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Exploring the Role of Coping Strategies in the Anxiety-Buffering Effect of Self-Esteem: A Terror Management Theory Perspective

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List of Abbreviations

TMT:	Terror Management Theory
SE:	Self-esteem
APA:	American Psychological Association
SAD:	Social Anxiety Disorder
GAD:	Generalized Anxiety Disorder
TA:	Trait Anxiety
SA:	State Anxiety
IU:	Intolerance of Uncertainty
CBT:	Cognitive Behavioral Therapy
GSE:	Global Self-esteem
SSE:	Specific Self-esteem
MS:	Mortality Salience
STAI:	State-Trait Anxiety Inventory
RSES:	Rosenberg Self-Esteem Scale
VIF:	Variance Inflation Factor
M:	mean
SD:	standard deviation
p :	significance
CFI:	Comparative Fit Index
TLI:	Tucker-Lewis Index

Abstract

Key words: terror management theory, anxiety-buffer hypothesis, self-esteem, trait anxiety, state anxiety, problem-focused coping, emotion-focused coping, avoidant coping

Objectives

Terror management theory (TMT) describes how individuals use self-esteem (SE) to buffer death anxiety by providing values and symbolic immortality. This interaction is called the *anxiety-buffer hypothesis*. Previous research has demonstrated this negative correlation between SE and both trait anxiety (TA) and state anxiety (SA). However, the tendency to use specific coping strategies such as problem-focused coping, emotion-focused coping and avoidant coping has also been associated significantly with SE, TA and SA, which suggests a mediating effect. Therefore, the objective of the present study is to understand whether the anxiety-buffering effects of SE are mediated by these coping strategies.

Method

73 female participants aged 18 – 35 filled out a series of questionnaires in German language. SE was measured with the Rosenberg Self-Esteem Scale (RSES), TA and SA using the State Trait Anxiety Index (STAI), coping strategies with the Brief COPE. Pearson's correlations, model-fit indices and a mediation analysis were used in the analysis of the data.

Results

The total anxiety-buffering effect of SE was strong and statistically significant. The effect of SE on problem-focused and avoidant, but not emotion-focused coping, was significant. The mediating effect of coping strategies was not significant.

Conclusions

The study supports the claim of the anxiety-buffering effect of SE presented by TMT and provides insight into the correlation between SE and different coping strategies. The results of the mediation analysis suggest that the mechanisms through which SE buffers anxiety are more direct and do not rely on mediators such as coping.

Zusammenfassung

Schlüsselbegriffe: Terrormanagementtheorie, Angstpuffer-Hypothese, Selbstwertgefühl, State-Angst, Trait-Angst, problemfokussiertes Coping, emotionsfokussiertes Coping, vermeidendes Coping

Ziele

Die Terrormanagementtheorie (TMT) beschreibt, wie Einzelpersonen ihr Selbstwertgefühl (SWG) nutzen, um Todesangst abzufedern, indem es ihnen Werte und symbolische Unsterblichkeit liefert. Diese Interaktion wird als Angst-Puffer-Hypothese bezeichnet. Frühere Untersuchungen haben negative Korrelationen zwischen SWG und sowohl der Trait-Angst (TA) als auch der State-Angst (SA) gezeigt. Allerdings wurden spezifische Bewältigungsstrategien, wie problemfokussiertes Coping, emotionsfokussiertes Coping und vermeidendes Coping, signifikant mit SWG, TA und SA in Verbindung gebracht, was auf eine vermittelnde Wirkung schließen lässt. Ziel der vorliegenden Studie ist es daher zu verstehen, ob die angstpuffernden Wirkungen von SWG durch diese Bewältigungsstrategien vermittelt werden.

Verfahren

73 Teilnehmerinnen im Alter von 18 – 35 Jahren füllten eine Reihe von Fragebögen in deutscher Sprache aus. SWG wurde mit der Rosenberg Self-Esteem Scale (RSES) gemessen, TA und SA mit dem State Trait Anxiety Index (STAI), Bewältigungsstrategien mit dem Brief COPE. Bei der Analyse der Daten wurden Pearson-Korrelationen, Model-Fit-Indizes und eine Mediationsanalyse verwendet.

Ergebnisse

Der gesamte angstpuffernde Effekt von SWG war stark und statistisch signifikant. Die Wirkung von SWG auf die problemfokussierte und vermeidende Bewältigung, nicht jedoch auf die emotionsfokussierte Bewältigung, war signifikant. Der vermittelnde Effekt von Bewältigungsstrategien war nicht signifikant.

Schlussfolgerungen

Die Studie unterstützt die von TMT vertretene Behauptung einer angstpuffernden Wirkung von SWG und liefert Einblicke in die Korrelation zwischen SWG und verschiedenen Bewältigungsstrategien. Die Ergebnisse der Mediationsanalyse legen nahe, dass die angstpuffernden Mechanismen des SWG, direkt wirken und nicht auf Mediatoren wie Bewältigungsstrategien beruhen.

Introduction

Terror Management Theory (TMT; Greenberg, Pyszczynski, & Solomon, 1986; Greenberg et al., 1997, 2004; Pyszczynski et al., 2015) is a relatively well-researched theory in social psychology, existing now for almost 40 years and having accumulated a substantial amount of explorative scientific literature. TMT specifically studies self-esteem (SE) and proposes the *anxiety-buffer* hypothesis to answer the questions as to *why* people have and need SE and how it develops.

Summarized shortly, the hypothesis insinuates that the general fear of death (*terror*), which is simply put the knowledge of one's own inevitable mortality, and the thereof resulting anxiety, is an important psychological motivator which drives people to strive for standards of value and meaning in their lives. These values result from our culturally subjective worldviews. Our assessment of the extent to which we are living up to those worldviews provides us with our level of SE, which in turn buffers feelings of anxiety resulting from the terror (Pyszczynski et al., 2015). Anxiety is, as per definition by the American Psychological Association (APA) Dictionary of Psychology (2018), a feeling of apprehension resulting from impending danger or misfortune. This feeling is usually future-oriented and is mostly triggered by broad and diffuse threats, and indeed perfectly fits the TMT description of terror.

However, a person's coping styles have been found to also strongly predict anxiety. The individual way a person reacts to stress and anxiety-provoking situations is ingrained as the definition of coping styles (APA Dictionary of Psychology, 2018). Thus, it is obvious that the debate about the factors which contribute to shaping anxiety cannot be held without including coping styles. Avoidant coping styles (substance use/abuse, distraction, etc.) are often correlated with negative outcomes, increased worry and anxiety (Cincidda et al., 2022), whereas problem-focused coping (active coping, planning, etc.) or emotion-focused coping (acceptance, seeking emotional support, etc.) have benefits such as decreasing anxiety (Dias et al., 2012; Littleton et al., 2007). TMT only makes very few statements to the topic of coping styles and their role within the theory.

The question now remains whether the *anxiety-buffer hypothesis* is as simple as the direct effect of SE on anxiety, or whether it can be explained in a different manner: through the mediating effect of coping strategies. Answering this question is supposed to clarify the importance of coping styles in addition to SE, regarding the

management of anxiety symptoms. Additionally, it should deepen the understanding of the interrelations between SE, anxiety and coping.

Theoretical Background

Before exploring TMT in further detail, it is helpful to first delve into the two aspects of the *anxiety-buffer hypothesis*: anxiety and SE.

Anxiety

Anxiety is one of the most common negative affective states, generally causing great suffering among those affected by it (Spielberger & Reheiser, 2009) and has been the subject of much scientific research. Common psychological disorders such as social anxiety disorder (SAD), generalized anxiety disorder (GAD), panic disorder, PTSD and various phobias all stem from pathological levels of anxiety. It is the feeling of apprehension resulting from impending danger or misfortune (APA Dictionary of Psychology, 2018).

A difference is made between *state-anxiety* (SA), caused by acute threats in specific moments, and *trait anxiety* (TA) which is more accurately described as a personality trait (Spielberger, et al., 1970). An example of SA would be test-anxiety, in which a temporally specified occurrence (the test), which is perceived as a threat by an individual, causes the adverse response. On the other hand, TA is not localized and can be described as an individual's tendency to react anxiously or worry (Leal et al., 2017). Like other personality traits, TA is relatively stable over time (Vagg et al., 1980). According to Grillon (2008), the distinction is made clear if observed through the *time* dimension, since SA is caused by imminent perceived threats, whereas TA is the result of a person's tendency of reacting to events that are temporally uncertain. The two types are intercorrelated, meaning that high TA predisposes individuals to having high SA-reactions (Leal et al., 2017).

The theory on *intolerance of uncertainty* (IU; Koerner & Dugas, 1997) discusses worry and goes into depth on the topic of *uncertainty* as catalyst for anxiety. It argues that IU is a very important predictor for worry, which in turn has been shown to strongly predict TA (e.g., Belzer et al., 2002; Reidy, 2004; Smith et al., 2016). GAD patients have displayed increased levels of worry and anxiety when brought in contact with the idea of possible negative events in the future, including their own mortality (Clark, 2011). This may imply that what scares humans about death is the uncertainty associated with what occurs in that moment and possibly afterwards. Koerner and

Dugas have performed studies, in which healthy individuals and GAD patients were both given a choice between negative outcomes and uncertain outcomes. Firstly, GAD patients showed an increased tendency to select negative outcomes over uncertain outcomes. Secondly, worry and IU had a medium-to-strong correlation, $r(213) = .44, p < .001$, through which the authors argued that uncertainty seemed to be more intolerable for people with GAD and/or an increased tendency for worry (Buhr & Dugas, 2002). Similar findings were made in a virtual-reality study by Grillon et al. (2006b), in which avoidant behavior was observed in participants who were faced with uncertain outcomes. Avoidance is the central behavioral component which helps people with dealing with worry in IU theory. The avoidance model of worry (Borkovec et al., 1994, 2004) explains that cognitive avoidance is a maladaptive coping strategy, which reduces short term stress created by stress-triggers such as uncertainty. This occurs by making an effort to avoid or suppress negative emotions and thoughts. However, in the long term it has proven to not be helpful as a coping strategy for anxiety management since it reinforces worry over time (Stapinski et al., 2010; Borza, 2017) and even hinders recovery from anxiety disorders (Newman & Llera, 2011). Figure 1 depicts the cycle of worry according to IU theory in further detail.

