacebar key to prepare.

Before completing the trials, you will be presented with 10 practice trials.

Press any key when you are ready to continue.

Practice trial stimuli:

sspeshers	**bicerimal**	**ensicans**	ten	matchbook
aluminium	checkers	numerical	**fafistics**	**reltorsular**
cen	rectangular	**acucaniop**	indicate	**madesbief**
logistics	**inkat**	**tritten**	input	flatten

Instructions after the practice trial:

Reminder:
Please respond by pressing the spacebar key if the string of letters is a word.

If the string of letters is a **non-word**, please **do not press any key**.

Please respond as quickly and accurately as possible.

Please place your finger on the spacebar key to prepare.

Positive	Positive-matched neutral	Threat	Threat-matched neutral	Death	Death-matched neutral
kindness	appetite	criticism	conductor	skull	broad
cheer	title	crisis	tracks	grave	taxi
laughter	machines	rejection	sentences	coffin	phrase
miracle	watches	vomit	topic	corpse	branch
excellence	equivalent	repulsive	reviewing	murder	except
victory	setting	betrayal	triangle	killed	having
success	section	dishonesty	deductions	bury	mile
riches	summit	cramp	paged	dead	room

Non-words					
mecteen	hifle	silazle	retouping	ruving	ditting
codcin	tilic	boly	kertness	paims	abbetint
braffs	magrists	stiansha	groad	haoi	excugn
thwase	flave	beprepal	grinis	crale	roob
kimped	preer	matilsts	condottar	laintler	tanterves
glull	esballence	merper	noccory	decystions	mibs
rammit	resulrism	doud	trares	etlemarent	Sudgess
rortes	disminofty	crosicine	cowsts	jemit	rekastion

Reaction times calculated for the following word categories: 1) positive, 2) positive-matched neutral, 3) threat, 4) threat-matched, 5) death, 6) death-matched neutral

Appendix 20 Death Anxiety Scale

		True (T)	False (F)
1	I am very much afraid to die.	T	F
2	The thought of death seldom enters my mind.	T	F
3	It doesn't make me nervous when people talk about death.	T	F
4	I dread to think about having to have an operation.	T	F
5	I am not at all afraid to die.	T	F
6	I am not particularly afraid of getting cancer.	T	F
7	The thought of death never bothers me.	T	F
8	I am often distressed by the way time flies s**o** very rapidly.	T	F
9	I fear dying a painful death.	T	F
10	The subject of life after death troubles me greatly.	T	F
11	I am really scared of having a heart attack.	T	F
12	I often think about how short life really is.	T	F
13	I shudder when I hear people talking about a World War III.	T	F
14	The sight of a dead body is horrifying to me.	T	F
15	I feel that the future holds nothing for me to fear.	T	F

Appendix 21 Pronoun Task

Pronoun Task (Individualist; Brewer & Gardner, 1996)

In the paragraph below, please click on all the pronouns (e.g., I, My, Me, Myself).

I go to the city often. My anticipation fills me as I see the skyscrapers come into view. I allow myself to explore every corner, never letting an attraction escape me. My voice fills the air and street. I see all the sights, I window shop, and everywhere I go I see my reflection looking back at me in the glass of a hundred windows. At nightfall I linger, my time in the city almost over. When finally I must leave, I do so knowing that I will soon return. The city belongs to me.

Have you click on all the pronouns (e.g. I, My, Me, Myself)?

Pronoun Task (Collectivist; Brewer & Gardner, 1996))

In the paragraph below, please click on all the pronouns (e.g., We, Us, Our,

Ourselves).

We go to the city often. Our anticipation fills us as we see the skyscrapers come into view. We allow ourselves to explore every corner, never letting an attraction escape us. Our voice fills the air and street. We see all the sights, we window shop, and everywhere we go we see our reflection looking back at us in the glass of a hundred windows. At nightfall we linger, our time in the city almost over. When finally we must leave, we do so knowing that we will soon return. The city belongs to us.

Have you click on all the pronouns (e.g. We, Us, Our, Ourselves)?

Appendix 22 Social Distancing Measures

		Never						Always
1	I still meet people outside of my direct household. *	1	2	3	4	5	6	7
2	I keep a safe distance from people outside of my direct household.	1	2	3	4	5	6	7
3	I still visit other (friends, relatives) outside of my direct household. *	1	2	3	4	5	6	7
4	I still allow others (friends, relatives) to visit my direct household. *	1	2	3	4	5	6	7
5	I have stayed at home after I was ordered to do so, apart from engaging in essential activities (e.g., grocery shopping, medical appointments).	1	2	3	4	5	6	7

Appendix 23 Prosocial Behavioural Intentions Scale

Imagine that you encounter the following opportunities to help others. Please indicate how willing you would be to perform each behavior from 1 (Definitely would not do this) to 7 (Definitely would do this).

		1 Definitely would not do this	2	3	4	5	6	7 Definitely would do this
1	Comfort someone I know after they experience a hardship							
2	Help a stranger find something they lost, like their key or a pet							
3	Help care for a sick friend or relative							
4	Assist a stranger with a small task (e.g., help carry groceries, watch their things while they use the restroom)							

Appendix 24 Prosociality Scale

The following statements describe a large number of common situations. There are no right or wrong answers; the best answer is the immediate, spontaneous one. Read each phrase carefully and fill in the number that reflects your first reaction.