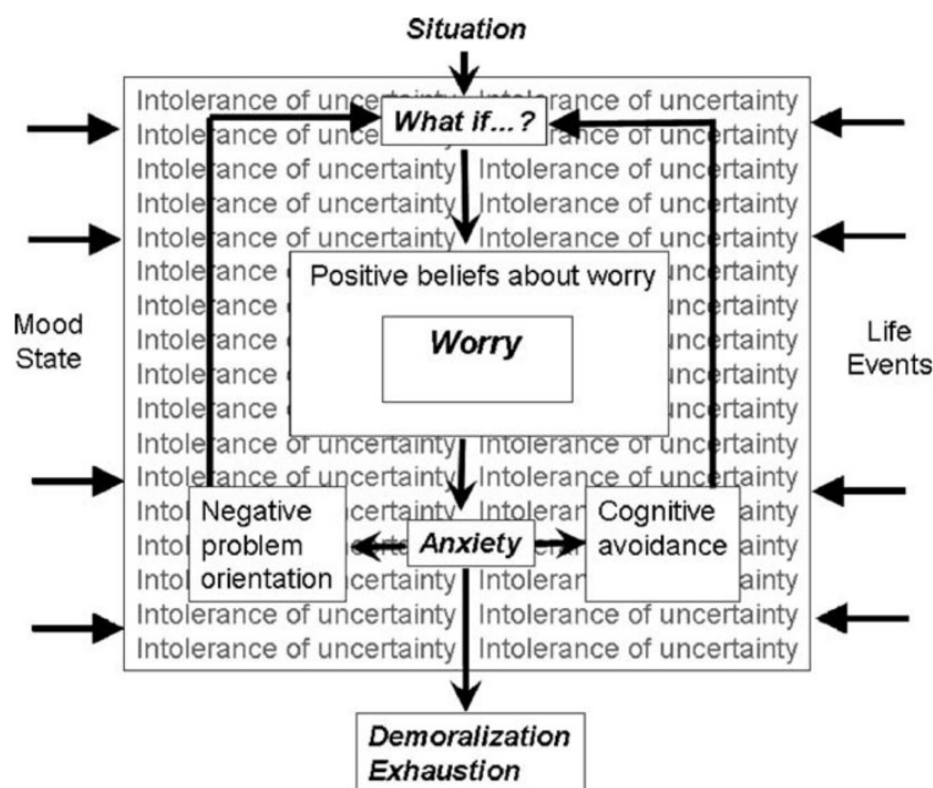
This may also be observed in the theoretical background of *Cognitive Behavioral Therapy* (CBT), an established form of treatment for various psychological disorders, including anxiety disorders (Hofmann et al., 2012). Among other theories, CBT is based on *cognitive theory*, *behavioral theory* and *social learning theory*. Briefly summarized, cognitive theory describes the negative effect of dysfunctional thinking patterns on emotion and behavior (Beck, 1967). Behavioral theory describes maladaptive behavior being the result of learning processes and can be modified through conditioning (Bandura, 1977; Pavlov, 1927; Skinner, 1953). Social learning theory highlights the importance of improving self-efficacy, the feeling of being able to overcome specific goals, as part of the treatment of psychological disorders (Bandura, 1977). In general, CBT addresses maladaptive avoidant thinking and behavior by attempting to restructure cognitive misinterpretations of danger (Beck et al., 2005). Van Dis et al. (2020) showed in a metanalysis that by using some tools employed by CBT, such as exposure to perceived threats and cognitive restructuring, there are significant decreases in worry, SA and TA in the short and long term. Amongst other things, it leans on the IU theory, firstly because it acknowledges that IU is a heavily anxiety provoking topic (Robichaud et al., 2019). Secondly, part of CBTs success is

due to it being helpful for individuals to accept and face uncertainty without feeling as threatened (Borza, 2017).

IU and the theories behind CBT are complementary in their approach on anxiety and have left their mark as defining models regarding its psychopathology. Both models identify the central theme for anxiety being avoidance of internal turmoil (Behar et al., 2009). With this background in mind, self-esteem, the second aspect of the *anxiety-buffer hypothesis* may be explored.

Figure 1

The Intolerance of Uncertainty Model (Koerner & Dugas, 1997)



Note: Adapted from Robichaud et al., (2019)

Self-Esteem

The importance of SE as a predictor for general wellbeing and psychological health cannot be overstated. Even in day-to-day life, the term “self-esteem boosting” is frequently portrayed as a wondrous remedy for many personal problems. Although public use of such terms, especially while giving friendly advice, can oftentimes be quite inaccurate, it seems to be hitting the mark when it comes to SE. Human beings seem to have an innate understanding that a low SE can lead to suffering and

unhappiness. In contrast, high SE is often associated with positive, desirable traits such as happiness and confidence, and with increased self-efficacy (Baumeister et al., 2003; Diener & Diener, 1995). Over the course of a lifetime, it is considered a relatively stable trait, comparable to TA and other Big-5 personality traits (Trzesniewski et al., 2003).

Morris Rosenberg developed one of the most robust and frequently used theories of SE (Rosenberg, 1965). It is stated that SE is the attitude we have toward ourselves. Attitudes have an affective quality, since they can be positive or negative. This attitude differs depending on whether we are looking at ourselves generally or if we are looking at ourselves within the domain of specific environments or behaviors. The former, more general perspective is called our *global self-esteem* (GSE) and is closely associated with general wellbeing. The latter may encompass anything, from our ability to play chess, speaking in front of a crowd, approaching people or riding a bike in a busy metropolitan area. Referred to as *specific self-esteem* (SSE), it is the part of SE, which is linked to a specific behavior, objects, status, etc. Interestingly, SSE does not need to be congruent with the GSE. The sum of our SSE's shapes parts of the GSE, whereas our GSE influences our general state of mind and affect, shifting our tendential attitudes on more specific topics in a positive or negative direction (Rosenberg et al., 1995). For example, a person may be afraid of public cycling on busy roads (low SSE) but may still retain a high GSE, especially if riding a bike is not particularly valued by the individual. A different person has never ridden a bike on a busy street, but due to a low GSE they may believe being incapable of doing so from the start.

In scientific literature, the distinction between GSE and SSE is rarely made. It is quite frequent that when authors use SE, they refer to the GSE, our general attitude towards ourselves, without specifying context. In the present study, from here on the term self-esteem (SE) will be used synonymously with GSE, the reason being that within TMT, the implied meaning of SE refers to how Rosenberg defines GSE.

Returning to the statement at the beginning of this chapter, what evidence is there that human understanding of the function of SE is so accurate? The data in table 1 shows a collection of correlations with variables which are directly involved in overall wellbeing, highlighting the potential of SE as a protective factor for psychological health.

Table 1*Pearson r correlations between SE and other variables*

Variable	Self-esteem (r)
Depression	-.45***;
Anxiety	-.26***; -.28*** -.49***; -.58**
Negative affect	-.45***
Life satisfaction	.32***; .39**
Happiness	.53***; .47**; .58***

Note: ** $p < .01$; *** $p < .001$

(Baumeister et al., 2003; Greenberg et al. 1992; Lee & Hankin, 2009; Li et al., 2023; Rollero et al., 2023; Rosenberg et al., 1995; Sowislo & Orth, 2013).

Terror Management Theory

TMT serves as a framework theory which gives plausible argumentations to the interrelatedness of SE and anxiety in the form of the *anxiety-buffer* hypothesis. The development of TMT, a theory stemming from social-psychology, is based on the work of cultural anthropologist Ernest Becker (Greenberg et al., 1986). His work on *the denial of death* (1973) describes the nature and function of SE as a tool for anxiety management. To examine SE from the perspective of TMT, it is useful to first explore *terror* (death anxiety), the source of the anxiety which SE is believed to shield us from.

Terror is the awareness of inevitable mortality and is described as a feeling of intense fear (Pyszczynski et al., 2015). It is only natural that animals, humans included, are driven to survival. To be afraid of threats to our lives increases the probability of survival of any given individual (Solomon et al., 1991). However, constantly living in fear of death poses a significant barrier to leading a successful life, as it can interfere with the ability to function effectively and constructively (Juhl, 2019). A difference must be made between the acute fear of danger felt in hazardous situations and the broader, long-term fear of inevitable mortality. The latter is object of study and TMT states that this *terror* can be paralyzing due to contrasting with the fundamental desire for self-preservation. The depiction of this terror is inherently connected to what IU theory describes as being afraid of the great uncertainty surrounding death and mortality. Fear of death has been linked to TA (Kopcsó & Láng, 2023). Considering this, there must be some kind of system which can manage the resulting anxiety (Greenberg et al., 2004). TMT proposes a two-fold solution to the problem:

The first answer to managing the knowledge of our transience is the creation of cultural worldviews (Greenberg et al., 1986). It our subjective way of perceiving reality, which is shaped by our upbringing and the cultural systems we grew up in (Brown & Larson, 2009; Rogoff, 2003). Greenberg et al. (1986) explain that our worldviews give us the standards by which we assess and distribute value in our lives. These worldviews are much larger, and more importantly, much more “eternal” than us. Therefore, by thinking and behaving congruently to our worldviews, we may become part of them and gain a sense of immortality, protecting us from *terror*.

This immortality can be symbolic, for instance by affiliating strongly with one’s country of birth. When behaving according to the according social rules and norms and by associating their identity with that country, the individual can feel like it will live on after death as part of the ideals of that country. The perceived immortality could also be literal, in the form of an afterlife. The same rules would apply here, since an individual would have to live according to a set of laws and norms, which fulfill the conditions required to be granted an afterlife after the physical death, in one form or another. Either way, symbolic or literal, the terror is abated to some extent since death is no longer perceived as so ultimate as it was before.

The second component for terror management is SE. In TMT, SE is defined as the *extent* to which we live up to the standards of value associated with our cultural worldviews (Pyszczynski et al., 2015). Taking the example of the person identifying strongly with their country of birth, if that person does not behave the way one should expect given the norms and values of their country (e.g. political mindset, hobbies, culinary preferences, etc.) there is little chance that the individual will have the feeling of being part of that country’s ideals. Not being part of anything greater than oneself weakens the perceived sense of immortality and gives room for *terror* to return. This *terror* will then manifest in the form of generalized anxieties and psychological suffering (Greenberg et al., 1992). TMT authors tested this theory by studying *mortality salience* (MS), which is the extent to which we are conscious of our mortality. Theoretically, if SE protects us from insecurities stemming from death anxiety, then subtle reminders of mortality should increase that insecurity and therefore also the striving for SE improvement. Studies on MS have shown that reminders of death indeed increase anxiety and therefore the subjective need for safety which SE and worldviews provide (Burke et al., 2010; Greenberg et al., 1992). The authors of TMT have used this framework to explain the mechanics of nationalism in individuals, a

claim supported by studies in east-Asian countries which showed that MS increases nationalism (Pyszczynski et al., 2015). In general terms, if life is meaningful and is of substance that goes beyond that of the physical self, an individual's SE should be strong enough to be capable of warding off death anxiety and thereof resulting generalized anxieties (Arrowood & Cox, 2020; Iverach et al., 2014; Juhl, 2019). The theory therefore provides quite a powerful framework with which much human behavior, such as pursuing meaningful activities, striving for excellence in comparison to others or even going to church can be explained through the anxiety-buffering effect of SE (Hart, 2019).

Although the explanations for behavior posited in TMT are appealing due to the widespread applicability, there are some aspects of the theory which have raised criticism. Firstly, anxiety is a complex topic, and it has been argued recently that a simple factor explanation is insufficient to portray that complexity (Hart, 2019). Death in itself is a powerful motivator; however, it has not yet been possible to scientifically attribute all anxiety to that single threat. It may be more humans are more influenced by many different threats, varying in severity, over the course of a lifespan. Secondly, the theory does not differentiate between TA and SA, which hinders practical interpretability considering that the two constructs are vastly different in nature. Secondly, even TMT authors agree with some criticism, that it is difficult to predict the way people react to reminders of death. The theory assumes that humans have clear and straightforward worldviews, but oftentimes they are vague or even conflicting within individuals, therefore not allowing causal interpretations of behavior related to MS (Martin & van den Bos, 2014; Pyszczynski et al., 2015). Furthermore, artificially increased MS within the experimental context as described below (Greenberg et al., 1992), does not account for multiple different worldviews in people and the potentially conflicting interactions.

In summary, TMT posits the fear of death as being an important factor regarding our thinking and behavior. It motivates human beings to create and cling to cultural worldviews which will surpass them in death and therefore granting them a symbolic or literal sense of immortality. SE is the extent to which we follow our own worldviews, depending on which the anxiety resulting from the terror is successfully buffered, or not. There is some discussion to the validity of the claims regarding death anxiety and MS, arguably the centerpieces of TMT, however this does not discredit it altogether. Critics of the theory acknowledge that laboratory studies such as the one discussed

below by Greenberg et al. (1992), have established TMTs meaningfulness as a theory exploring SE and anxiety (Hart, 2019).

Anxiety-Buffer Hypothesis

The *anxiety-buffer* hypothesis has been identified by a multitude of authors and goes beyond TMT. That high SE is linked with reduced levels of anxiety and vice-versa has been observed in cross-sectional studies in adults as well as adolescents (e.g., Lee & Hankin, 2009; Moksnes et al., 2010), longitudinal studies (e.g., Henriksen et al., 2017; Li et al., 2023) and by metaanalyses (Sowislo & Orth, 2013). The data from some of these studies is shown in Table 1. This knowledge has reached consensus and is being used for application of treatments such as CBT in the treatment of psychological disorders such as GAD, SAD or various depressive disorders (Goldin et al., 2013).

The theory would therefore imply that somehow increasing SE would lower subjective anxiety in the short term. These implications are in line with the findings of TMT authors Greenberg et al. (1992). They created three different studies on the topic which displayed this interaction. In study 1, participants would receive a fake psychological assessment report which was either positive or neutral. The positive report had the effect of boosting the SE in the participants, whereas the neutral one did not. Participants in both groups would then be shown either a neutral video or a graphic, death-related video. SA was measured using the State-Trait Anxiety Inventory (STAI; Spielberger et al., 1970), after watching the video. The results in Table 2 display how participants who had positive personality feedback were more resilient against anxiety when faced with anxiety-inducing imagery ($p < .001$). Findings on the *anxiety-buffering* function of SE speak for TA as well. Yang et al. (2023) conducted a study on the relationship of negative life events, TA and depression. Their final sample consisted of 6224 college students who displayed a medium to strong negative correlation $r(6222) = -.48$, $p < .01$, between TA and SE.

In summary, there is plenty of evidence speaking in favor of the *anxiety-buffer* hypothesis. This calls for greater appreciation for SE as a protective factor against psychological disorders and general factor for wellbeing. Some scientific findings, which will be discussed below, indicate that these protective effects may occur through SE's relationship to coping styles. This relationship has been briefly touched upon in previous chapters but will now be explored in further detail.

Table 2

Mean anxiety scores for the interaction between Mortality Salience and level of Self-Esteem: Study 1 (Greenberg et al., 1992)

Personality Feedback	Neutral	Positive
Neutral Video	43.46	44.93
Death video	54.15	43.09

Note: Scores on the anxiety measure could range from 20 (low anxiety) to 80 (high anxiety).

Coping

The aim of this chapter on coping is to firstly give an initial introduction, definition as per common theories and examples of coping styles. Secondly, the importance of coping for anxiety prevention and its interplay with SE is presented. This serves to clarify the need to introduce coping styles as a possible mediator of the correlational effect of the *anxiety-buffer* hypothesis described within the TMT framework.

Coping is described by Lazarus and Folkman (1984) as the “constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person”. Arguably one of the most important models which underlines the importance of coping for dealing with stressful situations is the *transactional model of stress and coping* (Lazarus and Folkman, 1984).

The model describes the cognitive appraisal and reappraisal pathway, which is decisive in whether a stress-reaction occurs or not. The pathway describes a primary- and secondary appraisal of a situation, available coping mechanisms and a final reappraisal. It begins whenever an individual is faced with any type of situation, then a primary appraisal occurs. Here, a situation is appraised either positively (the individual can deal with it), neutrally (the situation is not important, and the individual will not waste any effort on it) or as stressful (the individual feels threatened by the situation, especially if the outcome is important). A stressful appraisal can be further specified into challenge, benefit, harm/loss, or threat. In wake of a stressful primary appraisal, during the secondary appraisal, an individual will determine whether it has enough resources at its disposal to deal with the situation. A person falls into *distress* if there are not enough resources to cope with the stress, meaning they will experience a negative stress response which often leads to negative affect, including anxiety (APA

Dictionary of Psychology, 2018). However, if there are enough resources available to deal with the situation, then the individual will use them in specific coping strategies to reduce the affective burden of the situation. In the last step the situation is reappraised, meaning that it will once again be judged to be positive, neutral or still stressful to the individual (Lazarus & Folkman, 1984).

The model clarifies the use of coping strategies as stress-reducing mechanisms and although not being the only theory on coping, Lazarus' theory is the most widely used model (Dias et al., 2012). These coping strategies were originally divided into two categories: problem-focused coping and emotion-focused coping (Lazarus, 1999). The former is when a person tries to "solve" the stressful problem through exerting cognitive or behavioral effort (e.g. active coping, planning). The latter describes any effort that is primarily designed to change the way a person responds emotionally, without tackling the problem directly (e.g. acceptance, humor).

A different perspective is provided by the *approach-avoidance* model of coping (Roth & Cohen, 1986). In this model, cognitive and emotional efforts are describing as being oriented either toward or away from threat. Approach oriented coping is generally considered adaptive, since it actively reduces the impact of a situation, whereas avoidant coping is mostly maladaptive since the anxiety inducing situation doesn't change. It is therefore negatively correlated with general wellbeing (Baker & Berenbaum, 2007; Penley et al., 2002). However, there is some argument to be made in favor of avoidance-oriented coping in the short term, namely that it provides safety and preserves resources when individuals are faced with stress (Roth & Cohen, 1986).