1	2	3	4	5
Never/Almost Never	**Rarely**	**Occasionally**	**Often**	**Always/Almost Always**

1. I am pleased to help my friends/colleagues in their activities. 1 2 3 4 5

2. I share the things that I have with my friends. 1 2 3 4 5

3. I try to help others. 1 2 3 4 5

4. I am available for volunteer activities to help those who are in need. 1 2 3 4 5

5. I am empathic with those who are in need. 1 2 3 4 5

6. I help immediately those who are in need. 1 2 3 4 5

7. I do what I can to help others avoid getting into trouble. 1 2 3 4 5

8. I intensely feel what others feel 1 2 3 4 5

9. I am willing to make my knowledge and abilities available to others 1 2 3 4 5

10. I try to console those who are sad . 1 2 3 4 5

11. I easily lend money or other things 1 2 3 4 5

12. I easily put myself in the shoes of those who are in discomfort 1 2 3 4 5

13. I try to be close to and take care of those who are in need 1 2 3 4 5

14. I easily share with friends any good opportunity that comes to me 1 2 3 4 5

15. I spend time with those friends who feel lonely 1 2 3 4 5

16. I immediately sense my friends' discomfort even when it is not directly communicated to me. 1 2 3 4 5

Appendix 25 Demographic Form

Thank you for completing the survey! Please tell us more about yourself:

- Country of residence: _____
- Nationality: _____
- Age: _____
- Gender
    - Male
    - Female
    - Other, pls specify: _____
    - Prefer not to say
- Marital Status
    - Single
    - In a relationship
    - Cohabitating
    - Married
    - Divorced
    - Widowed
- Is any of your members a healthcare worker?
    - Yes
    - No
- Do you know anyone personally who has contracted COVID-19 or has been placed on quarantine due to potential exposure to COVID-19? (You can tick more than one option)

☐ I have personally contracted COVID-19
☐ I have been placed on quarantine for COVID-19
☐ Yes, I know at least one relative who has contracted COVID-19
☐ Yes, I know that at least one relative who has been placed on quarantine due to potential exposure to COVID-19
☐ Yes, I know at least one friend/acquaintance who has contracted COVID-19
☐ Yes, I know that at least one friend/acquaintance who has has been placed on quarantine due to potential exposure to COVID-19
☐ No to the above question

- What is the status of your COVID-19 vaccination?
    - I have received the full COVID-19 vaccination
    - I have signed up and am waiting for my COVID-19 vaccination
    - I have declined the COVID-19 vaccination
    - I am still thinking if I should get the COVID-19 vaccination
    - I have no access to the COVID-19 vaccination
- What are your concerns over COVID-19 vaccination?

- No I do not have any concerns
- Yes I have concerns. My concerns are as follow: _____

- Living arrangement
    - Alone
    - With housemates/tenants
    - With pre-school children
    - With child(ren) attending at least Primary school
    - With parents. How old are your parents? _____
    - With extended family. How old is your oldest extended family member: _____
    - With spouse/partner only_____

- Chronic health problems (e.g. diabetes, hypertension etc)
    - No
    - Yes, pls specify _____

Appendix 26 Mental Health Resources

Debrief

This study examines the effect of mortality salience on death-thought accessiblity. Participants are randomly assigned to six groups: (1) traditional mortality salience (thoughts about own death), (2) highly contagious virus resulting in severe symptoms (3) highly contagious virus with mild symptoms, (4) virus not contagious but result in very serious symptoms, (5) virus not contagious and resulting in mild symptoms and (6) control condition (thoughts about dental pain).

It is hypothesized that participants in condition (2) will report comparable levels of death-thought accessibility as the traditional mortality salience condition after a delay than participants in the other conditions.

In the event that you feel distressed following the participation in this survey, please approach psychological support from any of these websites:

Location	**Website**
United States of America	https://locator.apa.org/
United Kingdom	https://www.psychotherapy.org.uk/find-a-therapist/
Singapore	JCU Psychology Clinic Tel: +65 6709 3762 Email: psyclinic-singapore@jcu.edu.au Address: JCU Singapore Psychology Clinic 149 Sims Drive Singapore 387380 Opening hours: 9am – 6pm (Mondays – Fridays) **NUS Clinical and Health Psychology Centre (CHPC)** Tel: (65) 6516 5322 Email: chpc.enquiries@nus.edu.sg Address: National University of Singapore 20 Lower Kent Ridge Road Singapore 119080 Opening Hours: Mondays to Thursdays 9.00am to 1.00pm 2.00pm to 6.30pm Fridays 9.00am to 1.00pm 2.00pm to 6.00pm

	(Closed on weekends and public holidays)
Hong Kong	https://hkps-dcp.org.hk/en/home-en/member-directory-en Counselling Hotline The Samaritan Befrienders HK Emotion Counselling Hotline Tel: 2389 2222 (24 hours) Breakthrough Counselling Centre Counselling Service TeL; 2377 8511 (Make appointment for counselling)
India	https://www.therapyinindia.com/find
Australia	https://www.psychology.org.au/Find-a-Psychologist Beyond Blue Tel: 1300 22 4636 Lifeline Tel: 13 11 14 (24 hours)
China	http://www.psychologymatters.asia/find_therapist/China/
Japan	https://www.imhpj.org/
Korea	https://www.psychologytoday.com/us/therapists/korean
Others	Please visit your nearest General Practitioner for advice

Appendix 27 Email Permission

This administrative form has been removed