Folkman and Moskowitz (2004) also gave an analysis of coping strategies and discussed the possibility of including avoidance coping within transactional stress model. They showed that avoidant behavior is a form of emotion-focused coping but is more maladaptive since it implies avoidance and escape. Research discussed below has since proposed that a combination of the transactional model of stress and coping and the approach-avoidance model might provide a better overall explanation for the mechanisms of coping. Within emotion-focused coping there are both approach-oriented and avoidant-oriented-strategies. Which is why it may be helpful to split them by that category. The resulting subdivision resulted in problem-focused (approach) coping, emotion-focused (approach) coping and avoidant (avoidance) coping (see Dias et al., 2012; Poulus et al., 2020). Folkman and Moskowitz (2004) speak of the importance of the controllability of situations for the type of coping

category employed. They highlight that problem-focused coping is helpful in situations which are controllable, such as studying (problem-focused) being helpful for managing test-anxiety. On the other hand, emotion-focused coping is more adaptive in situations which don't grant the individual any possibility of control. This includes coming to terms (acceptance = emotion-focused) with traumatic life events, where there is little to nothing to be done about the situation.

The *brief-COPE* (Carver, 1997) inventory for assessing coping, which has also been used within the scope of this thesis, explores 14 coping strategies which can be attributed to one of those three categories. Table 3 shows each coping strategy and attributed category.

Having described the mechanisms of coping in detail, it is time to explore the importance of coping styles for SE and anxiety.

Table 3

Coping categories with corresponding coping style from the Brief-COPE subscales by Carver (1997).

Category	Coping Style
Problem-focused coping	Active coping
	Planning
	Positive reframing
	Using Instrumental support
Emotion-focused coping	Acceptance
	Humor
	Religion
	Using emotional support
	Venting
	Self-blame
Avoidance Coping	Self-distraction
	Substance use
	Denial
	Behavioral disengagement

Coping and Self-esteem

There is much previous research showing the relationship of coping styles and SE. Individuals with high SE tend to use more problem-focused or approach oriented coping strategies like active coping (e.g. Aspinwall & Taylor, 1992; Li et al., 2023) or using emotional support (e.g. Dumont & Provost, 1999; Thoits, 1995). High SE individuals also displayed less avoidance coping (Taylor & Stanton, 2007). Low SE individuals have an increased tendency for avoidant coping, such as substance use, and in general a reduced likelihood of employing problem-focused coping (Dumont & Provost, 1999). A recent study on Generation Z adults, underlined the interrelatedness of coping strategies and SE. Participants were asked to complete questionnaires which assessed problem-focused, emotion-focused, avoidant-coping and SE. The results showed that problem-focused coping and SE were significantly positively correlated, $r(196) = .24, p < .01$, whereas the correlation between avoidant coping and SE was negative $r(196) = -.27, p < .01$ (Raja Kumari, 2024). The study did not find a significant correlation between emotion-focused coping and SE, but stated that it was a surprising result, not in line with previous research (see Taylor & Stanton, 2007). In summary, research is clear that SE is a strong predictor for the category of coping strategies employed by individuals when faced with stressful situations. Research indicates that they bidirectionally predict each other (Li et al., 2023).

Coping and Anxiety

The predictive power of selected coping strategies over anxiety has been portrayed in previous studies. Research shows medium-to-strong negative correlations between problem-focused coping and anxiety (e.g. Blalock & Joiner, 2000; Cincidda et al., 2022; Novak et al., 2021). Looking at TA specifically, there is a clear relationship that shows a positive correlation between tendencies for avoidant and emotion-focused coping and TA ($r(196) = .33, p < .01$; $r(196) = .23, p < .01$ respectively), whereas problem-focused coping is negatively correlated $r(196) = -.14, p < .01$ (Raja Kumari, 2024). Dias et al. (2012) showed that high SA and high TA both independently predicted tendencies for more avoidant or emotion-focused coping and less problem-focused coping in athletes. The correlation between SA and avoidant coping has also been subject of previous studies $r(98) = .41, p < .001$ (Kausar & Yusuf, 2011). The relevance of this topic is further shown by a study on the anxiety-inducing effects of the lockdowns resulting from the COVID-19 pandemic. Among other things,

it looked at the relationship between dysfunctional coping (used synonymously with avoidant coping) and state anxiety in Italian citizens (Cincidda et al., 2022). Participants would complete online questionnaires and the results showed that high levels of avoidant coping strongly predicted SA levels $r(1266) = .66, p < .01$.

In conclusion, the research implies that individuals with an increased tendency for avoidant coping and emotion-focused coping experience higher levels of TA and/or SA (e.g. Dias et al., 2012; Raja Kumari, 2024). This speaks in support of the CBT approach (see previous chapter on anxiety for more detail), in which maladaptive avoidant strategies are intended to be restructured to alleviate the burden of both TA and SA. Furthermore, problem-focused coping seems to be a protective factor against anxiety (e.g. Blalock & Joiner, 2000). This is plausible since problem-focused coping helps individuals remove the anxiety-inducing problems completely and they will therefore not be subjected to the negative effects in the long-term. The opposite is the case for both emotion-focused and avoidant coping, although it is important to remember the benefits of emotion-focused coping in uncontrollable situations, such as the death of a family member, in which problem-focused strategies may not be of help. Therefore, the results are supposed to be interpreted in the light of general tendencies of application of coping strategies in individuals instead of explicitly focusing on specific life situations.

Research Questions and Hypothesis

Proposed Model

The anxiety-buffer hypothesis proposed by TMT has gained widespread support by scientific literature. However, considering that coping styles are associated with both SE and anxiety, they could be mediate part of the negative effect of SE on anxiety. Thus, since there is surprisingly little literature which explores all three variables and their relationship (see Dias et al., 2012; Li et al., 2023; Raja Kumari, 2024), the aim of this thesis is to propose a new model for the anxiety-buffer hypothesis, one which can account for the importance of individual coping strategies as mediators. This model acknowledges the highly probable direct predictive strength of SE on anxiety by claiming only a partial mediation via coping strategies.

Figure 2 shows the model which is proposed within this thesis. The reasoning behind it is as follows: The mechanisms behind the anxiety-buffering effect of SE are not clear and there is much evidence connecting coping strategies with SE and

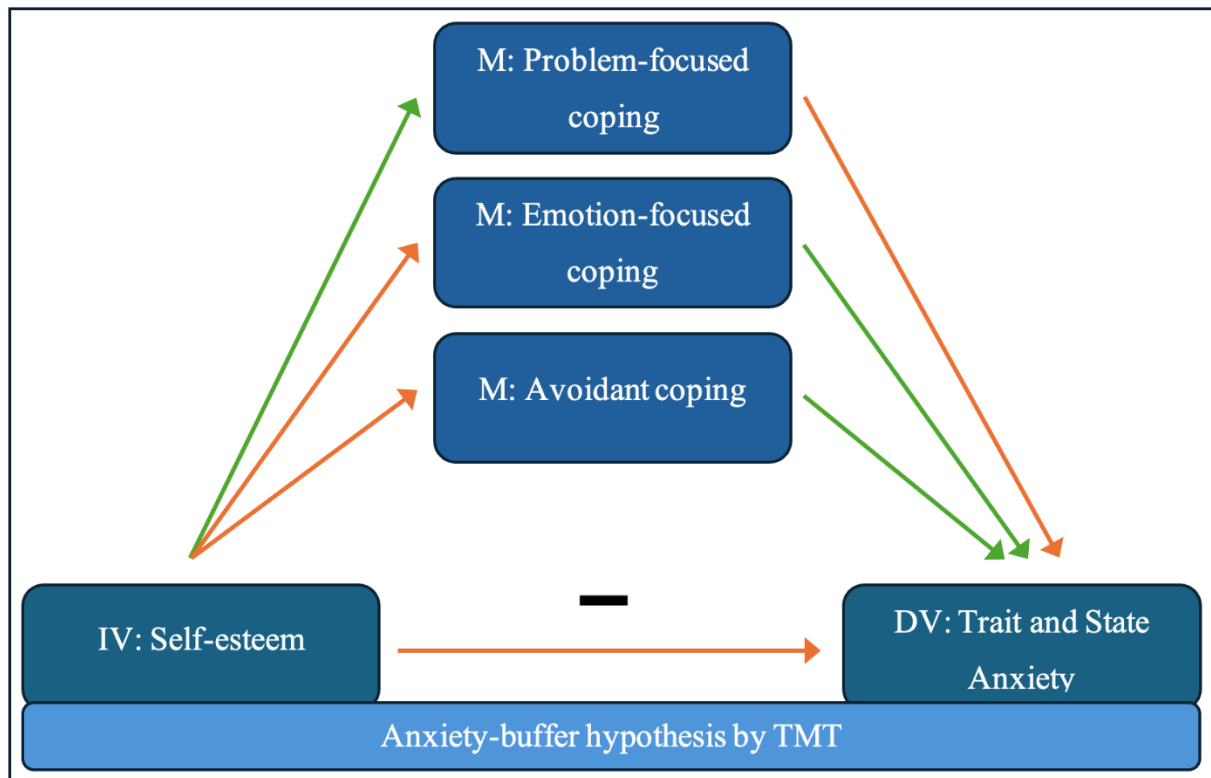
anxiety, as described in the previous chapter. The anxiety-buffer hypothesis could therefore be displayed at least partially through different paths. Firstly, high SE correlates positively with problem-focused coping, which in turn negatively predicts anxiety. Secondly, SE correlates negatively with emotion-focused and avoidant coping, which in turn correlate positively with anxiety. By exploring these mediation pathways, this study seeks to clarify whether the effect of SE on anxiety is applied directly or whether it is applied through the influence of coping strategies. Furthermore, the current study addresses a critical gap in the literature: while the direct effect of SE on both TA and SA has reached consensus, little is known about the mechanisms underlying this relationship. Studying the manner in which SE influences anxiety through coping strategies will contribute to a better understanding of the anxiety-buffer hypothesis.

Research Questions and Hypothesis

Considering that the sample consists exclusively of adult women (see methods) the following research question is formulated from the model:

Figure 2

Proposed model showing the mediating role of coping styles on the SE – anxiety correlation highlighted by the anxiety-buffer hypothesis by TMT.



Note: Green arrow = Positive correlation; Orange arrow = negative correlation;
IV = Independent variable; M = Mediator; DV = Dependent variable;
Figure created by author of this thesis.

- 1.) To what extent do problem-focused, emotion-focused, and avoidant coping strategies partially mediate the relationships between self-esteem and both trait and state anxiety in adult women?

Answering this question is relevant because, firstly, it addresses a theoretical gap within TMT. The theory emphasizes SE as a buffer against anxiety, but the mechanisms through which this occurs are not fully understood. There is only little testing regarding intermediary variables outside of SE and anxiety. By testing for coping strategies as potential mediators this research question extends TMT and addresses the complexity of the SE – anxiety interaction. Secondly, this research question is the first which differentiates between TA and SA within the TMT context.

This may expand TMT further, since until now it has considered anxiety a single construct.

Based on the model and the evidence above, following hypotheses are proposed for an analysis of mediation:

H_{1A}: Self-esteem has a direct effect on both state and trait anxiety, independent of coping strategies.

H_{1B}: Self-esteem has an effect on problem-focused, emotion-focused, and avoidant coping strategies.

H_{1C}: Problem-focused, emotion-focused, and avoidant coping strategies partially mediate the relationship between self-esteem and both state and trait anxiety.

The first hypothesis explores whether the claim of a direct buffering-effect of SE on anxiety, as hypothesized by TMT, is supported by the data. The second hypothesis seeks to underline the connection between SE and the various coping strategies, building the prerequisite connection needed for the mediation model. The third hypothesis explores the extent to which coping strategies mediate the effect of SE on anxiety. This will be seen in the portion of the total effect moving from SE to anxiety, which travels indirectly via coping strategies. If that indirect pathway is statistically significant, it implies that coping strategies are relevant in the SE – anxiety association. By answering this hypothesis, it is possible to gain a better insight of the pathways through which the anxiety-buffering effect of SE functions. It deepens the understanding of *how* this effect occurs, providing a more detailed perspective on the anxiety-buffer hypothesis.

Method

Study Design

The current study is of cross-sectional design. The main variables SE, problem-focused coping, emotion-focused coping, avoidant coping, TA and SA were collected within the scope of a larger project named *Music and Skin-barrier Recovery II* (MUSKIBA II). Led by Univ.-Prof. Dr. Urs Markus Nater and Dr. Jasminka Majdandžić, the project is being conducted at the University of Vienna and it explores the relationship between music, stress, and skin-barrier recovery. The participants within this study were recruited between March 2020 and November 2024. Within that project

participants are asked to complete a series of online questionnaires via Unipark as part of the pre-screening protocol, which had to be completed before the laboratory study. Filling out the questionnaires would take them 20 – 30 minutes. Among these questionnaires are those relevant for measuring the main variables: The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1979) which assesses SE, the STAI (Spielberger et al., 1983) which assesses SA and TA, and the Brief COPE (Carver, 1997) which assesses various coping strategies. All questionnaires were given in the German language and will be described in further detail below. There was only a single measurement time point. However, there were no specific requirements for the time or place in which participants were to complete the pre-screening questionnaires on Unipark mentioned above. They could also take breaks and, as long as the questionnaires were completed before the laboratory study, all their data was included. Problems which may be caused this method are discussed in the limitations section.

The specific timeline for each participant, from recruitment to study completion, is as follows: participants contact the research team via mail and declare their interest in participating in the study. Each participant is then contacted by phone for an interview, in which they were screened by the research team for inclusion and exclusion criteria (see below). After being deemed eligible for participation in the study by the person performing the screening interview, the participants would receive a link via E-Mail for a set of online questionnaires on Unipark. The main research project uses salivary cortisol as one of the principal measures of stress and, since a correlation between salivary cortisol and estrogen levels is possible (Kirschbaum et al., 1999), the female participants are tested during a specific phase of their menstrual cycle, the follicular phase. This being due to estrogen levels being different during the various phases of the menstrual cycle, which is why, in an effort to increase power by reducing inter-subject variance, participants are all-female and are tested during the same phase. They would then carry on to the laboratory experiment, however a description is omitted here due to non-relevance to the current master's thesis.

Participants received 45€ for completion of the full study (screening interview, online questionnaires and laboratory study). The research project was approved by the Ethics Committee of the University of Vienna (operation number: 00494).

Participants

Women aged between 18 and 35 were the research population within this study. The following inclusion and exclusion criteria had to be fulfilled in order to take part in the study: they had sufficiently good German language skills, they did not suffer from any chronic physical or psychological illnesses, allergies or addictions, they did not smoke or drink excessively, they did not take drugs or psychoactive substances, they did not use hormonal contraception or other medications which influence hormonal equilibrium and they had no experience with stress tests. Furthermore, their body mass index (BMI) had to be between 17 and 25, ensuring they were neither over- nor underweight. Since music is important in the scope of the larger study, participants should also not be working professionally with music, such as being musicians or music teachers for example.

The required sample size was estimated using the empirical estimates by Fritz & MacKinnon (2007). Considering that past literature has shown, on average, a medium effect for the direct impact of SE on anxiety (see Table 1), and medium effect of SE on coping strategies (see chapter Self-esteem and coping), a sample size of 78 participants is needed for 0.8 power.

Materials and Measures

Demographic Variables

Participants were asked about a multitude of demographic variables. Within this study participant's age, nationality, level of education and ongoing education were included.

Self Esteem

Morris Rosenberg devised the Rosenberg Self-Esteem Scale (Rosenberg, 1979) to appraise SE and it has since then been in use for several different research populations, including underage students and adults. It contains 10 items which are part of an ordinal Guttman scale. The four possible answers range from "Strongly disagree" and "Disagree" to "Agree" and "Strongly Agree". An example of the phrasing used within the items would be "I feel that I'm a person of worth" or "I feel I do not have much to be proud of". If a person has a high SE, they should respond "Agree" or "Strongly Agree" on items 1, 3, 4, 7 and 10. The opposite is the case for the remaining items. A score is calculated for each participant by totaling the four-point items after

reversing the inversely scored items. This could result in a minimum SE score of 10 and a maximum score of 40. Psychometric information on the RSE shows that it is quite stable, having correlations of .88 and .85 when looking at test-retest reliability over 2 weeks (Rosenberg, 1979). Solid validity of measure is provided by high correlations with other questionnaires that look at self-esteem, such as the Coopersmith Self-Esteem Inventory (Ciarrochi & Bilich, 2006).

State and Trait Anxiety

To get a measure of both trait and state anxiety, the widely known State Trait Anxiety Inventory (Spielberger et al., 1983) was used. The STAI was specifically designed to assess SA, as well as TA accurately in different populations, such as children or adults. The two variables are measured by individual subscales, each having 20 items and therefore bringing the STAI to 40 total items, 19 of which are inversely coded in order to account for answer bias. SA oriented items are phrased to assess the person's anxiety in the present moment: "I am worried" or "I am satisfied". The items in this subscale are scored on a 4-point scale and the answers can be "not at all", "somewhat", "moderately so", and "very much so". On the other hand, TA looks at more stable predictors for anxiety reactions, item examples here are phrased more generally: "I feel even-tempered" or "I worry too much over something that really doesn't matter". Every item here is also scored on a 4-point scale, but the answers can be "almost never", "sometimes", "often" and "almost always". The subscales are scored by adding up the individual item scores, after reversing the inversely coded items (Spielberger et al., 1983). This results in two scores between 20 and 80, one for TA and one for SA. Researchers have proposed 39 - 40 to be the cut-off point, as of which both SA and TA levels should be considered clinically relevant (Addolorato et al., 1999).

Psychometric properties of the STAI show test-retest reliability scores of .73 to .86 (Spielberger et al., 1983) and even .88 in another research depending on the population (Barnes et al., 2002; Knowles & Olatunji, 2020). Although over 10000 adolescents and adults were tested during test development, the STAI sometimes struggles to differ between anxiety and depression (Julian, 2011), however it has been correlated to two other measures of anxiety by different authors with promising results. Firstly, with the long-standing Taylor Manifest Anxiety Scale (Taylor, 1953) it shows a correlation of .73 when measuring anxiety overall. Secondly, Scheier's Anxiety Scale

Questionnaire (Cattell & Scheier, 1963) has a correlation of .85 with the STAI overall when measuring anxiety.

Coping Behavior

The original COPE inventory, used to assess coping strategies in participants by Carver et al. (1989), had 60 items and went beyond the scope of many research projects with regards to respondent burden (Carver, Scheier & Weintaub, 1989). Thus, the shorter version, namely the Brief COPE (Carver, 1997) was devised with only 28 items and slight modifications to the subscales. Within this study, the Brief COPE inventory was used.

A total of 14 different coping strategies are investigated in subscales, with two items per coping reaction. The strategies include (1) active coping, (2) planning, (3) positive reframing, (4) acceptance, (5) humor, (6) religion, (7) using emotional support, (8) using instrumental support, (9) self-distraction, (10) denial, (11) venting, (12) substance use, (13) behavioral disengagement and (14) self-blame. Subscales 1, 2, 3 and 8 are attributed to problem-focused coping. Subscales 4, 5, 6, 7, 11 and 14 are attributed to emotion-focused coping. Subscales 9, 10, 12 and 13 are attributed to avoidant coping. Participants are asked how much each item reflects their behaviour in past difficult situations and they could select one of four different possible answers, being “Not at all”, “A little”, “Somewhat” and “A lot”. The two items which make up one coping strategy are added up and participants receive scores which can range from 2-8. This is done on each of the 14 strategies. For each of the three main subscales (problem-focused, emotion-focused and avoidant) the scores of all items which are attributed to them are totalled to a single score. This means that scores for problem-focused coping can range from 8 – 32, emotion focused coping can range from 12 – 36 and avoidant coping can range from 8 – 32. Reliability of all 14 subscales reach at least the minimum of .50 as seen in Table 4.

Procedure

Individuals who were interested to participate in the study would first partake in the online screening where the inclusion criteria were checked. Then, they would receive a link for the above-mentioned Unipark questionnaires (including Brief-COPE, RSES and STAI), which they had to complete once. Completion of the questionnaires would take 20-30 minutes. Participants needed to complete the questionnaires before their appointment for the lab study.

Table 4

Average reliability values and sample items for each subscale of the Brief-COPE (Carver, 1997)

Subscale	Cronbach's α	Sample item
Active Coping (PF)	.68	I've been taking action to "try to make the situation better.
Planning (PF)	.73	I've been thinking hard about what steps to take.
Positive Reframing (PF)	.64	I've been looking for something good in what is happening.
Acceptance (EF)	.57	I've been learning to live with it.
Humor (EF)	.73	I've been making fun of the situation.
Religion (EF)	.82	I've been praying or meditating.
Using Emotional Support (EF)	.71	I've been getting emotional support from others.
Using Instrumental Support (PF)	.64	I've been getting help and advice from other people.
Self-Distraction (AC)	.71	I've been turning to work or other activities to take my mind off things.
Denial (AC)	.54	I've been saying to myself "this isn't real."
Venting (EF)	.50	I've been expressing my negative feelings.
Substance Use (AC)	.90	I've been using alcohol or other drugs to make myself feel better.
Behavioral Disengagement (AC)	.65	I've been giving up trying to deal with it.
Self-Blame (EF)	.69	I've been blaming myself for things that happened.

Note: PF = Problem-focused coping; EF = Emotion-focused coping; AC = Avoidant coping

Analysis

JASP 0.19.1 was used for the statistical analyses within this thesis. For the correlations between SE, TA, SA, problem-focused coping, emotion-focused coping and avoidant coping a Pearson's correlation analysis was calculated. Firstly, a correlation analysis is supposed to confirm the basic associations between predictor, outcomes and mediators. Secondly, the prerequisites for a mediation model are validated, since it assumes that SE is significantly correlated with the different coping

strategies and both TA and SA. Lastly, understanding the strength and direction of the correlation's aids in the interpretation of mediation effects.

The data was checked for multicollinearity using the variance inflation factor (VIF) test and no meaningful collinearity between the variables. A Shapiro-Wilk test was used to test normal distribution within the variables. The proposed model-fit was tested using a χ^2 test within JASP's structural equation modeling (SEM) module. Additionally, the SEM module was applied on the data for the mediation analysis. A mediation analysis was performed with SE as independent variable, problem-focused, emotion-focused and avoidant coping were mediators, and both TA and SA were dependent variables. Since normality was not given, in accordance with Biesanz et al., 2010, bias-corrected percentile bootstrapping with 1000 replications was used as a method as a more reliable way to estimate indirect effects. Especially in smaller samples, bootstrapping has shown to improve power and sensitivity to mediating effects (Biesanz et al., 2010). Age, level of education and current education were controlled for to reduce the bias from possible confounding effects. For example, age has been shown to significantly predict anxiety (Kessler et al., 2010) and preferred coping strategies (Folkman & Lazarus, 1980). By removing the confounders, a more robust interpretation of the interactions between the main variables can be drawn.

Results

Sample Description

The final sample consisted of N = 73 women. Table 5 shows the distribution of the participants across demographic variables.

Main Analysis

Correlation Analysis

The correlations in Table 7 show the interactions between the main variables within the present research population. The strengths of interactions are judged using Cohen's (2013) guidelines (small $r = .10$; medium $r = .30$; large $r = .50$). SE is seemingly a very good predictor of anxiety, displaying a large negative correlation ($r = -.82$, $p < .001$) with TA. The connection between SE and SA is also highly significant and large ($r = -.58$, $p < .001$). Regarding coping strategies, SE is positively associated with problem-focused coping ($r = .38$, $p < .01$) and negatively associated with avoidant coping ($r = -.44$, $p < .001$). TA is strongly intercorrelated with SA ($r = .64$, $p < .001$).

There is a negative correlation between TA and problem-focused coping ($r = -.31$, $p < .01$), whereas the correlation between TA and avoidant coping is positive ($r = .45$, $p < .001$). SA correlates positively with avoidant coping ($r = .26$, $p < .01$). Looking at the coping strategies amongst themselves, there is much predictive strength between problem-focused and emotion-focused coping, showing a large negative correlation ($r = -.67$, $p < .001$). Furthermore, emotion-focused coping has a medium positive correlation with avoidant coping ($r = .34$, $p < .01$). Emotion-focused coping does not correlate significantly with SE, TA or SA.

Table 5

Descriptive statistics of demographic characteristics
Total N = 73

Variable	N (%)
Age (Mean, SD)	24.25 (3.88)
Nationality	
Austria	46
Germany	11
Other	16
Level of education	
University	0 (0)
High school diploma	67 (91.8)
Secondary school	2 (2.7)
Apprenticeship	1 (1.4)
Other	3 (4.1)
Ongoing education	
University	58 (79.5)
Technical school	3 (4.1)
Other	3 (4.1)
None	9 (12.3)

Note: SD = Standard deviation

Table 6*Descriptive Statistics of all Variables within sample.*

Variable	N	M	SD	Scores	
				Min	Max
Age	73	24.25	3.88	18	34
Self-Esteem	73	32.30	6.20	16	40
Trait Anxiety	73	38.47	10.12	20	66
State Anxiety	73	37.15	10.28	21	74
Problem-focused Coping	73	23.01	4.54	17	32
Emotion-focused Coping	73	29.62	4.85	20	43
Avoidant coping	73	14.81	3.77	8	26

Note: N = Total number; M = Mean; SD = Standard deviation

Main Analysis

Correlation Analysis

The correlations in Table 7 show the interactions between the main variables within the present research population. The strengths of interactions are judged using Cohen's (2013) guidelines (small $r = .10$; medium $r = .30$; large $r = .50$). SE is seemingly a very good predictor of anxiety, displaying a large negative correlation ($r = -.82$, $p < .001$) with TA. The connection between SE and SA is also highly significant and large ($r = -.58$, $p < .001$). Regarding coping strategies, SE is positively associated with problem-focused coping ($r = .38$, $p < .01$) and negatively associated with avoidant coping ($r = -.44$, $p < .001$). TA is strongly intercorrelated with SA ($r = .64$, $p < .001$). There is a negative correlation between TA and problem-focused coping ($r = -.31$, $p < .01$), whereas the correlation between TA and avoidant coping is positive ($r = .45$, $p < .001$). SA correlates positively with avoidant coping ($r = .26$, $p < .01$). Looking at the coping strategies amongst themselves, there is much predictive strength between problem-focused and emotion-focused coping, showing a large negative correlation ($r = .67$, $p < .001$). Furthermore, emotion-focused coping has a medium positive

correlation with avoidant coping ($r = .34, p < .01$). Emotion-focused coping does not correlate significantly with SE, TA or SA.

Model-Fit Testing

The model presented in Figure 2 seemingly does not fit the data well. The resulting function when testing the model-fit was $\chi^2(3, N=73) = 65.38; p < .001$. Less conservative fit indices such as the Comparative Fit Index (CFI) or Tucker-Lewis Index (TLI) showed comparable results (CFI = .36; TLI = -.51).

Explorative Model-Fit Testing

The results above are indications for an unfitting factor. Considering that emotion-focused coping has no significant correlations with SE, TA or SA, the probability of it being responsible for poor model-fit are high. Model-fit calculations were repeated after removing emotion-focused coping as mediator. Results showed an excellent model-fit $\chi^2(1, N=73) = 1.28; p = .26$ (CFI = .90; TLI = .98).

Mediation Analysis

Firstly, the estimated total effects of SE on TA ($\beta = -1.33; p < .001$) and SA ($\beta = -0.96; p < .001$) are both negative and large.

Secondly, the resulting estimated direct effect of SE on TA is negative and large ($\beta = -1.26; p < .001$) and large for SA ($\beta = -1.04; p < .001$).

Thirdly, the effect of SE on problem-focused coping was positive and small-to-medium ($\beta = 0.28; p < .001$). SE has a negative small-to-medium effect on avoidant coping ($\beta = -0.27; p < .001$). No effect of SE on emotion-focused coping is found.

Lastly, the mediation analysis shows that there was no mediating effect of problem-focused, emotion-focused or avoidant coping when looking at SE as independent variable and both TA and SA as dependent variable. The analysis showed no significant indirect effects via any of the indirect mediating pathways of SE on TA ($\beta = -0.10; p = .21$) or SA ($\beta = 0.07; p = .52$). Direct pathways of the updated model are shown in Figure 3. Table 8 depicts estimated effect sizes along the paths of the mediation model.

Table 7*Pearson's (r) correlations between all the main variables.*

Variable	1	2	3	4	5	6
1. Self-esteem	1					
2. Trait anxiety	-.82***	1				
3. State anxiety	-.58***	.64***	1			
4. Problem-focused coping	.38**	-.31**	-.13	1		
5. Emotion-focused coping	.14	-.01	.03	.67***	1	
6. Avoidant coping	-.44***	.45***	.26*	-.05	.34**	1

Note: * p < .05; ** p < .01; *** p < .001

Table 8

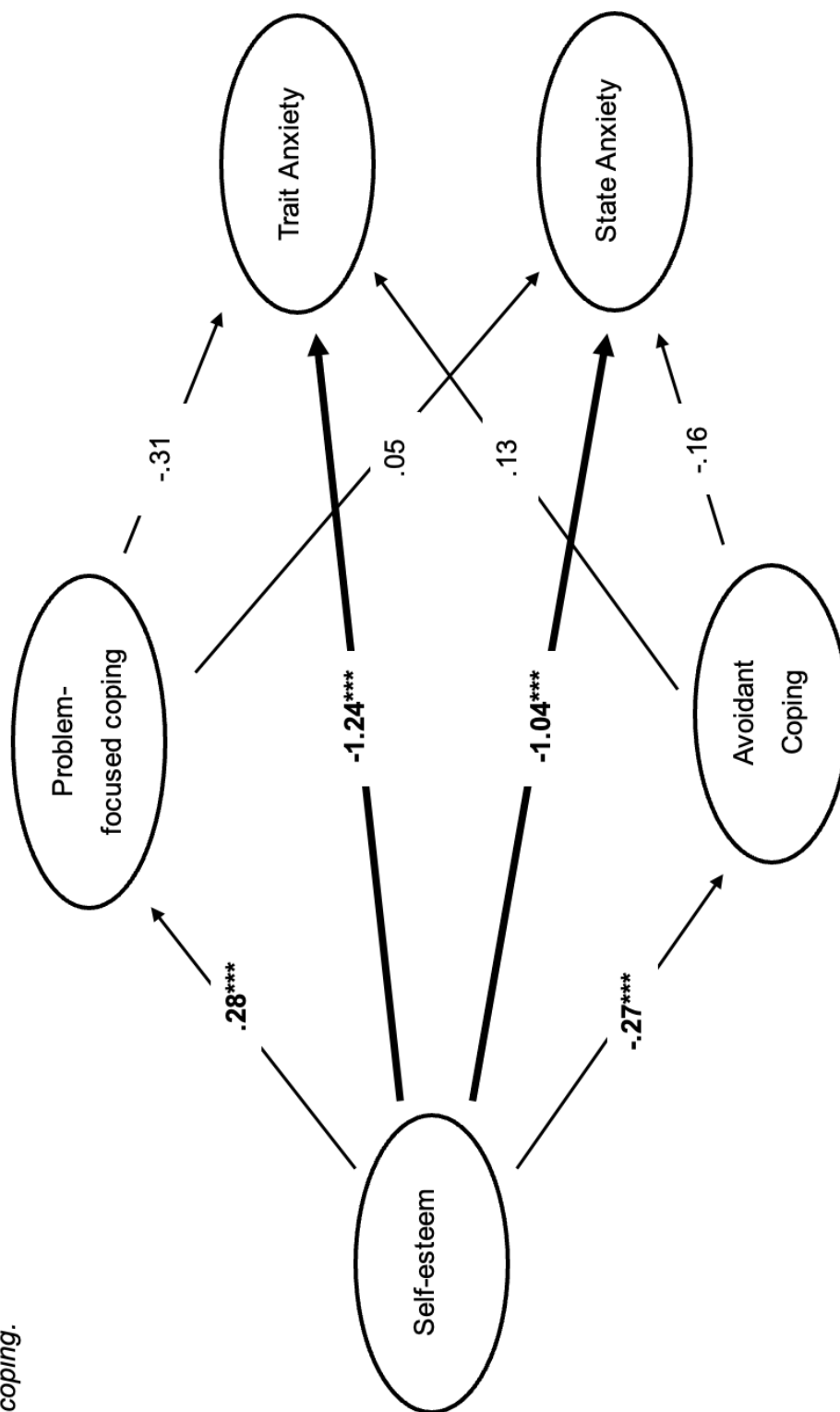
Parameter estimation of model of SE as predictor for both TA and SA, with problem-focused and avoidant coping as mediators.

Paths	β	z-value	<i>p</i>	95% confidence	
				Interval	
				Lower	Upper
Direct Effects					
SE → TA	-1.24	-9.47	< .001	-1.50	-1.02
SE → SA	-1.03	-5.40	< .001	-1.41	-0.73
Indirect Effects					
SE → PFC → TA	-0.01	-0.26	.80	-0.25	0.01
SE → AC → TA	-0.09	-1.50	.13	-0.17	0.13
SE → PFC → SA	0.06	0.97	.34	-0.21	0.25
SE → AC → SA	0.01	0.71	.94	-0.19	0.28
Total Indirect Effects					
SE → TA	-0.10	-1.27	.21	-0.26	0.12
SE → SA	0.07	0.64	.52	-0.17	0.33
Total Effects					
SE → TA	-1.33	-12.13	< .001	-1.16	-1.05
SE → SA	-0.96	-6.05	< .001	-1.26	-0.67

Note: PFC = problem-focused coping, EFC = emotion-focused coping, AC = avoidant coping. Significant paths are indicated in bold.

Figure 3

Updated path-analysis model of SE as predictor for both TA and SA, mediated by problem-focused and avoidant coping.



Note: Estimated effects using bootstrap based on 1000 samples. ***p < .001. Statistically significant effects are bolded

Discussion

The aim of this study was to explore the anxiety-buffering hypothesis through a new light: the mediating effect of different coping strategies. It was an explorative extension of TMT's foundational hypothesis and intended to increase the understanding of the mechanisms behind SE's anxiety buffering properties. Ample research has discussed the connection between coping strategies and both SE and anxiety, however, there has not been a mediation analysis in this form.

The large negative total effects of SE on TA ($\beta = -1.33$; $p < .001$) and SA ($\beta = -0.96$; $p < .001$) support the core idea of the anxiety-buffer hypothesis, in which high SE is linked with lower anxiety. This studies first hypothesis tested whether this effect exists independently of coping strategies. This hypothesis was confirmed statistically, displayed by the large negative direct effect of SE on TA ($\beta = -1.26$; $p < .001$) and SA ($\beta = -1.04$; $p < .001$). The second hypothesis tested whether SE predicts problem-focused, emotion-focused, and avoidant coping strategies. This hypothesis was partially supported since SE predicted problem-focused ($\beta = 0.28$; $p < .001$) and avoidant coping ($\beta = -0.27$; $p < .001$) significantly, but not emotion focused coping. By updating the model to exclude emotion-focused coping an improved model-fit was achieved. The implications of this will be discussed below. Resulting from the exclusion of emotion-focused coping, the third hypothesis was responsible for testing whether problem-focused and avoidant coping strategies mediate the relationship between SE and both TA and SA. This hypothesis was not supported, given that no mediating effect is found of any coping strategy.

Within TMT, Greenberg et al. (1986) make a strong case for the importance of SE in the anxiety-buffer hypothesis. Being a measure of the extent to which people live up to their worldviews, it protects them from terror and from the thereof resulting anxiety. This study supports the anxiety-buffer hypothesis by showing a notable total effect of SE on TA ($\beta = -1.33$; $p < .001$) and on SA ($\beta = -0.96$; $p < .001$). It adds to the credibility of other studies shown in Table 1, which have looked at the anxiety buffering effect of SE within TMT (see Pyszczynski et al., 2015) and independently of TMT (e.g., Henriksen et al., 2017; Lee & Hankin, 2009; Li et al., 2023; Moksnes et al., 2010). Furthermore, it speaks for interventions within CBT which target negative cognitive and behavioral distortions, for which low SE is partly responsible (Borza, 2017). However, past research has not only supported the anxiety-buffer hypothesis but has

also laid the groundwork for a plausible extension to the model via coping strategies, as described in the third hypothesis.

Looking at the connection between SE and coping, this study has discovered that SE significantly predicts problem-focused ($\beta = 0.28$; $p < .001$) and avoidant coping ($\beta = -0.27$; $p < .001$). This is in line with previous research (see Li et al., 2023; Taylor & Stanton, 2007). It is interesting to note that emotion-focused coping is the only category which does not interact significantly with SE. This seems to suggest that problem-focused and avoidant coping result much more directly from a person's SE, whereas anyone may employ emotion-focused coping, regardless of SE. Emotion-focused coping not being predicted significantly by SE is unexpected since it speaks against some previous research (see Dumont & Provost, 1999). However, the study on Generation Z adults by Raja Kumari (2024) shares these results and shows the importance of further research on the nature of emotion-focused coping to resolve these uncertainties.

A possible explanation may be given by Folkman and Moskowitz's (2004) idea of controllability of situations. Considering that high SE is linked with confidence and increased self-efficacy (Baumeister et al., 2003), individuals with these traits may tend to deal with controllable problems actively with problem-focused coping. Therefore, they may display less emotion-focused and avoidant coping. This is why the original model of this study hypothesized emotion-focused coping to be negatively predicted by SE. When a person is faced with an uncontrollable situation, such as the death of a family member, that person is forced to use either emotion-focused or avoidant coping, since there is no solution to the problem which could be tackled by problem-focused strategies. This means that those individuals with high SE, who don't tend to use avoidant coping strategies, will display increased use of emotion-focused coping. Therefore, it is plausible to hypothesize that in such uncontrollable cases, emotion-focused strategies could even be positively predicted by SE. In summary, depending on the controllability of the situation, emotion-focused coping strategies may be predicted negatively (controllable) or positively (uncontrollable) by SE. Therefore, it may have not been possible to make assumptions on the interaction between emotion-focused coping and SE, without standardizing the type of situation (controllable vs. uncontrollable) in advance. This may provide an explanation for the poor fit of the originally proposed model. Some implications will be further discussed in the chapter on the limitations of the study.

The connection between coping and anxiety is also well researched. For example, CBT uses techniques such as cognitive restructuring to help people unlearn maladaptive avoidant strategies which has shown to reduce anxiety (Dias et al., 2012). The results in the correlational analysis support the importance of this approach, since avoidant coping has a medium-to-large positive correlation with TA ($r = .45$; $p < .001$). This is in line with IU theory, where people with high TA may prefer avoidant behavior in uncertain and therefore anxiety inducing situations. Van Dis et al. (2020) explained that CBT aims at improving individual's thoughts, feelings and behaviors to give them the self-competence to deal with their problems more effectively and reducing the resulting anxiety. In other words, CBT also teaches an increased use of problem-focused coping strategies. This is supported by past research (see Dias et al., 2012; Raja Kumari, 2024) and partly by the results of this study, showing a medium negative correlation between problem-focused coping and TA ($r = -.31$; $p < .01$).

Considering all these indications for the significance of coping strategies for both SE and anxiety, the results of the mediation analysis are unexpected, since a partial mediation seemed quite plausible. Especially so, considering the updated model with the exclusion of emotion-focused coping fit the data well $\chi^2(1, N=73) = 1.28$; $p = .26$. Recapitulating, the results do not support the third hypothesis since there is no indirect effect of SE via any coping strategy on either TA or SA. Knowing that SE predicts anxiety independently of coping strategies allows for a more detailed understanding of TMT's anxiety-buffer hypothesis.

Critique of TMT included that the main assumptions are too simplistic, and that simple factor explanation does not provide a valid representation of the complexity of anxiety reactions in humans (Hart, 2019). The current thesis was an attempt to improve representability by testing both TA and SA as outcome variables. Within this study there were large negative total effects of SE on both outcomes (TA: $\beta = -1.33$; $p < .001$; SA: $\beta = -0.96$; $p < .001$). Using TMT as an explorational standpoint, these results may suggest that individuals with high SE are sufficiently protected from death anxiety that their tendencies to react anxiously in specific moments (SA) and generally in life (TA) are reduced. However, it is still not fully possible to connect an existential concept such as death anxiety to broader anxiety contexts, such as SA and TA, which limits the causal interpretability. Another critique stated, TMT does not address important behavioral or cognitive mechanisms involved in anxiety management, such

as coping strategies (Martin & van den Bos, 2014). The results display that SE predicts both TA ($\beta = -1.26$; $p < .001$) and SA ($\beta = -1.04$; $p < .001$) independently of coping strategies. This speaks for the TMT perspective, which would argue that the anxiety-buffering effect of SE only works by shielding individuals from death anxiety, against which other behavioral or cognitive mechanisms are less protective. According to TMT, SE is the extent to which individuals live up to their worldviews and the symbolic immortality which is gained by doing so directly buffers anxiety. This explanation does not need mediating factors such as coping strategies and highlights TMT's existential focus. Although the results support this claim, it is important to remember that in contrast to death anxiety, more general anxiety contexts like SA and TA may function outside of the scope of TMT.

The anxiety-buffer hypothesis stands strongly outside of the TMT framework as well. As previously discussed, there is much research which, independently of TMT, has studied the effect of SE on anxiety (e.g., Lee & Hankin, 2009; Li et al., 2023; Sedikides & Gregg, 2008). Those authors have explained the interaction without the existential implications such as death anxiety and symbolic immortality. Instead, high SE was linked to reducing negative cognitive distortions such as negativity, which is strongly associated with anxiety (Sedikides & Gregg, 2008). Considering the exploratory nature of this thesis and that the mediation model was inspired by the anxiety-buffer hypothesis by TMT, a comprehensive analysis of the aforementioned cognitive explanations would exceed the scope of the project. Future research could build on these findings and use them for broader analyses.

In summary, these results are accompanied by several practical implications. Firstly, it underlines the importance of SE-enhancement within the therapeutic setting for anxiety reduction. The results speak in favor of aspects of anxiety management interventions such as CBT, which target maladaptive cognitive distortions which are responsible for low SE. Secondly, the importance of targeting maladaptive avoidant coping strategies by replacing them with problem-focused coping remains important given the significant correlations with both TA and SA.

Strengths and Limitations

This project sought to fill a research gap by studying the manner in which SE predicts TA and SA, while incorporating the possible partially mediating effect of coping strategies. There was already much research in favor of the anxiety-buffer hypothesis

of SE by TMT (Greenberg et al., 1986), however the hypothesis has not been tested for other indirect pathways, such as coping. This is especially important considering anxiety disorders being some of the most common forms of psychological disorders (Spielberger & Reheiser, 2009). Improving the understanding of the mechanisms behind protective factors against anxiety, such as SE, may be beneficial for the development and improvement of anxiety-treatment options.

There are several factors which hinder the significance of the present study. Firstly, the required sample size needed for a mediation analysis of this type was not reached. Only 73 participants filled out the questionnaires, but according to Fritz & MacKinnon (2007) a total of 78 were needed for sufficient test power, given the correlations between SE, coping and anxiety found in past research. This means that the study lacks power, which increases the risk of Type II errors. The problem concerning the research sample extends to the participants themselves, being only women in the age between 18 and 35. Furthermore almost all participants had a high level of education. The results therefore cannot be generalized and applied to the whole spectrum of human population. Another approach with a broader and more diverse research population is needed before further assumptions can be made, especially regarding an important subject such as anxiety management.

Considering that there was no instruction regarding when and where participants should complete the questionnaires, it raises the question of standardization. This is relevant as everyday occurrences change the way individuals perceive themselves and is especially important for the assessment of SA. In general, the cross-sectional nature of the study is a limitation as it reduces causal interpretation of the findings. Analyzing a moment in time within a research population, as was done here, is useful for explorative studies and can give a general direction regarding future research. An experimental study can better control the conditions in which participants fill out the questionnaires and can also add interesting variable manipulations. A longitudinal study may provide stronger causal explanations for SE, coping and anxiety interactions.

The controllability of situations which participants think of when answering the Brief COPE questionnaire was not standardized. This is problematic, since some participants may think of uncontrollable situations in which emotion-focused coping may be considered adaptive. On the other hand, other participants may think of controllable situations, in which emotion-focused coping is considered less adaptive

than problem-focused coping. As discussed above, this may have led to confusion within the data, causing a non-significant correlation between emotion-focused coping and SE, SA and TA.

Future Directions

The anxiety-buffer hypothesis proposed by TMT should be further tested. Problem-focused, emotion-focused and avoidant coping are only a few of many possible mediators of the anxiety-buffering effect. Considering that the effect seems to be very strong, future research should work to identify other possible mediating models such as the one proposed in this thesis.

The findings on emotion-focused coping were surprising. The results of this study indicate that emotion-focused coping does not correlate significantly with SE, SA or TA and therefore falls out of the mediation model. As discussed above, an explanation could be given by the controllability of situations. Future studies should investigate this specifically using a controllability manipulation within an experimental design in order to compare which coping strategies are considered adaptive or maladaptive in different contexts.

Firstly, the coping mediation should be researched with a more robust study, which addresses the limitations regarding sample size, standardization and generalizability. These studies should have a more diverse research population and should go beyond a cross-sectional design. An example of a possible study is described below. It would be interesting to replicate part of the previously described experiments by Greenberg et al. (1992) (see chapter *anxiety-buffer hypothesis*) and adding the use of SA inducing hypercapnic gas as seen in the study by Gillan et al. (2021). The gas high in carbon dioxide and is described as a validated method of causing a temporary state of acute anxiety in healthy participants. This way, an experimental manipulation of SA can be achieved (yes-gas), which can be compared to a control condition (no-gas). Artificial SE-manipulation in the form of a fake psychological assessment report which would be either neutral or positive. The positive report had the effect of boosting the SE in the participants (yes-SE), whereas the neutral one did not (no-SE). In combination with hypercapnic gas conditions, this would provide four different conditions (no-SE-no-gas; yes-SE-no-gas; no-SE-yes-gas; yes-SE-yes-gas). A manipulation check would be applied by comparing baseline SE and SA with the timepoint after applying the assessment report and after inhaling

the gas. TA is difficult to manipulate since it is much more stable over time. The questionnaires would remain the same as used in this study. According to the anxiety-buffer hypothesis, individuals with artificially increased SE by the psychological assessment report should have a weaker anxiety reaction when inhaling the gas than those whose SE is not increased. Applying these methods in a safe laboratory setting and by comparing the results of the different conditions, more robust causal interpretations of the anxiety-buffering effect of SE can be made. Exploring whether coping strategies have a mediating effect on the predictive power of SE on SA while applying these manipulations would further clarify the way SE buffers anxiety.

Conclusion

The results of the present study support the anxiety-buffering hypothesis presented by TMT by showing a strong total effect of SE on both TA and SA. The hypothesis connecting SE to coping strategies was partially supported. Only problem-focused and avoidant coping were significantly associated with SE, whereas emotion-focused coping was not. The hypothesis of a mediating effect of coping strategies on the SE and anxiety association was not supported. This suggests that the mechanisms through which SE buffers anxiety are more direct and do not rely on mediators such as coping.

The study underlines the importance of SE as a protective factor regarding anxiety. However, considering the complex nature of anxiety in human beings, further research should explore the anxiety-buffering effect of SE for more possible mediating or moderating variables. Future studies should include a more varied research population and adequate sample-size to make more generalizable statements on the nature of SE, anxiety and coping strategies.

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